

STRUMENTI  
PER LA DIDATTICA E LA RICERCA

PERIPLOI



collana di studi egei e ciprioti

## Periploi - Collana di Studi egei e ciprioti

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# **Non-scribal Communication Media in the Bronze Age Aegean and Surrounding Areas**

**The semantics of a-literate and proto-literate media (seals,  
potmarks, mason's marks, seal-impressed pottery, ideograms  
and logograms, and related systems)**

Edited by

Anna Margherita Jasink

Judith Weingarten

Silvia Ferrara

Firenze University Press  
2017

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Non-scribal Communication Media in the Bronze Age Aegean and Surrounding Areas : the semantics of a-literate and proto-literate media (seals, potmarks, mason's marks, seal-impressed pottery, ideograms and logograms, and related systems) / edited by Anna Margherita Jasink, Judith Weingarten, Silvia Ferrara. – Firenze : Firenze University Press, 2017.  
(Strumenti per la didattica e la ricerca ; 196)

<http://digital.casalini.it/9788864536378>

ISBN 978-88-6453-636-1 (print)  
ISBN 978-88-6453-637-8 (online)

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The volume was made with the contribution of the University of Florence.

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**COVER PHOTO:** Drawing by Silvia Ferrara adapted from L. Godart, J.-P. Olivier, *Recueil des inscriptions en Linéaire A*, Vol. 5, 1985.

**COVER DESIGN:** Alberto Pizarro Fernández, Pagina Maestra snc

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**CC** 2017 Firenze University Press  
Università degli Studi di Firenze  
Firenze University Press  
via Cittadella, 7, 50144 Firenze, Italy  
[www.fupress.com](http://www.fupress.com)  
*Printed in Italy*



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# Preface

Anna Margherita Jasink, Judith Weingarten, Silvia Ferrara

This volume is intended to be the first in a series that will focus on the origin of script and the boundaries of non-scribal communication media in proto-literate and literate societies. Over the last 30 years, the domain of scribes and bureaucrats has become much better known. Our goal now is to reach below the élite and scribal levels to interface with non-scribal operations conducted by people of the «middling» sort. Who made these marks and to what purpose? Did they serve private or (semi-) official roles in Bronze Age Aegean society? The comparative study of such practices in the contemporary East (Cyprus, Anatolia, the Levant, and Egypt) can shed light on sub-élite activities in the Aegean and also provide evidence for cultural and economic exchange networks.

Writing is a complex aspect of human behaviour, whose underlying mechanisms, genesis, inception and applied principles still deserve an exhaustive investigation in the specific contexts of its use. A close examination of the relationship between a fully-fledged writing system and the emblems, icons, symbols devoid of phonographic connotations, needs to be explored. *Periploi 9* sets the scene for such dynamic and fluid interactions, exploring the underpinnings and the preconditions that intermingle before, during and after the introduction of a functioning writing system.

From a methodological standpoint, we asked our contributors to explore the grey areas of this interface, to characterise a specific, if still neglected phenomenon, which we could refer to as the «broad concept of literacy», to shed light on what happens when communication, not strictly or uniquely in the specificities of linguistic notation, is harnessed through different media and to different purposes. This phenomenon encompasses symbols for marking or identifying objects, commodities, transactions, property and the like.

Our intention is to not shy away from attributing meaning to these mechanisms, but rather to pinpoint the cultural implications of the different agendas at play (whether ideological, utilitarian or tied to social differentiation), while addressing local complexities and patterns of progressive centralised control. This effort is geared towards building a full contextual environment for the whole of the Aegean, with counterpoints provided by other regions of the Eastern Mediterranean. This is why particular attention has been devoted to the role of marking systems as starting points for the development of script in response to new or expanding socio-economic needs.

It is of paramount importance however, to state two caveats at the outset. The first is that our intention was never to imply that para-literacy, intended as the set of symbols broadly recognised as communicative and meaningful, should be taken as a specific and easily identifiable precursor or forerunner to the inception of a fully-functioning, complete writing system. The aim has always been, rather, to capture whether the relationship between two separate, if related phenomena, can be understood better by looking closely at specific contexts, activities, and perceptions of, on the one hand, a broad symbolic apparatus, and, on the other, the earliest attestations of writing. We are interested in the trajectories, the interactions and the processes that make symbols active players in the life of the individuals that selected, used, discarded, and redeployed them in the course of the 2nd millennium BC.

Our request to our authors has been not to draw conclusions, from an interpretative standpoint, but to test the data systematically. The second word of caution was to maintain an open mind as to whether we can recognise the historical conditions that lead to writing as a system. This implies that we have sacrificed the idea, to an extent, that purpose and necessity will create the successful seedbed for writing, and that the big administration is always to be taken as the only guiding force that produces writing and makes it a successful endeavour.

This book marks a novel effort to characterise and, to an extent, explain the interconnectedness of writing to the «alternative», visible, if non-institutionalised, modes of interaction and communication. The scope for investigating the world of marks, sealings, measures, isolated «logograms», pictograms, tokens, and identity marks at large in the Eastern Mediterranean is still enormous. We hope that this contribution will shorten the distance to a full understanding of visual communication in the Aegean and the Eastern Mediterranean.

We believe, since the idea for this book first took shape, that it is only through an interdisciplinary outlook that this complex theme can be addressed. After a number of ‘philosophical’ discussions on its intricacies, first between Judith Weingarten and Anna Margherita Jasink, then with the addition of Silvia Ferrara, that the idea of investigating the symbols that gravitate around writing began to crystallize. It is from the informal setting of friendly and lively communications between the editors, and extended to experts in the Aegean, the Near East, and Egypt that *Periploi 9* was envisioned. Our firm belief, shared by the contributors, is that whatever is still uncertain, unreadable, opaque and still open to interpretation, can be better understood only through a systematic and multi-faceted approach. Through the lenses of history and the theory of writing, linguistics, archaeology, anthropology and semiotics, our authors accepted the challenge to confront the intricacies of our subject with rigour, critical thinking, and enthusiasm.

Aegean



# A measured world? Measures in Minoan daily life

*Maria Emanuela Alberti*

**Abstract:** Measures are embedded in human daily life: we measure the food we eat, the harvest of the year, the volume of our stocks and stores, the width of a field, the height of a building, the length and density of fabrics, the load of a donkey or a ship, the weight of precious metals; we measure the size of people and the extension of our families, the composition of working teams and the number of killed enemies; we measure the amount of taxes, the value of goods and the fluctuation of prices. And we measure as well the rain that falls, the season that change, the wind that blows and the time that flows.

Measures are then not only a way to communicate, but the means itself to think our world in practical terms. As such, they constitute the basis for any social action and a prerequisite for the continuation and development of human societies. Was Minoan Crete a measured world then? What impact had measures in Minoan daily life?

Researches on Minoan material culture are presently so rich to allow some first observations in this direction, on the basis of the evidence from both Proto- and Neopalatial times. Weighing systems, capacity of vases, architectonic modules and sizes of loom-weights seem all to point to a pervasive presence of measures in the material life.

From this perspective, Minoan society can also be seen as a network of measured relations and values.

## Introduction<sup>1</sup>

Measurement is embedded in human daily life: we measure the food we eat, the harvest of the year, the volume of our stocks and stores, the width of a field, the height of a building, the length and density of fabrics, the load of a donkey or a ship, the weight of precious metals; we measure the size of people and the extension of our families, the composition of working teams and the number of killed enemies; we measure the amount of taxes, the value of goods and the fluctuation of prices. And we measure as well the rain that falls, the season that changes, the wind that blows and the time that flows. Measures are then not only a way to communicate, but one of the means we use to think about our

<sup>1</sup> I wish to thank the editors for inviting me to contribute to the present volume, and especially Margherita Jasink for her continuous encouragement. Also, I wish to thank especially Giulia Dionisio for her precious help during the editing phases and Judith Weingarten for reviewing the English. My warmest thanks to Maurizio Del Freo and Francesca Fulminante for providing me with some study materials. I was not able to access Maurizio Del Freo also provided some valuable discussion of the evidence. Many thanks also to Maia Pomadère for allowing me to mention some unpublished finds from the *Bâtiment Pi* at Malia, Crete.

world in practical terms. As such, they constitute a prerequisite for the continuation and development of human societies<sup>2</sup>.

Was Minoan Crete a measured world then? What impact had measures in Minoan daily life? Research on Minoan material culture is presently rich enough to allow some first observations in this direction, on the basis of the evidence from both Proto- and Neopalatial times. Weighing systems, capacity of vases, architectonic modules and sizes of loom-weights seem all to point to a pervasive presence of measures in the material life. From this perspective, Minoan society can also be seen as a network of measured relations and values, independent of the existence of the palaces and of written records. On the other hand, palaces themselves cannot be conceived outside such a network of measures: their very function if not their very existence is grounded in the global quantification of their own world and territory. The administration of economy is above all quantification<sup>3</sup>.

### Measures in the Minoan world: Overview

In the last decades, the various aspects of measures and measuring in Minoan Crete have been investigated with different intensity, so that now weighing systems are substantially known, while capacity and linear measures are less understood. No effort has been made up to now to interpret the masses of loomweights in a metrological sense – an attempt that is proposed here for the first time. The present overview does not include the Linear A measuring system, mainly based on a fractional ground: its functioning and its correspondence with more concrete form of measures, such those examined here, are still poorly understood<sup>4</sup>.

#### *Weighing systems*

Thanks to the work of many different scholars over the years, the functioning of the Minoan weighing systems during the Neopalatial period is nowadays quite clear (Tables 1 and 2)<sup>5</sup>. The core information comes from the evidence of Knossos and Mochlos in Crete and of Ayia Irini (Keos) and Akrotiri (Thera) in the Cyclades. The system(s) seem(s) to combine both local and Near Eastern elements. The larger units of weights – the talent, the double mina, the mina and the half mina – were similar to those in use in the Near East. On the other hand, Minoan units of lighter weight had no or only very problematic parallels in Anatolia and Syria, thus suggesting a possible Aegean origin for these units. This is especially the case for the basic Minoan unit of 60-65 g, called *x*. It is largely attested throughout the islands. Its fraction *k* of 20-22 g could more easily be converted into Eastern shekels<sup>6</sup>. Beyond the main series, other parallel units were employed to weigh the wool (wool unit *l* of 3 kg, one fleece *z* of 750 g ca), according to habits and absolute

<sup>2</sup> Kula 1970; Michailidou 1999 and 2010; Morley 2010.

<sup>3</sup> Musti 1996: 627: «cultura della numerazione, della quantificazione».

<sup>4</sup> The script used in Minoan Crete, the Linear A, used «only one unit [...] for every kind of measurement, with all quantities expressed as multiples of the unit and fractions of the unit» (Bennett 1980: 165). However, only few signs are presently understood: 1/2, 1/4 and 3/4. Bennett 1950, 1980 and 1999; Karnava 2001; Montecchi 2009.

<sup>5</sup> The first studies are due to A. Evans (1900-1; 1906: 343-353; 1935). A synthesis of the scholarship can be found in Parise 1986a; Petruso 1992; Alberti 2003; 2011; 2016; Michailidou 2008a. See also Michailidou 1990, 2007; Brogan 2006.

<sup>6</sup> But not without problems. Actually, with some approximation it can be considered either twice times *s* (9.4 g) or *h* (11.4 g), but no correspondence is straightforward and the archaeological evidence is not large enough to clarify the matter once for all (Michailidou 2004: 318; Alberti and Parise 2005; Rahmstorf 2010 and 2016; Alberti 2011 and 2016).



values common to all the Eastern Mediterranean<sup>7</sup>. Another specialised unit for textiles *f* of 36 g ca has also been suggested<sup>8</sup>. The weighing of light masses is particularly difficult to understand<sup>9</sup>. The combined presence of standard series used to weigh all kinds of commodities and of some specialised ones points to the survival of some forms of *concrete counting* within a computational system already oriented towards the *abstract counting*<sup>10</sup>. It is presently difficult to reconstruct how these measures came into being throughout the centuries, and how was the situation during the Prepalatial and Protopalatial times, when the available evidence is scarce. What seems at least to be clear, is that the local development of weighing standards has always been in some form of relationship with the Near Eastern systems (Table 3; see below for the Protopalatial period)<sup>11</sup>.

### *Capacity measures*

Although some studies on vase capacities from Akrotiri, Thera (LC I, i.e. Neopalatial period), and Pylos, Messenia (LH IIIB2, i.e. Mycenaean period) were already attempted<sup>12</sup>, the first survey of the available information for Minoan Crete is quite recent<sup>13</sup>. It includes data from MM IIB Malia, LM I Mochlos, Petras and Palaikastro, and Minoan pithoi, and comparisons from Akrotiri and Pylos<sup>14</sup>. It should be stressed that the published information on vase capacity is still very scarce for Crete; thus the offered outline is still preliminary and more study and data processing are needed to refine it. However, in general terms, the system of capacity measurement in the Bronze Age Aegean seems to have had a number of constant characteristics through the time, at least from MM IIB to the end of LB IIIB (Table 4). The basic standards are the **hemikadion** (11-12 lt), the **kados** (22-24 lt) and the «heavy» **kados** (28-32 lt)<sup>15</sup>. For very small quantities (smaller than the liter) the system includes a series of volumes with intervals of 0.10 or 0.20 lt, with clustering at 0.15-0.16 lt, and at Malia also at 0.25 lt. Above the litre, the volumes have intervals of ca. 0.45 lt.; at Pylos, intervals are in this case of 0.20 and 0.40 lt. Larger measures are exact multiples of this possible standard of 0.45 lt: 24 for the hemikadion, 30 for the «heavy hemikadion», 48 for the kados and 60 for the «heavy kados». Mathematical ratios between the standards seem, therefore, to be preliminarily assessed: the main counting unit, however, could have been different according to places

<sup>7</sup> Parise 1986b and 1991; De Fidio 1998-9 and 1999.

<sup>8</sup> Parise 1987.

<sup>9</sup> This is a highly hypothetical and debated topic: however, the balance weights from some Cyprus tombs seem to point to the existence of a small fraction *j* of 1.9 g ca that could be common to many of the Eastern shekels (Alberti 2006: Table IX-X, p. 333-4). In Aegean terms, the same *j* could also be seen as a 1/8 of 15.2 g (= 1/4 *x*), i.e. as 1/32 *x*. In addition, some weights from Mochlos (LM IB) and Akrotiri (LC I) suggest the existence of an Aegean series of **k** (24-20 g), 1/2 **k** (12-10 g) and 1/4 **k** (6.5 g) (Alberti in preparation; Michailidou 1990; Brogan 2006).

<sup>10</sup> Parise 1986a: 307; Parise 1991: 14; Michailidou 2001b: 54; Michailidou 2001a: 15-27.

<sup>11</sup> See Rahmstorf 2016 for a detailed discussion of a group of EBA Cycladic weights. Alberti in press for a reconsideration of the MM II evidence from Malia. See below.

<sup>12</sup> Doumas and Constantinides 1990 and Katsa Tomara 1990 (Akrotiri); Lang 1964 and Darcque 2005 (Pylos).

<sup>13</sup> Alberti 2012.

<sup>14</sup> Poursat and Knappett 2005 (Malia); Barnard and Brogan 2001 (Mochlos); Knappett and Cunningham 2003 (Palaikastro); Christakis 2005 (pithoi).

<sup>15</sup> The names are conventional and inspired by contemporary Ugaritic (*kd*), and later Greek (κάδος) standard names (e.g. Heltzer 1989; Zamora 2000). Actually, the term *ka-ti* occurs at least once in Linear B texts, in PY Tn 996.3, preceding the ideogram \*206<sup>VAS</sup>, which resembles a jar or hydria (Bennett 1955: 108; Ventris and Chadwick 1973: 551; Vandenaabeele and Olivier 1979: 257; Aura Jorro and Adrados 1985: 331). The Syro-Canaanite jars from the Ulu-Burun shipwreck fall into three clusters of about 26,7 lt, 13 lt and 6,7 lt (Pulak 2001).

and periods (the possible use of the «heavy hemikadion» at Akrotiri being an example). The discussion of the absolute value of the measures for dry and liquid foodstuffs attested in Linear A and especially Linear B is outside the scope of the present work: however, the data presented and the analysis conducted here could perhaps contribute to this long-standing debate, which cannot be successfully undertaken without an adequate corpus of capacity measurements.

### *Linear measures*

Among the number of studies on Minoan architecture, only a handful investigate the possible individuation of a linear module, in strict connection to the reconstruction of planning habits<sup>16</sup>. The main outcome of these extended architectural overviews is the evidence for a careful laying out of the buildings, be it according to a single or to a series of modules or to the use of grids. The modules that have been singled out through these analyses by the various scholars, however, seem at first glance quite diverse, showing only few correspondences. Some scepticism has been rightly raised, pointing out the difficulty of finding a single standard measure in structures that are actually a palimpsest of modifications, additions, demolitions, reconstructions, and this through time and space<sup>17</sup>. On the other hand, a recent examination of two buildings at Kommos stressed that the values of the actual standards detectable through the architectural analysis are minor variations of an average value that can be then considered as the «module». This might suggest that there were different measuring devices used for the same type of unit, i.e. slightly different feet, hands or the like<sup>18</sup>. It is here proposed that these variations are the evidence for a flexible use of the standards, which is absolutely similar to what happened for balance weights. A flexibility that allows both slight variations of the same units through space and time and the effort to reconstruct the standard values.

Plotting together all the possible modules that have been identified in the various architectural studies, it seems clear that they can be easily composed in an anthropometric system of cubits, feet and spans (Table 5). Two types of cubits are seemingly present, a larger one of 54 cm (*Mlc*), and a smaller one of 46.8 cm (*Mc*). The range of the represented feet is quite wide, the average value being of 32.55 cm (*Mf*). It is not clear whether the module of 27-28 cm is a half of a *Mlc* or a large version of the span. The actual span (*Ms*, an outstretched hand and  $\frac{1}{2}$  *Mc*) is better to be seen in the average value of 23.45 (possibly up to 25.5 cm). The length of 19.15 cm is not easily connected to this system. The existence of a palm (*Mp*) of 7.5-7.8 cm and of a finger (*Mfn*) of 1.6-1.8 cm has been hypothesised here on the ground of the parallels with Egyptian metrology, but has not yet been detected in the architectural studies. Indeed, the modules singled out by the various scholars find direct parallels with the Egyptian and Mesopotamian standards (span, cubits): and in Egypt both a large «royal» and a regular cubit were used<sup>19</sup>.

<sup>16</sup> Graham 1960 and 1987: 222-229, 254-5 (Minoan foot of 30.36 cm); Preziosi 1983 (use of grids; various units, especially of 27-28 cm and of 34-35 cm, and also one of 54 cm); Cherry 1985 (cubit of 46.8 cm, double foot of 60.6 cm); Bianco 2003 (foot of 32.55 cm, half-cubit of 23.45 cm and a less convincing unit of 19.15 cm). Summary and comments in Preziosi 2003; McEnroe 2010: 88-89; Shaw 2010: 303-305.

<sup>17</sup> Shaw 2010: 88-9.

<sup>18</sup> Bianco 2003: 417.

<sup>19</sup> Alberti et al. 2002: 711-714. Mesopotamia: cubit 50 cm, span 25 cm, finger 1.6 cm. Egypt: «royal» cubit 55 cm, regular cubit 45 cm, palm 7.5 cm, finger 1.8 cm.

The presence of a «foot» among Minoan units is worthy of note: such a measure is not common in the contemporary Near East, but will be used, in many variations, during Greek times.

Further investigation and data are obviously needed. However, if the proposed scheme holds true, it seems that the system of linear measures worked in the same way as the weighing system: each unit could cover a short range of absolute values and in turn could be used as the basis for building calculations. The linear measures were, as the weight standards, connected to each other and at the same time working as «parallel units» for planning. This means that each area and period or even each single project could have used a different unit as main module: this is the case in Kommos, where the foot seems to be the reference for the LM I structures and the span for the LM III building<sup>20</sup>.

### *Measures and craftwork*

Theoretically, weighing standards and other measures ought to be largely used during craftwork, influencing the masses and sizes of the most common products, e.g. metal or ivory items, clothes, and containers. Unfortunately, the studies in this direction are not well developed, though some important results are available, pointing to the actual use of measuring units in the production of cauldrons, chisels and sickles, at least at Akrotiri, Thera<sup>21</sup>.

Another aspect that remains basically untouched is the meaning of the weighing values of loomweights, not in terms of craft needs and uses, but in relation to the standard measuring system. Indeed, it is now well-known that weight is one of the most important characteristics of a loomweight, potentially influencing the type of fabric to be produced<sup>22</sup>. However, how the weight of the tools was determined, and on which standards, is still to be assessed, though a recent survey underlines that the weights of loomweights within the same find-group could vary<sup>23</sup>. The hypothesis that loomweights were at least in some cases manufactured according to the standard weighing system is reinforced by the evidence from Akrotiri, Thera (LC I), where loomweights and balance weights are found together<sup>24</sup>.

The pervasive presence of measures in the Minoan daily life emerges from dispersed types of evidence through the island. Because of excavation history and taphonomic issues, rarely all elements are present in each site. Some settlements preserve weights, others have whole vases or complete sets of loomweights to be measured, while for others cases again architectural studies are available. It is not possible here to undertake a detailed examination of these dispersed traces. Instead, the following paragraphs present the few cases where more complete evidence is available.

<sup>20</sup> Bianco 2003.

<sup>21</sup> Michailidou 1999; 2001b: 97; 2003, 2008a: 100-130 and 2008b. For Mycenaean evidence: Michailidou 2001b: 101-102 and 2008b.

<sup>22</sup> Martensson *et al.* 2009; Andersson Strand 2012 and 2015; Cutler *et al.* 2013; Olofsson 2015; Olofsson *et al.* 2015, with references; Rahmstorf 2015.

<sup>23</sup> Firth 2015: 186.

<sup>24</sup> This is especially the case of the West House, that yielded 26 balance weights (lead discs) and 400 loomweights, but also of Sector A (Michailidou 1990; Tzachili 1990; Michailidou 2010). It is generally thought that in such contexts balance weights were to weigh the wool to be used in the textile manufacture. However, the weighing of loomweights can not be excluded.

## Protopalatial measures

### *Malia, Quartier Mu*

The largest data set that is presently available for the Protopalatial period comes from at *Quartier Mu* Malia, destroyed by the end of MM II (around 1700 BCE) and very well preserved until modern excavation. There, two large buildings with reception, residential, storage and cultic areas have been found: Building A and Building B. They also yielded evidence for substantial administrative and textile activity. Surrounding them, a series of small workshop-houses hosted various crafts: seal engraving, stone working, pottery production and metallurgy. This neighbourhood is considered as an example of the possible structure of at least part of the Protopalatial society, where important households had under their own control the activities of attached craftsmen and of areas in the countryside<sup>25</sup>. The excellent state of preservation of the findings and the various activities in the buildings provide the best chances to reconstruct the use of measures in Minoan daily life.

Balance weights are recorded from various areas of the complex: unfortunately, their number is low and no proper «set» has been found (Table 6)<sup>26</sup>. However, the widespread presence of the weights throughout the complex (Potter's Workshop, Building A, Building B, area of Building C) points to a frequent use in many fields of daily and productive activities. A pair of balance pans is also attested. The most interesting group of findings is from the Potter's Workshop: two limestone discs based on the *k* unit of 20 g ca, that could work with the third weight in the area, a stone cylinder of 9.7 g, as  $\frac{1}{2} k$ ,  $1 k$ ,  $\frac{3}{2} k$ . Other possibilities can not be excluded, such as a probable value within the *f* series. What is striking here, though, is that apparently balance weights from various different traditions were being used together: if the two discs anticipate types and values of the Neopalatial phase, and could then be regarded as «Minoan», the cylinder seems more related to types and units of the EBA (especially mainland and Cyclades) or of the Near East (being 9.7 g a «Syrian» shekel *s*)<sup>27</sup>. The special mark on its top could actually denote its Levantine value. The same «mixture» of types and standards is to be seen in the other weights from the complex: their types are all «Minoan», but their units seem to be both Near Eastern (*deben*, *kar*) and Aegean (*x*). It seems that during MM II weighing was in a sort of experimental phase, where both Near Eastern and local experiences and traditions were explored and exploited. This allows a glimpse on the complexity of trade interconnections in the period for the site<sup>28</sup>.

A number of whole or mendable vases has been recovered in the complex: and fortunately their volumes have been published, allowing a thorough study of the capacity system<sup>29</sup>. The main elements for the interpretation are provided by the necked jars (*jarres*

<sup>25</sup> Recent summary in Poursat 2010 and 2012 a. Detailed publications: Poursat *et al.* 1978; Detournay *et al.* 1980; Poursat 1996; Poursat and Knappett 2005; Poursat 2013.

<sup>26</sup> Alberti 2000 and in press; Poursat 1996: 123-124, pl. 57 f-j.

<sup>27</sup> During EBA, in mainland Greece and in some islands balance weights were spool-shaped items of rare stones, and followed Near Eastern weighing systems. See Rahmstorf 2006, 2010 and 2016.

<sup>28</sup> As it is also illustrated by another possible weight from the contemporary Dessenne Complex, also at Malia (Alberti in press). See also Poursat and Loubet 2005 for the evidence of external contacts in Protopalatial Malia.

<sup>29</sup> Alberti 2012, see above. Pottery publication: Poursat and Knappett 2005.

à col) and type 1 amphorae (Table 7): recurrent volumes point to the existence of a series based on two units, the *kados* (19-22 lt, with fractions and multiples) and the «heavy» *kados* (26-30 lt, with fractions and multiples). However, a closer look at the type 1 amphorae alone shows that their volumes form a series based on the unit of 0.45-0,5 lt, always linked to the *kados* standards (Table 8). The same is true for type 2 amphorae (Table 9) and for type 2 jars, type 3a amphorae and type 2 *brocs* (Table 10): they cover a range between 3 and 41 lt, including both of the *kados* standards, thus providing an idea about the functioning of the system for medium quantities of liquid or dry goods. Other vessels can illustrate the measurement of small amounts: type 6 and 9 amphorae, type 1 *brocs*, jugs and cups (Table 11). The smallest recorded volume is of 0.10 lt. Low volumes seem to compose a series with very small intervals, of ca. 0.10 lt. The standards of 0.15 lt, 0.25 lt and 0.45-0.5 lt seem to be particularly important. The data from other less numerous vessel groups, such as basins, bowls, tripod jars and bridge-spouted jars fit the proposed series as well, as it the case for the capacity of two bronze cauldrons<sup>30</sup>. It is worth noting that external typological differences among medium-sized containers, such as large-based (type 1) *vs* narrow-based (type 2) amphorae, are not related to different volume standards: the reference series is always the same.

Unfortunately, metal finds from the area have not been fully published yet and the available information does not include their weight: it is therefore impossible to know whether weight standards played any role within their manufacture<sup>31</sup>. Nevertheless, this is quite probable, as the presence of a fragment of copper mineral, weighing 96 g, i.e. exactly one *deben*, seems to suggest<sup>32</sup>.

As for ground stone tools, their final shape is dictated more by the original form of the chosen stone or pebble than by actual manufacture according to measuring units. Anyway, some general observations can be made here on the tools from Quartier Mu, since their data are fully available<sup>33</sup>. The lengths of querns cluster at 17 cm ca. - 20-25 cm, 27-32 cm, 36-40 cm: this should better mirror some practical concerns or constraints, even if the second and third clusters could correspond to the linear measures *Ms* and *Mf*. In any case, they are inferior to one cubit, i.e. an arm's length – the arm of the grinder. The weights of whetstones range mainly from 10 to 40 g, which is easily explained by the need of transportability. Pounders are represented in a number of sizes, as their weights cover a complete series between 60 g to more than 1 kg. Some of the main clusters do not seem to be connected to any standards (see e.g. the concentration around 150-180 g or the complete series 300-390 g), while in other cases clusters could hypothetically recall some well-known weight units: 20 k (210-240 g), half mina (250-270 g), 40 k (400 – 440 g), a Syrian mina or 5 *deben* (480-490 g), 10 x (580-650 g), 10 *deben* (950-970 g), a double mina (?) (1120 g, 1200 g). However, this is perhaps too forced an interpretation.

A field where manufacture took actually place was the production of loomweights, and we could expect that some type of measuring was involved in the process, though the main requirement was to achieve a good combination of weight and thickness in relation to the actual use on a loom. Quartier Mu yielded a large amount of loomweights,

<sup>30</sup> Detournay et al. 1980 : 82-84.

<sup>31</sup> See e.g. Detournay et al. 1980, *passim*; Poursat 1996, *passim*.

<sup>32</sup> Poursat 1996: 64, D 30.

<sup>33</sup> Procopiou 2013: 197-212.

clustering in Building A, B and D. Thorough studies show that weaving activity took place on a certain scale there, with seemingly specialised areas for the production of different type of textiles<sup>34</sup>. However, once again no full catalogue has been published, so we must limit our investigation to the few available data (Table 12)<sup>35</sup>. In the overall assemblage of loomweights from Quartier Mu, meaningful clusters are based both on size and typology: discoid weights tend to be quite light, spherical weights are heavier and thicker, and torus weight are even heavier, while the cylindrical and the pyramidal truncated ones have more intermediate characteristics. In terms of size, four main groups are detectable: the first, with weight ranging from 75 to 150 g and thickness between 1.5 and 2.3 cm (mainly discoid weights); the second, with weight from 150 to 200 g and thickness between 2.5 and 3.5 cm (again mainly discoid examples); the third one, again with a weight range of 75-150 but thickness from 4 to 5.2 cm (mainly spherical ones), and the fourth, weighing 300-380 g and having thickness between 6.5-7.2 cm (torus-type items)<sup>36</sup>. Thickness is then a key-factor: it makes the difference between the first and the second group, and has therefore to be considered meaningful also in term of manufacture. Are these thickness values, and the other ones recorded, related to any measure? It is here proposed that they are actually related to the Minoan finger (*Mfn*), representing one, two or more units (Table 12). That could provide the craftsman with an easy way to calculate the intended thickness of the loomweight during manufacture, in combination with length/height parameters. Shaping by hand (or moulds?) according to a simple linear system could then have been the way used to produce the loomweights. Also for weavers, looking at the thickness of loomweights of the same type could have been useful when setting up the loom. The few available data on single items seem to support this suggestion (Table 13)<sup>37</sup>: especially discoid exemplars seem to have quite standardised dimensions, as do most of the spherical ones. The question of their actual weight is more delicate: theoretically, manufacture aimed at the production of loomweights of a certain size and weight, so we could expect somehow standardised masses in the loomweights of the same set. Indeed, in most cases the two extremities of the masses of the same set do fit known metrological standards (Table 12 and 14). However, the weight of single items often falls in between these brackets, with no clear corresponding unit<sup>38</sup>. It does not seem possible to make further observations on the topic with presently available information. The only possible group of loomweights that might have been weighed when manufactured are hypothetically the torus ones: some of them are quite heavy, and their masses match some well-known standards (Table 15)<sup>39</sup>. While this picture is seemingly confirmed by findings from other contemporary excavations (see below), it could completely change once the full catalogue of the loomweights from the area is published.

The evidence from Quartier Mu, even with the obvious limitations of the available information, seems to suggest that measures were actually embedded in daily lives and were used in a number of occasions, both for the production and use of the most common objects.

<sup>34</sup> Cutler *et al.* 2013; Poursat *et al.* 2015 ; see also Poursat 2012b;

<sup>35</sup> Cutler *et al.* 2013: 99, 106, 108, 112, 114, Fig. 5.2, 5.3, 5.8, 5.9, 5.11, 5.13, 5.17, 5.19, 5.21.

<sup>36</sup> Cutler *et al.* 2013 : 99-100.

<sup>37</sup> Poursat 1996: 28, 32-33, 38-39, 52, 64.

<sup>38</sup> As it appears from the graphs in Cutler *et al.* 2013: Fig. 5.2, 5.3, 5.8, 5.9, 5.11, 5.13, 5.17, 5.19, 5.21.

<sup>39</sup> Cutler *et al.* 2013 : 106, 112, Fig. 5.4.

### *Malia, Bâtiment Pi (MM II)*

A group of fifteen loomweights, which seem to follow some precise size and weight standards, have been found in room 22 of Bâtiment Pi, in the same site of Malia (MM II). They are all of the pyramidal truncated type. Their dimensions are very similar, their heights ranging from 4.2 to 4.7 cm, and their bases being of 3.8 x 3.4-4 cm, possibly respectively corresponding to 3 and to 2 *Mfn*. Their weights vary between 56 and 72 g, with clusters around 66-68 g and an average of 64 g, i.e. a typical Aegean unit *x*. The presence of a single item weighing 72 g (= 2 *f*) is to be stressed: this could ideally «bridge» the standard series *x* and the (not well represented among balance weights) series *f*. The value of 72 g ca (= 2 *f*), that is quite common among the Quartier Mu loomweights (Table 12), could be hypothetically seen as a «heavier» version of the standard<sup>40</sup>.

### *Knossos, Loomweight Basement of the Palace (MM II)*

Over four hundred discoid loomweights were found by A. Evans in the so-called «Loomweight Basement» of the Palace at Knossos (MM II). The small portion of them that has been re-studied recently shows a striking uniformity in size and weight<sup>41</sup>: they measured between 9 and 10 cm in height and about 7.5 to 8.5 in width, what can be equated with five and four (i.e. one palm) *Mfn* respectively. Their weights range from 127 to 205 g, i.e. from 2 *x* to 3 *x*, encompassing the value of 150 g (= 4 *f*) that plays a major role within the Quartier Mu examples (see above).

By the end of the Protopalatial period, measuring standards were then quite developed and widespread throughout the island, and they were used for various types of crafts.

## Neopalatial measures

### *Mochlos, The Artisans' Quarter (LM IB)*

The wide array of metrological evidence available for *Quartier Mu* is presently unparalleled for the Neopalatial period. While in recent publications both stone tools and loomweights are generally presented in detail, not enough information is provided for vessel capacities and for the weight of metal items. However, the Artisans' Quarter of Mochlos is a good parallel of the workshop – houses of Quartier Mu and has been thoroughly published<sup>42</sup>. The complex consists of two buildings, Building A and B, both including living, cooking and working areas, with some external areas also used for craft activities. Stone vase making, textile production, metallurgy, pottery production and food processing and consuming are the activities that are more clearly attested there. The area seems to have been a focus of specialised craftsmanship for the nearby village, but lacks indicators of prestige productions such as seal engraving or jewellery making, and has not yielded any administrative or inscribed document.

<sup>40</sup> A series of very similar loomweights has been found in Palaikastro, all along a single street (LMI IB). They bear all on their tops the imprint of a single seal. Their weight is very homogenous, clustering around 111 g (3 *f*). MacGillivray *et al.* 1990: 145-6.

<sup>41</sup> Burke 2010: 56-8.

<sup>42</sup> Soles 2003 (excavations and contexts); Barnard and Brogan 2003 (pottery); Soles and Davaras 2004 (small finds).

Weights and scale pans were found throughout the settlement, in areas where also storage jars, metal hoards and craftwork indicators were attested<sup>43</sup>. In most cases, weights are single finds, with only small clusters in the village (Building B.2 and C.7) and in the Artisans' Quarter<sup>44</sup>. There, Building A and Building B yielded a couple of weights each (Table 16). Though the large majority of the balance weights from the settlement as a whole are lead discs based on the Aegean main series *x*, and only few are made of haematite, here haematite examples prevail. They come from rooms A4 and B7, especially connected with metalworking and stone vase making. Building B was also involved in textile production. The couple from room A4 includes a lead disc and a haematite cuboid, the first easily equated to a  $\frac{1}{2} x$ , the other with a more dubious interpretation. While a value on the same basis *x* cannot be excluded<sup>45</sup>, its mass corresponds to 5 Mesopotamian shekels *mp*<sup>46</sup>, and is in any case very close to the first «conversion» point of the others Near Eastern shekels, 47 g (theoretically equivalent to 4 *h*, 5 *s* and 6 *kar* respectively, see above Table 3)<sup>47</sup>. Also the two haematite domed weights from Building B have a Levantine shape and material: they weigh respectively one *mina* and a *double mina*, a standard common to many areas in the Eastern Mediterranean and Mesopotamia, and also at home in the Aegean<sup>48</sup>. Such heavy weights are generally connected to metalwork or textile activity, both attested in the building<sup>49</sup>. It is not clear if the marked stone pebble IC.210 should be included among the balance weights: the combination of a linear sign (though not precisely identical to a Linear A sign) and strokes could resemble more a «token» or «nodulus» than a balance weight proper. Its mass could fit the *f* value, but the three strokes, if they are to be intended as value marks, i.e. three units, point to the *k* unit<sup>50</sup>. Overall, the weights from the Artisans' Quarter seem to have Near Eastern models if not a Near Eastern origin: however, it is impossible to assess if they were used as such or according to their possible Aegean values.

Despite the large quantity of pottery found in the structures, capacity has been recorded only for a small number of conical cups and ogival cups (Tables 17 and 18)<sup>51</sup>. Most of the conical cups contain between 0.10 and 0.12 lt, with some smaller and larger example. It is not clear if the volume of 0.14 lt has to be considered as a variation of the 0.10-0.12 lt size or as a separate value/standard. Most of the ogival cups have a volume of 0.25-0.28 lt, with some smaller and larger examples. The value of 0.34 lt has to be seen a separate size. Both these dimensional clusters of 0.10-0.12 lt and of 0.25-0.28 lt find a parallel in the capacities of the smaller vessels from Quartier Mu (see above and Table 11) and can be roughly considered one the double of the other, being ideally fractions of the 0.45-0.5 lt unit. However, the sample is very limited.

<sup>43</sup> Brogan 2006: 279. Brogan 2006 is the source of most of the following paragraph on balance weights. See also Petruso 1992: 40-42 for an assessment of the data from the previous excavations and Soles 2005 for the presence of Levantine weights.

<sup>44</sup> Brogan 2006: 287.

<sup>45</sup> Brogan 2006: 273.

<sup>46</sup> Soles 2005: 431.

<sup>47</sup> See Parise 1981 and 1984; Alberti and Parise 2005; Alberti 2011: Table 1.

<sup>48</sup> Soles 2005: 431. Other two haematite weights are reported from the main settlement, weighing one «Western» mina each (478 g), and haematite was also imported raw (Soles 2005: 430-431; Brogan 2006: 276).

<sup>49</sup> Brogan 2006: 281.

<sup>50</sup> The findspot is controversial: B.6 (Soles and Davaras 2004: 52, fig. 17) or A.4 (Brogan 2006: 274, to be grouped with the other weights from the same room).

<sup>51</sup> Barnard and Brogan 2003: 35-45.



On the other hand, the evidence for metalwork is quite compelling, and it has been thoroughly studied<sup>52</sup>. A number of tools, waste, spill and finished products are recorded from the two buildings, in addition to various ingot fragments and other bronzes intended for recycling. For our purposes, the contents of a «foundry hoard» just at the exterior of Building A (northern room) deserve special consideration (Table 19). They include fifteen ingot fragments, two lumps of copper waste with a regular side, and some bronzes for recycling. Their weights seem to compose quite a regular series, and their relative values can be easily linked to the main  $x$  unit, from  $\frac{1}{2}x$  to  $12x$ . This could confirm the suggestion that the ingots were cut according to approximated weight values, in order to be more easily used for production, transactions and accounting<sup>53</sup>. In addition, the dimensions of the ingot fragments from this «foundry hoard» are very similar within each dimensional cluster (e.g. the two fragments weighing  $\frac{1}{2}x$  measure  $2.3 \times 3.4 \times 1.6$  cm and  $2.7 \times 3.7 \times 1.6$  cm, while those weighing  $1x$  measure  $2.7 \times 3.9 \times 2.2$  cm and  $3.2 \times 3.7 \times 2.1$  cm): we can even speculate on the possibility that a simple linear system of measuring was used when cutting the various pieces, something like  $2 \times 2 \times 1$  *Mfn* and  $3 \times 3 \times 2$  *Mfn* respectively. Apparently, also the different items of scrap metal assembled in the hoard had an approximate weight on basis  $x$ . The two lumps of copper waste are clearly one the double of the other, and are possibly related to another weighing standard. In some cases, an alternative interpretation according to other units is also possible, but the general pattern seems to point to  $x$  as the main reference for all the hoard. The few present inconsistencies are probably due to the approximation of the cutting procedure. As for the other metal items recorded from the two structures, they include some ingot fragments, finished objects and scrap metal (Table 20). A more or less sound metrological value can be proposed only for the ingot fragments, mainly based on the  $x$  unit, though in one case a possible *dbn* is attested (if not to be seen as  $\frac{3}{2}x$ , IC.241). Finished objects are mostly incomplete and their masses could not be meaningfully measured. Most of the best preserved pieces (knife IC.269, spatula IC.276 and earring IC.274) are very light and do not seem to fit easily in any metrological series, while the heaviest (knife IC.277) could belong either to an Aegean or to a Levantine standard. The interpretation of the scrap metal items is even less clear, though most of the lighter objects could match some Levantine or Aegean unit. More generally, these materials raise the question of the interpretation of light masses<sup>54</sup>. The presence of some strip fragments is worthy of note, since bundles of strips, more or less of equal size, are known from metal hoards found in other areas of the settlement<sup>55</sup>. However, no similar bundles are known from the Artisans' Quarter. All in all, it seems that, out of the «foundry hoard», in these buildings only the ingot fragments had a metrological connotation and that all the other materials, even when intended for recycling, had no regular weights or token value. However, the preference for light masses mirrors the reduced size of the scale pans found in the settlement<sup>56</sup>. Overall, the evidence from the Artisans' Quarter on one hand attests the existence of metrological correlations as for «foundry hoards» and ingot fragments are concerned, and, on the

<sup>52</sup> Soles and Davaras 2004: 46-52; Brogan 2006: 283-6 and 2008; Soles 2008.

<sup>53</sup> Brogan 2006: 283.

<sup>54</sup> See above, fn. 9.

<sup>55</sup> Brogan 2006: 283; Soles 2008. No detailed information on the bundles' weight is available.

<sup>56</sup> Brogan 2006: 284.

other, could support an acquaintance with Levantine standards, as suggested above by the balance weights analysis.

The stone tools from the area have been published in great detail<sup>57</sup>. As mentioned above, it is not sure if measures entered at all in the process of choosing these implements. However, their general dimensions and weight affect greatly their practical use, so that some tentative observations may be of some use. Hammerstones and heavy oblong handstones (Table 21) could have been chosen according to their length: and it actually seems that their lengths could be referred to a rough fingers (*Mfn*) measuring. Also their weight can mostly be easily counted in standard unit *x*. The latter is also possible for smaller handstones (Table 22). The sub-cuboid cobbles with abraded surfaces are made in non-local stone and have mostly a faceted surface: because of that, they have been hypothetically likened to balance weights<sup>58</sup>. However, most of them have been found in clear craft activity context (with ochre, with mortar) or have use wear from craft activity (abrasion and percussion): so they have to be considered essentially as polishers/grinders. Among the few remnants, only IC.352 and IC.353 have a sound weight/relative value, while IC.356 has the more convincing shape (Table 23). However, the whole group has better to be seen as craft tools. In the same way, the evident use-wear on IC.466 point to a practical use as drill-bit, even if its weight of 62 g could be linked to the *x* unit<sup>59</sup>. The dimensions of saddle querns are quite meaningful: they can theoretically be equated to various measures of length (Table 24). What is more important in practical terms, however, is that their proportions tend to be the same, the length being roughly the double of the width, and that the length itself is generally in some relationship with the cubit (*Mc* or *Mlc*). This is clearly in connection to the actual function of the implements, that could not exceed the extension of the grinder's arms, as we have seen above for Quartier Mu. Minor units of length can be hypothetically proposed for the dimensions of stone palettes and stone tables (Table 24).

A number of loomweights have been found in the two buildings. Quite interestingly, their findspots «[...] suggest that some, if not all, fell from the roofs where the actual looms were set up»<sup>60</sup>. As is underlined in the publication, each of the recorded types has its specific weight-range<sup>61</sup>. The most numerous elliptical ones (Type A) cluster in three groups, covering the larger range of all types: the large ones weighing 150 to 270 g, the medium ones from 70 to 150 g and the small ones from 30 to 70 g. The second group, the rounded loomweights (Type B) have a more restricted range of weights, from 80 to 160 g. Still narrower is the range for the few discoid ones (Type C), from 60 to 70 g, and of the few trapezoidal ones (Type D), from 40 to 65 g. The only spherical one weighs 158 g. There are then some similarities with the evidence from Quartier Mu (see above). A closer examination of the catalogue allows further insights, on the relative value of their weights and on possible patterns for their sizes – though the analysis is necessarily limited to the complete or nearly complete items. Plotting together the data of the elliptical

<sup>57</sup> Carter 2004.

<sup>58</sup> Carter 2004: 67-68, 79 and table 9.

<sup>59</sup> Carter 2004: 82, with thorough discussion. It can perhaps be suggested that it was a bore-core selected first to act as a balance weight, within the earlier tradition of «spool-shaped» weights (see above), and then re-used as a drill-bit. However, this is very hypothetical.

<sup>60</sup> Soles *et al.* 2004: 28.

<sup>61</sup> Soles *et al.* 2004: 28-33.

loomweights (Type A), it is clear that their masses actually correspond to precise weight standards, allowing for some approximation: they range from the single unit  $x$  to the *half mina* (Table 25). In addition, it seems that the items having similar weight have also similar size, what is hardly a surprise, but gives us a clue as to how a craftsman could have reached the desired weight when shaping the clay into loomweights, be it by hand or by mould. The group of loomweights from room B.8 is particularly informative, in terms of consistence of dimensions/weight and of weight range. As for the rounded loomweights (Type B, Table 26), their weights correspond to a single unit  $x$  or  $f$  or to their doubles. The few recorded discoid examples (Type C, Table 27) seem to be specialised in representing the main unit  $x$  both in Building B and in the more distant Chalinomouri farmstead, while the trapezoidal loomweights from Building A (Type D, always Table 27) better embody the first fraction of the main unit, i.e.  $2/3 x (= 2 k)$  and  $x$  itself. In addition to clay loomweights proper, also a stone loomweight and various naturally perforated weights have to be taken into account, even though the latter ones could have been used for a variety of purposes<sup>62</sup>. Their weights fit quite nicely the standard series, the lightest examples actually matching the loomweights masses (Table 28). This is especially clear if looking at the evidence from Building A (Table 29): as expected the lowest units are represented by the trapezoidal loomweights, the main unit  $x$  by the trapezoidal and the elliptical ones, and the medium units by the rounded and elliptical items. The way the masses of naturally perforated weights fit in is remarkable. In particular, with reference to rooms A.2 and A.4, a series based on ca. 40-48 g ( $= 2 k$ ) stands out beside the examples of the  $x$  unit:  $2 k$ ,  $4 k$ ,  $8 k$ , possibly involving also the unusual weight of 360 g as  $40 k$ . The more classical *minas* weights from room A.5 could either be ascribed to the weaving activity or to actual weighing operations. The overall view of the analysed evidence (Table 30), incorporating also two pierced sherds found in the Chalinomouri farmstead, illustrates once again the typological specialisation for weight ranges and the flexible character of both elliptical loomweights and naturally perforated weights<sup>63</sup>. In addition, it is clear that the loomweights belonged to at least three different series of weight standards: the main unit  $x$  (57-67 g), the unit  $f$  (32-36 g) and especially its double  $2f$  (70-78 g), and the unit  $k$  (20-24 g), here present with its multiples of  $2k$ ,  $4k$  and  $8k$ . The series of  $x$  and  $k$  are interrelated, being  $k = 1/3 x$ . In abstract terms, all the weights together form a continuous series of values, with very short intervals, best to be seen as based on  $k$  or  $1/2 k$ . This could provide the weaver with a highly sophisticated mean, allowing the perfect calibration of the loomweight arrangement according to the various needs of the work. However, the concentration of loomweights based on  $2k$  in Building A (see above) and of the few based on  $2f$  in Building B<sup>64</sup> points to precise choices of the weavers and to possible specialisation of weight series for type of textiles, though the evidence from Building B is quite variegated<sup>65</sup>. As for the heaviest examples (multiples

<sup>62</sup> «From their various shapes, sizes, and findspots, it is unlikely that they [naturally perforated weights] fulfilled a single function» (Carter 2004: 81). Two have been found in room A.4, that yielded also various clay loomweights: «It suggests that many of the smaller examples were employed in weaving, with the larger pieces used as tetherstones for animals, or possibly anchors.» (*ibidem*).

<sup>63</sup> Pierced sherds: Soles *et al.* 2004: 33.

<sup>64</sup> NPW IC.440 A-B road; A: IC.94 A-B road, IC.104 B.2, IC.108 B.8.

<sup>65</sup> On the possible relationship between weight standard and loomweights and on the textile-related evidence of Building B, see Brogan 2006: 281.

of the *mina*), all naturally perforated weights, as mentioned above they are probably more linked to the actual weighing of commodities, wool, textiles, metals, clay, etc., than to proper weaving activities. On the other hand, the possibility that they were used for completely different purposes, their weight matching only by chance some weighing units, is still open. The attempt to give a metrological interpretation to the loomweight dimensions according to a possible *Mfn* unit is admittedly quite hypothetical, also because the finger actual dimensions, i.e. the thickness of the thinner loomweights, vary considerably. On the other hand, it could mirror the variety of the actual craftsman's hands that were shaping the objects, from adult man to woman or child, or reflect the use of moulds or other modelling devices. What is striking, in any case, is the close correspondence between size and weight within each loomweight type (always Table 30): it is clear that some manufacturing pattern is at work here, with some easy way to produce a loomweight of a certain type and weight. For example, the lightest of the elliptical ones (Type A) weighs around one main unit *x* and its dimensions in *Mfn* are 3 x 3 x 1-2 (a trait common to other types of loomweights). The one coming immediately after, weighing 2*f*, i.e. just something more than *x*, is 4 x 3 x 1 *Mfn*: only one dimension is augmented. To reach a step further, the double of *x*, all dimensions are doubled: 4 x 4 x 2. And so on. Obviously, this is a mere suggestion, and data does not always support this interpretation.

#### *Kommos, Building T (MM III – LM IA)*

According to recent studies, Building T at Kommos was built at the end of MM III following a module of 32.55 cm, i.e. a *Mf*. Linear measures of 12 and 14 modules (4.56 and 3.91 m) are especially recurrent<sup>66</sup>. A group of discoid loomweights has been found there, in the LM IA final-LM IB Early room 29: their dimensions (H: 5.9-6.8 cm; W: 5.9-6.7 cm; Th.: 1.6-2.3 cm) and their weights (54-76 g) are quite homogeneous, with only a heavier example (160 g)<sup>67</sup>. The dimensions can be roughly equated to 3 x 3 x 1 *Mfn*. As for the weights, the large majority weighs 70 g, while others weigh 54, 60, 76 and 80 g. While each of these masses could have a different relative value (2*f*, *x*, *x*, 2*f*-4*k*, 4*k*), it is probably better to see all the loomweights as a group and so as ideally ranging between 60 and 70 g. This would raise once again the question of the actual meaning of the 70 g unit, i.e. a measure of the «parallel» series based on the (not well attested among balance weights) *f* value, or an approximate version of the main unit *x*, perhaps due to manufacture reasons (see above, Malia Bâtiment Pi). The loomweights from Room 29 could possibly be considered as working together with those from Room 22 (92 g, 105 g, 120 g), mostly in relation to the *x* series.

#### *Knossos, Acropolis Houses (LM IA)*

A number of loomweights has been found in room 1 of the LM IA House of the Knossos Acropolis<sup>68</sup>. The large majority are spherical or spherical grooved, and compose a continue series of masses from 110 to 900 g. It is not always easy to detect precise measure standards in this sequence: however, the spherical items seem more clearly related to the

<sup>66</sup> Bianco 2003; see above.

<sup>67</sup> Dabney 1996: Table 4.1; Shaw 2006: 43-46, 729-738, Table 4.2. The latter has been chosen here as reference, since the weight of some items is not the same in both publications.

<sup>68</sup> Catling et al. 1979: 44-51, 63-65, Deposit F.

main unit  $x$  than the spherical grooved ones, that are possibly better connected to the  $2f$  series. Heavy examples, if their weight is not approximated, are again mostly multiples of  $x$ , in the same way of the few cylindrical and «obloid» loomweights.

#### *Malia, Bâtiment Pi (LM IA)*

Preliminary studies have been made of a large part of the LM IA materials from the complex which allows some first insights on volume measures. The capacity of the conical cups from rooms 10, 11 and 13 cluster in three groups: a large one (capacity 0.07 lt), a medium one, comprising the majority of the examples (capacity 0.05-0.06 lt), and a small one (capacity 0.025 lt). The second and the third groups are one the double of the other. They seem to be generally smaller of the conical cups from Mochlos (see above). Exception to this pattern are however present, and few conical cups are significantly larger, having a volume of 0.1 lt, similar to that of most of the Mochlos items, to be possibly seen as the double of the 0.05-0.06 lt volume. Both the 0.1 lt and the 0.07 lt measures find a parallel in the evidence from Palaikastro, where the 0.07 lt value is the most represented during the LM IA<sup>69</sup>.

#### *Communicating through a network of measures*

This is the first attempt toward a global reading of the archaeological evidence for Minoan measures and many more studies will obviously be needed to achieve more solid results and to build up a picture of chronological and regional variations. Nevertheless, what clearly emerges from the present analysis is that Minoan material culture preserves at least some traces of the use of standard measurements. Although some of the proposed interpretations are admittedly somewhat forced and may turn out wrong after further investigations, we can start to see Minoan daily life as based on a network of measures, involving all aspects of practical activity. This has an enormous impact on communication: standardized measures means that an architect could direct and check the work of teams of builders, a cook could create and teach his/her recipes, a buyer could choose the desired vessel at the market, not to speak of scribes and administration. If a family had an unexpected guest, they could send their child to ask a neighbour for an exact quantity of flour or honey. If a metalworker needed some raw metal, he could ask the supplier (be it a palatial bureaucrat or a merchant) for this weight of bronze or that size of ingot fragments, and once back in his workshop, tell an assistant to use that size of hammer on the anvil. If a group of weavers intended to arm the loom in a certain way, they could discuss among themselves the right size/weight of loomweight to be used, and then decide to ask the potter or some other craftsman to produce exactly what they wanted – and it could be done easily, thanks again to measures. Measures would tell a team of grinders which querns to use, which containers to fill and then how long to work. Or they would dictate to a feast overseer how many bowls and cups to ask from his attendants, and how many bulls and goats to request from the butchers or the shepherds. Measures, no matter how concrete or abstract, are the backbone of practical communication within a society: and the Minoans were certainly communicating through measures, because Minoan Crete was a measured world.

<sup>69</sup> Knappett and Cunningham 2003: 115-116, 162.

**«Minoan» (Neopalatial) System  
MMIII-LMI**

1	<i>L</i>	30.000 g	480	duodecimal and sexagesimal progressive fractions
1/30	<i>M</i> <i>double mina</i>	1.000 g	16	
1/60	<i>Mina</i>	500 g ca	8	
1/480	<i>x</i>	60-65 g	1	
1/1440 (1/1500)	<i>k</i>	20 g	1/3	

Table 1. Simplified structure of the weighing system used during the Neopalatial period in the Aegean, reconstructed on the basis of the attested groups of weights. The wool (*l*) and textile (*f*) units and the smaller hypothetical fractions are not considered. For a detailed view, see Alberti 2011a

**«Minoan» (Neopalatial) System  
MMIII-LMI**

1	<i>talent</i>	30.000 g ca	480	
1/10			48	<i>Wool unit</i> 3.000 g ca 4
1/30	<i>double mina</i>	1.000 g ca	16	
1/40			12	<i>One fleece</i> 720-780 g 1
1/60	<i>mina</i>	500 g ca	8	
1/120	<i>half mina</i>	250 g ca	4	
1/480	<i>x</i>	60-65 g	1	
				<i>f</i> 36,7 g 1/20

Table 2. Main structure of the weighing system used during the Neopalatial period in the Aegean, including the wool and textile (*f*) units. For a detailed view, see Alberti 2011a

Egypt	«Western» Units Ugarit, Karkemish (Syria), Khatti (Anatolia)	Ashdod (Palestina)
	1 talent 28.2 kg	1 talent 23.5 kg (= 5/6 talent 28.2 kg)
5 <i>dbn</i> 470 g	60 1 mina 470 g	30 1 «double» mina 783.3 g (= z)
		50 1 mina 470 g
1 <i>dbn</i> 90,95 g		60 1 mina 391,5 g
	40 shekels for 1 mina <i>h</i> 11.75 g	
10 1 <i>qdt</i> 9,09 g	50 <i>s</i> 9.4 g	100 Shekels for both minas
12 1 <i>s'ty</i> 7,83 g	60 <i>kar</i> 7.83 g	50 <i>k</i> 7.83 g
	(4 <i>h</i> = 5 <i>s</i> = 6 <i>kar</i> )	

A – Levant and Egypt

Mesopotamia	
1	1 talent 30,3 kg
30	1 «double» mina 1008 g
60	1 mina 504 g
60	Shekels for 1 mina <i>mp</i> 8,4 g

B - Mesopotamia

Table 3. Main Near Eastern weight systems during the Bronze Age. Parallel divisions and conversion systems (modified from Alberti and Parise 2005:Table 1)

Volume lt	Unit 0.5 lt	Unit 1.5 lt	Hemikadion	Kados	«Heavy Kados»
0.15			1/64	1/128	
0.25	1/2	1/6			1/128
<b>0.4/0.6</b>	1	1/3			1/64
0.7			1/16	1/32	
0.9					1/32
(1)	(2)	(2/3)			
<b>1.3-1.4</b>			1/8	1/16	
<b>1.5/1.7; 1.6</b>	3	1			
1.8-1.9					1/16
2	4				
2.7-2.8	5		¼	1/8	
3.3	6	2			
3.7-4	8				1/8
<b>4.2-4.5; 4.6</b>	9 or 10	3			
4.8-5	10				
5.5	<b>12</b>		½	1/4	
6.3	14	4			
7.5	16	5			¼
8.5-9	18	5? or 6	3/4	3/8	
9.5	20				
10.5	22	7			3/8 (= 3/4 hemikadion)
<b>11.5</b>	<b>24</b>		1	½	
<b>12; 12</b>	25	8	1	½	
<b>13.5</b>	28	9			
<b>13.8-14.00</b>	29			1 + 1.5 lt?	½ hemikadion?
<b>14.5</b>	<b>30</b>				½
15		10	3/2	¾	
16			3/2	¾	
17	36		3/2	¾	
18					
<b>22-24</b>	48	16	2	1	
<b>28-32</b>	60	20			1
37	72		3	3/2	
40				2	
45-50	120			2	

Table 4. Simplified structure of the Minoan capacity system as proposed in Alberti 2012. In bold the most represented values



Lenght (cm)	Possible measure	Mp (?)	Mf	Mc	Mlc
60.6	Double Mf	8	2		
54	Mc large (= 1 Mc + 1 Mp?)	7			1
46.8	Mc (= 1 Mf + 2 Mp?)	6		1	
30.3-30.4; <b>32.55</b> ; 34-35	Mf (= 1/2 Mc + Mp?)	5?	1		3/5
27-28?	½ Mc large				1/2
23.45, <b>[25.5]</b> , 27-28?	Ms	4?		1/2	
19.15	??????	3?			
7.5	Mp (?)	1			
1.8	Mfn	1/4			

Table 5. Minoan linear measures plotted together (M.E. Alberti).

The represented lengths have all been reported in various architectural studies as possible modules, with the exception of the palm and the finger; that are hypothetical. In bold, average values. In bracket, reconstructed values.

**Mc** = Minoan cubit

**Mlc** = Minoan large cubit

**Mf** = Minoan foot

**Mfn** = Minoan finger

**Mp** = Minoan palm

**Ms** = Minoan span or outstretched hand

Context	Inv. N.	Type	Weight (g.)	Aeg. Rel. Value	NE Rel. Val.	Resultant Unit (g.)	Marks	Preservation
Mu Potier VIII4	B 89	Limestone disc	21.45 (+).	k; 1/3 x?		k = 21.45 (+); x = 64.35 (+);	One circle engraved on one face	Good. Overweight. Concretions.
Mu Potier VIII4	B 90	Limestone disc	34.84 (-).	f; 2/3 x? <b>3/2 k</b>	<b>4 mp</b>	f = 34.84 (-); x = 52.26 (-) k = 23.22 (-) mp = 8.71		Good
Mu Potier VIII4	B 88	Stone cylinder	9.7		s	s = 9.7	One arrow (three converging lines) on one end	
Mu B, IV4.	68 M 463	Stone disc	95 ca.	<b>4k; 3/2 x;</b>	<b>1 dbn = 10 qdt/s</b>	k = 23.75; x = 63.33 dbn = 95; qdt/s = 9.5		
Mu A III 13.	M71/ B92bis	Lead parallelep.	16.5 ca.	<b>1/4 x</b>	2 mp	x = 66 mp = 8.25		
Mu, area of C	M69/ B55bis	Lead disc	14.40 (+).	<b>2 w;</b> 1/4 x?	<b>2 kar</b>	w = 7.5 (+); x = 57.6 (+) kar = 7.5 (+)	Two strokes on one face	

Table 6. Malia, Quartier Mu (MM IIB): balance weights. Modified from Alberti 2000: table II; Alberti 2007b: table 2; Alberti in press: table I

Recurrent volumes (lt.)	Kados	«Heavy» Kados
5.5	$\frac{1}{4}$	
10-12	$\frac{1}{2}$	
13-15 (mostly ca 14)		$\frac{1}{2}$
19-22	1	
26-27		1
40	2	
63-5	3	2
90-95	4	3

Table 7. Malia, Quartier Mu (MM IIB): capacity measures. Necked jars (*jarres à col*) and amphorae of type 1: recurrent volumes point to the existence of a series based on the «*kados*» (19-22 lt, with fractions and multiples) and the «*heavy*» *kados* (26-30 lt, with fractions and multiples) (reworked from Alberti 2012: Table 2)

Volumes (lt)	N. Exemplars	Unit 0.45-0.5 lt	Kados	«Heavy» Kados
11.4	2	24	$\frac{1}{2}$	
12.2-12.5	3	26	$\frac{1}{2}$	
13 ca	2	27		$\frac{1}{2}$
14 ca	1	29		$\frac{1}{2}$
14.5	1	30	=	$\frac{1}{2}$
21 ca	1	42	1	
24 ca	1	48	1	

Table 8. Malia, Quartier Mu (MM IIB): capacity measures. Amphorae type 1: recorded capacities form a continuous series based on the *unit of 0.45-0.5 lt* ca, connected to the *kados* standards

Volumes (lt)	N. Exemplars	Unit 0.45-0.5 lt	Kados	«Heavy» Kados
3	1	6		
3.7	1	8		$\frac{1}{8}$
4.1	1	8		$\frac{1}{8}$
5.5	1	12	$\frac{1}{4}$	
6	1	13		
6.9	1	14		
7	2	15		
8 ca	1	17		
9	1	19		
11 ca	5	23	$\frac{1}{2}$	
11.5	1	24	$\frac{1}{2}$	
12.5 ca	2	26	$\frac{1}{2}$	
13	1			$\frac{1}{2}$
14.5 ca	1	30		$\frac{1}{2}$
15.5	1	32		
15.9	1	33		
16.5	1	34		
17 ca	2	35		
18.9	1	40		
20 ca	1	44	1	
21	1	48	1	
45	2		2	

Table 9. Malia, Quartier Mu (MM IIB): capacity measures. Amphorae type 2: recorded capacities form a continuous series based on the *unit of 0.45-0.5 lt* ca, connected to the *kados* standards

Recurrent volumes (lt)	Unit 0.45-0.5 lt
3	6
3.7-4 (1/8 «heavy kados»)	8
4.5	10
5.7 (1/4 kados)	12
6	13
6.5	14
7	15
7.5 (1/4 «heavy» kados)	16
8	17
8.5 (3/8 of kados)	18
9.5	20
10	21
10.5 (3/8 of «heavy» kados)	22
11	23
11.5 (1/2 kados)	24
12; 12	25
12.5	26
13.5	
14.5 (1/2 «heavy» kados)	30
15	
24-25 kados	48
29 «heavy kados»	60
36 (3/2 kados)	
41 (2 kados)	

Table 10. Malia, Quartier Mu (MM IIB): capacity measures. Jars of type 2, amphorae of type 3a and brocs of type 2: the series of measures has intervals of ca 0.45 lt and is as well connected to the «kados» standards (shaded standards are not attested in these groups but have been hypothetically restored) (Alberti 2012: Table 3)

Recurrent volumes (lt)	Unit 0.45-0.5 lt
0.10	
0.15	
0.20	1/2
0.24-0.25	1/2
0.30	1/2?
0.30-0.38	
0.4-0.6	1
0.6	
0.7	1+1/2?
0.8	
0.9	2
1.1-1.2	2?, 2+1/2?
1.3-1.4	2?, 2+1/2
1.5/1.7; 1.6	3

1.8-1.9	3 + ½?
2	4
2.4-2.6	4 + ½?
2.7-2.8	5
2.9-3.1	6
3.3-3.4	7
3.7	8
4.5	10

Table 11. Malia, Quartier Mu (MM IIB): capacity measures. Amphorae of types 6 and 9, brocs of type 1, jugs and cups: minor volumes seem to compose a series with very small intervals, of ca. 0.10 lt. The standards of **0.25 lt.** and **0.45-0.5 lt.** seem to be particularly important. Shaded: recurrent volumes for cups (Alberti 2012: Table 4)

Findspot of loomweights	Weight Range (g)	Relative Value of Weight	Thickness Range (cm)	Relative Value of Thickness (Mfn)
Quartier Mu all 1	75-150	2 <i>f</i> , 4 <i>f</i>	1.5-2.3	1
Quartier Mu all 2	150-200	4 <i>f</i> , 3 <i>x</i> , 10 <i>k</i>	2.5-3.5	2
Quartier Mu all 3	75-150	2 <i>f</i> , 4 <i>f</i>	4-5.2	3
Quartier Mu all 4 (mostly from Building D)	300-380	5 <i>x</i> , 6 <i>x</i>	6.5-7.2	4 (= 1 palm)
Building A I.8	105-185 (mostly 110-145)	2 <i>x</i> ?, 3 <i>x</i>	4-5.5 (4-5)	3
Building A III.1	90-450	1 <i>dbn</i> , 5 <i>dbn</i>	1.7-6.2	1-4
Building B	55-240	<i>x</i> , 4 <i>x</i>	1.8-6.6	1-4
Building D	300-380	5 <i>x</i> , 6 <i>x</i>	6.5-7.2	4
Building E	70-160	2 <i>f</i> , 4 <i>f</i>	1.6-5.5	1-3
Potter's Workshop	70-230	2 <i>f</i> , 6 <i>f</i> ?	1.8-6.2	1-4
Founder's Workshop	100-170	3 <i>f</i> ?, 5 <i>f</i> ?	1.7-5.1	1-3
Southern Workshop	70-150	2 <i>f</i> , 4 <i>f</i>	1.8-3.9	1-2
Building C	50-405		1.6-6	1-4
Building C small torus	335-405	5 <i>x</i> or 10 <i>f</i> , 6 <i>x</i> or 12 <i>f</i>	3.3-4	2

Table 12. Malia, Quartier Mu (MM IIB). Main groups of loomweights : findspot, weight and thickness (Cutler et al. 2013: 99, 106, 108, 112, 114; large torus weights excluded) and proposed relative value

N. inv.	Description	Major dimensions	Relative Value of Major Dimension	Thickness	Relative Value of Thickness (Mfn)
B 10	3 discoids	D 7.5	1 <i>Mp</i>	1.8-2.2	1
B 31	8 discoids	D 7-7.7	1 <i>Mp</i>	1.8-2.1	1
B 64	1 discoid	D 6.2	1 <i>Mp</i> ? (small)	2.8	2
B 64	1 discoid	D 7.5	1 <i>Mp</i>	2	1
B 11	3 spherical	D 5.1-5.6	3 <i>Mfn</i>		
B 65	1 spherical	D 5.6	3 <i>Mfn</i>		
B 123	9 spherical	D 4.5-6.2	3 <i>Mfn</i> ?		
C 8	1 spherical	D 5	3 <i>Mfn</i>		
D 17	1 spherical	D 6.5	3 <i>Mfn</i> (large) or 1 <i>Mp</i> (small)		
B 32	1 parallelep.	H 4.3 L 3.5	3 <i>Mfn</i> ? 2 <i>Mfn</i>		
B 124	1 parallelep.	H 5.8 L 3.1-3.3	3 <i>Mfn</i> , 2 <i>Mfn</i>		
B 125	1 piriform	H 6.5 L 5.5	1 <i>Mp</i> ? (small), 3 <i>Mfn</i>	4.7	3? (small)
C 8	1 torus	D 8.4	5 <i>Mfn</i> or the double of thickness	4.2	3? (small)

Table 13. Malia, Quartier Mu (MM IIB): dimensions of loomweights (Poursat 1996 *passim*) and proposed relative values

Type	Weight Range (g)	Relative Value
Type 1	40-380	2 k, 6 x
Type 2	285-725	8 f, 20 f?
Type 3	20-255	k, half mina
Type 4	120-410	2 x, 20 k
Type 5	20-195	k, 3 x
Type 6	65-370	x, 6 x
Type 7	40-305	2 k, ?
Type 8	50-385	?, 6 x
Type 9	100-500	1 dbn?, 3 f., mina
Type 10	40-515	2 k, mina
Type 11	120-440	2 x (= 6 k), 20 k
Type 12	110-270	2 x? 3 dbn
Type 13	120-150	2 x, 4 f
Type 14	500-540	mina, mina
Type 15 (pebbles)	30-420	½ x? f, 20 k

Table 14. Malia, Quartier Mu (MM IIB): weight range of loomweights per type (Poursat 2013: 89-94) and possible relative value according to Aegean and Near Eastern standards

Findspot	Weight (g)	Relative Value
Building A I.8	620	10 x
Building A I.8	1040	Double Mina
Building A III. I	450	«Western» Mina or 5 dbn
Potter's Workshop	1400	3 Minas

Table 15. Malia, Quartier Mu (MM IIB): torus loomweights (Cutler *et al.* 2013: 106, 112) and their possible metrological interpretation

Context	Inv. N.	Type	Weight (g)	Aeg. Rel. Value	NE Rel. Val.	Resultant Unit (g)	Marks	Preservation
A 4	IC. 297/ Pb 6	Lead disc	30.85	½ x		x = 61.70		Intact
A 4	GS 935	Haematite cuboid	42	2/3 x 4 k	4 h 5 s 6 kar 5 mp	x = 63 k = 10.5 h = 10.5 s = 8.44 kar = 7 mp = 8.4		Intact
B6 (A4 according to Brogan 2006)	IC. 210 / S31	Limestone pebble	38.6	3 k (?) 2/3 x (?) f (?)		k = 12.8 x = 57.9 f = 38.6	A linear sign on top and 3 incised lines around the circumference	Intact
B.7	GS 875	Haematite domed	552.7	Mina		Mina = 552.7 (Aegean and Mesopot.)		Intact
B.7	GS 876	Haematite domed	1092.2	Double mina		Double Mina = 1092.2		Intact

Table 16. Mochlos, Artisans' Quarter (LM IB) : balance weights (Soles and Davaras 2004: 40, 52, 78-79; Brogan 2006: 273)

N. Exemplars	Volume (lt)	Unit of 0.45-0.5 lt
2	0.085	
2	0.090	
1	0.095	
5	0.100	¼?
3	0.105	¼?
2	0.110	1/4
3	0.120	1/4
1	0.125	1/4
1	0.130	
2	0.140	¼?
1	0.145	

Table 17. Mochlos, Artisans' Quarter (LM IB): capacity of conical cups (Barnard and Brogan 2003: 37-41) and proposed relative values

N. Exemplars	Volume (lt)	Unit of 0.45-0.5 lt
1	0.220	1/2
1	0.235	1/2
4	0.250	1/2
3	0.285	1/2
1	0.295	
1	0.300	
1	0.310	
2	0.340	¾ ?

Table 18. Mochlos, Artisans' Quarter (LM IB): capacity of ogival cups (Barnard and Brogan 2003: 44-45) and proposed relative value

Inv. N.	Type	Dimensions (cm)	Weight (g)	Aeg. Rel. Value	NE Rel. Val.	Resultant Unit (g)	Marks
IC.240	Ingot fragment, copper	2.4 × 2.6 × 1.5	29	½ x		x = 58	
IC.239	Ingot fragment, copper	2.3 × 3.4 × 1.6	31	½ x		x = 62	
IC.238	Ingot fragment, copper	2.7 × 3.7 × 1.6	35	½ x? 1 f?	5 kar?	x = 70 f = 35 kar = 7	
IC.230	Ingot fragment, copper	2.7 × 3.9 × 2.2	61.4	x		x = 61.4	
IC.234	Ingot fragment, copper	3.2 × 3.7 × 2.1	62.6	x		x = 62.6	
IC.231	Ingot fragment, copper	2.8 × 4.9 × 2.3	75.5 (possibly 80 g?)	3/2 x? 1 + 1/3 x = 4/3 x 2 f?	10 kar?	x = 50.33 x = 56.62 f = 37.75 kar = 7.5	
IC.228	Ingot fragment, copper	3.5 × 3.9 × 2.6	89.2	1 + ½ x = 3/2 x		x = 59.46	
IC.227	Ingot fragment, copper	3.2 × 5.5 × 2	116.1	2 x		x = 58.05	
IC.229	Ingot fragment, copper	3.9 × 6 × 2	133.9	2 x		x = 66.95	
IC.232	Bun (?) ingot fragment, copper	3.9 × 4.7 × 2.2	136.9	2 x		x = 68.45	
IC.233	Ingot fragment, copper	3.9 × 5.5 × 2.8	139.6	2 x?		x = 69.8	
IC.235	Ingot fragment, copper	4.5 × 3.7 × 4.3	174.2	3 x		x = 58.06	
IC.237	Ingot fragment, copper	4.6 × 7.5 × 2.6	214.8	3 x? 4 x?		x = 71.6 x = 53.7	
IC.236	Ingot fragment, copper	4.7 × 5.3 × 3.7	230.8	4 x		x = 57.7	

IC.226	Oxhide ingot fragment, copper	7.2 x 10.6 x 4	797.9	Z (fleece) = 12 x	Double Mina (Ashdod) = 100 kar	x = 66.49 kar = 7.979	
IC.250	Casting waste, smooth on one side, copper	4.9 x 5.7 x 1.2	76.7	1+1/3 x = 4/3 x 2 f?	10 kar?	x = 57.52 f = 38.35 kar = 7.67	
IC.249	Casting waste, smooth on one side, copper	7.1 x 8.5 x 1.1	149.6	2+1/2 x = 5/2 x 4 f?	20 kar?	x = 59.84 f = 37.4 kar = 7.48	
IC.285	Scrap metal: handle, copper-tin alloy	Pres Length 5.3	27.5	1/2 x?		x = 55	
IC.280	Scrap metal: frgs of a bowl, copper-tin alloy	H 5.9 Rim d. 16	181.6	3 x		x = 60.53	
IC.279	Scrap metal: frgs of lekane, copper-tin alloy	H 9.5, est. Rim d. 22.6	183.4	3 x		x = 61.13	

Table 19. Mochlos, Artisans' Quarter (LM 1B): «foundry hoard» in the northern room of Building A (Soles and Davaras 2004: 46-52) and proposed relative value. The fifteen ingot fragments weigh all together 2.33 kg; this value can be equated to 2 *Double Minas* and 5 x

Context	Inv. N.	Type	Dimensions (cm)	Weight (g)	Aeg. Rel. Value	NE Rel. Val.	Resultant Unit (g)
A.1 workroom	IC.241	Oxhide (?) ingot fragment, copper	2.7 x 4.5 x 2.9	98.9	3/2 x	1 dbn = 10 s	x = 65.93 s = 9.89
A.2	IC.275	Pin, various fragments, copper-tin	various	1.4 (-)		j?	j = 1.4 (-)
A.2	IC.269	Small knife, intact, copper	5.2 x 0.2	1.6		j?	j = 1.6
A.2	IC.281	Scrap, copper, tweezers, frgs	Pres length 2.2	1.7		j?	j = 1.7
A.2	IC.300/ Pb 32	Scrap. Lead flat fragment	1.4 x 2.2 x 0.4	5.7	1/2 e	1/2 h 3 j?	e = 11.4 h = 11.4 j = 1.9
A.2	IC.301/ Pb 34	Scrap. Flat lead strip, broken. Pierced with three rivet holes	Pres length 5.7 cm, w. 1.2 cm, th 0.15-0.3 cm	5.9	1/2 e	1/2 h 3 j?	e = 11.8 h = 11.8 j = 1.96
A.2	IC.299/ Pb 31	Scrap, lead flat fragment	Pres h. 1.1 cm, pres length 3.1	8.1		1 mp	mp = 8.1
A.4 workroom	IC.288	Scrap, copper	-	2.2		j?	j = 2.2
A.4	IC.287	Frgs of flat copper item(s)	various	3.7		2 j?	j = 1.85
A.4	IC.296	Scrap, metal: two rounded pieces, copper-tin alloy	various	8.9 and 4.2		1 mp and 1/2 mp	mp = 8.9 mp = 8.4
A.4	IC.244	Ingot fragment, copper	2 x 3.2 x 1.8	29.5	1/2 x	4 kar 3 s	x = 59 kar = 7.37 s = 9.8
A.6	IC.267	Hook, two non-joining pieces, copper-tin alloy	Pres. length: 5.2	5.3	1/2 e	1/2 h 3 j?	e = 10.6 h = 10.6 j = 1.76
A.6 Shrine?	IC.243	Ingot fragment, copper	8.4 x 9.2 x 4.1	667.9	10 x	1 Mina Lagash	x = 66.79

A.RY	IC.277	Knife, nearly intact, copper-tin alloy	17.5 x 2.6	42.6	2 k 2/3 x	5 mp 6 kar 4 s	k = 21.3 x = 63.9 mp = 8.52 kar = 7.1 s = 10.65
B.1	IC.268	Chisel, copper, one end broken	Pres. length 4.1	12.1 (-)	1/4 x?		x = 48 (-)
B.3	IC.294	Scrap metal: knife, uncomplete, copper-tin alloy	Pres length 3.9	2.5 (-)		j?	j = 2.5
B.3	IC.295	Scrap metal: tang, uncomplete, copper-tin alloy	Pres length 2.6	4.4		1/2 mp?	mp = 8.8
B.4	IC.272	Needle, uncomplete, copper-tin alloy	Pres. Length 1.1	1.9 (-)		j?	j = 1.9
B.4	IC.245	Strip, broken at one end, copper, bent in two places	30 x 0.8	4.5		1/2 mp? 1/2 s?	mp = 9 s = 9
B.4	IC.276	Spatula or scraper, complete, copper-tin alloy	Length 5.5, width of blade 2.2	12.5	1/5 x?	6 j?	x = 62.5 j = 2.08
B.8	IC.274	Earring, almost intact, copper	D. 1.9	1.8		j?	j = 1.8
B.9	IC.292	Scrap, broken, copper-tin alloy	Pres length 3.4	1.4		j?	j = 1.4
B.9	IC.293	Scrap, rounded (rivet?), copper-tin	1.3 x 1.9	4.6		1/2 mp? 1/2 s?	mp = 9.2 s = 9.2
B.9	IC.291	Scrap, rounded (rivet?), copper	1.3 x 1.8	5.2	1/2 e?	1/2 h? 3 j?	e = 10.4 h = 10.4 j = 1.73
B.10	IC.282	Scrap, copper, flat rectangular piece, pierced	Pres length 5.7	15.7	1/4 x		x = 62.8
B.13E Living/ sleeping space?	IC.242	Ingot fragment, copper	6.3 x 6.6 x 4.3	539	1 mina		mina = 539

Table 20. Mochlos, Artisans' Quarter (LM 1B): metal objects and scrap for recycling (Soles and Davaras 2004: 46-52). Objects weighing less than 1 g are not included

N. Inv.	Dimensions (cm), length first	Weight (gr)	Rel. Value of Length (Mfn)	Rel. Value of Weight
IC.309	10.9 x 9.7 x 7.2	1175		18 x
IC.307	4.8 x 6.2 x 2.5	560	3	10 x
IC.312	5.7 x 4.06 x 3.04	110	3	2 x
IC.316	5.9 x 4.6 x 3.9	166	3	3 x?
IC.306	6.9 x 6 x 4.3-5.4	398	4	6 x
IC.302	9.26 x 7.46 x 4.13	424	5	20 k? 7 x?
IC.304	9.1 x 7.3 x 6	755	5	12 x
IC.308	11.9 x 10.6 x 7.3	1290	6	20 x
IC.315	11.1 x 7.8 x 6.2	765	6	12 x
IC.305	12.5 x 7.5 x 6.6	1145	7	18 x
IC.310	12.7 x 9.8 x 10.1	1965	7	30 x
IC.311	12.8 x 9.5 x 7.8	1480	7	24 x
IC.303	16.5 x 6.8 x 5.0	1385	9	24 x
IC.313	16.5 x 4.9 x 3.6	480	9	8 x



IC.335	15.8 × 8.4 × 5.1	1550	8	24 x = a <i>double mina</i> + a <i>mina</i> or 3 <i>minas</i>
IC.334	16 × 7.5 × 4.5	1370	9	22 x
IC.331	17 × 15 × 3	1305	9 or 10?	20 x or 22 x?
IC.332	17.9 × 11 × 4	2040	9 or 10?	32 x = 2 <i>double minas</i>
IC.330	19.6 × 9.5 × 4	1900	10	30 x = almost 2 <i>double minas</i>
IC.333	18.5 × 11 × 5	1935	10	32 x = 2 <i>double minas</i>
IC.329	21 × 11 × 5.5	2500	12	40 x = 2 <i>double minas</i> + a <i>mina</i>
IC.336	20 × 11.6 × 4.6	1955	10 or 11	32 x = 2 <i>double minas</i>

Table 21. Mochlos, Artisans' Quarter (LM IB): hammerstones (above, IC.309-IC.313) and heavy oblong handstones (below, IC.335-IC.336) (Carter 2004: 63-64 and 65-66, ground stone tools type 1 and 4) and the possible relative value of their length and weight. Only complete examples are included

N. Inv.	Dimensions (cm)	Weight (gr)	Rel. Value of Weight
IC.317	11.5 × 17.3 × 4.4	900	15 x
IC.318	11.7 × 8.5 × 6.0	1225	20 x
IC.319	11.6 × 10 × 5	1685	28 x
IC.320	8.6 × 6 × 5	480	8 x
IC.321	15.03 × 8.6 × 6.9	1580	24 x
IC.322	10.8 × 9.5 × 6.1	1125	18 x
IC.323	12.28 × 10.35 × 7.04	1365	22 x
IC.324	9.7 × 9.2 × 3.7	570	10 x
IC.325	9.7 × 10.1 × 5.13	795	12 x
IC.326	16.5 × 10.7 × 6.2	1915	30 x

Table 22. Mochlos, Artisans' Quarter (LM IB): small handstones (Carter 2004: 64-5, ground stone tools type 2) and possible relative value of their weight. Only complete examples are included

Inv. N.	Description	Weight (g)	Aeg. Rel. Val.	NE Rel. Val.	Resultant Unit (g)	Marks
IC.350	Amphibolite, rough, only one face smoothed flat by abrasion	620	10 x		x = 62	
IC.352	Amphibolite, 6 facets by polishing, rounded rougher edges	530	<i>Mina</i> = 8 x		<i>Mina</i> = 530, x = 66.25	Found in pithos IC 445
IC.353	Amphibolite, discoid, intensive polishing, two facets	201	10 k		k = 20.1	
IC.354	Amphibolite, sub-cuboid	157	4 <i>f</i> , 3/2 <i>dbn</i> ?		<i>f</i> = 39.25 <i>dbn</i> = 104.66	Faceted by abrasion
IC.356	Green quartzite, polished flat in a number of places	148	4 <i>f</i> , 3/2 <i>dbn</i> ?		<i>f</i> = 37 <i>dbn</i> = 98.66	

Table 23. Mochlos, Artisans' Quarter (LM IB): sub-cuboid polishers with polished and faceted surfaces as possible balance weights (Carter 2004: 67-8, 79, table 9, ground stone tools type 6a)

N. Inv.	Dimensions (cm): Length, Width and Height	Weight (gr)	Ratio Width: Length	Rel. Value of Length	Rel. Value of Width
IC.401	37 x 16 x 55	5950	1 : 2.3	4 <i>Mp</i> (less than 1 <i>Mc</i> )	2 <i>Mp</i>
IC.402	43 x 19 x 4	2160	1 : 2.2	6 <i>Mp</i> (about 1 <i>Mc</i> )	3 <i>Mp</i> ?
IC.403	26 x 16.3 x 4.5	3590	1 : 1.61	3 <i>Mp</i> or ½ <i>Mc</i> large	2 <i>Mp</i>
IC.405	32.75 x 21.9 x 3.52	5025	1 : 1.49	1 <i>Mf</i>	3 <i>Mp</i> , 1 <i>Ms</i> ?
IC.412	19.1 x 15.1 x 6	2560	1 : 2.6	3 <i>Mp</i>	2 <i>Mp</i>
IC.413	37 x 27.5 x 6.7	/	1 : 1.34	5 <i>Mp</i>	½ <i>Mlc</i> ?

Table 24. Mochlos, Artisans' Quarter (LM IB): saddle querns (above, IC.401-403), palettes (centre, IC.405) and stone tables (below, IC. 412-413) (Carter 2004: 73-74, 76, ground stone tools type 14, 15 and 18) and possible relative value of their length and width. Only complete examples are included

N. inv.	Findspot	Dimensions (cm)	Weight (g)	Rel. Value of Dimensions ( <i>Mfn</i> )	Rel. Value of Weight
IC.106	B.13W	4.9 x 4 x 1.5	54	4-3 x 3? x 1	x
IC.111	B.13W	6 x 5.2 x 2.2	62	3 x 3 x 1	x
IC.110	B.above	5.7 x 4.9 x 2.2	62	3 x 3 x 1	x
IC.88	A.4	7.4 x 5.6 x 1.5	62 (-) (probably 80 g)	4 x 3 x 2	4/3 x, 4 k
IC.94	A-B road	6.5 x 5.8 x 2.2	78	4 x 3 x 1-2	2 f
IC.122	B.RY	7.5 x 6.1 x 2.2	120	4 x 4-3 x 2	2 x
IC.116	A.RY	8 x 7.8 x 2.5	162	5 x 4-5 x 2	3 x? 8 k
IC.104	B.2	8.3 x 6.9 x 2.4	148	5 x 4 x 2	4 f
IC.120	B.2	8.8 x 7.4 x 3.4	190	5 x 4-5 x 2	3 x
IC.126	Kiln A	10 x 8 x 2.6 (-)	140 (-)	6 x 5 x 2?	3 x 10 k?
IC.112	Kiln A	9.4 x 8.6 x 3.1 (-)	174 (-)	6-5 x 5 x 2	3 x
IC.89	B.5	8.8 x 8.2 x 2.6	186 (-)	5 x 5 x 2?	3 x
IC.93	N.Terrace	10 x 8.6 x 3.2	254	6? x 5 x 2	4 x = half <i>mina</i>
IC.108	B.8	6.2 (-) x 5.3 x 2.1	66 (-)	4 x 3 x 1	2 f
IC.100	B.8	9.7 x 8 x 2.9	204 (-)	6 x 5 x 2	10 k? 4 x?
IC.102	B.8	10.1 x 8.5 x 2.6	216	6 x 5 x 2	10 k? 4 x?
IC.101	B.8	10.5 x 8.5 x 3.3	268	6 x 5 x 2	4 x = half <i>mina</i>

Table 25. Mochlos, Artisans' Quarter (LM IB): elliptical loomweights (Type A) (Soles *et al.* 2004: 29-31) and proposed relative value of their dimensions and weight. The evidence from room B.8 is particularly consistent (grouped below, IC.108-101). Only complete or nearly complete items are included

N. inv.	Findspot	Dimensions (cm)	Weight (g)	Rel. Value of Dimensions ( <i>Mfn</i> )	Rel. Value of Weight
IC.130	A.4	8.7 x 7.9 x 2.4	156	6 x 5 x 2	4 f, 8 k
IC.129	B.3	7.8 x 7.3 x 2.5	112 (-)	4 x 4 x 2	2 x?
IC.133	B.6	6.4 x 6 x 2.4	82	4 x 4 x 1-2	4/3 x, 4 k, 2 f? 3/2 x?
IC.138	A.9	6.4 x 6.5 x 2.4	80	4 x 4 x 1-2	2 f? 3/2 x?
IC.139	B.10	6 x 6.4 x 2.2	84 (-) (possibly 112 g)	4 x 4 x 1	4/3 x, 4 k 2 f? 3/2 x? 2 x?
IC.140	B.10	5.1 x 5.3 x 2.3	62 (-)	3 x 3 x 1	x

Table 26. Mochlos, Artisans' Quarter (LM IB): rounded loomweights (Type B) (Soles *et al.* 2004: 31-32) and proposed relative value of their dimensions and weight. Only complete or nearly complete items are included

N. inv.	Findspot	Dimensions (cm)	Weight (g)	Rel. Value of Dimensions (Mfn)	Rel. Value of Weight
IC.147	A-B road	6.4 × 5.7 × 1.6	60	4 × 4 × 1	x
IC.148	B.4	6.5 × 6.1 × 1.7	68	4 × 4 × 1	x? 2f?
IC.149	Chalinomouri	5.7 × 5.8 × 1.8	66	3? × 3? × 1	x
IC.153	A.2	5.2 × 4.6 × 2.4	62	3 × 3 × 1	x
IC.154	A.2	5.1 × 3.9 × 0.2(?)	48	3 × 2 × 1	2 k = 2/3 x
IC.151	A.4	4.8 × 3.8 × 2.3	48	3 × 2 × 1	2 k = 2/3 x
IC.152	A.4	4.5 × 3.8 × 2.2	42	3 × 2 × 1	2 k = 2/3 x

Table 27. Mochlos, Artisans' Quarter (LM IB): discoid (Type C, above, IC.147-9) and trapezoidal loomweights (Type D, below, IC.151-4) (Soles et al. 2004: 32-33 and 33-34) and proposed relative value of their dimensions and weight. IC.149 from the Chalinomouri farmstead (LM IB) is added here to better illustrate the weight range. The thickness of IC.154 should possibly be restored as 2.2 cm. Only complete or nearly complete items are included

N. inv.	Findspot	Dimensions (cm)	Weight (g)	Rel. Value of Dimensions (Mfn)	Rel. Value of Weight
IC.445	A.2	4.9 × 4.3 × 2.5	56		x
IC.443	A-B road	8.5 × 3.7 × 1.9	62		x
IC.440	A-B road	5.9 × 4.7 × 2	70		2 f
IC.441	A.4	6.8 × 4 × 3.1	86		4/3 x, 4 k
IC.437	A.4	12.57 × 9.8 × 5.6	860		14 x
IC.439	A.5	6.6 × 5.9 × 5.7	258		4 x = ½ Mina
IC.438	A.5	14.5 × 9.8 × 9.8	1585		3 Minas = one Double Mina and half
IC.444	B.2	19 × 14 × 7.6	2830		3 Double Minas ca.
IC.436, stone discoid	B.NW of room 7	5.5 × 1.6-1.7	90	3 × 1	3/2 x

Table 28. Mochlos, Artisans' Quarter (LM IB): the stone loomweight IC.436 and the naturally perforated weights IC.437-445 (Carter 2004: 81, ground stone tools types 24 and 25) and proposed relative values of their dimensions and weight. Only complete or nearly complete items are included

N. inv.	Type	Findspot	Dimensions (cm)	Weight (g)	Rel. Value of Dimensions (Mfn)	Rel. Value of Weight
IC.445	NPW	A.2	4.9 × 4.3 × 2.5	56		x = 3 k
IC.153	Type D trapezoidal	A.2	5.2 × 4.6 × 2.4	62	3 × 3 × 1	x = 3 k
IC.154	Type D trapezoidal	A.2	5.1 × 3.9 × 0.2(?)	48	3 × 2 × 1	2 k = 2/3 x
IC.151	Type D trapezoidal	A.4	4.8 × 3.8 × 2.3	48	3 × 2 × 1	2 k = 2/3 x
IC.152	Type D trapezoidal	A.4	4.5 × 3.8 × 2.2	42	3 × 2 × 1	2 k = 2/3 x
IC.88	Type A elliptical	A.4	7.4 × 5.6 × 1.5	62 (-) (probably 80 g)	4 × 3 × 2	4/3 x, 4 k
IC.441	NPW	A.4	6.8 × 4 × 3.1	86		4/3 x, 4 k
IC.130	Type B rounded	A.4	8.7 × 7.9 × 2.4	156	6 × 5 × 2	4 f, 8 k
IC.437	NPW	A.4	12.57 × 9.8 × 5.6	860		14 x?, 40 k?
IC.439	NPW	A.5	6.6 × 5.9 × 5.7	258		4 x = ½ Mina
IC.438	NPW	A.5	14.5 × 9.8 × 9.8	1585		3 Minas = one Double Mina and half
IC.138	Type B rounded	A.9	6.4 × 6.5 × 2.4	80	4 × 4 × 1-2	4/3 x, 4 k 2 f? 3/2 x?
IC.116	Type A elliptical	A.RY	8 × 7.8 × 2.5	162	5 × 4-5 × 2.5	3 x? 8 k

IC.126	Type A elliptical	Kiln A	10 × 8 × 2.6 (-)	140 (-)	6 × 5 × 2?	3 x, 10 k?
IC.112	Type A elliptical	Kiln A	9.4 × 8.6 × 3.1 (-)	174 (-)	6-5 × 5 × 2	3 x
IC.443	NPW	A-B road	8.5 × 3.7 × 1.9	62		x
IC.440	NPW	A-B road	5.9 × 4.7 × 2	70		2 f

Table 29. Mochlos, Artisans' Quarter (LM IB): typology, dimensions, weight and proposed relative values of the loomweights from Building A. NPW = Naturally Perforated Weight. Only complete or nearly complete items are included

Type	Weight range (g)	Relative Value Weight x	Relative value weight f	Relative value weight k	k as a general series	Relative value Dimensions (Mfn)
NPW	2830	3 <i>Double Minas</i> ca				
NPW	1585	3 <i>Minas</i>				
NPW	860	14 x		40 k	40	
NPW, Type A elliptical	254-268	4 x = half <i>Mina</i>			13	6 × 5 × 2 Type A elliptical
Type A elliptical, Type E spherical	210-220			10 k	10	6 × 5 × 2 Type A elliptical
Type A elliptical	190	3 x			8.5	5 × 5 × 2 Type A elliptical
Type A elliptical, Type B rounded	156-162			8 k	8	5 × 4-5 × 2 Type A elliptical 6 × 5 × 2 Type B rounded
Type A elliptical	148		4 f		7	5 × 4 × 2 Type A elliptical
Type A elliptical	120	2 x		6 k	6	4 × 4 × 2 Type A elliptical, Type B rounded
Stone discoid IC.436	90	3/2 x			4.5	
NPW, Type B rounded	80-86	3/2 x		4 k	4	4 × 4 × 1-2 Type B rounded
NPW, Type A elliptical	70-78		2 f		3.5	4 × 3 × 1 Type A elliptical
NPW, Type A elliptical, Type C discs, Type D trapezoidal	56-66	1 x		3 k	3	3 × 3 × 1-2 Type A elliptical, Type B rounded, Type D trapezoidal; 4 × 4 × 1 Type C discs (and 3 × 3 × 1 at Chalinomouri)
Type D trapezoidal, Pierced sherd IC.156	42-48	2/3 x		2 k	2	3 × 2 × 1 Type D trapezoidal
Pierced sherd IC.157	32-36		1 f			

Table 30. Mochlos, Artisans' Quarter (LM IB): summary of the analysis of loomweights. Types, weight ranges and their relative values, possible relative values in *Mfn* of their dimensions. NPW = Naturally Perforated Weights (typology as in Soles *et al.* 2004: 28-33, and Carter 2004: 81, ground stone tools type 25)

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# To have and to hold: Hieroglyphic seals as personal markers and objects of display

*Silvia Ferrara, Anna Margherita Jasink*

**Abstract:** Seals decorated with iconography or inscribed in the undeciphered Cretan Hieroglyphic script were used as personal instruments embedded in the administrative machine of the First Palaces. Often used to be stamped on clay nodules and crescent-shaped sealings to manage transactions, they were strikingly small objects made of soft and hard stones of fine, often very fine, manufacture.

This contribution aims to relate shape with function, by reconstructing their development in relation to the message they conveyed and through the typologies of seals selected to carry it. We address questions such as: is there a correlation between the ways in which iconicity was expressed in seal shape and in carrying script signs? To what extent did this iconicity represent a manipulation of specific personal display? What perception did illiterate Cretans have of these objects? These questions address the issue of authority at large and the particular status projected by carrying these objects rather than their being functional tools, within a culture which, seemingly, did not perceive literacy as a potent marker of prestige, as other coeval cultures did.

## Introduction: Iconography and scripts

It is often claimed that the Aegean use and perception of writing, for its whole duration from approximately the 2000s BCE to the end of the Bronze Age, is predominantly administrative, embedded in the management and maintenance of the bureaucratic machine of the «palaces», be they Minoan or, later, Mycenaean<sup>1</sup>. This is not the place to subvert or upend this long-standing and, mostly accepted, view, but, here, a more nuanced position will be attempted, converging with other recent voices<sup>2</sup>.

The specific focus, here, will be to chart the development of the earliest Aegean script, the Cretan Hieroglyphic<sup>3</sup> by relating it to the development of the material supports on which it was first found, namely small bone seals, and offer observations on the parallel developments that tie form (the seal types) with contents (iconography or script).

In other words, what we will attempt is a diachronic reconstruction that aims to explain how the seal types were first manipulated and adapted to creating and projecting

<sup>1</sup> Olivier 1986; Palaima 1990, but the list is long.

<sup>2</sup> Bennet 2008; Flouda 2013; Finlayson 2013, etc.

<sup>3</sup> On its early chronology *vis à vis* Linear A, see diverging views Godart 1999; Anastasiadou 2016, etc.

symbolic expressions, and how the earliest script manifests itself in the interstices of such creations and projections.

At the transition to the Protopalatial period that saw the establishment of the palatial structure (from the beginning of the 2000s BCE) Cretan seals started to be embellished with a vast array of iconographical details, undergoing a veritable boom. Less frequently, they were inscribed with the so-called Hieroglyphic script, in compositions that often, but not exclusively, mixed icons with signs. The manufacture and quality of the shapes and decorations ranged as widely as the images displayed. This variety stands in stark contrast with the preceding Prepalatial period, during which the assortment of designs was limited, often rendered crudely, and showed no script signs.

From this rapid excursus, it would be tempting to infer that the palatial organisation may have been the catalyst, if not the active agent, responsible for the boom in creative output that favoured the appearance of a local script, which accompanied the diversity of iconographical devices applied on the seals. To be sure, functions linked to authorising transactions, storing commodities and redacting documents by the act of stamping seals (clay sealings, vases etc.) must have been the prompt for manufacturing these objects. But we should not forget that the regulation and normalisation of codes, be they iconographic or tied to a specific language notation, can be preceded by instances of less formalised experimentation that may skirt top-down structure and control.

Also, seals have an inherently hybrid significance, that works towards status-oriented display and utilitarian application in administrative processes. The former is projected onto the often precious and colourful materials used for their manufacture, in the skilled artistry involved, and in their exhibited recognisability when worn as body ornaments (pendants, rings, bracelets); the latter in that the act of stamping is indeed functional as a memory-aid in keeping track of transactions and documentation. As such seals play a bivalent role, and their «impression» as physical objects ought not to be sidelined in favour of their functionality as tools for impressions of a different kind.

Their recognisability as insignia of authority should, therefore, not be understated. As objects to be worn and displayed in their full physicality, they are highly impressionistic, even despite the small sizes (*ca* 2 cm) of the average Minoan seal. The contents, be they decorative, or related to script signs, work in synergy with their shapes, bound up intimately with communication and display. The specific messages to be transmitted can work regardless of their being understood or not by literate and illiterate individuals. This creates an iconic literacy that is played out both in the typologies of seals selected to be worn and used, and in the messages displayed. What we aim to do in this paper is to reconstruct the interface between the form (the distinctive typologies of seals), and the contents carried on them (the decorations selected, and the inception of a highly iconic script).

In addressing seals as physical objects of selected individuals, rather than as tools of the bureaucratic apparatus, the questions we seek to address relate to whether a correlation can be established, in the time span in which Cretan seals are attested, between the shapes of the objects and the icons selected to decorate them. This goes hand in hand with whether a progression, tied to cultural preferences, can be reconstructed to explain how the seals acquired specific despite not being able to «decode» their message.

With the benefit of hindsight, we can draw conclusions based on drawing this chronological progression through choices made by the Minoans in typological and

iconographical details. The specific symbolic qualities, expressed by both types and styles, go beyond the use of the seals in administration. In other words, our concern is not so much tied to understanding *how* the seals were used in the mechanics of the bureaucratic machine, but to understanding *why* certain styles and types were selected to embody the authority of the persons involved in their use. It is undoubted that a restricted number of Cretans intended to display a specific role through the clever manipulation of symbolic expression, and we contend that this was achieved first by the specificities of the shapes of the seals and afterwards by the seal designs and the parallel development of writing.

This can be seen in the highly impressionistic zoomorphic seals of the Prepalatial period (and other characteristic types, such as various signet seals which are prototypical for this phase) and the iconicity later displayed in the use of the script. As will become apparent, there is reason to believe that the former paves the way for the latter, both working in the development of an autonomous Cretan declension of, we could claim, iconic awareness. This is played out in the ingenious, if short-lived, use of the hieroglyphs, which acquire the power of recognisability, and as such emphasise the social position, authority and weight of the officials active in the bureaucracy of the palaces, but also, most likely, outside the palace confines.

### Shaping seals in 3D: Iconic types

Consensus has long been established over the idea of an indirect external influence for the development of seal practices on Crete<sup>4</sup>. That the Minoans were exposed to the Egyptian, Near Eastern, and Anatolian cultures for the development of their own seal practices is highly likely. Exchanges with Egypt date as far back as the Middle Kingdom, when the earliest Egyptian scarabs and scaraboids appear on the island<sup>5</sup>. As we shall see, this type of import was so significant that it contributed to boost the craft of seal engraving in Early Minoan III-Middle Minoan IA<sup>6</sup>. Even though some vague inspiration may have come from abroad, the Minoans were quick to create original and innovative tropes in seal stones from the very beginning.

Already during the preceding EM II period (belonging to the Early Bronze Age in the whole Mediterranean area), the Minoans, in a similar way to the common practices observable in Anatolia<sup>7</sup>, used seals both for stamping – and never for rolling, as was the common practice in the Near East – and as luxury objects. It needs to be stressed and reiterated that the shapes used for stamping in Anatolia, especially of the Petschaft type<sup>8</sup>, are uncannily similar to some of the seals found on Crete.

This hypothesis seems to be supported by the scarcity of sealings in contrast to seals. In this way, it seems that the Minoans had a penchant for practicality and efficiency rather than aesthetic concerns. Seal shapes were chosen for their simplicity: conoids or irregular pyramids all pierced at the top are the prevalent types. These were handy and

<sup>4</sup> Weingarten 2005; Aruz 2000.

<sup>5</sup> Pini 2000; Weingarten 2005.

<sup>6</sup> Krzyszkowska 2005.

<sup>7</sup> von Wickede 1990; Beran 1967: 15-16.81; Mora 1982; Jasink 2002a: 391-392, ns.1.2.

<sup>8</sup> Boehmer and Güterbock 1987: 17.

also practical for being impressed. The signet shape is already attested, and it is very similar to the Anatolian type. It is not farfetched to speculate that these may represent probable prototypes. The Anatolian plateau and Crete were already in contact at this stage, likely through the southern coast of Turkey: Minoan merchants could have been active through this preferential trading route, and the Minoan preference for stamping rather than rolling seals may have emerged from such interactions.

The EM II marks a phase that characterises, possibly down to the transition to the Protopalatial period, a very limited sphragistic use for seals, which seem to be perceived as status-oriented objects rather than as purely administrative instruments used for stamping. This inclination towards a symbolic use is further corroborated by the very scarce evidence for sealings<sup>9</sup>. From a typological perspective, the consistent tendency to favour shapes that are pierced and suspended, to be worn by specific individuals as pendants or necklaces, testifies to their importance as visible and recognisable markers of social position.

Plentiful examples of these kinds are attested at Myrtos-*Fournou Korifi*, Lenda and at Hagia Triada. This penchant for simplicity in shape does not, however, imply that sophisticated flourishes in three dimensional shapes are not attested: Lenda provides examples of organic adaptations of the natural shapes of bones, the preferred material at this stage, to create cylinders, be they long sections cut lengthwise or convexo-concave ones, shoulder-shaped or crescent-shaped cuts. Platanos contributes to the same picture. Seal faces are decorated with schematic and linear devices, such as lattices and cross-hatched motifs, geometric or spiral-like symbols, all working towards an iconographic and morphological *koine* observable in the Mesara, which did not specifically signify particular social identities<sup>10</sup>.

In fact, the schematisation in shape and in decoration marks a *long durée* that characterises almost seven centuries of glyptic activity on the island, which highlights two separate phenomena: on the one hand, the absence of a working system of individual personalisation, and on the other, from a macro-scale, a homeostatic development in which continuity rather than innovation is emphasised. From this continuum, an abrupt change of direction follows.

The later EM III-MM IA period (about the end of the 3rd and the beginning of the 2nd millennium BCE) sees a fast introduction of new seal typologies, striking in the array of shapes displayed. Local imitations and adaptations of the Egyptian models were produced<sup>11</sup>, and a vibrant, if short-lived fashion of Egyptianising features took place in response to exotic imports<sup>12</sup>. Hippopotamus ivory is a crucial factor in the further stages of development of Minoan glyptic. In this context, the Mesara region is involved in the manufacture of a particularly characteristic type, the so-called «white pieces», which imitated the appearance of ivory with a coating of less impressive magnesium silicate<sup>13</sup>. In brief, a quantum leap is visible in the shapes used in glyptic. The designs on the bases of the seals, however, favour schematic decoration, linear or spiralfiform motifs, especially

<sup>9</sup> On this debated question, see Perna 1999.

<sup>10</sup> Anderson 2011.

<sup>11</sup> Aruz 2000.

<sup>12</sup> Phillips 2008.

<sup>13</sup> Pini 2000.



as shown in the zoomorphic seals, whose complex production in three-dimension more often than not creates a striking contrast with the simplicity of the designs at the base<sup>14</sup>. Tholos tombs A and B at Platanos and the cemetery at Archanes yielded the most important assemblages<sup>15</sup>. Spirals, leaves and rudimentary representations of animals decorate seals made of stone, bone and the «white pieces»<sup>16</sup>.

Towards the Protopalatial phase (late EM III and MM IA), the motifs become more individualising, even though the shapes are simple cylinders (Parading Lion/Spiral group), and at the same time, the signet types start morphing into the so-called Petschaft. It is interesting that this type of seal, to be worn and displayed, is the one upon which writing will take shape. This is valid if we assume, as we contend we should<sup>17</sup> that specific motifs on seal bases, such as animal heads, spirals and human figures, will end up in the repertoire of Cretan Hieroglyphic signs.

It is interesting to note that the use of ivory wanes rapidly after the EM III period. This can be explained by the discontinuation of the imports from Egypt<sup>18</sup> but intrinsic and practical explanations can also be sought. Whereas ivory was particularly suited for the creation of idiosyncratic shapes in three dimensions, it was undoubtedly less suited for the detailed and accurate decoration of the seal faces. It appears that the Minoans started recognising the potential of seals for an ever enlarging administrative machine, and were thus keen on expanding the potential of iconographic variety. The only way to achieve such expansion was to change the material used for making the seals and take full advantage of the seal bases. This marks another abrupt change after the MM IA phase. The following MM II period witnesses the full fruition of the iconographic potential and sees a flourishing diversification of the iconography engraved on the bases or faces of seals. Such a quantum leap in expression must have largely been tied to the change in material used and the definitive discontinuation of ivory and bone.

The introduction on Crete, likely in MM IB, of the fixed lapidary lathe with its faster rotary or horizontal bow-drill made working hard stone much easier. This applied as much to the seal types as to the decorations engraved<sup>19</sup>. This technological innovation was employed specifically in this period and during the following MM II, as steatite establishes itself as the preferred soft materials selected for the seals<sup>20</sup>. By this time, the remodelling of seal shapes from external sources, as seen at the beginning of seal practices on Crete, with their highly impressionistic, if impractical, penchant for three dimensionality, and zoomorphic and anthropomorphic shapes, is supplanted by a more limited array of seal types. These, as a counterbalance, lend themselves to expand the possibilities of engraving a wider variety of decorative elements.

To summarise, there is reason to believe that in the Prepalatial period the Minoans favoured iconic and readily recognisable figurative shapes for their seals, while keeping decoration and symbolic contents either very simple or very repetitive. Shapes seem to carry the coded message of status symbol and authority much more than the actual

<sup>14</sup> Galanakis 2005: 24.

<sup>15</sup> Galanakis 2005: 23.

<sup>16</sup> Yule 1980; Weingarten 2005: 760; Pini 2000; Karetsou 2000: 302-334.

<sup>17</sup> Jasink 2009; Ferrara 2017.

<sup>18</sup> Karetsou 2000; Krzyszkowska 2005.

<sup>19</sup> Krzyszkowska 2005: 83-85.

<sup>20</sup> Anastasiadou 2011.

ornamental contents. By the time the administration starts kicking with a more regulated effort to produce seals and to practice stamping more widely, the switch to content is apparent. It is in such a switch, that we believe lies the introduction of a new, highly iconic, writing system, Cretan Hieroglyphic.

### Iconicity in writing

We are specifically concerned here with the introduction of writing on seal faces, rather than on the administrative documents. This is for two main reasons: one, the former, as exemplified in the Archanes group<sup>21</sup> is likely to have preceded the latter; two, the script starts off as highly iconic, and then becomes progressively more stylised and schematic when introduced on the archival clay material.

It is in the iconicity of the script, represented by sign shapes which have identifiable, figurative referents in natural representations, such as objects, animals, plant and body parts, that we see an intentional manipulation of highly symbolic meanings and emblems, as personalising items belonging a clearly distinct elite group. These individuals projected their own status by relying on the recognisability of the icons engraved on the seals. Contents, in other words, take the lead in displaying social role, position and cultural differentiation. Such symbol-bound manipulation counterweighs the impressionistic varieties in three-dimensional seal shapes that were favoured in the Prepalatial period, bestowing the faces of the seals, rather than their morphology, with the ‘notice-me’ factor. While we cannot take for granted that this transition was intentional and mechanical, it seems that figurative iconicity was an aspect that the Minoans bore in mind when they augmented their decorative input on the faces of the seals.

In a way, such a process may have not been too dissimilar from the direction that literacy took in Mesopotamia in the transposition for three-dimensional tokens enveloped in clay *bullae* to the impression of the same tokens on flattened-out clay surfaces, which eventually culminated in the first tablet archives at Uruk and Jemdet Nasr in the 4th millennium BCE<sup>22</sup>. The difference, which arguably is not insignificant, lies in the extended timeframe to be allowed for the Mesopotamian trajectory to full literacy, which, if we agree with Schmandt-Besserat, took a substantial number of centuries.

In the Minoan context, the timespan is much more confined, but it is exactly to the momentous transition that leads to the palace-run administration that we should ascribe the perception and appreciation of what an iconic literacy can accomplish. This transition represented a trampoline, to make the authority subtly, yet effectively, noticeable, while favouring simple and handy shapes of seals. The symbolic value of the icons was retained, if transposed to a different side of the same medium, and made to acquire a new significance and added use: that of recording the sounds of the Minoan language.

### Paradigm shift: Petschaft as catalyst for writing

This transition, and the role played by writing, once introduced, are not immediately evident. As already stated, it is only with the benefit of hindsight that we can speculate

<sup>21</sup> Yule 1980; Sakellarakis and Sakellaraki 1997; Flouda 2013; Webb, Weingarten 2012; Ferrara 2015.

<sup>22</sup> Schmandt-Besserat 1992.

on the relationships between shape and content, form and function, taking full advantage of a diachronic perspective.

If we turn to the types of seals that gained favour at the beginning of the Protopalatial period, we can see that the introduction of more sophisticated tools, such as the lathe mentioned above, favoured a transition from the relatively simple «signet» seal type to the Petschaft during the MM IB phase. Petschaft types tend to be roughly homogenous in shape and manufacture, are generally very refined in their execution and generally made of hard stones. Particularly interesting to note is their relationship with the Cretan Hieroglyphic writing, once its inception is fully underway in the MM II period.

In our statistical analysis, based on of the *CMS (Corpus der minoischen und mykenischen Siegel)* online catalogue that gathers all Minoan seals (inscribed and uninscribed), we have computed that 26% of the Petschaft seal typology is inscribed with the Cretan Hieroglyphic script.

In specific terms, this is 82+14 individual specimens defined in *CMS* as «Griffönsiegel», for a total of 96 attested Petschaft in total. The 14 figure is a distinct addendum, as it represents handle seals that closely resemble Petschaft, but were treated by us as a separate sub-category (they are almost all in steatite, and therefore to be considered less refined than the hard stone material (or metal) reserved for the «properly defined» Petschaft.

The inscribed material is substantial and particularly interesting in the preciousness and sophistication of the specimens (Table 1). It is to be noted that we treat as «inscribed» not just the Petschaft seal faces that bear more than two consecutive signs of the Cretan Hieroglyphic script arranged coherently (following the conventional definition of what constitutes a «proper» inscription), but we also include single attestations of isolated signs that rightfully belong to the Hieroglyphic repertoire.

	Cat. no.	CH sign	Material	Provenance	Date
1	CMS I.423	Cat mask	Steatite	Crete	MM II
2	CMS II.2.3	Cat mask	Green jasper	-	-
3	CMS II.2.24	Possible cat mask	Pseudo-jasper	-	-
4	CMS II.2.249	2 signs	Chalcedony		
5	CMS II.2.282	Cat mask	Green jasper		
6	CMS III.103	4 signs	Steatite	Crete	
7	CMS III.104	Cat mask	Green jasper	Mallia	MM II
8	CMS VI.124	4 signs	Green jasper	Ziros	
9	CMS VI.125	4 signs	Chalcedony	Kalo Xorio	
10	CMS VI.126	3 signs	Silver	Neapolis	MM II
11	CMS VI.127	Wolf with protruding tongue	Camelian	Kedri? Ierapetras	MM II
12	CMS VI.131	Full-bodied cat	Green jasper	Lato? Mirabello	
13	CMS VI.132	Bucranion	Green jasper	Crete	
14	CMS VI.138**	Full-bodied cat	Chalcedony	Crete	
15	CMS VII.34	Bucranion	Green jasper	Crete	MM II
16	CMS VII.255	2 signs	Green jasper	Crete	MM II
17	CMS VIII.34	Cat mask	Green jasper		
18	CMS VIII.103	Wolf with protruding tongue	Rock crystal	Crete	
19	CMS X.53	2 signs?	Hard stone	Crete	MM II
20	CMS X.280	Cat mask	Quartz	Crete	MM II
21	CMS XII.100	Cat mask	Camelian		
22	CMS XII.101	3 signs	Green jasper	Crete	MM II

23	CMS XII.102	3 signs	Hematite	Crete	MM II
24	TSU06/104	Wolf with protruding tongue	Chlorite	Petras	MM II?
25	TSK06/145	4 signs	Green jasper	Petras	
26	#185	4 signs	Green jasper	Mallia	MM II?

Table 1. Petschaft bearing Cretan Hieroglyphic inscriptions. NB<sub>1</sub>: zoomorph highlighted as\*\*. NB<sub>2</sub>: Possible Petschaft impression, CMS II.5.300 with impression of wolf with protruding tongue, not included.

We contend that the definition *stricto sensu* of what constitutes an inscription subtracts from the possibility that the single-sign attestations may, we argue, record sounds of the Minoan language. These had been intentionally omitted and dismissed as «simply decorative» in the extant corpus of inscriptions<sup>23</sup>, but we believe ought to be reinstated and treated as part of the sign repertoire. Examples of Petschaft seals show such signs as the so-called cat mask, as well as «proper» (longer) inscriptions (Fig. 1).



Fig. 1. Examples of Petschaft shapes, with their respective engraved seal faces. Adapted from *Corpus der minoischen und mykenischen Siegel* (CMS): CMS I.423; CMS VIII.34, CMS II.2.3, and CMS VI.124.

Petschaft seals reproduce also purely decorative symbols, with a prevalence of architectonic, animal and floral designs. Because of the limited space available on the single seal face, this is generally an individual main motif. This has exceptions, of course, as testified by the longer, if rare, inscriptions (see the last seal in Fig. 1, for instance). These are highly significant, according to our statistical count. First, we now know that roughly half of the inscribed seal corpus (taking all seal shapes together: Petschaft, three-sided and four-sided prisms, etc.) is inscribed with formulas, *i.e.* repeated sequences of signs<sup>24</sup>. Being highly repetitive and formulaic, the inscriptions yield very little information as to their subject matters: the formulas may refer to official roles or realms of activity, but we remain in the dark as to a more precise meaning.

If we look at the specific attestations of Hieroglyphic sequences on the Petschaft seals, where the space to bestow information is constrained and limited, we see that the formulas are almost absent. Eleven specimens are inscribed with more than one sign, nine of which are without formulas. This means that the almost all of the attestations are unique, or to put it in jargon, *hapax graphomena*. While conceding the usual caveats, namely that we are at the mercy of the limited data and the vagaries of the record,

<sup>23</sup> Olivier and Godart 1996: 13.

<sup>24</sup> Ferrara 2015.

we still can draw two important conclusions: the (extant) inscribed Petschaft seals are all of remarkable manufacture, and they show a clear emphasis, through their unique attestations, on individualising features and personalisation. If formulas revolve around bureaucratic, administrative concerns, *hapaxes* tend to identify personalities. Thus it should not surprise us if a largely autonomous development of the Cretan Hieroglyphic script hinged on intents geared towards marking out individuals through their singular social position. This was achieved through the recognisable shape, colour and refined manufacture of the Petschaft seals, which were worn as pendants and thus very visible (albeit often small!), and the recording of Hieroglyphic unique attestations. The shape was striking and the script was tailor-made, creating a most effective, impactful visual code. Yet, the space for the script was limited.

### From Petschaft to prism

To counteract space-limitations, enter the multi-faced prism. It is tempting to infer that it is the space constraint itself that gave momentum to recording inscriptions in a neater way. The roundish face of Petschaft seals is not particularly conducive to a clear arrangement of the signs of the script. In the history of early writing, the intent to write signs in consecutive coherent arrangement, beyond pictography and at the language notation stage, is a principal motion towards the standardisation of written language<sup>25</sup>. Of course this is a simplification not devoid of tangible exceptions, but as far as the Cretans are concerned, this need for coherence, logic, and order in configuring phonography seems to have been deeply felt. All the same, the multi-faced prismatic category of seals is complex, as it encompasses two-sided (which are quite rare), three-sided (which are mainly made of steatite and only rarely inscribed), and four-sided prisms (Fig. 2).

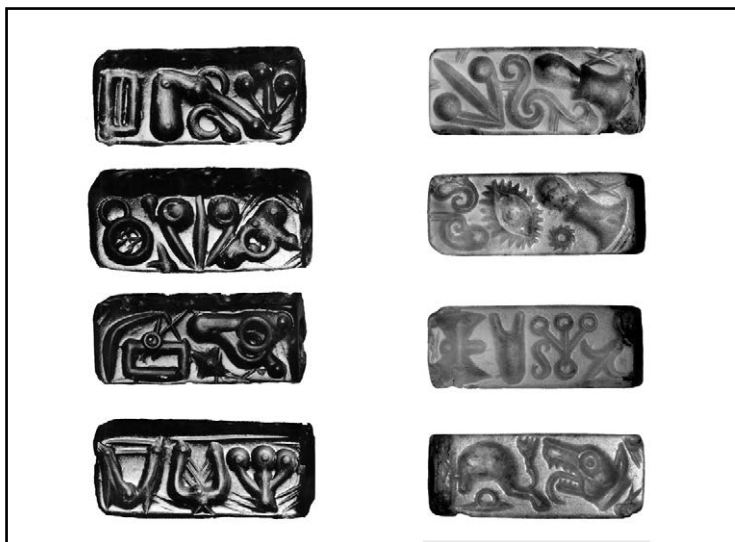


Fig. 2. Example of four-sided prism, made of green jasper (CMSVI, 105) on the left and one, right, made of agate (CMS XII, 106)

<sup>25</sup> Houston 2004.

The latter is what concerns us here, because it seems to have been intended to record Cretan Hieroglyphic information.

Indeed, it strikes the eye that, more often than not, the seal faces of four-sided prisms bear inscriptions<sup>26</sup>. According to our statistical analysis, the patterns involving the types of inscriptions are also clear: formulas abound almost 20 examples (out of 44, including the Petras finds) have either two or three formulas engraved. This makes the four-sided prism mini-corpus a tool particularly targeted to recording administrative transactions, and less concerned with recording unique sequences. It must also be noted that the sides of the prisms that do not bear inscriptions show coherence in recurring symbols, such as floral motifs, spirals and a limited array of animals (fish, birds, etc.). The materials used show an equal amount of homogeneity, with green jasper being the absolute favourite among precious stones.

This cursory survey indicates that the four-sided prism expands and brings to full fruition the possibilities of recording formulas tied to the administration neatly and precisely, while not disregarding the high-status «look at me» effect of a seal that is as visible as the Petschaft, which was also possibly worn as pendant. The generally precious materials used also point in the direction of a specific projection of status display, although always in miniature (the prisms are on average 2 cm in length).

Four-sided prisms were tied to the running of the administration. For instance, at Malia, a number of sealings bear impressions from four-sided prism. However, direct autopsy carried out by us on a sample of seals has shown insubstantial traces of wear through sphragistic use, which, arguably, may emphasise their significance as objects of personal prestige and status.

In brief, for four-sided prisms, the script, with its striking iconicity, takes centre stage, while the shape takes on a more marginalised role, tailor-made and functional to bearing script signs. In this way, this preference in supporting writing paves the ways towards a utilitarian, rather than completely symbolic, significance and purpose for the Cretan Hieroglyphic script. Inscriptions on prisms may have provided the impetus for the progressive application of Cretan Hieroglyphic to the less resilient, but more manageable, nimble, and economic (both in time-consumption and labour) medium of clay.

### And from prism to bar (or the other way round?)

Despite extensive studies on the material inscribed in Cretan Hieroglyphic<sup>27</sup>, a more in-depth investigation of the direct correlation between the objects inscribed on clay (bars and medallions, mainly) and those engraved on stone (seals, specifically) can still prove instructive. Even from a superficial perspective, the relationship between four-sided prisms and clay bars is patently clear. On the clay material, bars are inscribed on all four sides (just as the sealstones are engraved on all four sides) and pierced at the top (the seals are instead pierced longitudinally). The clay bars are relatively larger, as they need to contain more detailed information than two- or three-sign formulas, but the inclination towards the same typology of object to be inscribed (or engraved) is obvious. This means that the Cretan Hieroglyphic bar represents a veritable *extension* of the use of the script

<sup>26</sup> Poursat 2000.

<sup>27</sup> Olivier 2000; Poursat 2000; Perna 2014; Jasink 2002b.

for administrative purposes, itemising transactions with sign sequences combined with numbers.

We cannot, in light of the problems in dating all of the inscriptions in Hieroglyphic, reconstruct a progressive and linear development from stone prism to clay bar, and while we cannot exclude that the progression could run the other way round, it is tempting to see the possibility of recording more information (and of a different kind) on the clay bars as a direct consequence of having created a seal type, the prism, that fit the bill as a bearer of Hieroglyphic formulas. The step is almost natural: if the seal functioned as *both* an instrument of bureaucracy *and* as a marker of social distinction, it would follow quite seamlessly that the clay bar, humbler but re-usable, could fit the bill as a tool for recording ephemeral, transient information.

### Shapes, signs to remember: Literacy through iconicity

The glyptic tradition on Crete, from its Prepalatial beginnings to the miniaturistic «flowering» of the Neopalatial apogee, is long-lived and successful, innovative and creative, for its whole duration. When it comes to its relationship to writing, it is, instead, short-lived and stunted. As opposed to other coeval traditions in the other literate regions of the Eastern Mediterranean, such as Anatolia and the Near East, it represents nothing more than a fleeting fashion within the very limited timespan of the Protopalatial period. Petschaft seals and prisms disappear from record by the time the Neopalatial period begins, which proves again their close relation as seal shapes tied to recording Cretan Hieroglyphic writing. Lentoid, amygdaloidal, and cushion become the preferred seals shapes, and writing, by then uniquely in the Linear A tradition, becomes predominantly confined to the malleability of clay.

Indeed, it may not be a coincidence that in the Neopalatial period, objects intended as personal markers take on the common repertory that was tied to the Cretan Hieroglyphic seal corpus, while *completely* forsaking the actual script signs. This is the trajectory paved by the so-called «talismanic» seals, which are clearly different from the other seal types commonly used in this period. Their penchant is to renew and recuperate the most common iconography of the Protopalatial period, such as jars, boats, animals (spiders, cuttlefish, scorpion, bucranion, fish), keeping the previous tradition alive<sup>28</sup>. The fact that sealings created by talismanic seals are very rare (21 out of 902, Onassoglou 1985) points to their likely use as personalising devices rather than objects used sphragistically.

It is equally not a coincidence that the two seal shapes specialised in recording writing, Petschaft seals and prisms, die out with the script that they are commonly made to record, at the end of the Protopalatial period. The fad for personalisation was by then over, as the Hieroglyphic script wanes and its status symbol significance wanes with it. These two seal shapes epitomise the personal and individual emphasis, recognisable immediately as markers of prestige within the palatial hierarchy, as well as outside its confines. The iconicity of these shapes and their readily recognisable symbolic connotation went hand-in-hand with the iconicity of the script they generally bore, in a synergic attempt to make increasing authority, social distinction, personal position and, arguably, named individuals, visible to all, literate and illiterates alike.

<sup>28</sup> Jasink 2016.

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# Management, power and non-literate communication in Prepalatial and Palatial Messara

*Pietro M. Militello*

**Abstract:** If a restricted definition of script is accepted, a-literate media include a variety of devices belonging to different classes of artefacts: non alphabetic signs incised/impressed/painted on pottery and stone objects, tokens, seals and stamped objects. They form connected but not coinciding sets, which have been used mainly, but not only, in the administrative sphere. Our survey will focus on two case studies represented by the Bronze Age sites of Phaistos and Ayia Triada in Crete, both with Linear A documents as well. They provide a good opportunity for comparing, in the same context, literate and a-literate media. The analysis of potter's and mason's marks, tokens and stamped objects reveals that the counting tools appear already in EM II, were used alongside literate media during the palatial periods and disappear after the destruction of the second palaces. It is possible therefore to compare the difference between the use of non literate media in non-literate and in literate societies, and to demonstrate the influence writing can have in the development of those devices through the conscious or unconscious emulation of the official script.

## Introduction

Communication is a fundamental element in the construction of human societies and, as such, an important tool for the management of power. Communication embraces, as semiotics demonstrate, almost all aspects of human life, not limiting itself to what is normally perceived as a communicative act (i.e. speech, writing). Dress, gestures, movement, together with dance and visual arts are forms of communication, which, in the perspective of this volume, were actively exploited by emerging élites to consolidate their prestige. Among communication tools, script has acquired a dominant role, not only from the historiographical point of view (the importance it has for archaeologists in the reconstruction of past societies), but also from an historical one, since it was one of the most important tools of power since the birth of early states.

Even if the function of writing is not limited to the managing of goods (see below), at the beginning, Aegean and Near Eastern script appears to be strictly linked with bureaucracy: protoelamite tablets in the East, Linear A and B in the Aegean, are mainly concerned with lists of objects and management of goods, together with *cretulae*, *bullae* (clay envelopes), tokens, and stamped objects.

This strong connection between literate and non literate tools in the management of goods has been at the base of the evolutionistic model proposed by Schmandt Besserat<sup>1</sup>. According to her, writing developed from counting, through tokens, i.e. objects shaped in the form of goods. These appeared already in the 8th millennium BCE, afterwards clay envelopes were introduced (*bullae*) inscribed outside with a drawing reproducing the shape of the tokens, and finally the same signs were simply incised on tablets, first with an ideographic meaning, afterwards with a phonetic value.

Cretulae, nodules etc. continue to be part of the administrative system until the end of the 2nd millennium, after the introduction of writing, often associated within the same archaeological context. A consequence has been that, in the Aegean archaeological literature, inscribed objects and various types of sealings are often dealt with together by the same authors, and by some authors they are also classified according to a single system<sup>2</sup>.

In this perspective, other devices used for counting objects and crops or managing the movement of goods and activities have been also included in the realm of the administrative sphere in the wider sense: simple tokens, sealings, potters' marks, mason's marks, signs on objects. The economic interpretation of such tools, however, has in some way obscured all other possible uses and meanings, falling within the «private sphere» and the realms of magic, religion and social symbols. Each of these a-literate media constitutes a set intersecting, but not coinciding, with the administrative set; moreover, such devices could be largely independent from script, running parallel to the literate world or be complementary with it.

The relation between literate and a-literate systems of communication becomes therefore a fascinating but complex field of research, involving archaeology, history, anthropology and also linguistics and semiotics. In order to make things clear, the first step to do is to clarify what we mean by «script» and by «non literary tools».

*Writing.* Definitions for script refers often to its communicative role and its visual (often permanent) nature<sup>3</sup>. But these definitions are too broad for our purposes, and create a large buffer zone. A visual communicative system includes also rock art, painted motifs, even textile decoration, together with, obviously, graphemes, marks and cuttings<sup>4</sup>. In this paper, we prefer to use a more restricted definition for writing (and literacy), considering script as a secondary communication system, i.e., a code (system of signs) representing another code (system of sounds: language)<sup>5</sup>.

<sup>1</sup> Schmandt Besserat 1992.

<sup>2</sup> Hallager 1995. The proposal refused however by other authors (e.g. Olivier 1999: 420). However, the same Olivier accept the idea of giving the same sequence to inscribed and un-inscribed tablets, demonstrating that the belonging to a system is more important than the presence/absence of a true script.

<sup>3</sup> Script has been defined as «A system of human intercommunication through visible conventional signs» (Gelb 1952 (1993): 16. «L'insieme di operazioni, materiali, prodotti, legati alla produzione e all'uso dei sistemi grafici (Cardona 1981: 32). «A system of more or less permanent marks used to represent an utterance in such a way that it can be recovered more or less exactly without the intervention of the utterer» (Daniels, Bright 1996: 3). «A set of visible or tactile signs used to represent units of language in a systematic way, with the purpose of recording messages which can be retrieved by everyone who knows the language in question and the rules by virtue of which its units are encoded in the writing system». Coulmas 1999: 560). Facchetti 2007: 15-16 stresses the relation of script with linguistic analysis. (<http://www.omniglot.com/writing/definition.htm>).

<sup>4</sup> Gelb 1952 (1993), chapter 2; Cardona 1981:37-42.

<sup>5</sup> Marchese 1987: 44. The same, more restricted definition can be found also in the authors quoted above (e.g. Daniels, Bright 1996; Gelb 1952 (1993): 17). Also according to Fischer 2001:12, a «complete writing» system should fulfil all the

In this way, we are able to cut a clear line between societies with and without writing, and give a reason for the gap represented by the introduction of a script. This definition, as every definition, has some points of weakness. It creates a grey zone, represented by logographic scripts, where signs do not represent the language, but concepts, as in the Elamite tablets. In these cases, however, insofar signs are standardized, logographic scripts (and numerals) try to reproduce the logic of the discourse, and quickly evolve into phonetic scripts.

Once defined in this way, true writing systems require a lot of energy not only for being created, but also maintained (i.e. teaching it and perpetuating) and they can only be sustained if there is sufficient motivation and an efficient (political or religious) structure.

On the other hand, even when the syllabary of a script is known, it is not always easy to understand if single signs, especially of simple shape (such as X or +) are to be interpreted as inscriptions or as non scribal signs. Godart and Olivier carefully suggest that only when two or more signs are present can we be sure we are in presence of an inscription<sup>6</sup>.

The great attention paid to administration as the origin of writing has in some way missed the importance of the religious and legal spheres, well recognized by J. Goody in his book on writing<sup>7</sup>. If in the Near East and the Aegean, the administrative purpose of script («word of Mammona») seems to be the first to appear, elsewhere the earliest examples of inscriptions fall in the realm of religion<sup>8</sup>. Even in Minoan Crete the reassessment of chronology confirms that the first inscriptions were of religious nature<sup>9</sup>. After being introduced, writing is not simply a tool, but acquires a power in itself, makes things alive, as it happens for the «speaking objects»<sup>10</sup>, affirm identity, as for children writing their name. In doing so writing divorces from the purely communicative goal, and or acquire a symbolic value in itself<sup>11</sup>, so that inscriptions can be hidden<sup>12</sup> or writing can be deliberately obscured<sup>13</sup>, contradicting its communicative role.

*A-literate means of communication.* According to the given definition, all other forms of visual communication, not representing a language, such as pottery or textile decoration, are considered here an a-literate mean of communication. But among these forms, seals, sealings, marks and tokens form a separate group, due to their (potential) administrative function. Insofar they were used for the identification of property or destination, for the control of production processes or for simple counting, they share a purpose similar to

following criteria: it must have as its purpose communication; it must consist of artificial graphic marks on a durable or electronic surface; it must use marks that relate conventionally to articulate speech (the systematic arrangement of significant vocal sounds) or electronic programming in such a way that communication is achieved.

<sup>6</sup> GORILA I: XI-XII. An evidence of this ambiguity is apparent in the different interpretation of incised signs on sherds of the Early Bronze Age in Sicily, considered by me as simple potter's marks (Milietto 1998) and by Negri as true inscriptions (Negri 2002).

<sup>7</sup> Goody 1986.

<sup>8</sup> See the *lapis niger* in Rome, or the Cuma inscription.

<sup>9</sup> We refer to the so called Archanes script: Perna 2014; Karnava 2016a: 82

<sup>10</sup> Carraro 2007.

<sup>11</sup> Schoep 2007: 56 (writing as a symbolic commodity).

<sup>12</sup> As the Tabara inscriptions of Apulia, dated to the 5th-4th century BCE incised in the tombs slabs, where nobody could read them after the burial (Herring 2007).

<sup>13</sup> Cardona 1981: 154-195 (magic alphabets and divination). See, e.g., the votive inscriptions with words deliberately modified and obscured by accompanying signs.

that of the tablets<sup>14</sup> and can be included within the *non scribal devices*. Three groups can be identified.

The first group is represented by *non figurative, non syllabic single signs* (sealings, potters' marks, mason's marks) used for identification, which share with script the action (incising, impressing, painting) and the medium (pottery, clay, stone). They can be influenced by script, using signs similar to that of the syllabary, or be totally independent of it. They can be in some way codified (when used within an administrative system) or be a personal invention (e.g. a check sign made by an individual for personal use). Sometimes they are considered proto-literate, but in this paper I will avoid this term due to its evolutionistic nuances.

The second group is represented by *mnemonic numeric devices*, such as tokens, multiple incisions or multiple impressions. They share with writing the administrative goal, the need to keep a track of numbers of objects<sup>15</sup>, are independent of script and appear perhaps at the beginning of modern human minds, as a form of extended memory<sup>16</sup>.

The third group of bureaucracy-related objects is represented by *seals and sealings*. They are a clear example of the plurality of meanings of non scribal devices insofar they put together an object (the seal with its materiality), a picture (the engraving), and an action (the impression). They are related to writing because they can be a support for an inscription, or because the action of impressing makes them an administrative tool. But their meaning is much wider, and involves the symbolic sphere (self representation) and the magic one (amuletic function).

As is clear, these three groups are sometimes overlapping and it is not easy to distinguish among those different uses, as we will see.

### A-literate devices. The evidence from Phaistos and Ayia Triada

After these premises, we would like to analyze the evidence for communication systems other than writing in the two sites of Phaistos and Ayia Triada. Here one (or two) forms of writings, Linear A and perhaps, Hieroglyphic, were used during the Bronze Age<sup>17</sup>, not to mention the Disk of Phaistos. This situation allow us a better understanding of the diachronic and synchronic relation between literate and a-literate means of communication.

For our goal it is important to remind the reader that for the palatial period the evidence is not only represented by tablets and sealings in Linear A<sup>18</sup>, but also by true inscriptions on vases, published in *GORILA* (HT Zb 158-161; PH Zb 4-5, 47-48). They occur mainly on large *pithoi* from the official buildings (Palace of Phaistos, Villa of Ayia Triada), and were probably written by true scribes, falling within the official control system. In one case the script seems to indicate a toponym (*sukirita*: if the identification

<sup>14</sup> We are not dealing here with other possible spheres of action of seals and signs, such as their possible apotropaic or magic use, but we should always bear this possibility in mind.

<sup>15</sup> The same can not be said, however, of numerals as part of a script, codified according to a hierarchical structure (tens or dozens, hundreds etc.), in a more or less abstract way.

<sup>16</sup> D'Errico & Cacho 1994; D'Errico 1995; Marshack, D'Errico 1996. Sulla *estende memory*, Clark, Charlmes 1998.

<sup>17</sup> For hieroglyphic script I refer to the tablet PH Hi 01, to the hieroglyphic (?) inscriptions PH Yb 01 and Yc 01, to the hieroglyphic signs on seals from Ayia Triada (CMS II, 6, 168, 176-184, 187-189, 220, 231, 245). See, however, the doubts expressed by Kamava 2015: 64 and n. 17.

<sup>18</sup> See for a review Militello 2011.

with Sybrita in HT Zb 158b is correct), in another an anthroponyme (*pa-ta-da* in HT Zb 160?<sup>19</sup>) which would perfectly fit the later use (see, e.g., the *paidopila* inscription in Phaistos). Two short inscriptions of two signs each were published by me<sup>20</sup> and have been included in the corpus of hieroglyphic inscriptions (PH Yb 01; PH Yc 01). They differ from the preceding examples for occurring on small cups and not on large pithoi.

Source	Inv.	Sign	Provenance
Levi 1976: 286-87, Tav. 227c	F838a	trident (Carratelli 1957-58: Catalogue n. 41)	LXX
Levi 1976: 286-87, Tav. 227h	F838b	<b>ABI6+</b> part of a second sign	LXX
Levi 1976: Tav. 227a; Militello 1990	PH Yb 01		So called Grande Frana
Militello 1990	PH Yc 01		So called Grande Frana

Table 1. Inscriptions not published in GORILA

According to what has been said in our introduction, discussion will tackle the three categories of a) single signs, b) objects and c) seals, largely already published<sup>21</sup> but never dealt with as a whole. On their own, single signs fall into two groups: on mobile artefacts and on architectural blocks.

### 1. *Non figurative, non syllabic single signs*

This group includes signs on mobile objects (vases, weights, loom-weights etc.) and on stone blocks (so called mason's marks). It is not always easy to mark the border between «signs» and «decoration», as demonstrated by the inclusion, in the publication by Pernier, of motifs which belong, in fact, to the decorative repertoire of Kamares pottery<sup>22</sup>. We will consider only schematic signs not used elsewhere in the decoration of pottery or other media.

In the same way, it is not always easy to distinguish between single signs as abbreviations taken from a true script, or a mnemonic device. This is particularly true for very simple motifs such as the cross.

#### 1a. *Incised/painted signs on mobile artefacts*

Already in EM III pottery belonging to phase VIII of Todaro, some painted strokes on vases have been interpreted as identification signs<sup>23</sup>. They are very simple, and not easily distinguishable from plain decoration; moreover, they do not seem to have any connections with palatial specimens, which are all incised or impressed.

For the palatial period, signs on vases occur together with true inscriptions and can have been influenced by these.

<sup>19</sup> Valerio 2007 interprets *PA-TA-DA DU-PU<sub>2</sub>-RE* of HT Zb 160 as «Patada, the master».

<sup>20</sup> Militello 1990. Mentioned in Olivier 1991: 444 and 446, they were not included in the corpus of hieroglyphic inscriptions (*CHIC*), but were after considered «hieroglyphic», with some doubts Olivier 1999: 420 and named PH Yb 01, PH Yc 01. See also Del Frio 2012: 6. PH Yb 01 is F6000c Levi 1976: tav. 227a.

<sup>21</sup> Seals and seal impressions have been published in the *CMS II, 1-3 and II, 8*, with a few addition in Levi 1978-81: pl. 228; Levi-Carinci 1988: 294 and Militello 2001. Moreover they have been one of the major focus of discussion on Minoan administration by Fiandra, Ferioli and Fiandra; Weingarten; Pini; Hallager; Perna. Mason's marks from Phaistos have been published in Pernier; Banti 1951, from Aya Triada in Cucuzza 1992, 1995. Tokens by Militello 2001, with a few additions by Todaro 2013, *passim*.

<sup>22</sup> Pernier 1935: 410-419. See motifs 2-8 (S, flower, bull etc.).

<sup>23</sup> Todaro 2013: 253-254 and fig. 110.

For Phaistos they have been collected by Levi and Carinci in a short chapter<sup>24</sup>, but no full catalogue of such evidence exists while in Ayia Triada only one «inscribed» sherd is known<sup>25</sup>. The known data are collected in Table 1 and, together with other published evidence allow to make some considerations.

**Phaistos** (from Pernier 1935; Levi 1976)<sup>26</sup>

Source	Inv.	Sign	Provenance
Levi-Carinci 1988: 207, fig. 66	F0876 Kitchen pot	Inverted «N» before firing	H. Photini, Room Beta
Levi 1976: 651, Tav. 227d	F0924a Sherd	«N» Pugliese (Carratelli 1957-58: n. 84)	H.Photini «strada»
Levi 1976: 651, Tav. 227r	F0924b Sherd	Scrubble	H.Photini «strada»
Levi 1976: Tav. 227e	F2556 Sherd	<b>AB57</b>	West of Court LXX
Levi 1976: 523, Tav. 227q	F4940 Sherd	«M» (half)	Room LXXXV
Levi 1976: 563, 591; Tav. 227k/l	F5275a-b Sherd	Double axe	Grande Frana
Levi 1976: 563, 591; Tav. 227s	F5275c Sherd	«V»	Grande Frana
Levi 1976: 587, Tav. 227f	F6000a Sherd	<b>AB57</b> (impressed 8 or 9 times)	Grande Frana
Levi 1976: Tav. 227g Levi-Carinci 1988: 297	F6337 Sherd	<b>vvv</b> (cfr. Pugliese Carratelli 1957-58: n. 62).	No provenance
Levi 1976: 159, Tav. 227p	F6400a Sherd	triangle (with an inner stroke?)	Palace, Room LII fase Ib
Levi 1976: 159, Tav. 227n	F6400b Sherd	X+Cross ( <b>AB02?</b> )	Palace, Room LII fase Ib
Levi 1976: 446-447, Tav. 227i	F6598 Sherd	E (Carratelli 1957-58: n.74?)	Saggi sud
Levi 1976: 478, Tav. 227m	F6599 Sherd	X	Under Room CC
Pernier 1935: 417, fig. 245	No inv. Sherd	X plus stroke	Filling over court XXXII

**Ayia Triada**

Militello 1991	Weight HTR Zg 163	Metrogramme A703	Complesso della Mazza di Breccia
Militello 2014, p. 264, fig.	Loomweight Nr. 581, 712	AB03	Villa
Baldacci in press	No inv.	Herringbone motifs on a cooking pot	

Table 2. Single signs on mobile artefacts from Phaistos and Ayia Triada

The situation is a complex one and reveals, once more, the buffer zone between literate and a-literate means of communication, even when using the rule of thumb of the single vs multiple signs. In fact, the distinction between, e.g., a potter's mark and a single sign is not an easy one. PH Z 48 of Raison and Pope has been not included in *GORILA*, since considered a potter's mark<sup>27</sup>, but it was considered an inscription by Pugliese Carratelli.

<sup>24</sup> Levi 1976: tav. 228 (photographs of some fragments); Levi, Carinci 1988: 297.

<sup>25</sup> Baldacci 2013.

<sup>26</sup> Among the inscribed pieces collected in plate 227, number a) is PHYc 01; n. b is the roundel PHWc 47; n. c joins with number h forming the inscription PH Zb 48. Finally, the large, deep cross incised on the painted lid in F5464 (number 227o) probably had the practical use of allowing vapour to escape (cfr. Levi 1976: 568; Levi Carinci 1988: 233).

<sup>27</sup> *GORILA* VI: xxi.



Two subgroups can be distinguished.

A) Single signs with correspondence in the official script. From Ayia Triada the incised metrogramme on a stone weight, HTR Zg 163, and the (possible) AB04 on two loom-weights from the Villa can be mentioned<sup>28</sup>. They resemble the Hieroglyphic #025 and Linear B AB04. In Linear B AB04 has the phonetic value of «TE», and is used as abbreviation for a kind of textile. In Linear A it appears as one of the most frequent «transaction signs».

From Phaistos the following incisions can be mentioned (inventory numbers refers to Phaistos classification): F2556 (AB57); 6000 (AB57 repeated); F838 (AB16).

AB57 has in Linear B the phonetic value of «ja». It occurs alone in HT Zd 156, a graffito on the wall of room 54<sup>29</sup>, of unknown meaning, and on a stone vase from Juktas (IO Za). It appears also repeated two (and perhaps more times) on a stone vase from Palaikastro (PK ZA18). If it has a phonetic value, it could represent the abbreviation of a personal name or of a social group, but a connection with the so called Minoan Libation Formula<sup>30</sup> can not be excluded, «JA» being the first sign of the formula (A/JA-SA-SARA)<sup>31</sup> but it can not be said if it was considered a true abbreviation or a simple imitation of the first sign of the inscription, enhancing the magic value of the vase.

If our reading is correct, signs with a very simple design such as the cross (similar to AB02) or the «trident» (AB28<sup>2</sup>) are particularly uncertain. A special discussion is deserved for the «double axe». One of the more common symbols in Minoan iconography, it appears in its more pictorial form among the mason marks and the potter's marks. The same pictorial form is also present in the hieroglyphic (H042) and in official documents from Ayia Triada (HTR Wa 1148-1149) where it is considered as a variety of AB08. Also in this case we can not say if it was intended as an abbreviation by the engravers or it was used for its symbolic meaning and not for its phonetic value. It is clear, in any case, that the group a) creates a connection between non official «inscriptions» and true bureaucratic documents, represented in Ayia Triada by the nodules and cretulae with single signs or countermark (Wa 1031-1861; WB 2001-2002).

B) Graphemes without a precise correspondence with the Linear A or Hieroglyphic syllabary: simple oblique cross (2 signs), the double, framed, cross (1), the more or less complex zig-zag (6), the butterfly or simplified double axe (2), the triangle (1), an irregular motif<sup>32</sup>. Due to their simple shape some of them could look like script signs, e.g., AB02, AB09; AB27, A305 or the Hieroglyphic H061, but the very simple shape suggests more a non «scribal» meaning. None of them, even of the «orthodox» signs, seems to be inscribed by a professional scribe and they are probably the work of an uneducated engraver. They could be check signs or having a purely decorative intention.

<sup>28</sup> Militello 1989 (for HT Zg 163) and Militello 2014: 263 (for AB04).

<sup>29</sup> Militello 1988: 243-244, for the find spots of this and other documents quoted in the text. However the position of JA in the Ayia Triada graffito is not sure and it could be linked with the preceding TA.

<sup>30</sup> Karnava 2016b, with preceding bibliography.

<sup>31</sup> It is normally assumed that «JA-SA-SARA» is a theonym, but see contra Facchetti 2001: 10-11, according to him it would represent the dedicated object.

<sup>32</sup> Levi 1976: tav. 228. From the sherds in this plate number a) is PH Yb 01 (Militello 1990); b) is an inscribed roundel (see GORILA II, PH Wc 47).

A further group of incisions is present on stone plaques (*pessoi*) probably belonging to game tokens or to the cover of a box. They seem to be related to the position of the pieces or to a game and will not be included in our discussion<sup>33</sup>.

From an archaeological point of view, all these documents comes unfortunately mainly from secondary contexts<sup>34</sup>.

From an epigraphical point of view, in a few cases, these (pseudo) inscriptions were incised before firing<sup>35</sup>, but in many other cases they were incised after firing. As far as the medium is concerned, they are both small vases, mainly conical cups, and middle sized vases, mainly kitchen ware (*stamnoi*). It is significant that the most reliable «true» inscriptions are incised after firing and on conical cups, while the others are incised before firing on kitchen ware, and show lesser acquaintance with writing than the first ones. It is clear that inscriptions on kitchen ware were executed by the potter, and should represent more the identification of the maker or of the addressee, while inscriptions on small vases were added later, probably by the owner.

#### *Ib. Impressed motifs on mobile artefacts*

They have been recently analyzed by Baldacci in an article which, devoted to Ayia Triada pottery, considers also specimens from Phaistos<sup>36</sup>. She collects 9 marks from Ayia Triada and 26 from Phaistos (but the list is not complete, being based on published material). They appear on the bottom of vases and were probably impressed by the motifs on the bats used for the potter's wheel. Significantly, the vases are mainly coarse ware, often kitchen ware: ollae and *stamnoi* used for dry or liquid goods, pots with or without foots, dated all to the Protopalatial phase (MM IB-MM IIB). Motifs are decorative, sometimes taken from the Kamares repertoire. A few marks can be considered «look alikes» since they are very similar with small differences.

#### *Ic. Signs on non mobile artefacts (mason's marks)*

So called mason's marks<sup>37</sup> occur both at Phaistos and Ayia Triada, incised on blocks of the walls of the official buildings: the first and second palace in Phaistos and the Villa. In Phaistos<sup>38</sup> they appear in the Protopalatial period, when the majority of engraved signs are present, and continues in the Neopalatial. During the first phase they show a wider «syllabary», while a more restricted range of signs is preserved for the later phase. In Ayia Triada<sup>39</sup> mason's marks appear first in MM III/LM I and do not survive to the destruction of the Villa, since some incised blocks of the LM III Megaron seem to be reused. They were set in not visible places, located in the inner face of the blocks or,

<sup>33</sup> Pernier 1935: 417-419, fig. 246. Similar objects were found at Ayia Triada, first dealt by Pugliese Carratelli, they were fully discussed by V. La Rosa 2009.

<sup>34</sup> The Grande Frana (landslide) was a dump of material realized in LM I with debris from the ruins of the first palace (La Rosa 2010); Courtyard LXX or «under Room CC» are the post-MM II filling over Courtyard LXX. A more precise context is given for Corridor III, even in this case with a complex stratigraphy, Room LXXXV, belonging to a private house (House C in Militello 2012); Room Beta of Haghia Photini, a MM II House.

<sup>35</sup> Unfortunately autoptical analysis has not been possible. Levi, Carinci 1988:297 consider all the fragments incised after firing, with few exceptions. From the inventory files were incised before firing tav. 227 k, n, m, p, q.

<sup>36</sup> Baldacci 2013.

<sup>37</sup> On mason's marks see Shaw 2009: 76-79.

<sup>38</sup> For Phaistos, see Pernier 1935: 399-415. Tavola dei segni a fig. 239 (pp. 407-410); Pernier, Banti 1951: 423-424 (non significant addition).

<sup>39</sup> Edition in Cucuzza 1992, with three additions in Cucuzza 2001.

when they were in the outer (today visible) face, they were covered by the plaster. This is not sufficient for excluding a religious significance, as Banti on the contrary assumed<sup>40</sup>. More cogent against the religious interpretation is the reasoning by Cucuzza, who demonstrates the identification of mason's marks with quarry marks identifying group of workers through the analysis of their spatial distribution in the buildings, demonstrating the indifference for their setting. In this case, a comparison with the later experience of the classical period, from the Greek, Roman and Punic area, is significant<sup>41</sup>. Here true inscriptions or abbreviations can be found along with single signs. Inscriptions can indicate the quarry, the date, the name of the responsible personnel. Therefore, simple signs could play the same role. As for the classical period, also for the Minoan period it is not easy to understand at which step of quarrying were they incised, and if they refer to the single worker, the group or the supervisor. But inscriptions could also refer to the placement of the blocks, and in this case they should be incised at a later stage, in the construction site, perhaps under the architect's guide<sup>42</sup>.

The list of mason's marks amounts to 25 different signs from Phaistos (plus incomplete specimens) (from an unknown number of pieces) and 5 different signs from Ayia Triada (from 34 pieces). The 5 from Ayia Triada coincides with the most diffused in Phaistos (spike, double axe, trident, star) with the exception of the «window» sign.

The main question, as far as the topic of our article is concerned, is however not so much the meaning of the signs, but their origin. Some correspondences with Linear A can be found, and in three cases also with Hieroglyphic (see table), but many other marks are idiosyncratic. Among them the «star» (Pernier n. 5) and the «trident», whose resemblance with AB28 is far from sure, which are among the more common mason's marks all over Crete (together with the spike).

Correspondences with the potter's marks are apparent, as for the cross, but they could be simple coincidence. Interesting is, on the contrary, the occurrence of the spike in the mason's marks and in the loomweights from Ayia Triada. We interpreted the last instance as referring to the TEPA quality of textile, but another possible connection could be with the transaction sign AB04, one of the most frequent in the Linear A tablet. In this case AB04 TE, representing perhaps the palace as the client, could have the same meaning in tablets, loomweight and mason's marks (in this case meaning something like «from the «palatial» quarry» or «from the palatial group of stone-cutters»?).

Mason's marks are widespread all over Crete in palatial architecture. The same signs can be found in many places even if some local preferences can be detected. In some cases mason's marks show a perfect correspondence with Linear A (or Hieroglyphic); in other cases (as for the double axe) they represent a kind of monumental version of it. The connection with script is therefore stronger than for potters' marks, and this connection is reinforced by the palatial involvement. Signs were not personal devices to recognize property, but official means in the management of the complex process of building a palace. It cannot be excluded that identification would be assigned by the palace personnel, rather than chosen by the owner of the quarry. All in all, mason's marks seem to constitute a system on its own, a code purposely elaborated for the process

<sup>40</sup> Banti, Pernier 1951: 432.

<sup>41</sup> Martin 1966: 221-238.

<sup>42</sup> Mezzolani 2008; Tomasello 2011.

of construction with ashlar masonry, with some knowledge of script but with a different goal.

Pernier n.	Linear A	Pernier n.	Hieroglyph	Linear A
3	A320	10 (double axe)	H 042	LA A317
6	A318	8 «tree» sign Also in HTR	H 025	AB04
7	AB02			
11	AB27			
12	AB57			
35	AB31			
13 (trident) Also in HTR	AB28?			

Table 3. Mason's marks with correspondence in Linear A or Hieroglyphic

## 2. Mnemonic numeric devices

The second category of a-literate devices is represented by multiple signs or impressions and objects used for keeping a record of quantities.

Multiple impressions of the same seals occurs sometimes in Phaistos, on the *cretulae* from Room 25, but it is not possible to state any relation between this practice and the quantity of the stored stuff since the sealed objects are not preserved. At least 55 impressions are stamped on a pithos from the Prepalatial quarter of Ayia Triada, from a seal with a quatrifoil motif running on a band separating the body from the neck of the vase<sup>43</sup>. I checked the possibility that the number refers to the quantity of the content. The capacity of the pithos can be calculated in around 303 liters, which, if the number of impressions represents a quantity, would give an unit of 5 liters, totally unknown in the Aegean area. The most probable explanation is therefore that the owner of the seal impressed along the rim as many impressions he (or she) could. Why is an open question, and the choice is, in my opinion, between a statement of property or an apotropaic role (as the Christian crosses in Middle and Early modern vases). A different case is the use of multiple stamps of seals on the border of roundels, which Perna has convincingly demonstrated as a way of indicating quantity by a non literate partner to the transaction<sup>44</sup>. These would true non literate media occurring, however, within a well established official administrative system, as that represented by the roundels.

A possible hint to a primitive system of counting is represented by the incised strokes on the uninscribed tablet PH 11. Groups of vertical strokes in the upper part are separated by horizontal and vertical lines, in a very irregular way, while the lower half of the tablet is incised with horizontal strokes. The drawing is not careful, lines are sometimes shorter, sometimes bigger, and often oblique. One possibility is that they represented the result of a scribe taking progressively note of something, as it normally happens in on the field when, e.g., taking note of number of baskets being transported. I would expect, however, that groups of strokes would be of the same number of units, but this is not the case. In the upper part of the tablets, the more irregular one, at least

<sup>43</sup> Militello 2001:38. Inv. HTR 9, from «Casa Ovest» of the Prepalatial quarter in Ayia Triada. See Laviosa:1972-73: 511-512, fig. 11; *Creta Antica*: 182, fig. 275. In the article I reported the number of 30 inscriptions, basing upon the inventory card, but after my article I had the possibility to check the pithos and to note that the impressions were not 30 but 55 (plus perhaps other 3 in the missing part).

<sup>44</sup> Perna 1992; 1994; 1995. See also Hallager 1996.

four groups are separated by irregular lines; in the central part, two registers separated by horizontal lines present, respectively, 18 and 20 «units»; in the lower part at least 17 horizontal strokes are scattered on the ground. It seems more logical to interpret this document as an exercise tablet by a student scribe introducing himself to the writing of units and tens.

More interesting for our discussion are the «tokens». They include a large variety of artefacts: purposely shaped clay or stone objects; circular, semicircular, triangular disks made of stone or clay, or cut out of vases. Normally they are considered counters representing units or fractions of goods, but objects labelled as tokens can be used also for purposes other than counting, as game pieces<sup>45</sup>, stoppers<sup>46</sup>, identification tools<sup>47</sup> or as momentos relating to special events. It is not always possible to distinguish among these different meanings in the archaeological record. From La Rosa's excavations in Phaistos around 50 regularly cut sherds, in circular, semicircular, triangular shape have been recovered, belonging to EM II-III phase<sup>48</sup>. They disappear at the beginning of the Protopalatial period until the Iron Age, when a group of such sherds appear in houses of the geometric period<sup>49</sup>. They are normally of circular shape but semicircular and triangular shapes also occur. Their diameter varies from cm 2,8 to cm 5,4. Similar circular sherds were found at Ayia Triada, and are to be dated within EM II, since they are obtained from vases of the Haghios Onouphrios style.

It is not possible to say if the connection between different shapes was qualitative (i.e. referring to diverse goods) or quantitative (eg. circular = one unit; semicircular: half of a unit?) as proposed for other sites<sup>50</sup>. Triangular pieces are somewhat the leftover of the cutting of circular pieces, with curvilinear sides and have been interpreted as pot separators for the firing of vases in the kiln<sup>51</sup>. EM II miniature vases have been identified as tokens by Todaro, «performing a recording function»<sup>52</sup>, in a way similar to what was proposed by Poursat for Mallia<sup>53</sup>.

### 3. *Seals, sealings and stamped objects*

The use of the seal has been long discussed, the main question remaining that of their administrative or not administrative use in the Prepalatial period<sup>54</sup>. Impressions of seals

<sup>45</sup> E. Brann, Protoattic Well Groups from the Athenian Agora, in *Hesperia* 30, 1961, p. 342.

<sup>46</sup> See the Menelaion of Sparta (Dawkins 1909-1910: 9-10) and Mycene (Wace and Wace 1953: 17); Haghios Kosmas (Mylonas 1959: 146 «Loomweight or clay stoppers»).

<sup>47</sup> As proposed for some Athenian objects of the 5th century BCE: Lalonde 1968: 131.

<sup>48</sup> A first list of the until then known tokens has been published in Militello 2001. The study on the EM material carried on by Todaro has brought to the discovery of other pieces (Todaro 2013: 95 (from Corridor III/7), 140, 152 (from the area of Casa a Sud della Rampa), 240-243 (from Casa Est), 246-247, 253-254 and 256-257). They are dated to her Phaistos II, VIA, VIB and VIII phases, corresponding to EM II and EM III.

<sup>49</sup> 74 circular clay tokens were found in the geometric Room AA: Cucuzza 1998: 65-66. In this case they shaped before firing and not cut out of vases.

<sup>50</sup> In Vivara, tokens from the settlement of the Bronze Age have different shapes but according to the editor; these refer to different goods, while quantitative relations were expressed by dimensions (Marazzi 1996: 1582). This seems not to be the case in Phaistos (Militello 2001).

<sup>51</sup> Todaro 2013: 247.

<sup>52</sup> Todaro 2012: 224.

<sup>53</sup> In Mallia many miniature vases were found in Quartier MU (Poursat 1994) see however; contra, Driessen 1994-1995: 247.

<sup>54</sup> Weingarten 1990 proposed a non administrative use of prepalatia seals, contra Pini 1990.

are known in the Prepalatial period on different media<sup>55</sup>. When occurring on *cretulae* they have an unquestionable administrative function, but beyond this the symbolic role of the seal, and its impression, must not be forgotten and in a recent paper I suggested that at least the Prepalatial scarabs could play an apotropaic function<sup>56</sup>. As a consequence, impressions on vases, loomweights or spindle-whorls could be used to express property but also to protect the object and its activities or, simply, to decorate it.

The same can be said for the later periods when an administrative system based on seal stamps is firmly established and well known. I would like to discuss, instead, the few instances in which seals appear not on sealings but on objects. Beyond the above-mentioned *pitthos* from Ayia Triada, this is the case for 7 cylindrical loomweights and one ovoid coming from the South-Western quarter of the first Palace of Phaistos<sup>57</sup>. As far as the loomweights are concerned, I interpreted the impression as indicating different sets of weights, each corresponding to different groups<sup>58</sup>. This interpretation is based upon the idea that loomweights from the SW quarter, due to their light weight, could be used to weave special, light textiles, not for daily use but for special consumption.

## Conclusion

Which conclusions can be drawn from such a fragmented picture of discrete classes of artefacts? Is it possible to reconstruct a system of communication including all the scattered evidence we have collected for our area?

The bureaucratic metanarrative (palaces as centralized economic centres) which has characterized Aegean studies since the early 60s, has been a powerful means of interpretation of the archaeological evidence but has missed the complexity of reality, especially in the case of ancient societies where different spheres (economy, religion, social relations) were strictly interlinked.

Our review of the evidence has confirmed the differences among patterns of use of non scribal devices and the great variety of behaviour falling within the wide umbrella of the concept of «administration». This is used to denote both the bureaucratic control of officials within a palatial administrative system (as, e.g., tablets and inscribed sealings) and the «private» management of goods. But in the two spheres the function of non literate media could be very different. A potter marking his vase to identify it among others in a communal kiln has no other goal than to avoid losing his goods; the official incising a cross on the vase from Room LXXXV had no other aim than avoiding the confusion with other containers. Instead, the owner marking his/her object with his/her seal attributes to this action a symbolic value, linking his/her personality with the object.

With this proviso in mind, the following considerations can be done for the Mesara.

1) In a diachronic perspective, tokens stand out for their chronological isolation. They are the earliest evidence for a possible use as administrative function or, as I prefer, management devices in our area, going back to EM II. But their function is not clear. In

<sup>55</sup> Vlasaki, Hallager 1995; Perna 1999. In a more recent contribution, the same Perna believes that the administrative use of *cretulae* was established already in EM III (2015: 57-58) but mentions only the sealing from Myrtyos and not the other specimens quoted by Vlasaki and Hallager.

<sup>56</sup> Militello in press.

<sup>57</sup> Militello 2014: 40-41, tav. XIII-XIV (catt. 270, 271, 304, 320, 323-326) and tav. XV (cat. 377).

<sup>58</sup> Militello 2007; 2014.

the bureaucratic metanarrative described above, and in an evolutionary perspective, I interpreted them according to the model proposed for similar objects from Vivara, in Italy, as a «sistema parascrittoriale oggettuale»<sup>59</sup>, considering them as the proof of a codified and not isolated system of counting, where the token has probably acquired an abstract value, indicating the number and not the object. I also proposed that they were introduced to answer the new demand of managing large quantity of goods, and were superseded once script introduced a more efficient system of counting. This hypothesis was however based on the supposed short period of use of the tokens (MM IA), a hypothesis now contradicted by the new chronology, spanning between EM II and MM IA.

Todaro, on the contrary, tries to insert tokens (and potters' marks) in the framework of pottery production, consistent with her reconstruction of the nature of the settlement in the hill of Phaistos, interpreted as an area of communal production. Tokens could be linked with the production of obsidian blades (triangular and semicircular cut sherds) and pottery (circular sherds), and, in the last case, they could be a «means through which the potters kept a record of their failed products, because a single circular sherd has been cut off from an entire misfired vase»<sup>60</sup>. A counting use thus, but one not linked with public, but with private needs.

Todaro interprets painted signs on vases within the same framework of communal pottery production. Since many craftsmen from different places of the Messara were working, it could be useful for the single artisan to distinguish his vases from the other ones<sup>61</sup>. Independent from the choice among the different interpretations, tokens seem to answer the need for keeping an account of something, but they seem more for individual use and not to be part of an administrative system.

2) Always in a diachronic perspective the best evidence appears in the «palatial» periods MM IB-LM IB, and disappears afterwards, perhaps not by chance.

3) The majority of our a-literate devices belong therefore to the palatial period, and fall mainly within MM IIA-B: incised signs, impressed marks, mason's marks. Normally they have been interpreted as a consequence of needs of administration, as identifying the owner, the producer or the destination, on the assumption that the palace was in some way involved in this process. Baldacci, for example, concludes that impressed marks on the bottom of vases identify the potter's workshop and were used within a system of control limited to such vases that could contain goods to be used in special circumstances. In the same way, mason's marks could be used to control the production and the setting of ashlar masonry.

After our review, however, different levels and functions seem to emerge. Check sign at the bottom of the vase should be made by the potter for no other goal than distinguishing his product. When the quality of the design is high, as in the impressed marks from Ayia Triada, the practical aspect goes together with a statement of pride, just as the logo

<sup>59</sup> Marazzi 1996.

<sup>60</sup> Todaro 2013: 256-257.

<sup>61</sup> Todaro 2013: 255 «if several potters were firing their products in the same kiln, it would have been sufficient to mark a single specimen of the pile to recognise their load». She notes also that some of the signs are similar to those of other location, and suggests that «after the completion of the production cycle and related ceremony, returned to their respective communities». She refers to the already quoted inverted N from Ayia Photini (Levi 1976: pl. 228b), which however can be considered part of the site, and to the lozenges from Kommos (Van de Moortel 2006: pl. 3.17B: Je/31) occurring in one piece from Phaistos. The resemblance is not strict, however; the number of strokes varies, so that it is far to be sure that they could be made by the same «hand».

of prestigious pottery today at the bottom of the vase. When signs were made on visible parts of the vases they should be used for distinguishing them from other similar artefacts because their quality had been controlled, or they were used for some special purpose. In this case they are semantically the a-literate version of the discursive statements of inscriptions on vases.

For smaller vases, inscriptions could have a different meaning, by analogy with classical examples they could express exhortation (drink!), dedication (to the goddess) or the full name of the owner. It is possible, in my opinion, to consider in the same way the application of a incised/painted a-literate sign, as the analphabetic imitation of those inscriptions.

Mason's marks are distinguished by their more official nature. Independent from who incised them, a careful planning of the drawing and of the execution was necessary, and at least two people should be at work, the skilled stone cutter and the architect/head of the staff who suggested how to draw the sign and where to set it. The link with writing is different from previous cases: mason's marks were not the result of a more or less failed attempt to imitate script, but of a conscious creation of system in its own, where the connotative aspect, i.g. the association of ideas, was strong. For their association with symbols of power: the double axe, the spike sign (reminding the transaction sign AB04 TE and perhaps the palace) and the trident should acquire, at the same moment, a denotative value (this comes from quarry A) and a connotative one (this belong to the palace, to the religious sphere etc.).

Sealings, *cretulae*, nodules and nodule seem to belong exclusively to the administrative sphere, but also in this case it was not necessarily so and even stamping a *cretula* could achieve a different meaning from that of control. The interpretation of the Archivio di *Cretulae* from Room 25 proposed by Maria Relaki<sup>62</sup> goes in this direction: the majority of seal impressions would not have been impressed for quantitative control by officials of the palace but by representatives of the community: «qualitative control of the palatial storerooms was performed by representatives from the different Mesara communities». Qualitative control means that people simply check that everything is in order, but is not interested to how much is going in or out.

4) A last question must be addressed, that of the relation between these media and writing, when they are contemporary. Within the palatial system, alphabetic and non alphabetic tools are used in a consistent and complementary way, according to the addressees (as in the roundels). Outside the palatial system the problem is linked with that of the consumption of writing, how much are some of these tools induced by script? If our observations are correct, some of the authors of the signs had some contact with writing. Probably they were not able to write, nor even to read, but they knew the existence of Linear A and Hieroglyphic. Since monumental inscriptions are not present, they could have seen scribes in action in working places (as the Vano 101), or the signs on the pithoi in the storerooms they entered for whatever reason, or could look at the inscribed vase in the hand of a priest during feasting events. Probably they tried to imitate them, and in this perspective we would like to interpret the repeated (and meaningless) AB57 on the sherd from Phaistos.

<sup>62</sup> Relaki 2012: 313-320.



If literacy was still a knowledge of the few, nonetheless its sphere of action went well beyond the restricted range of literate people.

5) To sum up, a-literate devices stand at the intersection between official administration and private use revealing a multifaceted use of these tools at different levels. If they are independent of script and used alongside it, it seems also that they were strongly influenced by it. This can explain perhaps why in the postpalatial periods, when script disappears in Phaistos (no evidence for Linear B tablets has been found) the evidence for potter's or mason's marks also disappears – which demonstrates that a-literate and literate media are perhaps more strictly linked than normally presumed.

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# Administrative documents without writing: The case of sealings and flat-based nodules

*Massimo Perna*

**Abstract:** This article will discuss the role of so-called Flat-based nodules (FBN). We will present the results of an experiment using an ancient parchment fragment to show that the parchments sealed by FBN could theoretically contain a large number of painted signs. The possible use of Linear B on perishable materials will be also discussed: although nothing yet proves its existence, it cannot be ruled out with certainty.

**I**n this paper some Minoan documents will be examined, the so called flat-based nodules (FBN) that although closely connected with writing and bookkeeping practices do not show any signs of writing but in spite of this are of fundamental importance for Minoan Administration.

They are very small clay pieces that were modelled around small parchments sheets, folded to create very small packages, tied with extremely thin strings (Fig. 1a-b).



Fig. 1a-b. FNB reverse and a modern mould of an FNB reverse from Weingarten 1983: Plate II (appr. 2:1)

Although they also have other names (in German *Päckchenplomben*) these documents are essentially small sealings that were not applied to containers, like the sealings of the proto-palatial period, but were applied to documents that were made of lost materials, whereas the sealings were accidentally fired during the destructions of the the Minoan palaces. The imprint left by parchments on the clay allows us to understand how the parchments were sealed. The clay completely surrounded the folded parchment (although in some FBN parts of parchment was left uncovered) to protect the content and on the

clay were imprinted up to three seal impressions. Finally, the strings hanging down were rolled in the clay creating an inviolable wrapping, resistant against any fraudulent intention. The cast of these documents clearly demonstrate that they were made of parchment not of other materials<sup>1</sup>. Trying to replicate FBN it was evident that without the strings, the folded parchment, which is very elastic, would open again modifying the shape of the still soft clay.

The dimensions of these documents suggest that they might have sealed parchment of various dimensions, particularly up to 21x15 cm according to E. Hallager<sup>2</sup> or cm 6x6, according to O. Krzyszkowska<sup>3</sup>. W. Müller<sup>4</sup> thinks that the parchments were maximum 6 cm long.

FBN are a well-documented category, in fact we know more than 760 examples, more or less three times the number of the Linear A tablets. Finally, if we consider that about 500 documents come from the site of Zakro, on the extreme east of the island, in a context with no Mycenaean overlay, it is logical to wonder how much this type of document was used in other palaces, and particularly in Knossos<sup>5</sup>. However, it has been demonstrated that these documents could «travel», as we see the documents found in Thera, made of a non-local clay and with imprints of seals used in Haghia Triada and in Sklavokambos (v. *infra*).

Because of the disagreement among scholars about the dimensions of the parchment in the FBN, I tried to recreate one of these documents using a fragment of ancient parchment of 6,8 x 4,7 cm in Coptic writing, coming from a prayer book, instead of fragments of modern parchment or leather (Fig. 2).

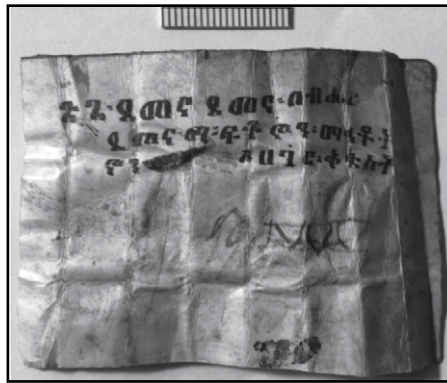


Fig. 2. Parchment fragment with Coptic script (1:1)

The folded fragment measures only 1,7 x 0,9 x 0,6 cm. Surrounded by clay, it creates a FBN of 2,00 x 1,5 x 1,00 cm, which is a document of average dimensions, since the FBN can be up to 3 cm long. Fig. 3a-b shows the imprint of the parchment of the HMs 1/6 nodule, which has approximately the same dimensions as our folded parchment<sup>6</sup>.

<sup>1</sup> Cf. Hallager 1996: 137 and n. 489, Krzyszkowska 2005: 156 and n. 9; Weingarten 1983.

<sup>2</sup> Hallager 1996: 138.

<sup>3</sup> Krzyszkowska 2005: 156.

<sup>4</sup> Müller 1999: 349-356 and particularly 352.

<sup>5</sup> From Festòs come the only four proto-palatial examples, which look different.

<sup>6</sup> Müller 1999: 351 and Abb. 9.



Fig. 3a-b. Folded Coptic parchment and mould of Minoan parchment sealed by an FNB (appr. 2:1). Fig. 3a, Photograph M. Perna. Fig. 3b CMS II,6: 351

By using an ancient parchment created for being a writing support and with writing symbols painted with specific tools, even if from a different cultural and chronological context, we created the premises for a valid scientific experiment<sup>7</sup>.

The fragment used for the experiment has only three written lines in Coptic, but most of the available space was not used, which means that theoretically it could contain at least 7 lines. The first two lines have 12 signs per line, which means there is enough space to paint at least 80 signs per face, at least 160 on two faces. This is quite a lot, if we consider that there is no palm leaf tablet in Linear B from Knossos with so many signs and, even if the signs were on just one face, the number of signs of our parchment (about 80) would be higher than many Linear B tablets. This means that less than fifty parchments like this could equal the number of signs in the entire corpus (about 8000 signs) of Linear A.

In Fig. 4 it is possible to see in scale 1:1 a second parchment of about 6 x 6 cm which has 120 signs.

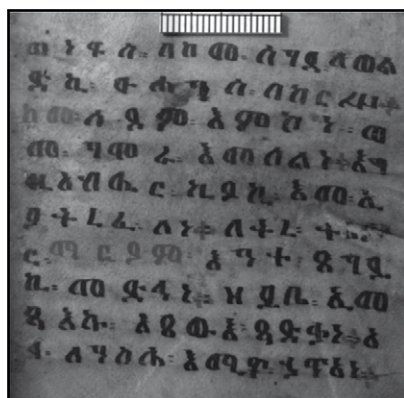


Fig. 4. Detail of a Coptic parchment, 6x6 cm, with approx. 120 painted signs (1:1). Photograph M. Perna

<sup>7</sup> The experiments made with «modern» parchment are difficult because they are thicker than the ancient because they are not created as writing supports.

Both the first and the second parchment contradict the conclusions of Krzyszkowska<sup>8</sup> who calculates a dimension of 6 x 6 cm for the parchment, but imagines that the information on these documents would have to be «*extremely terse*», comparing them to the short inscriptions in Cretan Hieroglyphic on *crescent nodules* or to those in Linear B on *gable-shaped nodules* of Mycenaean times. Obviously, we cannot know the dimensions of the signs painted by the Minoans scribes but our experiment demonstrates that it would have been possible to paint an important number of signs; furthermore, we think that a support like parchment, which takes a lot of time and care to prepare properly, would have not been wasted for a few signs.

This simple experiment demonstrates that these small parchments – though still received with scepticism by some scholars – are evidence of an archive system of great importance both for the quantity (about 760 documents found) and for the quality, since the information was registered on a valuable support and was further sealed to protect it.

Finally, it is important to remember that there are FBN that sealed the parchment only on three sides and this typology could have sealed only a side of a bigger parchment sheet. Therefore, there is no reason to think that these parchments necessarily contain short texts.

Clearly, it is not possible to demonstrate that all documents written on parchment were always sealed, nor that when there is a sealing it is always a FBN. In fact, there might have been parchment rolls sealed by the many hanging nodules that were found in Minoan contexts. Hanging nodules were used in Egypt<sup>9</sup> to seal papyrus rolls and also such nodules could have sealed perishable documents and goods in Hittite Anatolia<sup>10</sup>.

Because of the low number of the texts in Linear A (and in Cretan Hieroglyphics too) and because of their temporary nature, we suggest that part of the economic documentation was recorded on perishable supports.

The case of Cyprus in the 2nd and in the 1st millennium BCE offers an interesting confirmation, as will be demonstrated later in this paper. It is still important to mention that parchment is just one of the perishable supports that the Minoan could have used. We talk about parchment only because we found the imprints, but the perishable support used in the past were many, like the palm leaves, as Pliny wrote: *in palmarum foliis primo scriptitatum*.

According to the Suda Lexicon, Cretans knew the technique; Φοινικήϊα γράμματα: Λυδοὶ καὶ Ἴωνες τὰ γράμματα ἀπὸ Φοίνικος τοῦ Ἀγίνορος τοῦ εὐρόντος; τούτοις δὲ ἂν τι λέγουσι Κρήτες, ὡς εὐρέθη ἀπὸ τοῦ γράφειν ἐν φοινίκων πετάλοις. Moreover, according to Diodorus Siculus (V, 74) writing would have been invented in Crete: φασὶ (sc. οἱ Κρήτες) τοὺς Φοίνικας οὐκὲ ξάρχης εὐρεῖν, ἀλλὰ τοὺς τύπους τῶν γραμμάτων μεταθεῖναι μόνον. It is also interesting to remember that documents in Tamil were already recorded in the 15th century BCE on dry palm leaves (Fig. 5) and this support had been used until modern times<sup>11</sup>. There are still entire libraries containing divinatory texts written on palm leaves.

<sup>8</sup> Krzyszkowska 2005: 156.

<sup>9</sup> Aruz 2000: 127 e fig. 7.

<sup>10</sup> For the use of hanging nodules as seals of documents in the Hittite Anatolia, see Marazzi 2000: 79-98.

<sup>11</sup> About these documents, see Mahadevan 2003.



Another well-known ancient support used for several millennia are the waxed wooden tablets as the famous diptych of Ulu Burun<sup>12</sup> or the one from Nimrud<sup>13</sup>, but there existed also non-waxed boards, on which it was possible to paint, and that were extensively used in all the Near East and that are mentioned in the Hittite and Akkadian texts<sup>14</sup>.

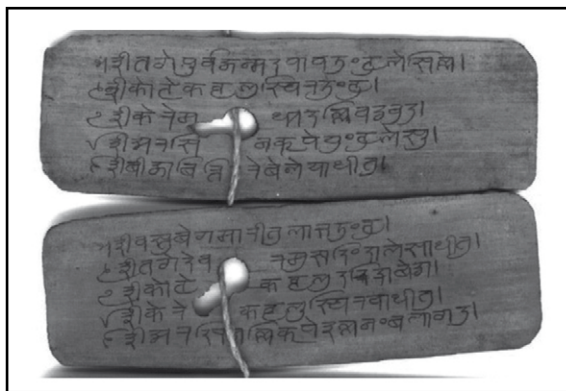


Fig. 5. Tamil text on dired palm leaves (not in scale)

Moreover, the fact that the Minoan administration use supports differs from the clay and the great diffusion of writing also outside the palaces on many different supports such as jewels (pins, votive objects, rings) made of gold, silver, and bronze, as well as stone, stucco, painted or incised vases, and such documents as the small statue with Linear A inscriptions from Poros Irakliou, that testifies the use of a private and religious use of Linear A even after the Minoan Palatial Period, makes us understand that the idea of writing for Minoans was completely different from that of the Mycenaeans. In fact, 99,5% of the inscriptions in Linear B are incised or painted on only one support, which is clay, and there is no documentation related to religious practices. The non-economic documentation for the Linear A, on the other hand, is about 10% of the documents we know and, differently from Linear B, evidence for its religious use occurs on libation vases from sanctuaries; nor can we exclude the possible existence of administrative documents in Minoan sanctuaries, given the fragment of a Hieroglyphic tablet at Symi.

Another significant difference between the Minoan and the Mycenaean world regarding the use of writing, is that for each tablet in Linear A there exist 6 sealed documents, while for every 7 tablets in Linear B we have just one sealed document. The ratio is completely reversed, a fact which seems meaningful.

What emerges out from the statistic and qualitative analysis of the documents in Linear A and B is that after the Mycenaeans learned the use of writing from the Minoans, they chose to use mostly clay as a writing support rather than anything else. The case of the seals is emblematic. In fact, excluding two dubious cases<sup>15</sup>, despite the thousands of Mycenaean seals, none of them has writings in Linear B and surely seals, which are made of hard materials, would have better chances of surviving than the thousands of

<sup>12</sup> Bass *et alii* 1989: 1-16.

<sup>13</sup> Mallowan 1955: 98.

<sup>14</sup> Marazzi 2000: 79-98.

<sup>15</sup> The Medeone seal (MED Zg 1) and the amber seal from Bernstorf (BE Zg 1?). There are doubts about the authenticity of the second. The only inscription on stone is the so-called «weight» of Dimini (DIM Zh 1), while the authenticity of the so-called «Kafkania pebble» (OL Zh 1?) is not unanimously accepted by the scientific community.

clay documents that we know. It is clear that tablets in Linear B, both for quality and quantity, were used for high level administrative documentation, unlike the temporary notes written on the Linear A documents<sup>16</sup>; although it is possible that the Mycenaeans used parchment or other perishable materials (like the waxed diptych, for example), the abundance of tablets with detailed economic data, makes us think that the use of perishable materials for economic documentation was limited. This choice was completely opposite to the choice of the Minoans who wrote a small part of their administrative data on clay, which makes it inevitable to think that they also used perishable materials for administrative records.

Obviously, we can neither prove nor deny the existence of non-administrative documents in Linear B on perishable materials and on this point, due to the lack of any evidence, it is not possible to make scientifically valid hypotheses. Regarding this point, it is important to underline that 4 Mycenaean nodules found in the *Room of the Chariot Tablets (RCT)* are very different from the FBN<sup>17</sup>. In fact, as clarified by Krzyszkowska<sup>18</sup> the 4 RCT nodules «...sealed narrow pieces of leather, folded lengthwise and bound once in the middle with leather or gut about 2-3 mm wide. They differ significantly from the tiny parchment «packets» bound with fine thread found in neo-palatial contexts and ought, perhaps, to be called by a different name... The precise purpose of these late «pachets» **remains obscure**. Though we cannot exclude the possibility that they too bore short written message, we cannot prove it either».

Because there is still some scepticism regarding the Minoans' use of perishable supports for administrative documents, it might be relevant to compare what happens in the 2nd millennium BCE in Cyprus. Of the ca. 150 Cypro-Minoan documents, only two are economic documents (with ideograms and numbers) – one an ostrakon, the other a small clay disk – survived because baked (Fig. 6 and 7)<sup>19</sup>.

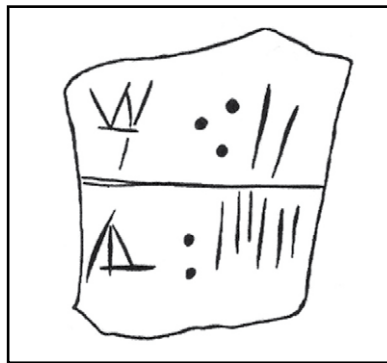


Fig. 6. Ostrakon with Cypro-Minoan script from Enkomi. After Olivier 2007: 114



Fig. 7. Clay disk with Cypro-Minoan script. Photograph M. Perna

Because of the almost total lack of administrative documents, we have to suppose that the Cypriots in the 2nd millennium BCE wrote their administrative records on perishable

<sup>16</sup> See Perna 2014: 258.

<sup>17</sup> These type of sealings found in *Room of the Chariot Tablets* at Knossos, are no longer attested in the following Mycenaean administrations, both in Crete and in the continent, although we have thousands of Mycenaean sealings.

<sup>18</sup> Krzyszkowska 2005: 217-218.

<sup>19</sup> ENKO Aost 001 and ATHI Adis 001. See Olivier 2007: 114 and 112.

supports that did not survive. In the 1st millennium BCE, the situation is even clearer: of about 1500 documents in Cypriot syllabic script, 99% are non-administrative.

As far as we know, for two millennia the Cypriots used perishable supports for most of their administrative documentation, there is no doubt that the same kind of supports were also used in Minoan Crete, with the difference that the Minoans also used clay for administrative purposes, although in a limited way.

Finally, it is important to underline that in Cyprus, in some texts of the 1st millennium BCE, we have a linguistic clue that the Cypriots in the 2nd millennium BCE wrote their administrative records on perishable supports, in the word *alefo* «to paint» used with the meaning of «to write» and also in the name of the scribe, the *diftheraloifós*, which means «the person who writes on leather», mentioned also in a gloss of Hesychius<sup>20</sup>.

As has been known, since the beginning of Mycenology, the palaeography of Linear A and of Linear B indicated that the signs of the two linear scripts were conceived to be painted rather than carved<sup>21</sup>. As convincingly argued by J.-P. Olivier<sup>22</sup>, the signs engraved in the clay by the scribes of the Linear B are different in respect to the homomorphic signs of the Linear A because Mycenaeans might have taken as a model the signs painted on perishable supports, like those contained in the FBN. It is not a coincidence that the FBN are the documents that prove the dispatch of documents from one place to another. The FBN found in LC IA Akrotiri (Thera), that we previously mentioned<sup>23</sup>, have the impression of the same ring (Fig. 8) used (in LM IB) in Ayia Triada and in Sklavokambos; since both were made of a non-local clay, they prove that these documents travelled and they might have been used to seal non-economic messages.

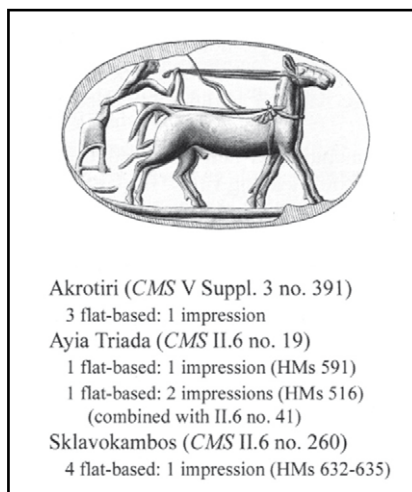


Fig. 8. Impressions stamped by the same ring on FBNs from Akrotiri, Ayia Triada and Sklavokambos. After Krzyszkowska 2005: 190

<sup>20</sup> For the Cypriot Syllabic document, see ICS 143. For Hesychius, see Hés. 1992.

<sup>21</sup> Ventris-Chadwick 1956: 109-110.

<sup>22</sup> Olivier forthcoming.

<sup>23</sup> On the FBN of Akrotiri see Doumas 2000: 57-65; Krzyszkowska 2005: 167-168 and the figure on p. 190. On the relations among the sites, see p. 188-192.

Therefore, it is likely that the Mycenaeans, during the acquisition process of the writing system, did not use as a model the texts on clay tablets, the use of which was limited to the Minoan palatial context, or the libation tables located in the dark of the Minoan sanctuaries. More probably, the Minoan dignitaries sent to the Mainland will have brought messages on parchment addressed to the princes of the Mycenaean palaces – where there were surely interpreters able to understand the language and writing of the Minoans. The proof of the existence of interpreters working for the Minoans is given by a text from Mari (ARMT XXIII 556) that explicitly mentions an interpreter of the Cretans.

Once Linear B was created by the Mycenaeans, they might have chosen to use clay for the administrative records, decreasing the use of other supports used by the Minoans. For this reason, the Mycenaean texts are more accurate in the redaction and in the execution of the signs than those of the Minoan scribes, who wrote short-term notes on clay which were then very likely transcribed or summarized onto perishable documents; a more «modern» choice that, however, has been a disaster for our knowledge of the Minoan language and culture.

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# The role of non-written communication in Minoan administrative practices

*Ilse Schoep*

**Abstract:** Although sealings<sup>1</sup> have traditionally been approached from an economic perspective, they are also an important medium of non-written communication in Neopalatial society. Sealings are the end product of a series of social practices and as such are the material embodiment of agreed identities and relationships between people but also between people, objects and events. On the basis of their architectural and artefactual associations, find contexts and iconography, it will be argued here that Neopalatial sealings were an important medium for social reproduction and that they can be related to the preparation and organization of rituals. These rituals, and by extension also the sealings that were produced in this context, played an important role in the legitimation and reproduction of social order.

## Introduction

Minoan writing and sealing practices have traditionally been studied from a functionalist perspective in which economic efficiency, keeping track of incoming and outgoing goods and the reconstruction of the administrative process were of primordial importance<sup>2</sup>. It is generally assumed that, like in Linear B administration, Neopalatial sealings played a role in the information gathering and processing system and that the information from these sealings was afterwards written onto Linear A tablets<sup>3</sup>. Because of the brevity and small number of Linear A tablets from Crete, it has furthermore been suggested that the final accounts were in perishable material<sup>4</sup> and that obsolete documents were discarded at the end of an administrative cycle or bookkeeping year. Traditionally, a distinction has been made between economic and non-economic documents. Whereas sealed and written documents in clay as well as inscriptions on vases are widely considered to be economic in nature, inscriptions on other supports are usually considered to be non-economic.

<sup>1</sup> The term sealings is here used as a general term for direct object sealings, hanging nodules, flat-based nodules, roundels and noduli. This by no means should be taken to imply that all these types fulfilled the same function. For terminology see Hallager 1996 and Müller *et al.* 1999.

<sup>2</sup> Palaima 1990; Militello 1991; Palmer 1995; Hallager 1996; Weingarten 1994; Schoep 2002.

<sup>3</sup> Militello 1991; Palaima 1990; Weingarten 1992; Hallager 1996; Schoep 2002.

<sup>4</sup> Hallager 1996; Schoep 2002.

This assumption has reinforced the notion that the main purpose of the clay documents was exclusively economic, to the exclusion of social and ritual purposes.

Recently, there has been a tendency to move away from the equation of sealed documents with a centralised administration and to stress other aspects of writing and sealing practices<sup>5</sup>. Peperaki suggests that the EH II sealing practices played a role in the promotion of a new form of practice centred round the consumption of collectively procured produce in the House of the Tiles. The sealings demarcated goods reserved for events of collective consumption and the correspondence between the number of seal-types on the Lerna sealings and the number of drinking cups stored points towards an event in which about 70 people were involved<sup>6</sup>. Relaki has emphasised the performative aspects of Middle Minoan I-II sealing practices and how performance played a crucial role in the shaping of identities<sup>7</sup>. I have argued elsewhere that economic considerations played a less important part in the production and preservation of sealed and written documents than hitherto assumed and that symbolic and even ritual factors were at play, as suggested by the fact that tablets and sealings are often found in structured depositions<sup>8</sup>. The concept of structured deposition, developed in the context of the British Neolithic, refers to «the deposition of valued items – in isolated pits, in pits inside causewayed enclosures, in hinges and in long barrow ditches – [which] seems to have been an important element of ritual practice»<sup>9</sup>. The two MM IIIB stone cists in the Central Palace Sanctuary at Knossos (Temple Repositories) form the best example of such deposition; they were filled with a large amount of ritual objects, pottery as well as sealings and one or two Linear A tablets<sup>10</sup>. Other examples of such depositions from Knossos are the Vat Room Deposit and perhaps the MM IIA context beneath the South-West House<sup>11</sup>. At Phaistos, three flat-based nodules and five roundels were found at the bottom of a bench in an ashy layer containing sherds in Room LI<sup>12</sup>. At Akrotiri, a sealing was placed in a wooden box with a balance set and weight<sup>13</sup>. In other cases, sealings – after having been detached from the objects they sealed – were not taken out of circulation by placing them in a structured deposition, but were preserved in a specific location – usually on an upper floor of special purpose buildings – where they were left to accumulate. This is the case for the sealing assemblages from Ayia Triada, Sklavokambos, Myrtos Pyrgos, and Zakro House A<sup>14</sup>. Although most clay documents were fired in the LM IB destructions (ca. 1470/60 BCE), the latter do not necessarily date their production and they may have accumulated over a longer period of time. This is suggested by the LM IA flat-based nodules from Akrotiri, one of which was impressed with the same gold ring that impressed sealings at Ayia Triada and Sklavokambos (see *infra*)<sup>15</sup>. Structured deposition, and the accumulation of sealings over a longer period of time than the last administrative cycle (cf. *supra*),

<sup>5</sup> Whittaker 2004; 2013; Schoep 2007; Flouda 2013.

<sup>6</sup> Peperaki 2004; 2010; 2016.

<sup>7</sup> Relaki 2012.

<sup>8</sup> Schoep *in press*.

<sup>9</sup> Richards and Thomas 1984: 214.

<sup>10</sup> Panagiotaki 1999: 151-179; Hatzaki 2009.

<sup>11</sup> See Macdonald and Knappett 2007 for deposit.

<sup>12</sup> Baldacci 2011.

<sup>13</sup> Karnava 2008.

<sup>14</sup> Hallager 1996; Schoep *in press*.

<sup>15</sup> Krzyszkowska 2005: 168.; Karnava 2017 (forthcoming).

suggests that sealings retained their value even after they had been detached from the objects they sealed<sup>16</sup>.

On the basis of their architectural and artefactual associations and iconography, it will be argued here that Neopalatial sealings were an important medium in social reproduction. Seals and rings are closely related to identity and as such sealings are the material embodiment of agreed identities and relationships between people but also between people, objects and events. Their production, consumption and preservation is here connected to the acquisition, storage and consumption of goods that were destined for certain rituals. These rituals, and by extension also the sealings that were produced as part of these rituals, played an important role in the legitimation and reproduction of social order.

### MM III-LM I glyptic

The MM III-LM I developments in glyptic go hand in hand with the proliferation of other iconographic media. Although stone and metal vases already occur in the Early and Middle Minoan periods, they are now engraved with relief scenes. Similarly, although painted plaster first occurs in MM II<sup>17</sup>, pictorial frescoes become important from MM IIIA onwards<sup>18</sup>.

In MM II glyptic, non-pictorial motifs were still most common but pictorial scenes depict humans, animals, insects, birds, vases and ships<sup>19</sup>. New poses and compositions are the flying gallop, animal attacks and landscape settings<sup>20</sup>. The gender of human figures (Palace of Phaistos, Atelier de Sceaux at Malia) is either not specific or mainly involves men<sup>21</sup>.

By MM III pictorial scenes are more frequent, as illustrated by the sealings from the Hieroglyphic Deposit (MM IIIA) and the Temple Repositories (MM IIIB) at Knossos<sup>22</sup>. Non-pictorial scenes (geometric motifs, occasional Cretan Hieroglyphic seal etc.) are rare and pictorial motifs, mainly animals and hybrid creatures, account for the majority of seals/rings<sup>23</sup>. In LM I, animals are depicted by themselves or interacting with other animal species or with humans (male as well as female). A difference with Protopalatial glyptic is the emphasis on the active involvement of human figures, men *and* women, in cult scenes (processions, worshipping at shrines etc.). Whereas women are surprisingly rare on MM III seals and rings<sup>24</sup>, they become much better represented in LM I. Several activities seem to be gender specific: males are depicted in boxing, fighting, charioteer, bull-leaping and occasionally cult scenes; females are participating in cult activities or

<sup>16</sup> Schoep *in press*.

<sup>17</sup> Blakolmer 1997; Hood 2005.

<sup>18</sup> Chapin 2010: 224. However, iconographic friezes existed from MM IIB onwards, as suggested by the faience inlays of landscape elements and people from the Loom Weight Basement, which presumably originally decorated a piece of wooden furniture.

<sup>19</sup> Kryszkowska 2005: 85, 89.

<sup>20</sup> Kryszkowska 2005: 89.

<sup>21</sup> Human figures are very rare at Phaistos, but more common on the steatite prisms from Malia and East Crete (Kryszkowska 2005: 90). Female human figures are, however, represented at the peak sanctuaries (Nikolaïdou 2002).

<sup>22</sup> Kryszkowska 2005: 89; Macdonald 2002; Macdonald 2010: 536.

<sup>23</sup> Younger 1988, X-XII; Blakolmer 2016.

<sup>24</sup> CMS II 8, 39 and I 18.

depicted as seated on a stepped platform or a shrine<sup>25</sup>; women are now also depicted as seated on animals (griffins, dragons)<sup>26</sup>. Men and women are only seldom depicted together in the same scenes and then only in cult scenes. A lot of attention is paid to the characterization of male and female figures, with different dress codes and hair styles for different activities<sup>27</sup>. Scenes are being specified by topographic elements (natural and/or built environment) and/or attributes of the participants.

Motifs on LM I seals and rings draw heavily upon larger iconographical cycles, mostly in the form of extensive friezes, such as has been argued for spirals, rosettes, half-rosettes, sacral knots, figure-of-eight shields etc.<sup>28</sup>. The same has been argued for scenes involving animals and humans. The bull leaping scene on seals/rings is a good example because it forms part of a larger cycle as narrated on the gold Vapheio Cups: the catching of the bull and the bull tied to an olive tree precede the leaping event in terms of temporality. Other glyptic scenes such as a bull sacrifice (or bucranium) could refer to practices following the bull-leaping event. Similarly, processions on seals/rings are likely to be a prelude to another ritual, such as worshipping at a shrine, an epiphany, dancing etc.

### Sealing practices and social reproduction

Since seals and rings were worn on the body, they may be the closest thing to a Minoan identity card we have<sup>29</sup>. It is therefore a logical deduction that there is a link between the seal/ring (shape, material, iconography), identity and by extension social reproduction<sup>30</sup>. Although it is sometimes assumed that one seal/signet ring equals one individual<sup>31</sup>, this is however not necessarily the case. Identity is a dynamic, flexible and multi-layered construct that can express a collective (membership of a social group, e.g. local community, imagined community<sup>32</sup>, office or function) or personal identity (gender, status, age, personal accomplishments etc.). Different seals with identical motifs and look-alikes<sup>33</sup> may refer to the same (collective) identity whereas *vice versa* different aspects of a person's identity may be expressed by ownership of different seals/rings<sup>34</sup>. The latter may also be suggested by the Early and Middle Minoan seals with multiple seal faces (bi-facial cylinder seals, sided prisms, bifacial discoids). The fact that a large numbers of motifs on EM and MM seals are largely indistinguishable from one another and cluster

<sup>25</sup> Günkel-Maschek 2016.

<sup>26</sup> Blakolmer 2014.

<sup>27</sup> See Crowley 2016.

<sup>28</sup> Blakolmer 2010: 101, 107; Günkel-Maschek 2012.

<sup>29</sup> Relaki 2009; 2012: 294.

<sup>30</sup> Weingarten 1986; Krzyskowska 2005; Haggis 2007; Relaki 2009; 2012: 294; Anastasiadou 2016.

<sup>31</sup> Hallager 1996: 156. But see Palaima 1987: 256-257 n. 34.

<sup>32</sup> All communities larger than primordial villages of face-to-face contact are imagined in the sense that individuals never know most of their fellow members or meet them but nevertheless bear the image of their communion (Canuto and Yaeger 2000).

<sup>33</sup> The term look-alike was coined by Weingarten (1992: 28, 34) to refer to seals/rings that are so similar they are virtually indistinguishable to the naked eye.

<sup>34</sup> The «Griffin Warrior Tomb» recently excavated at Pylos (<http://www.smithsonianmag.com/history/golden-warrior-greek-tomb-exposes-roots-western-civilization-180961441/>) contained 4 gold rings and over 50 seals (depicting female figures, reeds, altars, lions, bull-leaping and griffins) but this case may not be representative of Minoan seal-use. Most MM III-LM I tombs are collective, used over long periods of time and mostly plundered, which makes it difficult to connect seals/rings with individuals. At Poros, four gold signet rings were found in 3 tombs (Dimopoulou 2004: 368) but it is not clear how many individuals the tombs contained.



in distinct iconographic groups (cf. Weingarten's look-alikes) has been interpreted as reflecting a collective identity, such as corporate groups or officials<sup>35</sup>. Seals/rings sharing the same motif (but are not lookalikes) attested in all LM I sealing assemblages may also refer to a collective identity. It has been suggested that in the MM IIB sealings from Phaistos, seals/rings with clearly distinguishable motifs (e.g. with griffin, lion, Minoan genius, agrimi) may have served to promote personal identification and differentiation<sup>36</sup>. A similar interplay between collective and personal identity may be at stake in LM I sealing assemblages, although there is no conclusive evidence to connect motifs to either collective or personal identity. The scenes that are represented by multiple seals/rings and thus perhaps stand the best chance of representing collective rather than personal identities are depictions of animals without human figures (lion, bull, butterfly, birds). They occur mainly on lentoids and amygdaloids and only occasionally on metal rings. The scenes that show fewer similarities are those involving humans in ritual practices, with the exception of bull-leaping which seems to be represented on multiple rings at Ayia Triada, Gournia, Sklavokambos and Akrotiri<sup>37</sup>.

Although the exact nature of the link between iconography and identity cannot be determined, such link implies a coherent and coordinated system or network of social relations in which motifs and scenes were imbued with meaning. It should be emphasised that sealings are the by-product of processes of formation and production rather than the other way around. The process of production can be more important than the artefacts themselves and a sealing can thus be seen as the culmination of preceding practices, an observation that emphasizes the sealing's meaning and agency<sup>38</sup>. The impression of seals/rings on sealings can be seen as the material manifestation of the actors and social relations in a network. In Peperaki's words: «sealings draw their importance from their inherent quality from the dual process of objectifying persons in culturally codes roles and identities and emphatically representing a thing as the embodiment of these relationships»<sup>39</sup>. After their removal from the objects they sealed, the preservation of sealings and the relationships they represent may thus symbolise social reproduction (see *infra*).

If we accept that seal-use and sealing practices played a role in social reproduction, the fact that LM I glyptic displays a homogenous style and repertoire<sup>40</sup>, to the degree that the existence of pattern books has been suggested<sup>41</sup>, has implications. A recurrent repertoire of motifs is attested at the sites where assemblages of sealings have been found (Knossos, Ayia Triada, Sklavokambos, Zakro House A, Chania, Akrotiri). Inter-site similarities in shapes of seals/rings, iconography, sealing types, spatial distribution of sealings within a settlement etc., suggest similar strategies of social reproduction. Particularly significant is, in my opinion, the presence of scenes that depict females and females engaging in rituals of different (see *infra*) or interacting with gods and goddesses,

<sup>35</sup> Weingarten 1992: 28, 34; Relaki 2012: 312.

<sup>36</sup> Relaki 2012: 320.

<sup>37</sup> Krzyszkowska 2005: 164, 190.

<sup>38</sup> Ingold 2013.

<sup>39</sup> Peperaki 2016: 12.

<sup>40</sup> Blakolmer 2016: 98.

<sup>41</sup> Blakolmer 2010: 98.

a marked departure from Protopalatial glyptic<sup>42</sup>. This type of iconography draws attention to a group of people, i.e. those who are advertising their participation in ritual practices. The materiality of seals and rings, which allows them to be worn on the body and to be impressed on objects and sealings, formed an important vehicle for the multiplication and distribution of a visual message<sup>43</sup>. The relationship between glyptic and identity (whether collective or personal) implies that seal-use was paramount in propagating, reinforcing and reproducing a social order. The architectural context in which Neopalatial sealings were found functions as a focus or frame for social interaction, regulating its temporality and participation, and highlighting it as an enduring social fact<sup>44</sup>.

### Sealing practices and ritual

Ritual does not only pertain to religion but also to rites of passage, calendrical and commemorative rites (weekly, monthly or yearly cycle), rites of sacrifice and offering, rites of feasting, fasting, festivals and political rituals<sup>45</sup>. Although the ritual nature of scenes depicting women and men at shrines is unambiguous, it may be argued that other scenes, such as fighting, boxing, hunting, charioteer and bull-leaping scenes, also have a ritual character<sup>46</sup>.

Furthermore, many animals (dragonfly, butterfly, bird, agrimi, lion, griffin, dragon), hybrid creatures (Minoan Genius, bird-lady, bull-man) and plants (reeds, crocus, papyrus, lilies) may also have ritual connotations, as suggested by the contexts in which they appear on other media (relief vases, wall paintings, three-dimensional frescoes, two-dimensional plaques etc.)<sup>47</sup>. Thus, water-birds and dragonflies are depicted in the reed fresco on the first floor of Xeste 3, and it has been suggested that bird hunting may have ritual associations<sup>48</sup>. Griffins and agrimi also have ritual connections, since they often appear in cult scenes. Agrimi are depicted the peak sanctuary rhyton from Zakro, whereas the seated female in Xeste 3 who is receiving offerings of crocuses is accompanied by a griffin (Xeste 3)<sup>49</sup>. The lion, as the most prominent of all animals of power, may also have ritual associations<sup>50</sup>.

Thus, most motifs and scenes on MM III-LM I glyptic seem to have ritual associations. In addition, the artefactual and architectural associations of sealing assemblages as well as their preservation and deposition (cf. *supra*), suggests that there was a ritual aspect to sealings. After having been detached from the goods they were sealing, they were kept on the upper floors of special purpose buildings, together with ritual artefacts, suggesting they retained their value after having been detached from the objects they sealed. The largest sealing assemblage from Crete comes from the «Villa» at Ayia Triada (see *infra*) and fell from the upper floor of the Northwest Quarter with its ceremonial rooms, together

<sup>42</sup> See also Günkel-Mashek 2016.

<sup>43</sup> Tully 2012.

<sup>44</sup> As argued by Peperaki 2012 for the House of the Tiles at Lerna.

<sup>45</sup> Bell 1992; Geertz 1980; Turner 1969.

<sup>46</sup> Hood 1978: 146; Militello 2003; Soar 2014.

<sup>47</sup> Blakolmer 2016; Crowley 2016.

<sup>48</sup> Crowley 2016; Papageorgiou 2014.

<sup>49</sup> Blakolmer 2010; 2016.

<sup>50</sup> Blakolmer 2016: 61-62.

with a substantial amount of cult objects. At Sklavokambos, a stone hammer, terracotta foot and two cylindrical jars with reed decoration were found with 38 sealings<sup>51</sup>. In House A at Tyliossos, a copper ingot, scraper, two roundels and two Linear A tablets also fell from the upper floor<sup>52</sup>. The sealings were stored with two Linear A tablets, 4 clay tubular offering stands, a faience conch shell and a bronze rosette at Myrtos Pyrgos<sup>53</sup>. In the Hall of Ceremonies at Zakro a bull's head rhyton, to so-called Peak sanctuary rhyton, bronze saws, bronze hinges, three tablets and an indeterminate number of sealings were found<sup>54</sup>. The sealings from the Hogarth's House at Zakro were also stored on the upper floor in a sort of container and were accompanied by one Linear A tablet, an inscribed roundel, a large bronze knife, a steatite lamp, pottery, bronze points and bronze tools<sup>55</sup>.

On the basis of the above, it is suggested here that there may be a ritual aspect to sealing practices and that the latter maybe related to rituals taking place in the architectural context of the buildings in which they were found. Specifically, sealing practices may be associated with the procurement, transformation and consumption of goods for these events. Rituals are characterized by formalism, traditionalism, invariance, rule-governance, sacral symbolism, and performance<sup>56</sup>. Sealing assemblages, such as, for example, that from Ayia Triada (see *infra*), display a degree of formalism (adherence to formal procedures regarding application, removal, preservation or deposition of sealings), which could be called a restricted code and which induces acceptance, compliance, or at least forbearance with regard to any overt challenge<sup>57</sup>. Traditionalism refers to the evocation of historical precedents without necessarily accurately transmitting them. MM III-LM I sealing practices clearly evoke an earlier sealing tradition<sup>58</sup> although the latter tradition may not be historically correct but invented<sup>59</sup>. Traditional practices are attention-focusing and have a high-communicative potential that makes them crucial for the reproduction of social life<sup>60</sup>. The performance of the act of sealing may well be an aspect of traditionalism. The repetitive character of sealing practices (invariance) strives for timeless repetition, in an attempt to reproduce social order. Rule-governance refers to the imposition of rules on behavior and communally approved rules and customs evoke a legitimate communal authority that can constrain the possible outcomes<sup>61</sup>. Belief in the existence of the sacred demands that particular objects become sacral symbols through a process of consecration and setting the sacred apart from the profane. The architectural and artefactual contexts in which sealings were stored suggests that they were set apart from the profane. Sealings may have played a role in the transformation of a thing into a ritual object. Performance is a final characteristic of ritual that creates a theatrical-like

<sup>51</sup> Marinatos 1939: 72-73. A Clay bull's head and a stone rhyton were found in room 4.

<sup>52</sup> Hazzidakis 1912: 216.

<sup>53</sup> Cadogan 1981: 169-171.

<sup>54</sup> Hallager 1996: 75-76. Two nodules may also have come from the Archives and 4 or 5 from the Treasury, where the stone vases were stored.

<sup>55</sup> Hogarth 1901: 132-133.

<sup>56</sup> Bell 1992: 138-169.

<sup>57</sup> Bloch 1974.

<sup>58</sup> For a discussion of tradition in the MM IIB sealing system at Phaistos, see Relaki 2012.

<sup>59</sup> The MM III-LM I sealing system differs from the MM IIB system in several respects but traditions are always characterized by a dialectic of stability and change (Relaki 2012: 292). 29% of the motifs of the MM IIB sealings at Phaistos have Prepalatial parallels (Relaki 2012: 311).

<sup>60</sup> Relaki 2012: 291.

<sup>61</sup> Bell 1992: 155.

frame around the activities, symbols and events that shape participant's experience and cognitive ordering of the world, simplifying the chaos of life and imposing a more or less coherent system of categories of meaning onto it.

### Case-study Ayia Triada: Sealing practices in context

The sealings from Ayia Triada form an excellent case-study to study seal-use in LM I (1700/1675-1470/60 BCE). Ayia Triada is a small settlement (1,5 ha)<sup>62</sup> with adjacent cemetery that is dominated by a large building, the so-called Villa (Fig. 1)<sup>63</sup>. It has been suggested that the latter was a ritual centre<sup>64</sup>, which had a court to the north and south. The «Villa» and the houses to the north of the lower court (*Casa del Lebete*, *Casa del Pistrinum*, *Casa delle Sfere Fittili* etc.) constituted the core of the settlement and were separated from the settlement to the north by a heavy indented wall. Besides ceremonial rooms constructed around a polythyron system (Northwest Quarter, Northeast Quarter), the «Villa» contains numerous magazines (7, 57-61, 62, 64-67 etc.).



Fig. 1. Plan of the Villa at Ayia Triada (Müller et al. 1999: 4)

Sealings were restricted to the «Villa», where the main deposit of sealings (ca. 1150) was kept on the upper floor of the North-West Quarter. The ca. 1150 sealings were stamped by 158 different seals/rings and fall into five main types: roundels (22), single-

<sup>62</sup> Puglisi 2007.

<sup>63</sup> La Rosa 2011.

<sup>64</sup> Banti 1941-1943; Puglisi 2003.

hole hanging nodules (936), two-hole hanging nodules (11), flat-based nodules (76) and noduli (53)<sup>65</sup>. The interpretation of the sealing pattern is not without its problems. First of all, it is not known how many persons are behind the seals/rings that stamped the sealings (see *supra*). The 936 single-hole nodules are impressed by a total of 75 seals/rings but only about 10 – not necessarily of the best quality (Fig. 2)<sup>66</sup> – are responsible for three quarters of the nodules, suggesting that the other 65 together sealed about one quarter (ca.234).

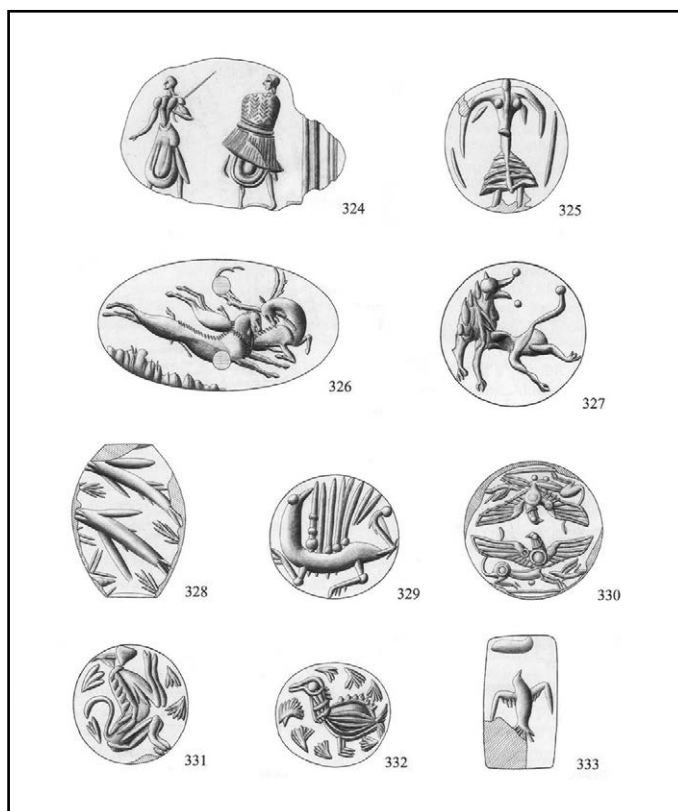


Fig. 2. Ten most active seal-users at Ayia Triada (after Krzyzkowska 2005: 170)

Can these ten (Weingarten's administrative elite) be identified as residents and as officials<sup>67</sup>? One of these ten, ring HT 125 (CMS II6 nr. 11) (Fig. 3), sealed 255 single-hole nodules as well as three roundels.

Although such intensity could suggest that the seal-user was resident<sup>68</sup>, other explanations are also possible: this ring was used repeatedly over a period of time that exceeds one administrative cycle (see *supra*); the large quantity of nodules sealed by HT 125 indicates quantities of a commodity etc.

<sup>65</sup> The typology and consistent dimensions of the sealings indicates that they were fashioned by specialists (Hallager 1996: 196-199).

<sup>66</sup> Weingarten 1987; Krzyzkowska 2005: 170.

<sup>67</sup> Hallager 1996.

<sup>68</sup> For this approach see Weingarten 1986; 1992.

It may be assumed that besides officials of the «Villa», individuals or parties fulfilling obligations may also have sealed nodules, but it remains tricky to identify residents and non-residents<sup>69</sup>.

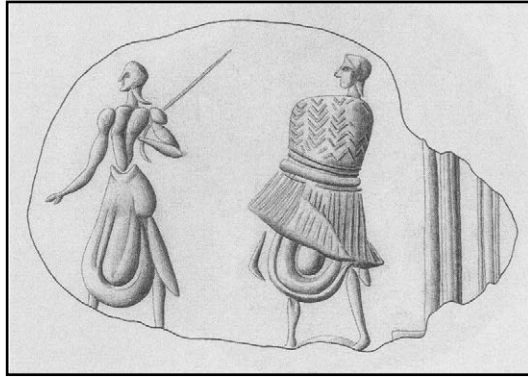


Fig. 3. HT 125 (Müller *et al.* 1999: 18)

The time-span covered by the sealings is unknown as the date of the destruction of the «Villa» does not necessarily date their production<sup>70</sup>. The fact that the charioteer ring impressed on a sealing in north-central Cretan clay from Akrotiri<sup>71</sup> (LM IA) also stamped a sealing at Ayia Triada makes the possibility that the Ayia Triada assemblage represents a diachronic rather than synchronic picture of seal-use very real. Evidence for this is provided by microscopic analysis of two sealings from Ayia Triada: the charioteer ring seems to have been more worn when used on HMs 516 than on HMs 591<sup>72</sup>, suggesting that the sealings were produced at a different time.

The sealings were preserved on the upper floor of the Northwest Quarter of the «Villa», together with at least 5 Linear A tablets and a substantial number of ritual objects such as stone vases (i.a. alabaster boat, obsidian conch shell, chalices, the Harvester Vase, the Chieftain Cup, the Boxer rhyton etc.), an ivory pyxis, metal objects (tools, figurines, double axes), lamps, pottery (i.a. Marine style pottery, alabaster) and loomweights<sup>73</sup>. Architecture is not a passive backdrop but a resource relied upon to guide actions and to make interaction meaningful; architecture provides cues securing a certain type of conduct and operates as a technology of inclusion and exclusion. The architecture of the Villa functions as focus or frame for social interaction, regulating its temporality and participation, and thus playing an important role in social reproduction<sup>74</sup>.

The fact that the sealings were found on the first floor of the Northwest Quarter, of which the ground floor was undoubtedly used for ritual practices suggests that sealing practices may have been linked to rituals taking place here (Fig. 1). Two sets of Minoan Halls may be recognized: 3-12-49-4 and 11-13-14-51-52. The lack of direct communication

<sup>69</sup> Cf. Flouda 2010: 80-81.

<sup>70</sup> Estimating the temporality of an assemblage is notoriously difficult, see Relaki 2012; Peperaki 2016 and Schoep *in press*.

<sup>71</sup> Most of the sealings were found in Delta 18, but in trench 64 one sealing was found in a wooden box with a balance and weight (Karnava 2008).

<sup>72</sup> Müller *et al.* 1999, XXVII, fig. 3, upper left (HM 516) and upper right (HM 591). I thank Diamantis Panagiotopoulos for pointing this out to me.

<sup>73</sup> Halbherr *et al.* 1980; Watrous 1984: 127 for list.

<sup>74</sup> Peperaki 2010: 251.

between these sets could suggest that they were used for different rituals or that they reflect different stages of a ritual. Pithoi were blocking three of the doors in room 3, and evidence for consumption of food and drink was found in rooms 12 and 49 as well as a storeroom (16), kitchen (45) and pantry (15) immediately to the south<sup>75</sup>. Room 4 with space for 16-17 people to be seated on benches along its walls and the small side-room to the north formed the focus of this set of rooms<sup>76</sup>. There is no evidence for consumption of food and drink in the second set of rooms (13-14-51-52), in which practices were focused on a frescoed room (14). Access to and visibility of the latter, which is interpreted as a shrine<sup>77</sup>, was controlled through non-axial access. This second set of rooms is smaller and could not have accommodated the same amount of people as 3-12-49-4. Therefore, access to the shrine and viewing of the frescoes on its north, east and south walls must have been individual or in very small groups (Fig. 3).

Considering the existence of two sets of stairs associated with these Minoan Hall systems, it is very likely that the ritual objects stored together with the sealings were used during rituals taking place on the ground floor or the court to the south of the «Villa». The latter which was located at the level of the upper floor of the Northwest Quarter<sup>78</sup>. The iconography of the relief stones vases suggests different types of rituals.

The Chieftain Cup has been interpreted as a male rite of passage; the men carrying flattened animal hides on its *verso* may refer to the sacrifice of an oxen as part of this rite<sup>79</sup>. Similarly, the Boxer Rhyton with its boxing, bull-leaping and fighting scenes may also refer to rites of passage<sup>80</sup>. The depiction of pillars with box-like projections may be the bases of flagpoles and could suggest that these activities took place in the court to the south-east. Fighting (CMS II6 nr. 15-7), hunting (CMS II6 nr. 37, 21) and bull-leaping (CMS II6 nr. 39-44) are all activities that are attested on the sealings<sup>81</sup>.

The Harvester Rhyton depicts a procession, perhaps as part of a Harvest festival, which may have ended in the «Villa»<sup>82</sup>. The procession on the Harvester Vase is accompanied by musicians and singing and music, which evokes the obsidian conch shell kept with the sealings. There are several sealings that were impressed with participants of processions carrying sticks and double axes (CMS II5 nr. 9, 10)<sup>83</sup>.

The ivory pyxis (Fig. 4) evokes the stone ring CMS II6, 3 which depicts a shrine decorated with a garland and topped with double horns (Fig. 5). Depictions of garments and textiles (*verso* of Chieftain Cup, CMS II6 nr. 7, 11, 26, House of the Ladies) suggest they played a role in rituals, and the 80 loom weights kept on the upper floor. The alabaster model of a boat recalls the seal depicting a female in a boat (CMS II6 nr. 20; cf. Mochlos ring) that impressed 45 noduli found on the window sill between corridor 9 and room 2, which were found in association with a Linear A tablet recording wool (HT

<sup>75</sup> The contents of this pottery storeroom and even the disproportionate ratio between containing and pouring vessels on the one hand and containers to eat out of on the other is reflected on tablet HT 31 which lists an inventory of pottery (Milittello 2015: 122).

<sup>76</sup> Milittello 2015: 122.

<sup>77</sup> Halbherr *et al.* 1980; Milittello 1992; Rehak 1998.

<sup>78</sup> Watrous 1984: 126.

<sup>79</sup> Koehl 1986.

<sup>80</sup> Milittello 2003.

<sup>81</sup> See Müller *et al.* 1999.

<sup>82</sup> Blakolmer 2007.

<sup>83</sup> Blakolmer 2007.

24)<sup>84</sup>. Elements from the frescoes decorating Room 14 are also found on the sealings: a monkey in a landscape with crocuses (CMS II6, nr. 73), agrimi (CMS II6, nr. 70-71), shrine (cf. ivory pyxis), seated women (CMS II6, nr. 30, 31, 32), kneeling woman in a rocky landscape (CMS II6 4).

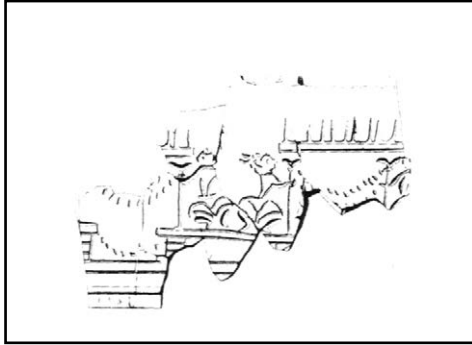


Fig. 4. Ivory pyxis (Halberr et al. 1980 : Fig. 65)

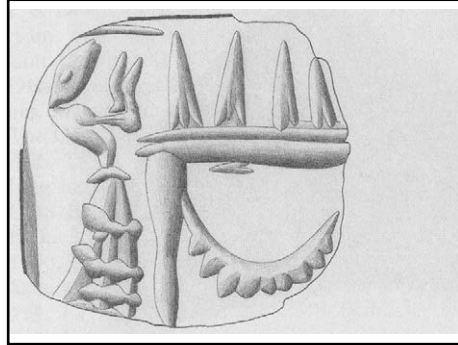


Fig. 5. CMS II6 nr. 3 (Müller et al. 1999:10)

Thus, the iconography of the seals and rings, especially those depicting rituals involving human figures, seem to have relate to practices that may have taken place in the Northwest Quarter of the «Villa» and to people involved in them. Thus, it may be suggested that these sealings, or at least a significant part of them, were produced for ritual purposes<sup>85</sup>. As noted above, rituals fall into different categories: rites of passage, calendrical and commemorative rites (weekly, monthly or yearly cycle), rites of sacrifice and offering, rites of feasting, fasting, festivals and political rituals<sup>86</sup>. It was argued above that Neopalatial sealing practices are characterized by elements that are typical of ritual, such as formalism, traditionalism, invariance, rule-governance, sacral symbolism, and performance<sup>87</sup>. The artefactual and architectural associations of the sealings combined with the ritual aspects of sealing practices allow us to suggest that the sealings formed part of the preparation of rituals events (procurement and preparation of food, drink, tableware, oils, festive garment, ritual preparation of location, participants and other objects used etc.)<sup>88</sup>. A link between some of the Linear A tablets recording pottery (e.g. HT 31) and livestock (e.g. PH 31) and ritual banquets has also been noted<sup>89</sup>.

The seals/rings impressing the sealings form a coherent and coordinated system or network of social relations in which motifs and scenes were imbued with meaning. Through their link with identity, seals/rings marked the types of goods, their destination (consumption/rituals) and/or provenance. Such an interpretation highlights the sequential activities that lie behind a sealing rather focusing on the final product of the act of

<sup>84</sup> Hallager 1996: 41.

<sup>85</sup> Bendall 2007 argues that a substantial part of the Linear B tablets deals with religious transactions (monthly offerings, organization of banquets and festivals and regular contributions of foodstuffs, goods). It has also been suggested that some Linear A tablets, especially those recording mixed commodities (foodstuffs and non-food stuffs) from Ayia Triada (e.g. HT 27, 30, 31, 38, 89, 94, 100, 114, 121) may also relate to either religious transactions or the preparation of banquets (Montecchi 2011; Miliello 2015). See also Killen 2001 for allocations made in a religious context.

<sup>86</sup> Bell 1992; Geertz 1980; Turner 1969.

<sup>87</sup> Bell 1992: 138-169.

<sup>88</sup> Constantinidis 2016. It may be suggested that the shipment of flat-based nodules to from Knossos could be related to the preparation of rituals taking place at Akrotiri, especially considering the role Cretan material culture played at Akrotiri from MM IIIA in the forging of identities and relationships (Knappett and Nikolakopoulou 2008).

<sup>89</sup> Miliello 2015.



sealing<sup>90</sup>. It is suggested here that the «Villa» and especially the Northwest Quarter with its Minoan Halls system was not only a hub of activity but also the symbol of a group's production and reproduction<sup>91</sup>. Sealing practices formed part of this and the physical accumulation of sealings and the repeated seal-use, practices and social relations of which they are the material embodiment could have provided an impression of stability and social reproduction. The long-time preservation of sealings as a physical reminder and evocation of these practices (a mnemonic record) but also of relationships that were of great importance to social reproduction is then logical.

## Concluding remarks

The purpose of this paper was to look at sealing practices from a social rather than a strictly economic perspective. That sealings retained a social value even after they were detached from objects is suggested by their structured deposition or accumulation. The approach taken here is that Neopalatial sealings are the end product of social practices and as such the material embodiment of agreed identities and relationships between people but also between people, objects and events. Rather than attempting to define resident or non-resident seal/ring-users, it is suggested that sealings are the material embodiment of a social network in which «officials», individuals or parties were fulfilling obligations.

The iconography on seals/rings (and sealings) has extensive links with other iconographic media, such as relief vases and frescoes, and as such, may have ritual connotations. Furthermore, it was argued that the sealing practices from Ayia Triada are characterized by several characteristics of ritual. On the basis of the latter, their architectural and artefactual associations and iconography, it was argued that the LM I sealings from Ayia Triada are related to the preparation, organization and hosting of rituals at the «Villa» and in particular in the Northwest Quarter and the court to its southeast. The relationship between glyptic and identity strongly suggest that seal-use and sealing practices were paramount in propagating, maintaining and reinforcing a social order. Indeed, judging from the quality of the seals and rings, the top of the social pyramid was represented by metal rings, which overwhelmingly depict men and women involved in ritual practices. It is these men and women that should be considered the protagonists in the social network that is represented by the sealing assemblage at Ayia Triada.

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<sup>90</sup> Ingold 2010: 127-130.

<sup>91</sup> Peperaki 2010: 256.

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# When one equals one: The Minoan roundel

*Judith Weingarten*

**Abstract:** Roundels are clay documents unique to Minoan culture. They are flattened clay disks, more or less wheel-shaped, with (usually) a very brief Linear A inscription on one or both sides and one or more seal impressions on the rim. The documents are coeval with Linear A administration: they appear along with the script in Middle Minoan IIB and vanish after the Late Minoan IB destructions. Roundels have been interpreted as receipts for commodities, the recipient of goods acknowledging units of «debt» by marking the rim of the roundel with the equivalent number of seal impressions, thereby accepting responsibility for removing that number of units from palatial storerooms. While widely accepted, this explanation does not account for two peculiarities of the document: 1) the probability that recipients of the goods were functionally illiterate; and 2) that they could not, or would not use abstract numbers. This paper examines two case studies in order to further our understanding of this peculiar Minoan document and proposes another way of looking at roundels.

During the First Palace period on Crete (Middle Minoan IB-Middle Minoan IIIA; roughly 1900-1700 BCE), Minoan administrators wrote in two scripts, both still undeciphered: Linear A and Cretan Hieroglyphic, the former in the south and the latter at sites in the north and east of the island. Some time before the construction of the Second Palaces – in any case, before the end of the Middle Bronze Age – the Hieroglyphic script vanished and all palaces and monumental country houses with preserved written records were using Linear A. Indeed, Linear A soon moved beyond economic administration to appear, for example, in votive inscriptions on personal objects (such as gold pins) and on stone vases (notably the «libation vases»). Besides administrative records kept on clay tablets, there is also abundant evidence for the use of parchment/leather documents with texts presumably written in ink: the documents themselves have all vanished but the medium left its negative traces on the backs of seal-impressed clay nodules (the so-called «flat-based» sealings)<sup>1</sup>. In addition, administrators stamped clay nodules which hung from relatively fine strings: besides bearing seal impressions, many hanging nodules were inscribed with single Linear A signs (very rarely, two signs). Another type of clay document is the seal-impressed *nodulus*, pl. *noduli* – mini-documents with no means of attachment whatsoever – so these never could have sealed anything; *noduli*

<sup>1</sup> Weingarten 1983a, Ch. IV; 1983b; Hallager 1996: 135-158; most recently Perna in this volume.

have been interpreted as docketts and/or tokens<sup>2</sup>. Finally, there are roundels, a type of sealed document unique to Minoan culture (Fig. 1). Roundels first appear in MM IIB at the «home» of Linear A in the palace of Phaistos, but their *floruit* is decidedly LM IB (ca. 1450 BCE) when they are found in destruction deposits across all of Crete. Roundels are flattened clay disks, more or less wheel-shaped, with (usually) a very brief Linear A inscription on one or both sides and one or more seal impressions on the rim<sup>3</sup>.



Fig.1. A roundel (Khania Wc 2001) inscribed AB 61, 6 seal impressions on rim (CMSVS 1A 163). After Hallager 1996, Vol. 2

Roundels have been convincingly interpreted as receipts for commodities, the recipient of goods acknowledging units of «debt» by marking the rim of the roundel with the equivalent number of seal impressions, thereby accepting responsibility for removing that number of units from a storeroom<sup>4</sup>. This explanation has been widely accepted among Aegean scholars, but it does have two intriguing consequences. Since Minoan clay tablets are *never* stamped by seals, roundels are, strangely enough, the Minoans' closest approach to the sealed written documents known from the Near East, but they

<sup>2</sup> Weingarten 1986; 1987b; 1990.

<sup>3</sup> When roundels are reasonably intact, they are rarely unscribed: at Ayia Triada, 1 of 22 catalogued roundels; Khania, 5/122; Knossos, 5/14; Malia 3/5; Tylissos, 1/2. Hallager 1996: 112 suggest that the lack of inscription means that the administrator would have *known* what the roundel was counting or that the seal-user was normally concerned only with a single commodity.

<sup>4</sup> Hallager 1996: 117.



appear to be documents written for a functionally illiterate bureaucracy. That may be why, on roundels, each seal impression equals one unit – so the scribe cannot cheat the seal-owner regarding numbers – and why, too, the vast majority of roundels are inscribed with simple ideograms or logograms which even the barely literate could understand. It is a simple system that allows the functionally illiterate to transact palace or villa business with confidence<sup>5</sup>. So, although seal-owners who stamped roundels demonstrably interacted with palatial officials/scribes, they worked within a system that was geared to individuals unable to read much beyond the level of ideograms and logograms.

Yet functional illiteracy is not the most striking peculiarity of Minoan roundels. For the system also means that seal-owners could not use, or did not trust, abstract numbers. They could not, or would not, let the scribe write, e.g., 6 SHEEP and put their seal on it, but apparently insisted on stamping the roundel six times instead. In fact, only a handful of roundel inscriptions include numbers: rather, the function of *counting* on roundels is almost always entirely a matter of adding up the seal impressions<sup>6</sup>. This seems extraordinary for the time and place. It requires us to believe that some relatively elite Minoans were not receptive to abstract numbers but retained (or resuscitated) a principle of cardinality – even though, quite clearly, Minoan scribes in both Cretan Hieroglyphics and Linear A traditions had been comfortable with abstract numbers since at least Middle Minoan II (ca. 1750 BCE)<sup>7</sup>.

Most of the ca. 182 published roundels are stamped by a single seal-type – once or repeatedly – with the number of impressions varying from 1-15<sup>8</sup>. In ten cases, two or more *different* seals are stamped on the same roundel, by which we assume that each seal-owner takes responsibility only for the units corresponding to the number of their own seal impression(s)<sup>9</sup>.

To further our understanding of this peculiar Minoan document, this paper will examine two case studies from among the 112 roundels excavated at Khania, Katre Street 10 – by far the largest concentration of roundels found on Crete; however, as always

<sup>5</sup> Weingarten 1994: 182.

<sup>6</sup> The equation  $1=1$  is virtually absolute. Only two roundels from Ayia Triada (HT Wc 3001, 3019) appear to diverge: HT 3001, stamped three times by CMS II.6 142, has the fraction sign «j» (=1/2?) *supra sigillum* on just one of its three impressions; and HT 3019, stamped three times by CMS II.6.33 has the fraction sign «E» (=1/4?) *supra sigillum*, also on just one of the three impressions [on Linear A fractions, see <http://people.ku.edu/~jyounger/LinearA/#14>]. The fractions were explained as either the recipient receiving 1+, 1+E or; alternatively, only the quantity of J or E. As it happens, three recently-discovered roundels seem to emphasize the equation  $1=1$  through the addition of the number «1» *supra sigillum*:

(a) an early roundel from MM IIB (-MMIIIA?) Petras stamped with a single seal impression on which is marked the number «1» *supra sigillum* (Tsipopoulou and Hallager 2010: R1, R2);

(b) a roundel from LM IB Gournia, stamped twice by the same seal, both marked with the number «1» (?) *supra sigillum* (Younger in Watrous *et al.*, 2015: GO Wc 3);

(c) a roundel from Pyrgos stamped five times by two different seals, all marked with the number «1» *supra sigillum* (Rehak and Younger 1995: PYR Wc 4).

<sup>7</sup> See Schmandt-Besserat in this volume. Briefly, cardinality is the ability to assign number words – for us, for example, we count «one, two, three...» with the final number word of the series representing the number of the set. Plurality was still viewed as series of separate concrete sets. On the related concept of «concrete weighing» as specific weight units for certain goods – on Crete, a heavier unit for weighing WOOL and lighter units for gold and saffron (see Michailidou 2001a).

<sup>8</sup> Hallager 1996.

<sup>9</sup> Multiply-stamped roundels come from Knossos, Malia, Pyrgos, and Samothrace. We can say nothing about Samothrace, which is literally an outlier. The other sites also commonly used a Multiple Sealing System, with two or more seal impressions stamped on single nodules; see further Weingarten 1988b; Hallager 1996: 105-108.

at Khania, none were *in situ*, but probably represents a secondary deposit<sup>10</sup>. The cases focus on three seal-owners who stamped exclusively (or almost so) one category of goods as expressed by a single repeated and/or closely related Linear A sign.

### Roundels stamped by CMS VS IA 158

**The Evidence.** This soft-stone (?) lentoid seal, depicting two facing calf heads in profile (Fig. 2)<sup>11</sup> left a total of 29 stamped roundels – more than any other seal at the site; all but two of the roundels were inscribed.

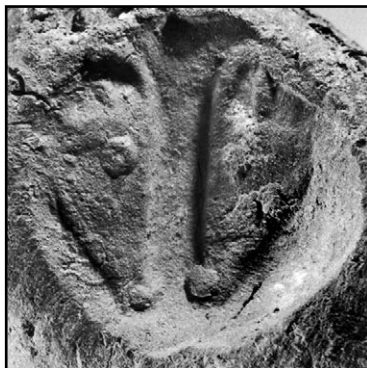


Fig. 2. Khania: CMS VS IA 158









Thirteen roundels were inscribed on one side with a single vase ideogram (VAS 409 , 411 , or 417 ) , three with a human-male sign (+ ligature, A 568 ) and one with both, VAS 409  and A 568 , a single sign on each side – which suggests a possible underlying relationship between the two disparate signs<sup>12</sup>. He (or She) stamped two to eleven impressions on each roundel, all with the idiosyncrasy of tilting the seal after the first upright impression (Fig. 3), which makes us sure that there is but one individual behind this seal<sup>13</sup>.






Fig. 3. Khania: First four impressions of CS VS IA 158 on rim of Wc 2010. NB: the increasing tilt of impressions from right to left

<sup>10</sup> Hallager 1996: 47-53.

<sup>11</sup> A very rare image, its sole parallel is CMS I S 169c (no provenance), on an amethyst 3-sided prism. CMS judges the Khania example to have been impressed by a «soft stone».

<sup>12</sup> The link between a sign for VAS and A 568 seems confirmed by seal CMSVS IA 170 (who shares a scribe with CMS VS IA 158; see n. 14 below) who stamped two roundels: Wc 2017, inscribed with VAS 411 , and Wc 2032, with A 568 . Further evidence for this link appears on two tablets, HT 97a.1 and HT 119a.1-2, n. 17 below.

<sup>13</sup> Hallager 1996: 94.


Scribe 54 is identified as having written VAS 411  and 409  (both «tripod» signs, the latter without handles) on eight roundels stamped by this seal; but he also wrote VAS 411  on two roundels stamped by another seal-user, CMS VS 1A 170 (a butterfly image). Thus, it appears that scribes were not bound to a single seal-owner<sup>14</sup>.

**The Explanation.** In all, four different seal-owners (CMS VS 1A 158, 170, 163, 182) stamped roundels inscribed with a «tripod» sign, for a total of at least 88 seal impressions. Assuming, reasonably enough, that the VAS signs refer to tripods made of bronze (and not clay), each weighing approximately 3,5 kg – the weight of a bronze tripod in the Khania Museum – the four seal-owners will have jointly taken in charge over 300 kg of bronze<sup>15</sup>.

The owner of CMS VS 1A 158, who by himself left at least 46 impressions on «tripod» roundels, must have himself received no less than 160 kg of bronze tripods<sup>16</sup>.





**The Question.** What did he do with 46 tripods? Are we to imagine that the person behind this rather simple seal scooped up as many as eleven bronze tripods at one time? If he was not the *Hellanodikis* (judge and prize-giver) at some Minoan sporting festival, why did he need so many tripods? One wonders if we are not reading this backwards, and that he hadn't *received* 46 tripods but, rather, *delivered* tripods to the palace, presumably having earlier received sufficient bronze to produce 46 tripods over time.



In other words, can this modest seal-owner be a metal-smith, or head of a metal workshop?





Admittedly, we have very little evidence for metal transactions. It is one of the oddities of Linear A documents that there is hardly any mention of metal on tablets. The sign A 327  [visually similar to Linear B AES \*140 for bronze/copper], occurs as a logogram on just two tablets, both from LM IB Ayia Triada (HT 97A.1 and HT 119A.1), and nowhere else<sup>17</sup>.

Metal vases are almost as elusive: a single MM III tablet, MA 10, from Malia, lists an inventory of vases, and another is HT 31 from LM IB Ayia Triada<sup>18</sup>. One must wonder why there are so few records for metal on Linear A tablets. While it is possible that the missing accounts were kept on the lost leather/parchment documents (perhaps sealed by the «flat-based nodules»), it seems unlikely that such an expensive medium would be used for temporary accounting documents. For whatever reason, the upshot is that almost

<sup>14</sup> Cf. n. 12, above. As many as four different scribal hands worked on roundels for the single seal-owner, CMS VS 1A 163 (who left a total of 15+ roundels).

<sup>15</sup> Hallager 1996: 115-116. None of their four seals were in any way impressive. On the contrary, the owner of CMS VS 163, an active roundel-stamper, used a rather ordinary amygdaloid depicting two early Cut-Style lions. Nonetheless, he stamped VAS ideograms a total of 35 times – in addition to 60 units of unidentified AB 61 . The fourth seal in the metal-vase business, CMS VS 1A 182, had a «talismanic» seal that stamped 6x VAS 409  (in addition to 8x the mysterious AB 61  and 5x equally unknown A 605 ).

<sup>16</sup> To which we must add an unknown quantity of bronze for his 10 impressions on two roundels inscribed with the sign VAS \*417  (Wc 2006 and 2007) – a sharply tapering «bucket» vase with two loop handles on top of the rim. For a similar vase shape but with horizontal handles on the belly, cf. the sign on MM III MA 10b 1a (Olivier, Pelon, Vandebecq 1979: Fig. 24). Also cf.: *u-do-ro* [water jar] sign from Linear B Knossos, *ibid.* Fig. 26, and – what is probably the closest parallels for VAS \*417  – bucket vases pictured on the front of the later Ayia Triada sarcophagus [*ibid.*, Fig. 27], and the (LM I?) Ayia Triada Procession fresco.

<sup>17</sup> HT 97a.1, the ideogram 33 units of A327  followed by A 568  (human male sign with ligature) with the number 82, a ratio almost exactly 2.5:1; HT 119A.1-2 has 34 units A327  followed by A 100  (human male sign, no ligature) with the number 68, in the exact ratio of 2:1. See n. 12, above.

<sup>18</sup> Olivier, Pelon, Vandebecq: 1979; at Ayia Triada (and the occasional fragments from Khania), vase ideograms otherwise appear on mixed product lists either in low or uncertain quantities. However, the fragmentary tablet HT 39 could possibly have listed diverse recipients(?) of +100(?) cauldrons [it unfortunately breaks off at the crucial point].

the only identifiable Linear A records for metal in any shape or form are the vases on roundels<sup>19</sup>. We shall consider this further in our summing up.

### Roundels stamped by CMS V S IA 169 and CMS V S IA 165




**The Evidence.** Both seal-owners were specialists: their extant roundels show them dealing with only a single type of cloth, described by the rare ideogram AB 164  (with minor variations = a, b, c, d, «e»). CMS V S IA 169 stamped his soft-stone(?) lentoid depicting a butterfly on eight surviving roundels (Fig. 4), one to five times each, all marked with the ideogram \*164 ; four of his roundels were inscribed by Scribe 55, the other hands are unidentified<sup>20</sup>.



Fig. 4. Khania: CMS VS IA 169 impressed on rim of roundel Wc 2037

CMS V S IA 165 used a soft-stone (?) amygdaloid of slightly irregular (lozenge) shape, with the image of a flying bird (Fig. 5); in front of the bird, an enigmatic cone-shape object with protruding «horns». This seal owner stamped four (or five?) roundels, three fully preserved with three to five seal impressions each and a fragment with at least two impressions; all are inscribed with \*164  (in minor variations)<sup>21</sup>.

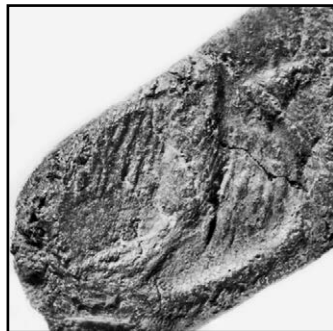



Fig. 5. Khania: CMS VS IA 165

<sup>19</sup> Conceivably the ideogram for GOLD on Pyrgos Wc 4 stamped 5 times by two different seals (each impression marked «1» *supra sigillum* (see n. 6, above). If A 372 is indeed the predecessor of Linear B \*141 (GOLD), presumably 5 units would have been divided between the two seal-owners (2+3 units each). If the Minoans had a concrete GOLD weight comparable to the Middle Kingdom Egyptian unit for gold (12-14 gr), the quantities given or received would not have been excessive. For a possible Linear B gold unit of ca. 13.6 grams, still based on this weight, see Michailidou 2001b: 100-103 and Table 2.

<sup>20</sup> One might cautiously also ascribe AB 164c on Wc 2041 and AB 164a on 2042 to a single hand.





<sup>21</sup> CMSVS IA adds Wc 2096 to the catalogue in Hallager 1996, perhaps a fragment later added to Wc 2095 and not an independent piece; presumably it would have had at least one seal impression.














**The Explanation.** Because \*164  survives into Linear B, we can glean some information from a later record at Knossos:


#### KN L 520

1. Do-ti-ja (PN)	LANA 18	pe-re-ke	*164 3
2. Ka-ma (PN)	LANA 12	[pe-re-ke]	*164 2
3. Sa-mu-ta-jo (MN/PN?)	LANA 24	[pe-re-ke]	*164 4

*At the villages of Do-ti-ja, Ka-ma and Sa-mu-ta-jo(?), 54 units of WOOL were «made into» or «woven for» 9 CLOTHS of \*164 type<sup>22</sup>.*

As one Mycenaean unit of LANA/WOOL weighed ca. 3 kg, it required 6 units (18 kg) of LANA/WOOL to produce one unit of \*164 . This seems exceptionally heavy, so it is likely that \*164  in this context does not refer to single pieces of cloth but to «bolts» or «bales»<sup>23</sup>. Whatever the exact quantity, the Late Minoan I owner of the butterfly seal CMS VS 1A 169 signed for at least 14 pieces of \*164 , while the bird seal CMS VS 1A 165 acknowledged at least 16 pieces. Thus, the producer(s) of \*164  would have needed some 250-300 kg of WOOL to make the 30 pieces of cloth marked on the roundels.



The butterfly seal, CMS VS 1A 169, had *also* stamped eight clay nodules [single-hole, hanging pendants (Class VII)], each of which was inscribed with a single Linear A sign: two were marked A 301  (Wa 1011, 1012) and six AB 74  (Wa 1006-1010). This is the only seal-owner at Khania who stamped documents inscribed with these particular signs. However, the same combination of A 301  and AB 74  (individually; never together on a single nodule) is very well known from Ayia Triada<sup>24</sup>. At Ayia Triada, ca. 70% of the more than one-thousand stamped clay nodules were inscribed – most commonly with one of six Linear A signs – which cluster into two Groups: Group I contains the four signs AB 77, AB 81, AB 02, AB 41; and Group II just two signs, A 301  and AB 74 . The seals that stamped nodules with Group I signs were totally dedicated to this Group, just as the seals which stamped nodules with Group II signs were exclusive to Group II<sup>25</sup>. So the procedure looks exactly the same as at Khania: members of Group II work with just two product(s) or in two specialist storerooms. We have no information on the meaning of the signs A 301  and AB 74 , not even whether they are used as logograms or abbreviations<sup>26</sup>. However, at Khania, we do have an added link through the butterfly seal who stamped nodules marked A 301  and AB 74  nodules and who was exclusively involved with \*164  cloth on roundels. Naturally, one wonders if signs A 301  and AB 74  were also connected with textiles in some manner.

<sup>22</sup> Nosch 2016: 441. Also proposed, «were shorn for»: Lane 2011: 93. Of course, we cannot be sure that \*164  has the same weight as the ideogram in Linear A since that could change over time, but the ideogram is so uncommon as well as specific that it is rather more likely that it refers to the same cloth.

<sup>23</sup> Nosch 2010: 322-323. On the other hand, if the quantity is of raw wool, washing, cleaning and combing before it can be spun and woven would reduce the wool's weight to about half the quantity; still a hefty 9 kg type of cloth if it does, in fact, refer to a single textile.

<sup>24</sup> Weingarten 1987.

<sup>25</sup> With the exception of the «overall sealing leader»: the ring-owner CMS II.6 II participated in both groups but his activity was overwhelmingly in Group I (179 nodules against 21 Group II nodules).

<sup>26</sup> At Ayia Triada, however, A 301  is always the more active sign: on 205 nodules versus 33 nodules marked AB 74 ; at Khania this is reversed [given 8 preserved nodules, perhaps pure chance].

**The Question.** The evidence is quite indirect, but surprising nonetheless. The butterfly seal and the bird seal, as we have seen, exclusively handle the same cloth product \*164  $\text{𐀀}$  on roundels. It may be no more than coincidence that well over half of Group II nodules at Ayia Triada – 133 of 238 nodules – also happened to be stamped by a seal with the image of a flying bird, CMS II.6 110 (Fig. 6)<sup>27</sup>. But what *cannot* be coincidence is the enigmatic conical object («ein nicht genauer benennbares konisches Objekt») floating before the Khania bird (Fig. 5), which strongly resembles the Linear A sign, AB 80  $\text{𐀀}$  (independently remarked by CMS VS IA, page 168). AB 80  $\text{𐀀}$  is also the Linear A WOOL logogram (as it was in Cretan Hieroglyphics, and will be again in Linear B; hence our certainty). In short, this seal-owner put the sign of his «trade» on his seal: he deals in WOOL or woolen goods. A «trade mark» on a Minoan seal is unique<sup>28</sup>.



Fig. 6. Ayia Triada: CMS II.6 110

We can be reasonably sure that the bird-seal was dealing with WOOL (presumably to be turned into \*164  $\text{𐀀}$  cloth [as on Knossos L 520]). Yet the logogram AB 80  $\text{𐀀}$  is itself conspicuously missing from roundels. AB 80  $\text{𐀀}$  is also relatively rare on Linear A tablets, though not as scarce as signs for metal and metal products, and always recorded in small quantities<sup>29</sup>. It never approaches anything remotely like the industrial quantities of WOOL/LANA recorded on Linear B tablets at Knossos (+23,000 kg from ca. 100,000 sheep: Nosch 2010: Table 3).

### Summing up

For the period covered by our Linear A records, we tentatively propose that metal and wool were not brought into palace storerooms as raw materials, but delivered direct to workshops. This implies a much more decentralized administrative system than that represented in the Linear B tablets. The palace storerooms, in this reading, only *received* the finished metal and textile goods in transactions recorded by roundels. The clay nodules found in most palaces and some villas could not have sealed bulky metal or

<sup>27</sup> Weingarten 1988: 91-98.

<sup>28</sup> Perhaps it is time to re-examine the rare Linear signs on Minoan (and Mycenaean) seals last discussed by Gill 1966: 11-16.

<sup>29</sup> Four examples on tablets: the largest amount of AB 80  $\text{𐀀}$  is HT 146.3 (30 units = ca. 90 kg); on the ostrakon THE Zg 5 from Akrotiri, 40 units (Michailidou 1995: 18). NB: 2 units on HT 110b.5, immediately followed by a fractional quantity of A 301  $\text{𐀀}$  (!). AB 80  $\text{𐀀}$  with AB 26 in ligature ( $\text{𐀀𐀀}$ ) is presumably the Minoan word for WOOL: MA.RU. See also TELA (CLOTH) and TALENT (weight of ca 29 kg), in a ratio of 1:10 between the WOOL unit (ca. 3 kg) and TALENT. Full discussion in Del Frio, Nosch, Rougemont 2010: 348-354.

textile products (given their fine cords) but more likely tracked the movement of finished goods in/out of palace storerooms<sup>30</sup>. A possible hypothesis is that storerooms dealing with textiles are those marked by A 301  $\text{𐀀}$  and AB 74  $\text{𐀁}$ . The roundels examined in our two case studies more logically represent finished goods delivered from workshops to the palace storerooms (rather than goods removed from the storerooms). This would help explain both the simplicity of most roundel texts – written for the functionally illiterate – and the «archaic» counting method that persisted at a time when abstract numbers were in use on all other records kept by scribes in the palaces and villas.

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<sup>30</sup> Weingarten 1988: 34-38.

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# Anatolia and Cyprus



# How to read the signs: The use of symbol, marking and pictographs in Bronze Age Anatolia

*Willemijn Waal*

**Abstract**<sup>1</sup>: The practice of applying simple marks on pottery (and other objects) is attested throughout Bronze Age Anatolia, though it was a relatively rare phenomenon. The marks mostly consist of simple and common motifs such as lines, crosses, arrows, twigs, triangles, chevrons, stars, as well as more complex signs. Various proposals have been made regarding their meaning and function: they have been seen as evidence for state control, as markings of potters using a communal kiln, markers of owners or as indicating the vessel's content or volume<sup>2</sup>. As has long been noted, some of the marks bear resemblance to signs of the Anatolian hieroglyphic script. This paper will explore if and to what extent these marks can be related to the Anatolian hieroglyphic script and if they may shed light on the highly debated origins and use of this script. The main focus will be on hand-made marks incised on pottery and other objects from central Anatolia, at times supplemented by relevant material from surrounding regions including a brief excursus on Troy, as this site has yielded some interesting material.

## Introduction: Writing in Bronze Age Anatolia

In the 2nd millennium two writing systems were in use in Anatolia: the cuneiform script and the Anatolian (or Luwian) Hieroglyphs:

### *The cuneiform script*

The cuneiform script was introduced to Anatolia twice. It was first brought along by Assyrian merchants who settled in Anatolia at the beginning of the 2nd millennium BCE. This so-called Old Assyrian colony or *kārum* period (ca. 1950-1720 BCE) has yielded several thousands of clay tablets at various locations in central Anatolia, with the largest concentration in Kültepe/Kaneš. The surviving documents predominantly formed part of the private archives of the Assyrian traders and mostly consist of business contracts,

<sup>1</sup> This paper could not have been written without the help of Michele Massa, who very generously shared his Early Bronze Age material with me and allowed me to use parts of his unpublished dissertation (Massa 2016). I would further like to thank the Institute for Aegean Prehistory (INSTAP) for their generous support which enabled this research.

<sup>2</sup> For an excellent discussion of the use and possible meaning of pot marks in Late Bronze Age Anatolia (with extensive bibliography), see Glatz 2012.

loans, memoranda and letters<sup>3</sup>. The documents are all written in the Assyrian language, though it is clear from some grammatical errors that texts were occasionally composed by non-native speakers. No documents recorded in Hittite or any other local language have come down to us. Likewise, hardly any administrative texts from the Anatolian palace, which was an important trading partner of the Assyrian merchants have survived.

When the Assyrian merchants leave, the cuneiform disappears in Anatolia to reappear in the Hittite period (ca. 1650-1180 BCE). It is generally agreed that this cuneiform script was introduced from Northern Syria somewhere in the 17th century<sup>4</sup>. Almost all clay tablets (ca. 30.000 fragments) from this period have been found in central Anatolia, the majority stemming from the Hittite capital Hattuša/Boğazköy. The texts are predominantly written in the Hittite language and they all belong to the palace or state administration<sup>5</sup>. They include religious, scholarly, historical, mythological and literary texts, but virtually no day-to-day administrative documentation from the palace nor records in private contexts have been discovered<sup>6</sup>. The cuneiform script was in use till the end of the Hittite Empire around ca. 1180 BCE.

### *The Anatolian Hieroglyphs*

*Usage* – The Anatolian Hieroglyphs are an indigenous writing system that was used for Luwian, a language closely related to Hittite that was in all likelihood spoken by the majority of the population<sup>7</sup>.

Geographically, the hieroglyphic sources are more widely spread than the cuneiform script, ranging from Northern Syria to the west coast of Anatolia. The script continues to be in use after the fall of the Hittite Empire in Cilicia and Northern Syria till around the 7th century BCE.

The Anatolian hieroglyphs are known from seals and seal impressions, rock inscriptions and incidental graffiti<sup>8</sup>. Due to the fortunate find of several lead strips from Aššur dating to the Iron Age we know that Anatolian Hieroglyphs were also used for economic and private documents in the 1st millennium BCE<sup>9</sup>.

Opinions differ about the extent to which they were used in the Hittite period, a problem which is inevitably tied to the disputed and elusive wooden writing boards. Hittite cuneiform texts often refer to wooden documents and to scribes-on-wood. It has been suggested that these scribes-on-wood refer to scribes writing in hieroglyphs – as opposed to regular scribes who wrote in cuneiform<sup>10</sup> – and that the missing wooden documents on which they wrote may have included daily administrative and private texts, which are so conspicuously absent in the Hittite records<sup>11</sup>. Another view, however, holds that these lost

<sup>3</sup> For an overview of the written Old Assyrian sources, see Veenhof 2008: 41-55. For a recent overview of this period, see now Larsen 2015.

<sup>4</sup> The *ductus* of the cuneiform script that was now in use clearly differs from the Old Assyrian one and more resembles the *ductus* that was used in Northern Syria at that time, see, e.g. Van den Hout 2009 with references.

<sup>5</sup> Other languages include Akkadian, Sumerian, Hurrian, Hattian, Palaic and Cuneiform Luwian. For an overview of the Hittite cuneiform sources, see Van den Hout 2011.

<sup>6</sup> For a possible example of a private document see Wilhelm 2007.

<sup>7</sup> See e.g. Van den Hout 2006.

<sup>8</sup> For an edition of the Anatolian hieroglyphic inscriptions, see Hawkins 2002.

<sup>9</sup> For these lead strips, see Hawkins 2002: 533-559.

<sup>10</sup> Note that a different verb was used when referring to writing on wood, for discussion see Waal 2011: 22-23.

<sup>11</sup> E.g. Güterbock 1939: 36; Bossert 1958; Dincol and Dincol 2002: 210; Waal 2011.

wooden tablets were inscribed with cuneiform and that the use of Anatolian Hieroglyphs was thus restricted to seals and royal inscriptions<sup>12</sup>.

*Origins* – The origins of the Anatolian Hieroglyphs are equally debated. The first attestations of hieroglyphic signs are found on seal impressions, dating to the beginning of the 2nd millennium BCE. It is debated to what extent the earliest signs on seals represent writing. The first inscriptions that can be confidentially read phonetically date to ca. the 15th century BCE<sup>13</sup>.

According to some scholars the Anatolian Hieroglyphs were invented around that time, inspired by the earlier signs on seals<sup>14</sup>. An alternative scenario proposes that the Anatolian Hieroglyphs are much older and were already in use (on wood) from the beginning of the 2nd millennium onwards<sup>15</sup>. Direct evidence is inevitably lacking due to the perishable nature of wood, but the Old Assyrian documents may suggest that the Anatolians already had their own form of notation system by then<sup>16</sup>. It is further of interest that the Anatolian Hieroglyphs show some striking similarities with Aegean scripts such as Linear A and Cretan Hieroglyphs<sup>17</sup> that emerge at the beginning of the 2nd millennium, whereas they differ from the cuneiform script in some aspects<sup>18</sup>.

In sum, two scenarios exist: on the one hand, a minimalist view that holds that the Anatolian Hieroglyphs were created around 1400 BCE and that their usage in the Late Bronze Age was restricted to seals and monumental public rock reliefs. The maximalist view, on the other hand, argues that the Anatolian Hieroglyphs already existed at the beginning of the 2nd millennium BCE and that they were more widely used for daily administrative records and private documents on wood.

Until new evidence comes to light this debate cannot be settled with certainty. It is therefore all the more interesting to see if the use of signs and symbols on pottery and other objects may shed light on these questions<sup>19</sup>. To what extent can these marks be connected to the Anatolian Hieroglyphs? Is there a clear continuation or change visible in their usage?

<sup>12</sup> Eg. Singer 1983: 40-41; Symington 1991: 115-16; Marazzi 1994; van den Hout 2010: 257-58.

A third possibility proposed by Hawkins (2000: 3; 2008: 33) is that both cuneiform and Anatolian Hieroglyphs were used on the wooden writing boards.

<sup>13</sup> For discussion, see most recently Waal 2012 with references.

<sup>14</sup> Yakubovich 2008.

<sup>15</sup> Waal 2012.

<sup>16</sup> For instance, the Old Assyrian documents make mention of *uṣurtu*- documents («drawings») in Anatolian context, see Waal 2012.

<sup>17</sup> Hawkins 1986: 374; Ferrara 2014.

<sup>18</sup> In some respects, the Anatolian Hieroglyphs seem less developed than the cuneiform script: the cuneiform script has V, CV, VC and CVC signs, whereas the Anatolian Hieroglyphs – like Linear A – has only V and CV (and very few CVCV) signs. Further; the Anatolian hieroglyphs are written *boustrophedon* with a loose, sometimes chaotic ordering of the signs. The cuneiform signs, on the other hand, are written from left to right, line by line. A further difference is that in the Anatolian hieroglyphic script, the determinatives may be written before or after the noun, whereas in cuneiform they are normally placed before the noun. These dissimilarities would point to an autonomous origin and development of the Anatolian Hieroglyphs, before the arrival of the cuneiform script in Anatolia. For further discussion, see Waal 2012: 304-305 with references.

<sup>19</sup> This paper will primarily focus only on marks and symbols that are applied on pottery and objects by hand; stamped impressions, seals and sealings with pictographic symbols are as a rule not included.

## The Early Bronze Age

For the Early Bronze Age (ca. 3200-2000 BCE; henceforth: EBA) material, I am deeply indebted to Michele Massa, who generously shared with me his collection of EBA marks and signs. In his dissertation<sup>20</sup> about social interaction in west and central Anatolia in the Early Bronze Age, Massa has investigated some 3.7000 individual artefacts of 169 sites, some of which contain markings<sup>21</sup>. As he points out, certain *caveats* are in order with respect to the representativeness of this material, as the intensity of archaeological investigations in the vast region of Anatolia is quite low and unevenly distributed and not all data are properly published<sup>22</sup>.

### *Single signs*

There are only few examples of EBA pre-fired pot marks known to me which all stem from Hisarlık/Troy<sup>23</sup>. The first example is a drinking vessel which has the impression of a crescent-shaped sign at the bottom<sup>24</sup>. Further, three vessels contain a «comb-like» sign, resembling the capital letter E, with a varying number (4, 5 and 6) horizontal strokes (Fig. 1). These marks have been interpreted as measurement signs, as the number of strokes seems to correspond to the different sizes of the vessels<sup>25</sup>. Regardless of their function, it is safe to say that these markings are exceptional and do not represent a common practice<sup>26</sup>.

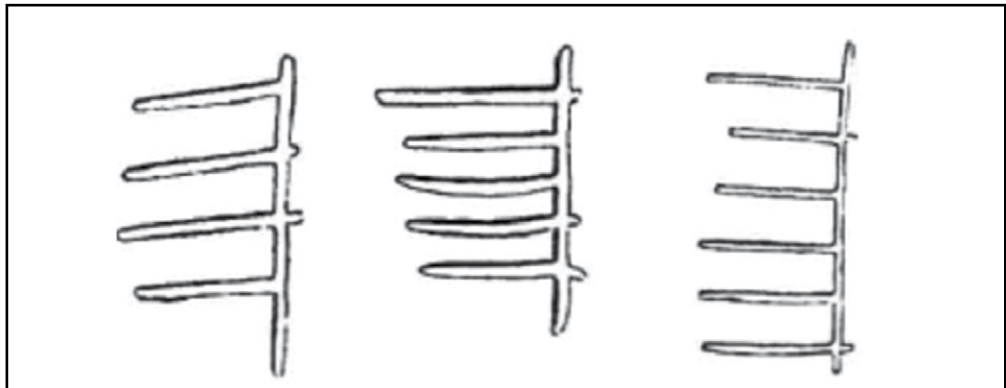


Fig. 1. Potmarks from EBA Troy (Schmidt 1902: 90, nos. 2030-2032)

In addition, we may mention three shards from EBA Troy on which signs have been incised after firing; a wheel-like sign incised at the bottom of a two-handed cup<sup>27</sup>, a

<sup>20</sup> Massa 2016.

<sup>21</sup> Massa 2016: 42.

<sup>22</sup> Massa 2016: 44-46.

<sup>23</sup> As for the period preceding the Bronze Age, note that in the Chalcolithic site of Arslantepe Level VII some 5-6% of the pottery was marked, see Truffeli 1994: 258; Glatz 2012: 15.

<sup>24</sup> Zurbach 2003, fig. 12; Schmidt 1902: 90 fig. 2033.

<sup>25</sup> Schmidt 1902; Zurbach 2003: 118. Though this interpretation is certainly possible, note that this «comb-like» sign also occurs in contexts where it does not seem to refer to measurements, e.g. on seal impressions from Beycesultan and Hacilar and spindle whorls from Alişar and Kusura as well as on LBA pottery from Hattuša (see below), but we are in all likelihood dealing with different traditions here.

<sup>26</sup> Zurbach 2003: 119.

<sup>27</sup> Schmidt 1902: 90, no. 2034.

pentagram incised on the inner side of a *pithos*<sup>28</sup> and a hashtag-like sign incised on a handle<sup>29</sup>.

Apart from pottery, some incidental EBA objects have been incised or stamped with a symbol. These include a crescent loom weight from Kusura with a fishbone-like twig mark, one with a complex cryptic sign (or signs?) from Karahisar<sup>30</sup> and one with an impression of a semi-circle with six «spires» within from Alişar II<sup>31</sup>. Further, an axe from Soloi Pompeiopolis bears impressions in the shape of a cross and a human foot<sup>32</sup>.

### *Multiple signs*

The EBA sites at Kusura and Beycesultan have yielded spindle whorls with multiple abstract signs, including crosses, chevrons and twigs (Fig. 2)<sup>33</sup>. One found in Kusura has «comb-like» signs that somewhat resemble the above discussed pot marks from Troy – also with a varying number of horizontals (Fig. 3). From Troy II stem two spindle whorls that have attracted quite some attention as the markings they bear have by some been identified as writing.



Fig. 2. A spindle whorl from EBA Beycesultan (Lloyd and Mellaart 1962: 278)



Fig. 3. A spindle whorl from EBA Kusura (Lamb 1938: fig. 20 no. 28)

### *Excursus: Early Bronze Age writing at Troy?*

In Early Bronze Age Troy, hundreds of spindle whorls have come to light with various types of decorations. Two spindle whorls dating to late Troy II (27/2600-2250 BCE) or early Troy III are of special interest, as they contain the exact same order of symbols (Fig. 4 and 5)<sup>34</sup>.

<sup>28</sup> Schmidt 1902: 162, no. 3325.

<sup>29</sup> Schmidt 1902: 162, no. 3324. Not included here is Mycenaean style pottery with pot marks, for which see Schmidt 1902: 167 (nos. 3392 and 3486); Zurbach 2003: 121 (nos. 27-29).

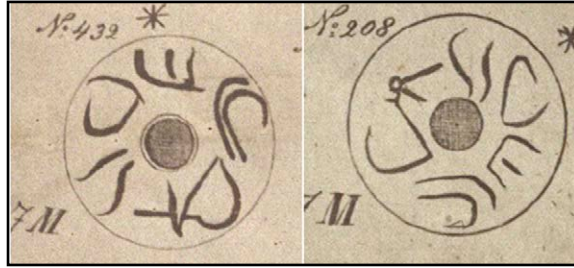
<sup>30</sup> Massa 2016: fig. 7.15, no. 12.

<sup>31</sup> Von der Osten and Schmidt 1932: fig. 44, no. 1468.

<sup>32</sup> Bittel 1940: 195, pl. 12. Note that two vessels from LBA Hattuşa also have impressions in the shape of a (human) foot (Seidle 1972: 35, pl. 10).

<sup>33</sup> Not included here are stamp seals and sealings that sometimes contain symbol-like motifs and signs, such as those found at Bademağacı (Umurtak 2002; 2010), Hacilar (Umurtak 2013) and Tarsus (Goldman 1956, fig. 393 no. 23).

<sup>34</sup> In addition, we may mention some vessels from Troy which are decorated with symbols that have been in the past



Figs. 4-5. Spindle whorls from EBA Troy (Schmidt 1902: no. 432 & no. 208)

The symbols have been tentatively identified as Linear A signs by Godart<sup>35</sup>, who acknowledges that this identification is not without problems, as not all signs can be confidently read as such. These uncertainties, in combination with the fact that the inscriptions predate the first secure attestations of the Linear A script have led Zurbach<sup>36</sup> to dismiss this identification altogether<sup>37</sup>.

Attempts to interpret the signs as Anatolian Hieroglyphic yield a similar unconvincing result: though some signs may be identified as Anatolian Hieroglyphs (e.g. \*223, \* 390 DOMINUS), this certainly does not apply to all and there is of course a significant chronological distance to bridge.

As pointed out by Zurbach the two spindle whorls typologically bear most resemblance to an «inscribed» spindle whorl discovered in DikiliTaş, which can be dated to the late Neolithic. The signs on this spindle whorl have been tentatively identified as writing by Harald Haarmann<sup>38</sup>, who sees them as examples of the Old European script. The considerable time gap between this spindle whorl from DikiliTaş (dating to 4.000 BCE at the latest) and those from Troy II, however, makes a direct link questionable.

Though it is at this point not possible to connect the symbols on the spindle whorls to a specific writing system, the fact that these signs occur in the precise same order on two objects is nonetheless intriguing. This repetition does of course not necessarily imply that the signs represent writing, as decorative motifs can also be, and in fact are, repeated on spindle whorls<sup>39</sup>. What is remarkable, however, is that though the order and the signs are the same, they do show variation and appear to have been written cursorily, giving the impression of handwriting. In addition, one could argue that the sign sequence does not have an obvious aesthetic value, but this is of course arbitrary<sup>40</sup>.

Though indeed there is too little evidence to regard the signs on the spindle whorls as a form of (proto) writing, Haarmann is right to point out that the presence of an inscription

been interpreted as signs belonging to the Linear A script, but as Zurbach 2003: 114-115 concludes these patterns of crosses and lines are better understood as ornamental decorations. Likewise, the pot shard from EBA Beycesultan, which depicts simple crosses and triangles, and a square with a cross within a square, is best regarded as decorative (Lloyd and Mellaart 1962: 250 fig.13).

<sup>35</sup> Godart 1994: 722-724.

<sup>36</sup> Zurbach 2003: 115.

<sup>37</sup> Note that Sayce (1881: 769-770) has suggested a connection with the Cypriot script.

<sup>38</sup> Haarmann 2010: 88.

<sup>39</sup> Zurbach 2003: 115.

<sup>40</sup> It is further of interest that some of the symbols also occur on other spindle whorls, notably the E-like sign is attested quite often (Zurbach 2003: 116), but this could be seen as both an argument for interpreting these signs as decorative or as communicating a message.



on a spindle whorl is *a priori* not inconceivable, as inscriptions on the spindle whorls – co-existing with ones that have strictly decorative motifs – have been attested in other ancient cultures, e.g. at Late Bronze Age Ugarit and in Classical Greece<sup>41</sup>. The fact that the same signs were duplicated in the same order, in combination with the apparently casual manner in which they were inscribed, makes it attractive to think that they were not (merely) decorative and – even if they did not form part of a writing system – did communicate some kind of code or message.

### Summary

In all cases, except for the three Troy vessels with similar E-like signs, the EBA marks are isolated examples of which the meaning or function is hard, if not impossible to retrieve. Most signs are quite generic and have also been attested in later periods.

## The Middle Bronze Age

For the Middle and Late Bronze Age pot marks I have gratefully made use of the admirable study by Claudia Glatz, who has investigated 305 (pre-fired) pot marks which are attested in 13 sites in west-central, central, southern and south eastern Anatolia<sup>42</sup>. Though her focus is on the Late Bronze Age (ca. 1650-1200 BCE, henceforth: LBA), she has also included some pot marks from the Middle Bronze Age period (ca. 2000-1650 BCE; henceforth: MBA)<sup>43</sup>.

### Single signs

The few examples of single pot marks from the MBA period in central Anatolia stem from Boğazköy/Ḫattuša(5), Kaneš/Kültepe (1), Alişar (2) and Korucutepe (3)<sup>44</sup>. Sign forms include simple lines, chevrons, arrows, crosses, fish-bone like twigs and triangles. From MBA Troy stems a shard with an arrow-like sign<sup>45</sup>. All these marks are quite generic and also known from other time periods and other regions<sup>46</sup>.

<sup>41</sup> Haarmann 2010: 91 mentions spindle whorls with ancient Greek invocations. For the Late Bronze Age, see now the Ugaritic spindle whorl with an inscription dating to the 13th century BCE (Sauvage and Hawley 2013). Further examples from later periods are the Saltfleetby (Lincolnshire) spindle whorl with an inscription in Norse runes and one with a Hebrew inscription dating to the 6th/5th century BCE (Tsori 1959).

<sup>42</sup> Glatz 2012: 9. Glatz has based her investigation on all available published material, which is, as she acknowledges, not exhaustive (p. 11).

<sup>43</sup> Glatz 2012: 15 notes that the use of pot marks was apparently more frequent in south-eastern than central Anatolia in the Middle Bronze Age, referring to the site Lidar Höyük, which has yielded relatively large amounts of pre-fired pot marks. Kaschau 1999 does not give an estimate of the ratio of marked vs. unmarked pottery there.

<sup>44</sup> See Glatz 2012: 13-15, 21. To this material one may add a shard with a pentagram-shaped sign from Ḫattuša. (Orthmann 1984: 29-30, no. 99, fig. 11).

<sup>45</sup> See Zurbach 2003: 119, fig. 15.

<sup>46</sup> In addition to pot marks made by hand, certain vessels have pre-fired stamp impressions, usually on the neck, or on, or near, the handle. This practice is attested from the MBA, or even the EBA (Seidl 1972: 67) onwards and continues in the Late Bronze Age. Examples are known from Kaneš/Kültepe, Alişar and Boğazköy/Ḫattuša (and a few examples of vessels with hieroglyphic seal impressions have now also been discovered in Kuşaklı/Şarışa, see Mielke 2006: 155). Some of these stamps are exclusively applied on pottery, others have also been attested in other contexts, notably on clay bullae. Seidl (1972) has divided the Ḫattuša material into three groups: round stamps (a), stamps of various shapes (b) and oval stamps (c). The stamps of group a mainly include the so-called «signe royale», of which several varieties exist, and stamps with rosettes, crosses, wheels, circles and stars. Those of group c predominantly consist of stamps with a fish-bone-like twig or grape bunch. Group b includes stamps of various shapes, among other with animal depictions and one or more hieroglyphic signs. Impressions of such stamp seals have also been attested on bullae and are not only known from pottery like those of group a and c (Seidle 1972: 73).

### *Multiple signs*

In Kültepe/Kaneš, three (possibly four) vessels from the Old Assyrian period have been discovered that contain two or more consecutive signs<sup>47</sup>. Two have several signs incised at the shoulder (Fig. 6), a third has three large symbols painted on the body of the vase<sup>48</sup>. They include simple signs, but also more complex ones that have not been attested in the EBA period.

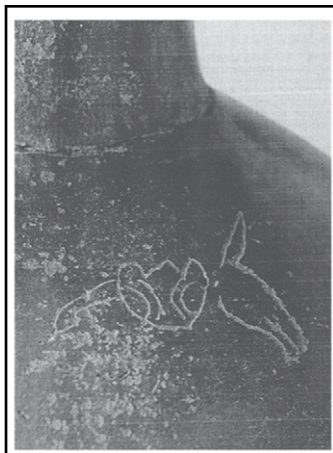


Fig. 6. Multiple (hieroglyphic?) signs on an Old Assyrian vessel (Hawkins 2011: 97)

A number of these symbols may be identified with later Anatolian hieroglyphs and the markings have been interpreted as representing the name of their owners<sup>49</sup>. This interpretation is convincing, all the more because there is a comparable, contemporary vessel from Kültepe with the (owner's) name inscribed in cuneiform<sup>50</sup>.

As several Old Assyrian debt notes explicitly state that the amounts of grain or barley due are to be measured out in the vessel of the creditor<sup>51</sup>, it would certainly have made sense to mark the vessel with the owner's name in order to make it distinctive and recognizable.

It is debated, however, if these signs reflect individual practices or if they formed part of a systematic writing system.

### *Summary*

The pot marks from the MBA period are mainly isolated signs of which the meaning is hard to establish. The motifs of the single marks are overall simple and most of them were already in use in the preceding EBA (and continuing in the LBA). The multiple signs present on some vessels from Kültepe, which in all likelihood indicate ownership, also

<sup>47</sup> Hawkins 2011; Waal 2012: 298-300.

<sup>48</sup> A possible fourth example is a relief in the shape of the \*199 TONITRUS sign on a vessel, but it is very well possible that this merely served as some sort of grip facilitating the handling of the vessel (Börker-Klähn 1995: 41).

<sup>49</sup> Hawkins 2011. The sign at the far right of the first inscription may represent \*101 ASINUS<sub>2A</sub> 25 or \*99 EQUUS. In the second inscription the sign to the far right may represent the hieroglyphic sign \*199 TONITRUS and the sign to the left of it may tentatively be interpreted as the sign \*140 SERPENS. The readings of the other signs are less evident.

<sup>50</sup> Özgüç 1995: 521.

<sup>51</sup> See Balkan 1974: 39-40.

include more complex, previously unattested signs, some of which show similarities with later Anatolian hieroglyphic signs.

## The Late Bronze Age

### *Single signs*

In absolute numbers, the LBA has yielded most pot marks. This does, however, not mean that the marking of pottery had become common practice. As Glatz observes, only a very low proportion of the vessels was marked; e.g., in *Ḫattuša* 0.01% and in *Kuşaklı* 0.04%<sup>52</sup>. Judging from the surviving archaeological records the marking of other objects was equally low<sup>53</sup>.

The use of pot marks was thus quite limited and as Glatz's study shows very few patterns can be discerned. There is for instance no straightforward link between the size of a site and the presence of pot marks<sup>54</sup>, nor are there relations between the type and size of the pottery and the type or location of the mark, nor is their presence confined to certain archaeological contexts<sup>55</sup>.

With respect to the characteristics of the marks, Glatz<sup>56</sup> distinguishes 20 motif groups. These include non-specific symbols such as lines (Glatz no.1), chevrons (Glatz no. 2), crosses (Glatz nos. 7, 8), concentric circles (Glatz no. 16) and stars (Glatz no. 9) that are found in all time periods and in many regions. Less generic, but still very common symbols are the arrow (Glatz no. 4), the fishbone-like twig (Glatz nos. 5, 6), the simple triangle (Glatz no. 10), the E-like sign (Glatz nos. 13, 14?), the hashtag-like sign (Glatz no. 12) and the «8» or hour-glass-like sign (Glatz no. 11). Apart from the last one, these signs have also been attested as marks on pottery or other objects in the preceding periods.

In addition, there are a number of more complex, thus far unattested signs, including the dissected triangle (Glatz no. 10), the sign listed by Glatz as no. 15 and the diverse group of signs that Glatz has listed under no. 20.

More than half of the motifs discussed here resemble Anatolian Hieroglyphs. Leaving aside the very generic symbols such as lines, stars and crosses, they include the following signs:

<sup>52</sup> A somewhat higher percentage is attested for *Kinet Höyük*, ranging between 6.5 and 15% (see Gates 2001:139), but this is still relatively modest.

<sup>53</sup> Examples include some inscribed objects from *Ḫattuša* (see below). With respect to marking property Gates 2001: 143 mentions the practice of marking cattle, horse or sheep, but the evidence for this is ambiguous. Gates refers to the Hittite Laws §60-62 in which the verb *parkunu-* «to (ritually) clean» according to some interpretations would refer to the removal of brands from cattle, horses or sheep, but other interpretations are possible as well; Hoffner 1997: 72-73 and the CHD P: 173 take this verb here to mean «to castrate». Not included here are the *Ulu-Burun* ingots as their provenance is unknown. Half of them bear marks consisting of 52 individual motifs, for which various functions have been proposed: designation of origin, quality, recipient or destination (Glatz 2012: 33 with references).

<sup>54</sup> Glatz 2012: 12.

<sup>55</sup> Glatz 2012: 20. Glatz (2012: 18,24) does tentatively distinguish at least two, possibly three different marking traditions indicative of regional communities.

<sup>56</sup> Glatz 2012: 7.












Shape	Hieroglyphic sign	Find spot
	zi/za/SCALPRUM (*376/268)	Hattuša, Alaca Höyük, Kuşaklı, Gordion, Tarsus, Kinet Höyük, Imikuşağı. (This sign has also been attested outside of central Anatolia, e.g. on a LBA vessel from Miletus (Niemeier 2005: 12, fig. 32a))
	*149/150	Hattuša, Alaca Höyük, Kinet Höyük
	DOMINUS (*390)	Kuşaklı, Alaca Höyük, Kinet Höyük
	BONUS (*370)	Alaca Höyük, Kuşaklı, Gordion, Mersin, Korucutepe
	REX (*17)	Hattuša, Alaca Höyük, Kuşaklı, Mersin, Kinet Höyük, Mağat Höyük?
	URBS (*225)	Kuşaklı?
	SCRIBA (*326)	Hattuša, Alaca Höyük
	DOMUS (*247)	Hattuša
	DOMUS (*248)	Hattuša
	*490	Alaca Höyük, Hattuša?
	MAGNA + DOMUS (*250)	Hattuša

Table 1. LBA (pot) marks that resemble Anatolian Hieroglyphs. Signs based on Laroche 1960

The above signs may be divided into two groups: signs that have already been attested in previous periods and signs that first make their appearance in the LBA. The first group overall consists of simple signs, whereas the new signs include more complex forms.

#### *Hieroglyphs or not? Previously attested «simple» marks*

Some symbols that were already used as pot marks in the preceding periods can be identified as Anatolian Hieroglyphs, such as the twig (\*149/150), the arrow (*za/i* «this» /SCALPRUM), the triangle (BONUS) and the E-like sign (DOMINUS). In previous scholarship, attempts have been made to read them as such, some more convincing than others.

*za/i* «this» /SCALPRUM – In Anatolian Hieroglyphs, the arrow sign has the phonetic value *zi/za* (\*376) and it may represent a demonstrative pronoun. The sign is attested on several vessels from Kuşaklı. Müller-Karpe<sup>57</sup> has suggested that we interpret these signs as an abbreviated form of writing ZITI («man»). He thus proposes that the vessels from Kuşaklı bearing the arrow sign represent gifts offered to the temple by the «men of the town» – thus distinguishing them from offerings of the king (see below). In a similar way, Mielke<sup>58</sup> has argued that the arrow sign is placed on vessels belonging to individuals, in contrast to vessels belonging to the urban collective indicated by a triangle with two horizontal parallel lines at the bottom which he identifies as URBS

<sup>57</sup> Müller-Karpe 1998: 106-107.

<sup>58</sup> Mielke 2006: 153-154.

(\*225). A different interpretation is given by Seidl<sup>59</sup> who proposes to read the arrow sign as \*268 SCALPRUM, which would refer to the branch of masons, either indicating an administrative unit or marking the vessels as ration vessels for members belonging to that profession<sup>60</sup>. These various explanations eloquently demonstrate how multi-interpretable and ambiguous the material is<sup>61</sup>.

BONUS – In Kuşaklı, a handful of water pipes was marked before firing with a simple triangle sign, which is sometimes incised very loosely and superficially<sup>62</sup>. As a rule, they are placed beneath the lock, pointing in the direction of the flow of the water<sup>63</sup>. The function of the symbols, which have not been attested on water pipes from other sites, such as Hattuša, is unclear. Hüser<sup>64</sup> suggests that we read them as the hieroglyphic sign BONUS (L 370), referring either to «good», i.e. fresh water, or expressing a wish that the «good» water may flow for the benefit of the city.

Though theoretically possible, this explanation sounds a bit far-fetched, and it is just as possible, if not more likely, that the marks here do not represent the hieroglyph BONUS, but had a different meaning, which is impossible for us to retrieve. One could, for instance, imagine that they had a function in the production process, in which, e.g., the first (and/or last) water pipe of a certain delivery were marked with a simple triangle. Likewise, other interpretations are possible for the simple triangle on a vessel from Kuşaklı that is read as BONUS by Mielke<sup>65</sup> and the sign DOMINUS (\*390) on a shard from Kuşaklı<sup>66</sup>.

#### *Hieroglyphs or not? Novel «complex» marks*

REX – Pot marks resembling the hieroglyphic sign REX (see Fig. 7) have been attested at various sites in central Anatolia. In Kuşaklı/Şarišša, several vessels found in the *West hang* and building E on the acropolis were marked before firing with a dissected triangle that has been identified as the hieroglyphic sign for «king».

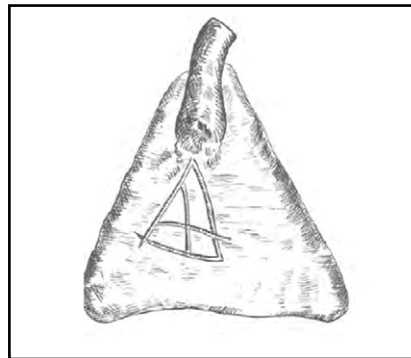


Fig. 7. The sign REX on a shard from Alaca-Höyük (Koşay 1965: fig. 12)

<sup>59</sup> Seidl 1972: 76.

<sup>60</sup> Note that she interprets the (stamped) twig mark (\*149/150) as referring to the vessel's content (Seidl 1972: 74).

<sup>61</sup> Note that arrow-like signs, of which the function is unclear, have also been attested on two Hittite clay tablets (Waal 2017: 303-304).

<sup>62</sup> Hüser 2007: 207.

<sup>63</sup> In addition, there is one pipe with a V-sign painted in red dye after firing (Hüser 2007: 207).

<sup>64</sup> Hüser 2007: 207.

<sup>65</sup> Mielke 2006: 153.

<sup>66</sup> Arnhold 2009: 118.

As mentioned above, Müller-Karpe has suggested that this sign indicates that the vessels represent gifts from the king, differentiating them from the vessels that are marked with the arrow sign representing «man». Mielke<sup>67</sup> connects these «REX» marks to stamp impressions found on pottery in Kuşaklı, which can be read as «REX *Sa<sub>5</sub>+ri-sa*» – «king of Šarišša».

It is of interest that there appears to be a relation between the vessel type and the marks: as far as can be established, the sign REX seems to be related to so-called «Trichterrandtöpfe» whereas the arrow sign mainly appears on a certain type of bowl<sup>68</sup>.

The identifications of the pot marks with hieroglyphic signs have been questioned by Glatz<sup>69</sup>, who points out with respect to Kuşaklı that the proposed interpretations are not supported by the find spots of the marked vessels, as they have been discovered in a variety of social and functional environments, both in private and public contexts. Likewise, Gates<sup>70</sup> dismisses the identification of a dissected triangle mark as REX in Kinet Höyük on the grounds of it being inappropriate for locally-made coarse cooking ware<sup>71</sup>.

SCRIBA – The sign identified as \*326 SCRIBA is attested in Ḫattuša on a bronze sickle<sup>72</sup> and – accompanied by a single stroke – on a semi-round stone<sup>73</sup>. Outside of Ḫattuša, the sign occurs as a pot mark in Alaca Höyük<sup>74</sup> (see Fig. 8). It is further attested in combination with other signs on several shards (see below).

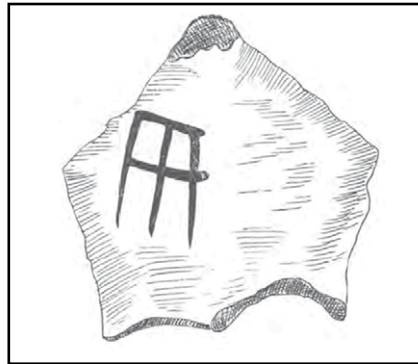


Fig. 8. The sign SCRIBA on a shard from Alaca-Höyük (Koşay 1965: fig. 20)

Apart from being used as a (pot) mark, this sign is very often attested – in combination with other signs – on hieroglyphic seals from the Hittite period and as occasional graffiti in Ḫattuša<sup>75</sup>. The sign is generally taken to represent the title «scribe»<sup>76</sup>. As convincingly

<sup>67</sup> Mielke 2006: 154.

<sup>68</sup> Mielke 2006: 153-154.

<sup>69</sup> Glatz 2012: 12.

<sup>70</sup> Gates 2001: 140.

<sup>71</sup> Note that she does see the highly uniform pottery assemblage at this site as evidence for direct Hittite state control.

<sup>72</sup> Güterbock apud Bittel 1937: 21, fig. 9 and pl. 13.1.

<sup>73</sup> Boehmer 1979: 62 w. pl. 38, no. 3842.

<sup>74</sup> Koşay 1965: nos. 20, 24-25, and 23?

<sup>75</sup> These include, e.g., graffiti on large stone blocks, which have been identified as marks of public scribes (Bittel 1937:19; Dincol and Dincol 2002: 210), graffiti on the sphinx gate (Alparslan apud Schachner 2013: 174-175) and on a statue base (Bittel 1967: 12).

<sup>76</sup> Herboldt 2002: 99-100.

argued by Theo van den Hout, however, this sign may not refer to the profession of scribe but rather more generally to a palace official or someone (or something) belonging to the royal administration<sup>77</sup>.

DOMUS (.MAGNA) – The signs DOMUS and DOMUS. MAGNA (see Fig. 9) have been attested on respectively two and one vessel(s) from Ḫattuša. Seidl<sup>78</sup> tentatively suggests that these signs may refer to various administrative units.

\*490 – Finally, we may mention a pot mark that resembles sign \*490, which has been attested in Alaca Höyük and possibly also – in damaged condition– in Ḫattuša<sup>79</sup>.

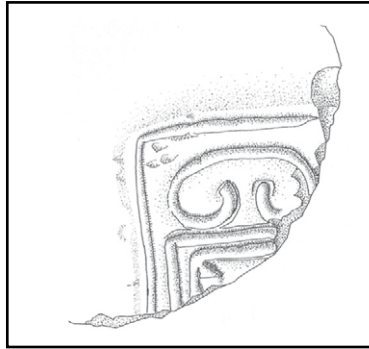


Fig. 9. The sign DOMUS.MAGNA (?) on a shard from Ḫattuša (Seidl 1972, fig. B39)

### *Multiple signs*

Examples of multiple marks applied on pottery or other objects include three fragments with the above-discussed sign SCRIBA<sup>80</sup>. In Tell Fray, a vessel with several hieroglyphic signs has been discovered, which is to be read as a personal name accompanied by the sign SCRIBA<sup>81</sup>. A pot shard from Civril Höyük (Konya plain) is inscribed with the sign SCRIBA followed by several broken-off hieroglyphic signs<sup>82</sup> (see Fig. 10).



Fig. 10. The sig SCRIBA followed by several broken-off hieroglyphic signs on a pot shard from Civril Höyük (Mellaart 1959: 32, fig. 2)

<sup>77</sup> Van den Hout [forthc.].

<sup>78</sup> Seidl 1972: 76

<sup>79</sup> Seidl 1972: fig. 24, no. B40.

<sup>80</sup> Note that the use of cuneiform inscriptions on objects is equally scarce: only very few objects inscribed with cuneiform: a sword, a spear head dating to the OA period and an axe and a hay fork (see Van den Hout 2009).

<sup>81</sup> Archi 1980.

<sup>82</sup> Mellaart 1959: 32-33, Glatz 2012: 10,.

The SCRIBA sign, again in combination with several other, partly damaged signs, is also found on a fragment from Hattuša, which may have formed part of a clay tablet<sup>83</sup>. In all likelihood, these last two damaged inscriptions also represent names, bringing to mind the multiple signs from MBA Kaneš, which are probably also to be understood as such (see above). Less clear combinations of more generic signs are found on several shards from Alaca Höyük, Hattuša and Tarsus<sup>84</sup>.

### Summary

The motifs and shapes of the LBA (pot) marks are to a large extent comparable to the previous periods, though some more complex, not previously attested signs make their entrance, notably in Hattuša. Signs that resemble Anatolian Hieroglyphs include very generic signs which also occur in preceding periods and other regions, such as the arrow symbol, the twig symbol, the E-like sign and the simple triangle. Their similarity may very well be coincidental.

Other signs, however, are more specific and may be linked to the Anatolian Hieroglyphs more confidently. They include the following signs: king (REX), house (DOMUS), palace (DOMUS.MAGNA), and scribe/palace official (SCRIBA). Though the precise reason why these signs were used may escape us, these concepts are not *a priori* unlikely in the context of marking pottery: one could e.g. think of transports meant for, stemming from, or ordered by the king or the palace<sup>85</sup>. The signs could further be seen as an indication that the potter's craft was (partly) related to state institutions<sup>86</sup>. However, it can first of all not be entirely excluded that their resemblance is coincidental, and it is further uncertain if (all) the pot marks used had the same meaning as their corresponding hieroglyphic signs. One further has to bear in mind that some of the marks cannot be identified as Anatolian Hieroglyphs. The fact that the occurrence of these marks is so rare makes clear that it was not an institutionalized practice and it is likely that the code conveyed by these signs differed per period and region<sup>87</sup>.

### Concluding remarks

The use of pot marks in Bronze Age central Anatolia was a rare phenomenon, especially compared to contemporary traditions in, e.g., the Aegean. Considering the limited data at our disposal, all conclusions are inevitably tentative. If we return to the questions posed

<sup>83</sup> SBo II.239, see Güterbock 1942: 6, no. 7 with pl.VIII; now also Waal 2017: 302-303.

<sup>84</sup> A shard from Hattuša has a combination of a chevron and several lines (Bittel 1937, pl. 12.16) and there is one from Tarsus with a single line and a chevron (Goldman 1956, no. 1141). From Alaca Höyük stem a shard with a triangle and several lines (Koşay no. 31), two dissected triangles (Koşay 1965: no. 32), a cross and an encircled cross (Koşay 1965: 26) and a chevron with a cross (Koşay no. 27), see also Glatz 2012: 10. Further, several large *pithoi* discovered in the storerooms of Temple I in Hattuša contain multiple markings that were made after firing, which have been interpreted as providing information about the vessel's content or volume (Seeher 2002: 21). Likewise, some (parallel) lines and crosses found on vessels from Kuşaklı and Hattuša are thought to refer to the vessel volume (e.g. Seidl 1972: 73-76; Müller-Karpe 1988: 148). This interpretation has, however, been questioned by Glatz (2012: 29), since there are no coherent and consistent patterns discernable.

<sup>85</sup> Note that the new interpretation of SCRIBA as «pertaining to the royal administration» by Van den Hout would also fit this context very well.

<sup>86</sup> For discussion, see Glatz 2012: 32.

<sup>87</sup> As Glatz 2012: 26-27 points out, ethnographic accounts show that potters usually did not intend the mark to convey meaning beyond the production process, and the form and shape of the mark were not necessarily important.



at the beginning of the paper, the following cautious observations may be made based on the investigated material.

No unambiguous answer can be given to the question to what extent the pot marks are related to the Anatolian Hieroglyphs. There are a number of marks that show formal similarities with hieroglyphic signs. In some cases, it concerns very simple and generic signs, which are also found in other regions and time periods and the resemblances are not very telling<sup>88</sup>.

However, from the Late Bronze Age onwards we see the emergence of some new, more complex signs, which may be identified as hieroglyphs with more certainty. Apart from the sign REX which occurs on several sites, these new signs are attested in Alaca Höyük, and foremost in Hattuša.

It is, however, unclear if the use of these signs as pot marks was related to the meaning of these signs in the hieroglyphic script. At times, such an interpretation seems possible, but there is no unambiguous evidence that confirms this. It is quite conceivable that their meaning varied per context and that some marks may have been used in their hieroglyphic meaning, whereas others were not. If we look at the markings consisting of more than one sign, the relations with the Anatolian Hieroglyphs are more evident, especially in the LBA, and possibly already in the MBA. These examples are, however, better defined as inscriptions than markings (cf. n. 40 above).

With respect to continuity and change in the shapes of the pot marks, continuity is mostly visible in generic motifs, such as arrow, twigs, lines and crosses, which are also commonly found in other parts of the world in all time periods. Their continuous presence should therefore not be seen as reflecting a single tradition.

A possible change may be witnessed in the LBA, with the afore-mentioned emergence of some new signs notably in Hattuša. Can this (slight) increase in the number of sign shapes and their complexity be linked to the use of Anatolian Hieroglyphs?

A useful comparison is provided by the LBA site Ayia Irini, where the use of pot marks is more firmly attested. The analysis of Bikaki has shown that on this site only very few pot marks can be dated to the EBA period, but there is a significant increase in the early and middle parts of the Middle Bronze Age, which Bikaki<sup>89</sup> links to the rise of a centralized controlled economy.

Interestingly, the forms of the pot marks seem to change under the influence of writing: in the last phase of MBA, they become more diverse and complex, and some signs can be identified as Linear A and B characters<sup>90</sup>. Like in Hattuša, it is unclear what the precise function of these pot marks was, and in what meaning the marks whose forms are reminiscent of Linear A and B were used.

The evidence from Hattuša is much scantier and more ambivalent and there is no clear expansion in the number and the use of pot marks in the LBA. Even if one accepts that some of the new signs added to the repertoire of pot marks were derived from the Anatolian hieroglyphic script, multiple interpretations are possible. It could be seen

<sup>88</sup> For instance, the E like signs, crosses and arrows and fish-bone twigs are also found as potter's mark at Ayia Irini (Bikaki 1984).

<sup>89</sup> Bikaki 1984: 43.

<sup>90</sup> Bikaki 1984: 42.

as evidence for the emergence of this script at the beginning of the LBA, or, perhaps more likely, as an indication that the script was by then so widespread that its signs had penetrated the potter's workshops. The latter scenario would imply an earlier origin of the script, which would concur with the apparent use of multiple signs to represent names already in the MBA. Alternatively, the appearance of these signs may be seen as a reflection that the potter's craft became more connected to state institutions. All in all, one should be careful of drawing far-reaching conclusions based on only a few signs, as future discoveries may surprise us.

The available evidence presents a miscellaneous picture and it seem best to leave all options open for now. Not all identifications of pot marks with Anatolian Hieroglyphs should be discarded out of hand, nor should one forcefully try to read them all as such. The purpose and meaning of the incidental markings on pottery and other objects in all likelihood varied per time and region and «scribal» and «non-scribal» signs may have co-existed.

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# Cypro-Minoan in marking systems of the Eastern and Central Mediterranean: New methods of investigating old questions

*Miguel Valério, Brent Davis*

**Abstract:** Marks incised or painted on Eastern Mediterranean pottery from the Late Bronze Age – generically known as «potmarks» – have been extensively studied in the past two decades. Incised markings have also appeared on ingots and other metallic supports, although these have arguably received less attention. It has long been clear that some of these marks consist of signs drawn from existing writing systems, with Cypro-Minoan playing a special role, and this has contributed to scholars' research on the relationship between marks and script. However, many unknowns remain. An old and significant problem relates to difficulties in assessing which marks can be securely identified with Cypro-Minoan signs, stemming from the lack of a detailed palaeographical study of the script's signary. Recent advances in our knowledge of Cypro-Minoan, especially with regards to the palaeographic variation and identity of its signs, now enable us to better understand which marks are extracted from that writing system and which are not. With a special focus on ingot- and potmarks from the Eastern Mediterranean and Sardinia, this article discusses methods for distinguishing Cypro-Minoan marks from non-Cypro-Minoan marks. It is argued that a greater number of marks can now be securely identified with signs of the Cypro-Minoan script. In a second stage, findings are compared with other parameters, such as vessel shapes and functions, find-spots and places of import, and methods (incised or painted) and timings (before or after firing or casting) of the marks. This re-evaluation reveals no significant distribution patterns, suggesting that many different marking systems might have been in use or that the choice of Cypro-Minoan signs used as marks was not very systematic. In our conclusions, we discuss the implications of these results for our knowledge of the dynamics of Bronze Age Cypriot society.

## Cypro-Minoan and marked objects in the Late Bronze Age

In the past two decades there have been an increasing number of studies about marks incised or painted on pottery – commonly known as «potmarks» – found at Late Bronze Age coastal and underwater sites of the Eastern Mediterranean. Emblematic sites where they have been discovered include Ugarit (coastal Syria), Enkomi (Cyprus), Tiryns (Peloponnese), and the Uluburun shipwreck (off the southern coast of Turkey), but the list of sites is much longer. Many of these marks consist of signs of writing and, when they do, the signs almost always belong to Cypro-Minoan, the undeciphered syllabary of Cyprus (ca.

1525-1050 BCE). In fact, the appearance of post-firing marks on Cypriot and Mycenaean vessels, as well as the so-called Canaanite jars or amphorae coincides with the flourishing of Cypro-Minoan in the Late Bronze Age<sup>1</sup>. However, marks related to Cypro-Minoan are not limited to pottery. They also occur on other types of objects, particularly of stone or metal, including ingots, tools, weights, stone blocks, etc. The common denominator of most of these items is that they have travelled and therefore appear not just in Cyprus, but also in the neighbouring regions in the Eastern Mediterranean, and even in the Central Mediterranean, on the island of Sardinia<sup>2</sup>. In some cases, the marked objects have been found in shipwrecks, so they were transported across seas. This is a first hint that, at least occasionally and when the items marked consist of containers, the marking has to do with the distribution (production and export, or import and channelling) of the objects or their contents.

The large number of finds, their broad geographical distribution, and the uneven criteria that have guided their publication have made a thorough study of the phenomenon of marks a goal difficult to achieve. Hirschfeld's 1999 doctoral thesis<sup>3</sup> is the first study of potmarks of the Eastern Mediterranean to incorporate both depth of analysis and wide interregional coverage, alongside an investigation of the archaeological contexts. It remains unparalleled. Beyond the realm of pottery, it is worth citing the recent Master's thesis of Kaiser<sup>4</sup>, which is comprised of a database and a distribution analysis of copper ox-hide ingots bearing marks.

Hirschfeld underscores that, with the exception of the work of Daniel<sup>5</sup>, scholarship on Eastern Mediterranean marks (and especially potmarks) has focussed for a very long time almost exclusively on their possible relationship to known writing systems, while largely neglecting functional and contextual aspects<sup>6</sup>. Her study was aimed at reversing this tendency and restoring a balance, and rightly so, as the study of any notational system should not concentrate on palaeographical issues at the expense of the marked objects themselves and their archaeological contexts.

At the same time, even though a number of marks on pottery could safely be identified as signs taken from the Cypro-Minoan script, Hirschfeld recognised that in general it will be hard to clarify the relationship between the marks and the script until some research problems are resolved<sup>7</sup>. We may underline two. First, we need a signary of Cypro-Minoan upon which scholars can agree, and that accurately represents the palaeographical variants of each sign in the script. To avoid circularity, Hirschfeld warned that this reference sign-list would have to rely on evidence from inscriptions alone and *cannot* consider isolated signs such as the ones presumably attested within the marking systems in question. Only afterwards can a potmark be securely identified with a sign in the script, and this principle also extends to other classes of marked objects, such as ingots<sup>8</sup>. In fact, the sign repertoires available today all follow this principle. The second issue is

<sup>1</sup> Hirschfeld 1999: 265.

<sup>2</sup> See Amadasi Guzzo 2009.

<sup>3</sup> See also Hirschfeld 2002.

<sup>4</sup> Kaiser 2013.

<sup>5</sup> Daniel 1941.

<sup>6</sup> Hirschfeld 1999: 8-11; 2002: 54.

<sup>7</sup> Hirschfeld 1999: 263-264.

<sup>8</sup> Kaiser 2013: 45.



the need to re-evaluate the blurry lines between writing and marking systems, or – put differently – between «inscriptions» and «marks»<sup>9</sup>. It is not unusual to find two signs with good Cypro-Minoan parallels applied to an object, leading scholars to hesitate as to whether to regard the signs as an «inscription» rather than two «marks». Such cases imply strong links between marking practices and formal writing, in which the signs involved may actually have been meant to be «read».

Recent developments in our understanding of Cypro-Minoan palaeography and a new proposal for a judicious signary of this script<sup>10</sup> have placed us in a more advantageous position to address these issues. It is the purpose of this paper to explore these fresh prospects and suggest new links between Cypro-Minoan and the marks found on diverse objects throughout the Central and Eastern Mediterranean. However, what follows is not a case for re-focusing the study of marks onto their relationship to formal writing. Rather, we hope that by better understanding how much the Cypriot marking systems are indebted to writing *stricto sensu*, including the extent to which Cypro-Minoan and non-Cypro-Minoan elements combine, our knowledge of their nature will improve. Concentrating particularly on ingot- and potmarks from the Eastern Mediterranean and Sardinia, this chapter also compares these new insights on script-related marks with other, more material and contextual parameters of marking, such as vessel shapes and functions, find-spots, and method of application (incision or painting, pre- or post-firing). The aim is to search for new patterns in the use of some of these marks. Of course, due to limitations of space, the present contribution can hardly be exhaustive; instead, it will be example-based. The paper concludes with a discussion of how these marking systems might relate to formal writing (Cypro-Minoan) and its spheres of use, and what this tells us about the social dynamics of Late Bronze Age Cyprus.

## Recent advances in Cypro-Minoan palaeography

As remarked above, a major *desideratum* in scholarship about Cypro-Minoan has been the establishment of a sign-list that can be widely agreed upon. The publication of two different repertoires of signs<sup>11</sup> (Fig. 1) and two different compilations of Cypro-Minoan inscriptions<sup>12</sup> has led to significant progress in the field, but this lacuna has still not been filled. For the larger part, this is due to the fact that the existing catalogues of inscriptions have not been accompanied by a comprehensive assessment of the palaeographical variations of each Cypro-Minoan sign (such as the one for Linear A published by Godart and Olivier 1985<sup>13</sup>).

Another crucial problem in the domain of Cypro-Minoan palaeography is the persistence of the classificatory scheme by É. Masson<sup>14</sup>, according to which the inscriptions represent not one, but as many as three different syllabaries: CM 1, 2 and 3. Although these «sub-scripts» were differentiated based on uneven criteria, their existence is still accepted by most scholars working on Cypro-Minoan, often uncritically. In fact, until recently, few

<sup>9</sup> Hirschfeld 1999: 263-265.

<sup>10</sup> Valério 2016.

<sup>11</sup> É. Masson 1974; Olivier 2007..

<sup>12</sup> Olivier 2007; Ferrara 2013a.

<sup>13</sup> See particularly Godart and Olivier 1985: xxviii-llii and the microfiches.

<sup>14</sup> É. Masson 1974.

others aside from Palaima<sup>15</sup> had criticized the criteria for this classification, though other authors have now begun to do so as well<sup>16</sup>. The implications of É. Masson's classification are significant, as the most recent and most cited sign-list, the one provided alongside Olivier's catalogue of inscriptions<sup>17</sup>, has been framed using this classificatory scheme. This choice has implications for our understanding of Cypro-Minoan signs. For example, within the scheme of Masson and Olivier, it is assumed that two given signs with similar shapes are in fact different signs if they occur in different sub-sets of inscriptions (i.e. CM 1, 2 and 3). In turn, in a somewhat circular fashion, these sub-sets have been defined based on the premise that each contains graphemes that are peculiar to it alone. As a consequence, signs that may well be mere variants of each other are listed as separate signs.

	CM 1	CM 2	« CM 3 »		CM 1	CM 2	« CM 3 »		CM 1	CM 2	« CM 3 »
001	I	I	I	040	...	...	↵	079	...	∩	...
002	†	...	†	041	△	...	...	080	...	∩	...
004	†	†	†	044	μ	μ	μ	081	∩	∩	...
005	†	†	†	046	h	...	...	082	Y	Y	Y
006	†	†	†	047	...	∩	...	083	Y	...	...
007	†	...	†	049	...	∩	...	084	Y	...	...
008	†	†	†	050	∩	...	∩	085	Y	...	...
009	...	...	...	051	...	∩	∩	086	Y	...	...
010	...	...	...	052	...	∩	...	087	Y	∩	∩
011	∩	∩	∩	053	∩	...	∩	088	Y	...	...
012	∩	∩	...	054	...	∩	...	089	...	∩	...
012b	∩	...	...	055	∩	...	∩	090	...	∩	...
013	∩	∩	∩	056	∩	∩	∩	091	∩	∩	∩
015	∩	...	...	058	...	∩	∩	092	∩	∩	∩
017	∩	∩	...	059	∩	∩	∩	094	...	∩	∩
019	∩	...	∩	060	...	∩	∩	095	∩	∩	∩
021	∩	∩	∩	061	∩	∩	∩	096	∩	∩	∩
023	∩	∩	∩	063	∩	∩	∩	097	∩	∩	∩
024	∩	∩	∩	062	∩	∩	∩	098	...	∩	∩
025	∩	∩	∩	064	∩	∩	∩	099	∩	∩	∩
026	∩	...	...	066	∩	∩	∩	100	...	∩	∩
027	∩	∩	∩	067	∩	∩	∩	101	∩	∩	∩
028	∩	∩	∩	068	∩	∩	∩	102	∩	∩	∩
029	...	∩	...	069	∩	∩	∩	103	∩	∩	∩
030	∩	∩	...	070	∩	∩	∩	104	∩	∩	∩
033	∩	∩	...	071	∩	∩	∩	105	∩	∩	∩
034	∩	...	...	072	∩	∩	∩	107	∩	∩	∩
035	∩	∩	∩	073	∩	∩	∩	108	∩	∩	∩
036	∩	∩	∩	074	∩	∩	∩	109	∩	∩	∩
037	∩	∩	∩	075	∩	∩	∩	110	∩	∩	∩
038	∩	∩	∩	076	∩	∩	∩	112	∩	∩	∩
039	∩	∩	∩	078	∩	∩	∩	114	∩	∩	∩

Fig. 1. Olivier's (2007: 413) general table of CM 1-2-3 syllabograms

<sup>15</sup> Palaima 1989a.

<sup>16</sup> Davis 2011; Ferrara 2012, 2013a, 2013b; Valério 2013, 2016.

<sup>17</sup> Olivier 2007: 413.

Valério's recent investigation<sup>18</sup> is in part aimed at dealing with these issues<sup>19</sup>. In addition to an investigation of the possible phonetic values of Cypro-Minoan signs, and as a necessary step prior to it, this work sought to revise the existing sign-lists and clearly identify individual signs. This task was for the first time undertaken through a meticulous palaeographical analysis that considered the signs as they appear in the inscriptions, without presumptions as to the existence of one or more Cypro-Minoan sub-scripts. The result is the proposal of a new working signary (see Fig. 2), with fewer individual signs than the current lists: between 57 and 70 (as compared to, say, the 96 proposed by Olivier; see Fig. 1). A by-product of this reappraisal is the conclusion that, as some authors have already argued, the current division of Cypro-Minoan into multiple sub-scripts should be abandoned, at least in its current form.

01	𐀀	21 / 15	𐀁 ( )	38	𐀂	65 / 67 / 99 / 100	𐀃 𐀄 𐀅 𐀆 𐀇	88 / 89 / 90	𐀈 𐀉 𐀊
02	𐀋	23	𐀌	39 / 49	𐀍 𐀎	68	𐀏	91	𐀐
04	𐀑	24	𐀒 𐀓	40	𐀔	69 / 71 / 72	𐀕 𐀖 𐀗	92	𐀘 𐀙
05	𐀚	25	𐀛 𐀜	41	𐀝 𐀞 𐀟	70	𐀠 𐀡	95	𐀢 𐀣
06	𐀤	26	𐀥	44	𐀦 𐀧	72b	𐀨	96 / 85 / 114	𐀩 𐀪 𐀫
07	𐀬	27	𐀭 𐀮	46 / 47	𐀯 𐀰	73	𐀱 𐀲	97	𐀳 𐀴
08	𐀵 𐀶	28	𐀷 𐀸	50 / 51	𐀹 𐀺	74	𐀻 𐀼	98	𐀽 𐀾
09	𐀿 𐁀	29	𐁁	52	𐁂	75	𐁃 𐁄	102 / 101	𐁅 𐁆
10	𐁇	30	𐁈 𐁉	53 / 54 / 55	𐁊 𐁋 𐁌	76	𐁍	103	𐁎
11	𐁏 𐁐	33	𐁑	59	𐁒 𐁓	80	𐁔	104	𐁕 𐁖
12	𐁗 𐁘	34 / 56	𐁙 𐁚	60	𐁛	81	𐁜	105	𐁝 𐁞
13 / 78	𐁟 𐁠	35	𐁡 𐁢	61	𐁣 𐁤	82	𐁥 𐁦	107 / 108	𐁧 𐁨
17	𐁩	36	𐁪	62	𐁫	86	𐁬	110	𐁭 𐁮
19 / 79	𐁯 𐁰 𐁱	37	𐁲	64	𐁳	87	𐁴 𐁵	112	𐁶 𐁷

Fig. 2. General working signary of Cypro-Minoan (adapted from Valério 2016: 164, table 2.98)

### «Mark» vs. «Inscription»

The standard definition of «inscription» among scholars of the Aegean and Cypriot scripts is the one proposed by Godart and Olivier in the late 1970s: the presence of two or more signs of a writing system<sup>20</sup>. This excludes isolated signs, which instead belong to the category of «marks». In general, this distinction has been the guiding principle in the collections of Cypro-Minoan inscriptions by Olivier<sup>21</sup> and Ferrara<sup>22</sup>, although Ferrara has decided to include a few objects with isolated signs<sup>23</sup>, namely APLI Psee 001 ADD##219, ENKO Apes 002-003ADD##222-223, and ENKO Mins 003 ADD##228<sup>24</sup>.

<sup>18</sup> Valério 2016.

<sup>19</sup> See also Valério 2013, as well as the treatment in Ferrara 2012: 235-256.

<sup>20</sup> Olivier and Godart 1978: 34; Godart and Olivier 1978: xi-xii.

<sup>21</sup> Olivier 2007.

<sup>22</sup> Ferrara 2013a.

<sup>23</sup> Ferrara 2012: 18-19, 2013a: 3-4.

<sup>24</sup> Here we follow the convention established by Olivier (2007: 26-32), where Cypro-Minoan inscriptions are catalogued

Palaima has criticised Godart and Olivier's definition<sup>25</sup>, in that the presence of two signs should not *always* be taken as an inscription. Although Cypro-Minoan inscriptions consistently make use of dividers, often even for separating two isolated signs, we can question whether this was an absolute norm. It is possible that two signs that appear in close proximity on an object may, in reality, function independently (as different marks). On occasion, they may even have been inscribed at different times.

Presumed marks sometimes consist of two contiguous Cypro-Minoan signs. Their positioning can be either horizontal or vertical, but it is always *linear*. Examples include: one vase from the Lower Citadel of Tiryns on the Greek mainland (TIRY Avas 001 ADD##245), bearing the signs  $\text{A}\text{U}$  → 25-87 (Fig. 3)<sup>26</sup>; one copper ingot from Aghia Triada on Crete, on which signs that seem to resemble  $\text{V}\text{K}$  → 91-13 are engraved vertically (Fig. 4)<sup>27</sup>; a marked ceramic handle from Ugarit in coastal Syria (RASH Avas 002 ADD##251), which reads  $[\text{H}\text{M}]$  → 106-96 (Fig. 5)<sup>28</sup>; various tin ingots with the sequence  $\text{NY}$  → 19-82 and a bronze hoe that clearly reads  $\text{H}\text{M}$  → 27-95, all from the Hishuley Carmel shipwreck off the coast of Israel (Figs. 6-7)<sup>29</sup>; and a ceramic handle from Pyla-Kokkinokremos on Cyprus, featuring the sequence  $\text{NY}$  → 12-82<sup>30</sup>.

These cases are no different than some Cypro-Minoan inscriptions included by Olivier and Ferrara in their catalogues: see, for example,  $\text{H}\text{H}$  → 28-27 on the base of a krater from Kition (KITI Avas 003 ##132; see Fig. 8) or  $\text{H}\text{U}$  → 102-61 on a ceramic handle from the same site (KITI Avas 021 ADD ##237). The only case in which we have reason to suspect we are not dealing with an actual inscription is that of  $\text{NY}$  → 19-82 on the ingots from Hishuley Carmel, as we also find an ingot showing the signs in the opposite order,  $\text{YN}$  → 82-19. Since Cypro-Minoan was consistently written from left to right, it is possible that the two signs, 19 and 82, functioned independently on these ingots.

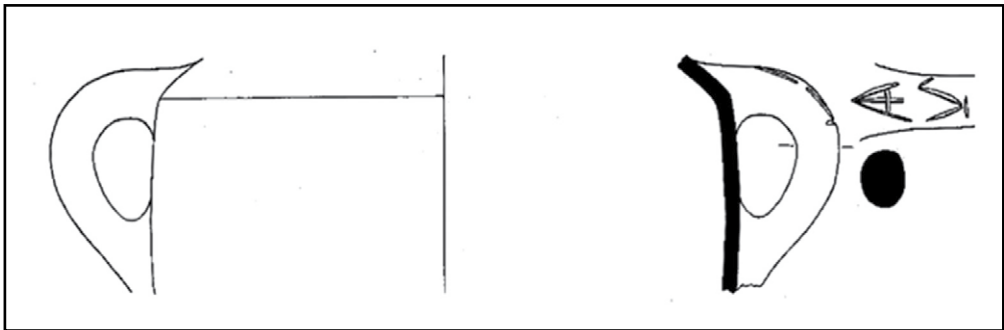


Fig. 3. TIRY Avas 001 ADD##245: inscribed handle of Canaanite jar (Olivier 1988: 258, fig. 2, no. 13)

with an absolute number (e.g. ##001) and a label (e.g. ENKO Atab 001). Labels are composed of the abbreviation of the place of provenance with four capital letters (ENKO), an abbreviated typological description in French that combines material and morpho-functional references to the inscribed object (e.g. Atab stands for *argile* «clay» + *tablette* «tablet»), and a sequential number with three digits. Thus ENKO Atab 001 is the first clay tablet from Enkomi to have been catalogued. The absolute numbers of newly catalogued inscriptions are preceded by «ADD» (Ferrara 2013a). For the sake of clarity, in this article each inscription is cited by its label followed by its absolute number: e.g. ENKO Atab 001 ##001.

<sup>25</sup> Palaima 1989b: 36, fn. 13.

<sup>26</sup> Olivier 1988: 255-256; 258, fig. 2, no. 13; Hirschfeld 1999: 72.

<sup>27</sup> Wheeler *et al.* 1975. Vertical inscriptions are not unknown within the corpus of Cypro-Minoan: cf. PYLA Mlin 001 ##177, a fragment of a bronze tool or ingot bearing four signs arranged vertically (Olivier 2007: 250; Ferrara 2013a: 90).

<sup>28</sup> Matoian 2012: 154-155, fig. 34; Valério 2014b: 7-8.

<sup>29</sup> Galili and Gale 2013: 11-12, fig. 19.

<sup>30</sup> Hirschfeld 2014a: 169, 172, fig. A115, no. 72.



Fig. 4. Marks on copper ingot from Aghia Triadha (Wheeler *et al.* 1975: 33, Figs. 6-7)

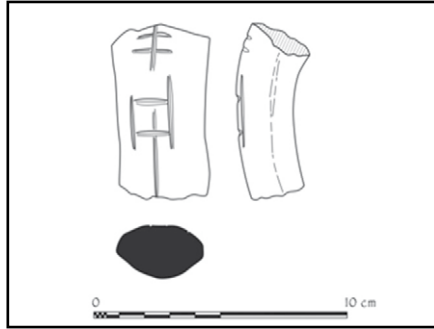


Fig. 5. RASH Avas 002 ADD ##251: ceramic handle bearing two Cypro-Minoan signs from Ugarit (Matoian 2012: 155, fig. 34; ©Mission de Ras Shamra)

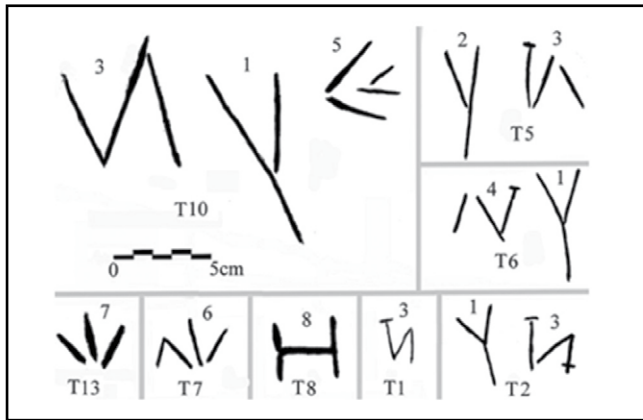


Fig. 6. Collection of Cypro-Minoan markings on tin ingots from the Hishuley Carmel shipwreck (drawings by E. Galili, in Galili and Gale 2013: 10, fig. 14)

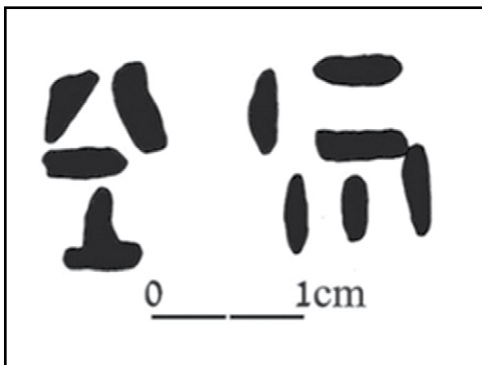


Fig. 7. Two-sign Cypro-Minoan inscription on a bronze hoe from the Hishuley Carmel shipwreck (drawings by E. Galili, in Galili and Gale 2013: 10, fig. 19)

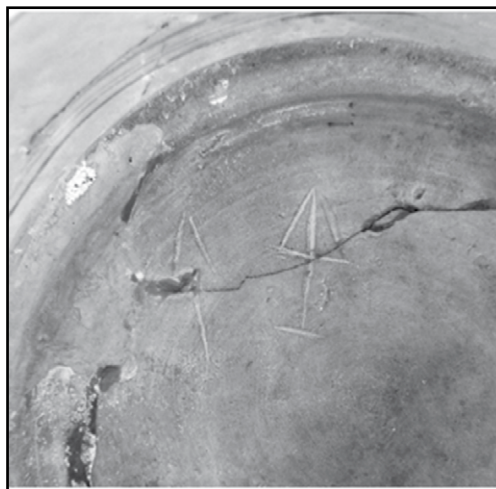


Fig. 8. KITI Avas 003 ##132 (not to scale; courtesy of S. Ferrara)

A specific category of Cypro-Minoan inscriptions containing two signs is the so-called 1+1 type. This type of inscription is comprised of a single sign separated from another single sign by a divider. It appears on a wide range of objects, including miniature ingots<sup>31</sup>, pottery, stone blocks, and one clay ball. The type even survives into the 1<sup>st</sup> millennium BCE, appearing in several Cypro-Greek inscriptions from the region of Paphos<sup>32</sup>. Its function is as yet unclear, but at least in the case of the Cypro-Minoan clay ball, the single signs seem to be substitutes for what normally would be a sign sequence, which suggests that they could represent abbreviations of full words<sup>33</sup>. It is, of course, possible that 1+1 inscriptions had various functions, especially when applied to different media; but in each case they may convey linguistic information, and this is worth signalling.

Thus despite the uncertainties surrounding notations of only two signs: as long as it is possible that an inscription is present, such cases ought to be considered alongside other Cypro-Minoan epigraphical material in published catalogues. The Tiryns and Ugarit vase marks have already been registered as potential Cypro-Minoan *inscriptions* and assigned catalogue labels and numbers: TIRY Avas 001 ADD##245 and RASH Avas 002ADD##251, respectively<sup>34</sup>. Yet the other cases discussed above also deserve the same kind of treatment.

Ultimately, with two-sign notations, disciplinary boundaries diffuse, and interests become entangled. Such notations should be at the same time collected as inscriptions and catalogued alongside other marks, as they are of concern to the study of both writing systems and marking systems. Following this line of reasoning, we will deal below with the ways in which inscriptions on pottery might elucidate the purposes of potmarks. First, though, we need to address the problem of identifying certain marks, on pottery and other materials as well, as signs extracted from the Cypro-Minoan writing system.

## The anatomy of the marking systems: Cypro-Minoan vs. non-Cypro-Minoan elements

### *Advances in the identification of marks as Cypro-Minoan signs*

In isolation, marks consisting of simpler shapes composed of few strokes (such as crosses, arrows, etc.) are impossible to associate with any particular writing system. They are bound to have parallels in numerous scripts of the ancient Eastern Mediterranean, not to mention the possibility that such similarities may be fortuitous<sup>35</sup>. Thus, *complexity* of form becomes crucial for diagnosis<sup>36</sup>. A mark can be securely linked to a particular writing system such as Cypro-Minoan only if (1) its shape and ductus correspond to a sign that is peculiar to that writing system, or if (2) the sign is accompanied by (and inscribed at the same time as) another sign that surely derives from that writing system,

<sup>31</sup> See the recent treatment by Bell and Ferrara (2016) on the inscriptions applied to miniature ingots.

<sup>32</sup> O. Masson and Mitford 1986: 75–76.







<sup>33</sup> Ferrara 2015; Ferrara and Valério forthcoming. É. Masson (apud É. and O. Masson 1983: 413) speculated that these inscriptions represent an «abbreviated votive formula». In inscriptions written in the Cypro-Greek syllabary from the Paphian area, one type of inscription consists of dedications bearing a personal name and a patronymic. Thus, one possibility is that the 1+1 inscriptions bear «Son's name + Father's name» constructions in abbreviated form.





<sup>34</sup> Valério 2014.



<sup>35</sup> Ventris and Chadwick 1973: 29, 40; Hirschfeld 1999: 29–30, 88. See also Davis 2011.

<sup>36</sup> Hirschfeld 1999: 30.

thus in effect forming a potential two-sign inscription (as in the examples given above). Clearly, a thorough palaeographical study of Cypro-Minoan signs and the establishment of a judicious sign-list are both prerequisites not only for the study of inscriptions, but for the study of marks as well<sup>37</sup>.

According to Hirschfeld, potmarks certainly drawn from the Cypro-Minoan syllabary include those that match signs CM 26 , 27  ~ , 31 and 87 , as well as, with less certainty, CM 25  and the shape<sup>38</sup> . The new evidence and conclusions offered in Valério<sup>39</sup> call for a revision of this position.

One mark, identified by Hirschfeld as corresponding to CM 31, is particularly worth reassessing. One reason is that she used it to illustrate the difficulties in assessing the relations between potmarks and signs of the Cypro-Minoan script<sup>40</sup>. Another is that our understanding of the sign has changed. Hirschfeld's<sup>41</sup> early treatment of CM 31 could be viewed as a warning against the possible circularity of identifying a potmark as a Cypro-Minoan sign in the absence of a judicious sign repertory. At the time of her writing, only the sign-list by É. Masson<sup>42</sup> was available and no catalogue of inscriptions had yet appeared. Thus, while criticising the complications in defining the source of a particular sign shape in Masson's repertory, Hirschfeld assumed that CM 31 was listed based on no more than an «isolated mark on pottery»— hence the danger of circularity. In reality, however, Masson almost certainly extracted CM 31 from a two-sign sequence on a cylinder seal now labelled as SALA Psce 001 (##205), which reads   31-110 in impression<sup>43</sup>. Oddly, this inscription was included in Olivier's 2007 catalogue, but the author transcribed it as ●●-110 and at the same time removed CM 31 from his revised sign-list. However, the fact that  accompanies a *bona fide* Cypro-Minoan sign (CM 110 ) in a linear notation indicates that it must also be a syllabogram. Therefore, it needs to be accounted for in some way. And while Olivier has removed it from his repertory of Cypro-Minoan signs, marks on different objects at sites in the Eastern Mediterranean, such as an Aegean stirrup jar from Miletus (Fig. 9)<sup>44</sup> and a clay loom-weight from Ugarit<sup>45</sup>, have continued to be identified with CM 31 by other authors, usually specialists in different fields. This only emphasises the necessity of a better dialogue between the disciplines of epigraphy and archaeology.

An examination of the full range of variation of the well-known sign CM 41 (, ) has now shown that it occurs in a wide array of forms with many levels of graphic complexity<sup>46</sup>. The lower part of the sign is roughly triangular and normally is drawn as a three-legged shape, the three «legs» each ending in a dot or underscored by a single horizontal stroke. The upper part consists of a curved or sub-vertical stroke, which sometimes is a continuation of one of the legs and may optionally be topped by a dot or horizontal stroke,

<sup>37</sup> Hirschfeld 1999: 31.

<sup>38</sup> Hirschfeld 1999: 89, n. 15; 2002: 102, n. 28.

<sup>39</sup> Valério 2016.

<sup>40</sup> Hirschfeld 1999: 32.

<sup>41</sup> Hirschfeld 1999.

<sup>42</sup> É. Masson 1974.

<sup>43</sup> The cylinder was published by O. Masson (1957a) and appeared in a first attempt at a repertoire of inscriptions published by the same scholar (O. Masson 1957b).

<sup>44</sup> Inv. no. S 1971.124e.5, in Zurbach 2014: 225.

<sup>45</sup> Inv. no. RS 96.2006, in Matoian 2012: 154.

<sup>46</sup> Valério 2016: 120-121.

as shown in Table 1. The former CM 31 is thus better accounted for as a variant of CM 41<sup>47</sup> (cf. especially the examples in the Enkomi clay cylinder, ENKO Arou 001 ##097, and on a pithos rim fragment from Idalion-Ambileri, IDAL Avas 001 ##123)<sup>48</sup>.

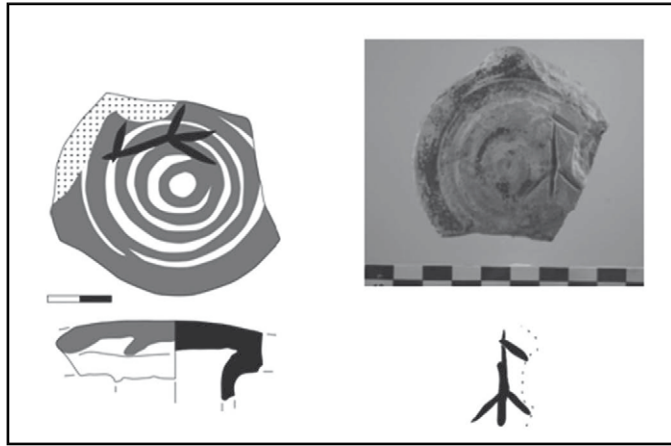




Fig. 9. Base of stirrup jar («amphore à étrier») from Miletus inscribed with CM 31 = CM 41 (Zurbach 2014: figs. 10-12)

				
ENKO Abou 003	ENKO Abou 016	ENKO Aost 002	ENKO Aost 002	ENKO Arou 001.10
				
ENKO Arou 001.10	IDAL Avas 001	IDAL Avas 001	SALA Psce 001	RASH Atab 004.A.09
				
RASH Atab 004.A.09	RASH Atab 004.B.17	TIRY Abou 001	TIRY Abou 001	

Table 1. Range of variation of sign CM 41

This not only confirms the plausibility of the identification of  as a Cypro-Minoan sign<sup>49</sup>, but also alerts us to the possibility that other potmarks may feature hitherto unsuspected variations of this sign.

<sup>47</sup> The table is adapted from Valério 2016: 121, table 2.34. The drawing of SALA Psce 001 is according to O. Masson (1957b: fig. 6, apud Olivier 2007: 279). The drawings of the two examples from TIRY Abou 001 are from Vetter (2011: 15, Fig. 3; but see also Ferrara 2013: Addendum).

<sup>48</sup> The examples of a sign found in the clay tablet RASH Atab 004 ##215 from Ugarit, long thought to be a doubtful CM 37 () are also better accounted for as a variant of CM 41 (Valério 2016).

<sup>49</sup> In addition to the Miletus and Ugarit examples mentioned above, this sign also occurs in post-firing marks on Aegean wares found at the Cypriot sites of Enkomi, Kalavassos-Ayios Dhimitrios, and Athienou (Hirschfeld 1993, fig. 1; 2002: 71, table 1).



As for the shape  $\mathfrak{N}$ , which Hirschfeld interpreted guardedly, we can be sure that it represents a Cypro-Minoan syllabogram. It corresponds to CM 19, which Olivier justifiably defined as encompassing the former CM 19  $\mathfrak{J}^{\sim} \sim \mathfrak{E}^{\sim}$  and 20  $\mathfrak{N}$  of É. Masson<sup>50</sup>. It is now also clear that CM 19, which Olivier assigned exclusively to the purported «CM 1» and «CM 3» sub-scripts, also has a counterpart in the so-called «CM 2» sub-script: CM 79 ( $\mathfrak{N}$ )<sup>51</sup>. As with CM 41 above, CM 19/79 is a grapheme with a wide range of palaeographical variations (Table 2). Its diagnostic characteristics are three zigzagging strokes topped by a horizontal line, but a number of traits are optional. Not surprisingly, the marks inventoried by Hirschfeld match the variants of the sign that were inscribed after firing on ceramic objects, namely ENKO Avas 006 ##113 ( $\mathfrak{N}$ ) and KITI Avas 019 ##148 ( $\mathfrak{N}$ ). Moreover, as implied above, one of the marks repeated on the tin ingots from the Hishuley Carmel shipwreck (Fig. 6) is consistent with CM 19.















"CM 1" (INSCRIPTIONS FROM CYPRUS, EXCLUDING "CM 2")					
					
ENKO Abou 001	ENKO Abou 016	ENKO Arou 001.14	ENKO Arou 001.20	KITI Avas 019	ENKO Avas 006
"CM 2" (CLAY TABLETS ENKO ATAB 002-004 ##207-209, ENKOMI)					
					
ENKO Atab 002.B.I.11	ENKO Atab 002.B.II.02	ENKO Atab 003.B.15	ENKO Atab 004.A.I.6.01		
"CM 3" (INSCRIPTIONS FROM UGARIT)					
					
RASH Atab 001.A.04	RASH Atab 001.B.07	RASH Atab 004.B.14	RASH Atab 004.B.12		

Table 2. Range of variation of sign CM 19/79 (adapted from Valério 2016: 116-117)

Other, more complex forms such as 88/89/90  $\mathfrak{V}^{\sim} \sim \mathfrak{L}^{\circ} \sim \mathfrak{L}^{\circ}$ , 91  $\mathfrak{V}$ , 92  $\mathfrak{Z}$ , 96  $\mathfrak{H}$ , 98  $\mathfrak{Y}$ , 102  $\mathfrak{H}$ , 107  $\mathfrak{W}$ , 109  $\mathfrak{X}$ , 110  $\mathfrak{W}$ , 112  $\mathfrak{V}$  should also be relatively easy to identify as Cypro-Minoan signs<sup>52</sup>. Thus a broken sign on a ceramic handle fragment from a 12<sup>th</sup>-11<sup>th</sup> century BCE context at Ashkelon has been treated cautiously by Hirschfeld<sup>53</sup>, but is indeed consistent with CM 107 as pointed out by the publishers of the fragment<sup>54</sup>. The latter is well-attested in a similar palaeographical variant ( $\mathfrak{X}$ ) among inscriptions of the 1+1-type on ceramic handles from the Cypriot site of Kition-*Kathari*, namely from Late Cypriot IIIA, IIIB and

<sup>50</sup> Cf. É. Masson 1974: 13, fig. 2.

<sup>51</sup> Valério 2016: 116-117. The assimilation of CM 19 and 79 as allographs of the same sign was first suggested by Nahm (1981: 55-56; Abb. 3), but unfortunately this suggestion was not sustained with palaeographical evidence. The somewhat different aspect of the CM 79  $\mathfrak{N}$  variant is easily accounted for by the writing technique typical of the clay tablets that make up the sub-corpus of CM 2. The signs are very small (0.3-0.5 mm) and therefore a more schematic, with fewer curves and optional traits (Palaima 1989a: 155; Ferrara 2012: 202). In fact, CM 79 is very similar to the variant of CM 19 used on the clay cylinder ENKO Arou 001 ##097 (see Table 12), whose signs are equally small.

<sup>52</sup> Some of these shapes are among the post-firing marks on Aegean vases identified as Cypro-Minoan signs by Hirschfeld (1993: fig. 1). See also the presence of marks corresponding to CM 91 and 102 on pottery from Ugarit (Matoian 2012: 135-136, figs. 12-14).

<sup>53</sup> Hirschfeld 2014b: 2.

<sup>54</sup> Cross and Stager 2006: 129, 140, fig. 10.

Cypro-Geometric I (and probably ca. 1125-1050 BCE) levels at Temple 5 and Courtyard A (Area II)<sup>55</sup>. CM 107 is probably also used in marks on Aegean wares found at Enkomi and Tiryns<sup>56</sup>. Another interesting case is that of a potmark on the handle of a Canaanite jar from a Cypro-Geometric I (1050-950 BCE) funerary context at Palaepaphos-*Skales*. It consists of a sign resembling a late form of CM 112  $\Psi$ <sup>57</sup>, but an early Cypro-Greek *ke*  $\chi$  is not impossible, as we have little evidence for the palaeographical variation of signs in the earliest stages of the Cypro-Greek syllabary. Cases like the latter are potentially relevant for understanding the transition from one script to the other.

It is also of importance to consider marks on ingots. Whereas at times tin (see above) and miniature copper ox-hide ingots<sup>58</sup> were marked with clear Cypro-Minoan signs, this needs yet to be thoroughly demonstrated for regular copper ox-hide ingots. Besides the works by Sibella and Pulak on the 160 incised ingots of different shape and material (copper and tin) from the Uluburun shipwreck<sup>59</sup>, Kaiser<sup>60</sup> has compiled and analysed a database of marks on copper ox-hide ingots. Her list of 72 «symbols» that appear incised or impressed on copper ox-hide ingots must be assessed with much caution, as they are listed separately and are illustrated by drawings alone<sup>61</sup>. It would be important to evaluate the markings as they appear on the object (including aspects such as orientation and possible interactions with other symbols, if the markings actually consist of two symbols) and at least check the drawings against photographs. For example, her symbols D4 and D5 are in reality part of a *potential* two-sign inscription on an ingot from Aghia Triada (Crete), to be read as  $\Psi\star \rightarrow 91-13$  (see above). Even with these caveats in mind, it is evident that none of Kaiser's symbols can be *securely* identified as a Cypro-Minoan sign. In fact, only very few of Kaiser's 72 symbols have plausible parallels in Cypro-Minoan, if we exclude the simpler shapes that have parallels in various scripts of the Eastern Mediterranean as well, such as the «cross» (+), the T or  $\vdash$  and the «double T» (⌘), and the vertical stroke crossed by two horizontal ones (‡). The exceptions include symbol D2, which is identical with  $\Psi$ , a Cypro-Minoan sign attested in KLAV Avas 001 ADD##231 and which is probably a variant of CM 98  $\Psi$ <sup>62</sup>. Depending on their orientations, shapes A6  $\Psi$ , E2  $\Psi$ , and F1  $\Psi$ , and perhaps also J5  $\Psi$ , *could* correspond to variants of CM 41 (see above).

It is therefore possible that the marking system(s) on the copper ox-hide ingots combine Cypro-Minoan signs and several symbols unrelated to writing. In addressing the ox-hide and bun types, Pulak notices that a significant number of marks on ingots from the Uluburun shipwreck depict marine and nautical motifs, including fishhooks, a trident, a fish, rudders, and possibly even a boat<sup>63</sup>. If such combinations of Cypro-Minoan

<sup>55</sup> Compare particularly KIT1 Avas 008, 014 and 018 = ##137, 143, and 147 (Olivier 2007: 204, 210, 214; Ferrara 2013a: 70, 72-75, 192, 197, 201).

<sup>56</sup> Hirschfeld 1993: fig. 1; 2002: 71, table 2.

<sup>57</sup> Karageorghis 1983: 134-135; É. Masson and O. Masson 1983: 412-413, fig. 7c.

<sup>58</sup> See Giunilia-Mair et al. (2011: 14, 17, fig. 2.2) for the case of an isolated sign (likely CM 63  $\Psi$ ) incised after casting on a miniature copper ox-hide ingot from Enkomi (inv. no. Enk. 1995). Miniature ingots have typically been interpreted as votive, but see Bell and Ferrara (2016) for the hypothesis that they were samples marked with a «brand» denoting quality and provenance.

<sup>59</sup> Sibella 1996; Pulak 1998.

<sup>60</sup> Kaiser 2013.

<sup>61</sup> See especially Kaiser 2013: 30-35.

<sup>62</sup> For KLAV Avas 001 ADD##231 see Ferrara 2013: 119-120, 272-273.

<sup>63</sup> Pulak 1998: 194-196.

signs and non-Cypro-Minoan symbols really occur, they may incidentally be examples of what makes it difficult for us to differentiate marks extracted from Cypro-Minoan from marks unrelated to writing<sup>64</sup>. As the orientation of a script sign was certainly conserved when inscribed on an object as a mark<sup>65</sup>, being able to identify more marks as Cypro-Minoan syllabograms has implications for understanding the placement and function of the marks.

#### *The use of numbers in Cypriot marking systems*

Cypro-Minoan numerical signs are so far rarely attested, as they occur in no more than ten documents, but their existence is indisputable (Table 3)<sup>66</sup>. Palaima<sup>67</sup> deals with the use of numerical notations on Cyprus at some length, and Olivier<sup>68</sup> has catalogued numbers («arithmograms» in his terminology) alongside phonograms in his sign-lists. Despite the rarity of numerical signs, in general it seems that units were indicated by vertical bars (|) and tens by dots (•), just as in Linear A. However, it seems that at least in one instance (ENKO Mvas 001 ##182; but cf. possibly also ATHI Adis 001 ##092 and ENKO Aost 001 ##093) dots were used for hundreds and horizontal strokes (–) for tens. For Palaima, this may be due to an alternative epigraphical practice that simplified Linear A-derived circles (hundreds) to dots, and then changed dots (tens) to horizontal strokes to avoid confusion<sup>69</sup>.











				
'20 4 20' <sup>(e)</sup>	'32' or '302'	'26' or '206'	'7'	'3' <sup>(e)</sup>
ATHI Adis 001 ##092	ENKO Aost 001 ##093	ENKO Aost 001 ##093	KALA Arou 004.04 ##101	KATY Avas 002 ##128
				
'2'	'3'	'230'	'4'	'4' or '  2  '
KITI Avas 016 ##145	KITI Avas 016 ##145	ENKO Mvas 001 ##182	RASH Atab 002.02 ##213	PPAP Mvas 002 ADD##254

Table 3. Numbers in Cypro-Minoan inscriptions (adapted from Valério 2016: 157, table 2.90 and updated)

<sup>64</sup> Four rectangular tin ingots of uncertain provenance, housed in the Museum of Ancient Art of the Municipality of Haifa, are inscribed with symbols that may include sign CM 102 # besides non-Cypro-Minoan symbols (Maddin *et al.* 1977: 44, fig. 23; Artzy 1983). Ingot ##8251 is particularly telling, because it was incised (possibly at different times) with CM 102 plus a symbol resembling an hourglass or pushpin. Two other ingots in this group, ##8252 and CMS 5, bear the same «pushpin» alongside a «rudder» (Artzy 1983), and this last symbol is also attested on copper ox-hide ingots found at Aghia Triadha and Mochlos in Crete, and in the Uluburun shipwreck (Kaiser 2013: 35, 42). This association might be significant, but Artzy (1983) has argued that the ingots date to the 5<sup>th</sup> century BCE.

<sup>65</sup> Hirschfeld 1999: 40.

<sup>66</sup> For PPAP Mvas 002 ADD ##254 see Egetmeyer 2016. For ATHI Adis 001 ##092, the numerical reading provided in the table is the most likely. Yet it cannot be excluded that the odd use of dots before and after the vertical bars does not correspond to a numerical notation, but rather to a kind of decoration (Olivier 2007: 113). Finally, the interpretation of this inscription is made even more difficult by the possibility that it is written in the Cypro-Greek syllabary, not Cypro-Minoan.

<sup>67</sup> Palaima 1989b.

<sup>68</sup> Olivier 2007.

<sup>69</sup> See Palaima 1989b: 49.

Now, dots and straight lines are common amongst marks. Among the potmarks from Enkomi, Hirschfeld registers various instances of a single vertical stroke and series of horizontal strokes on various types of vases, though mostly on vessels pertaining to the «amphorae» (fourteen cases) and «local» categories (seven cases) (see Fig. 10). They could all represent numerals, units and tens, respectively, and their close association with large containers such as the Canaanite amphorae would certainly not be surprising if this were the case.

MARK	amphora	local	Aegean	other
—		1		
≡	7	2		
≡	4			<sub>1</sub> Myc.IIIc:1b
≡	1	2		
≡	1			
	1	3		

Fig. 10. Potmarks from Enkomi that may represent numerals and their attestations by vase type (according to Hirschfeld 1999: 137; 2002: 69, table 1)

However, some Linear B numbers consist of similar shapes, and for straight lines we should also consider the possibility that a simple tally system, attached to no particular script, was used. Thus, we can only be certain about the presence of Cypriot numerical notation when a marking combines numbers and Cypro-Minoan phonograms, or two types of numbers in clear Cypro-Minoan arrangements (such as dots and vertical lines, vertical and horizontal lines, and so on). A good example is KITI Avas 016 ##145, which has been catalogued as an inscription by Olivier, but is composed of a single syllabogram, CM 38  $\text{ϣ} \rightarrow e^2$ , followed and probably also preceded by numbers: JII 38 III<sup>70</sup>. All of these signs were incised after firing on the fragmented rim of a large pithos<sup>71</sup>. Ferrara notices that the inscription is fractured at the left edge, so each numeral may have been preceded by a phonetic sign. She also discusses the default hypothesis that the phonogram has a logographic function, speculating that it might refer to the contents of the pithos<sup>72</sup>. She may well be right. Whatever the exact significance of CM 38  $\rightarrow e^2$ , something designated by it, or related to whatever it designates, is being enumerated<sup>73</sup>; and since the object is a large ceramic container, it is likely that what is being enumerated is either the container's capacity or its contents.

<sup>70</sup> Olivier 2007: 212.

<sup>71</sup> Olivier 2007: 212; Ferrara 2013a: 73-74, 199, with refs.

<sup>72</sup> Ferrara 2013a: 73-74.

<sup>73</sup> It is worth mentioning that CM 38  $\text{ϣ}$  also appears on a fragment of an amphora handle found in a 13th century BCE context at Aphek (Yasur-Landau and Goren 2004), but the object is fractured in a way that leaves open the possibility that the sign may have belonged to a sequence rather than being isolated. Petrographic analysis shows that the amphora was made in the Levant, namely in the area of Acco-Tyre, but Yasur-Landau and Goren propose that prior to its final deposition it was shipped to Cyprus, marked, and then re-shipped to Aphek. Finally, the same publication then draws attention to a sherd of a Mycenaean vase from Ugarit, published by Courtois and Courtois (1978: 336-337, fig. 48:2), on which CM 38  $\text{ϣ}$  seems to have been incised in isolation.



Fig. 11. KIT1 Avas 016 ##145 (courtesy of Silvia Ferrara)

### Function of the marks: Some observations

#### *Re-evaluating distribution patterns*

A deeper understanding of Cypro-Minoan palaeography and the identification of further marks as corresponding to signs of the script should prompt us to re-evaluate patterns of occurrence. To this end, we have examined the material from Tiryns, Enkomi and Ugarit treated by Hirschfeld<sup>74</sup>, the marks on ingots compiled by Kaiser<sup>75</sup>, and further data from these and other sites. We have considered the type and function of the media on which marks corresponding to Cypro-Minoan signs appear, their find-spots and archaeological contexts, possible places of import of the objects, methods of application (incised or painted), and the timings of application (pre- or post-firing with pottery, pre- or post-casting with ingots). The latter parameter is of great consequence for the function of markings. It has been repeatedly stressed by specialists that pre-firing marks made on pottery while still in the workshop might have had a much more restricted range of purposes than marks made after firing, which could have been made at any point during a vessel's useful lifetime<sup>76</sup>. Likewise, impressed or «primary» marks on ingots were probably made during production stages when the metal was still soft, whereas incised or «secondary» marks could have been made at any point after casting<sup>77</sup>.

Our re-examination in fact revealed no significant distribution patterns. In the case of ingots, Sibella and Kaiser have already concluded that there is no clear pattern of distribution of the marks, although these objects are even more problematic, as we have found no mark on them that can be linked to Cypro-Minoan beyond doubt<sup>78</sup>. Earlier, we saw evidence that a particular symbol used on marked pottery (and possibly ingots) is

<sup>74</sup> Hirschfeld 1999, 2002.

<sup>75</sup> Kaiser 2013.

<sup>76</sup> Hirschfeld 1999: 33.

<sup>77</sup> Bass 1967: 72; Kaiser 2013: 47-48.

<sup>78</sup> Sibella 1996: 10 apud Pulak 1998: 194; Kaiser 2013: 38.

actually consistent with a sign of Cypro-Minoan, CM 41. However, this is one example in which the palaeographical identification has not shed any significant light on the possible meaning of the mark. Actually, the fact that CM 41 can now be identified on a great variety of objects from different sites suggests that its function was not very specialised, or that it was used in different marking systems.

These results are interesting, as the absence of distribution patterns is in itself meaningful. If this absence is real, then it suggests that many different marking systems were in use, depending more on the agents applying them than on the objects they were applied to, or perhaps that the rationale for choosing and using Cypro-Minoan signs as marks was not very systematic.

#### *Possible function of Cypro-Minoan potmarks in light of the inscriptions*

There is little doubt that Cypro-Minoan writing was closely associated with the production, distribution or use of ceramic vessels or their contents. Of 244 Cypro-Minoan inscriptions inventoried in Valério<sup>79</sup>, 74 (i.e. 30%), mostly very short, are on pottery. In fact, pottery is the second most inscribed class of objects, surpassed only by clay balls (91 specimens). It is therefore worth asking whether potmarks corresponding to Cypro-Minoan signs had, at least on occasion, functions identical or related to those of the inscriptions on pottery. It has so far been nearly impossible to address this question given the lack of headway in determining the phonetic values of Cypro-Minoan signs, but recent progress in this area now enables us to read sign sequences with experimental values and to make some informed attempts at interpreting some of these sequences<sup>80</sup>.

Label+No.	Inscription	Vase type	Placement	Time	Context	Interpretation
ENKO Avas 002 ##109	87-15-82   102-73-04-97   107-•• →  a'-ko'-sa'   a-mo'-ta'-ro   za <sub>2</sub> '!-••	Pithos	Rim	Uncertain	None reported	102-04-73-97 → a-mo'-ta'-ro is almost certainly a PN in «nominative» form, also found on a clay ball and ivory plaque (Cf. non-Semitic PN Amutaru at Ugarit; Nahm 1981: 62 and Valério 2016: 423-425)  Likely not ownership-related Manufacturer's name?
ENKO Avas 003 ##110	27-73-64-23 → ] si'-mo'-ol'-ti	Deep bowl fragment (lower part)	Wall base, next to perforation. Reversed with respect to the base	Pre-firing	Enkomi Area I, Quartier 4W, Λ-M 8-10 north. Street filling, bordering the N façade of the «Sanctuary of the Horned God», in association with Myc IIIc.1b pottery sherds	Possessive(?) -o-ti (Ownership/provenance?)

<sup>79</sup> Valério 2016.

<sup>80</sup> Valério 2016.

ENKO Avas 004 ##111	06-23-13-23   110 → ]pa'-ti-to-ti   ke/lu <sup>2</sup>	Terracotta pithos with decorated shoulder	Rim	Pre-firing	Enkomi Quartier 4E, Sanctuary of the Ingot God, adjacent to the west threshold, between two monolithic altars	Possessive(?) -o-ti (Ownership/ provenance?)
ENKO Avas 005 ##112	102 + 82-85-88-97-23 → A+ sa'-ri-jo-ro-ti	Large amphora (?)	Handle	Post-firing	None reported	Isolated 102  Possessive(?) -o-ti (Ownership/ provenance?)
DAL Avas 001 ##123	41-41-97 → zi'-zi'-ro	Pithos	On the wall under the rim	Pre-firing	Idalion-Ambileri, West Acropolis, south-west edge	Word attested on a clay ball from Tiryns (TIRY Abou 001), besides the Enkomi cylinder (ENKO Arou 001), and possibly in nominative form.
MARO Avas 001 ##157	38-46-23   44-27-97-23 → e-si/tu <sup>2</sup> -ti   se?-si'-ro-ti	Pithoid jar	Mid wall	Post-firing	Maroni-Vournes, Ashlar Building, Room 7	Possessive(?) -o-ti ( O w n e r s h i p / provenance?)

Table 4. Cypro-Minoan inscriptions on pottery with textual elements that can be provisionally interpreted (data drawn from Olivier 2007 and Ferrara 2013; the transliterations follow the working reading system of Valério 2016)

Some short Cypro-Minoan inscriptions on ceramic vessels possibly marked possession or ownership (Table 4). They consist of sign sequences ending in -23, with this sign and the preceding one being read as -o-ti according to hypothetical sign values<sup>81</sup>. It has long been thought that this ending corresponds to the Eteocypriot suffix -o-ti<sup>82</sup>, which evidence suggests was used in a genitive role<sup>83</sup>. Cypro-Minoan inscriptions ending in ...-23 → -o-ti are attested both pre- and post-firing, and on different parts of the vessels (wall, rim and handle). The only evident pattern of distribution is a possible preference for large containers – namely, pithoi or amphorae/jars. The number of examples is small enough that this pattern might simply be fortuitous, but in any case these examples seem to link the marks to storage and transportation, and hence again to the management and distribution of goods. In the case of the two inscriptions with sequences ending in ...-23 → -o-ti that were applied before firing, we might suggest that the destination of the vessel was already known in the workshop. Or, if this ending indeed denotes some kind of genitive function, it might also indicate the maker of the vessel or the workshop it was made in, although it would make more sense to find this information on high-value items (e.g. metal bowls) than on transportation and storage containers.

Label+No.	Inscription	Vase type	Placement	Time	Context	Interpretation
ENKO Avas 005 ##112	102 + 82-85-88-97-23 → A + sa'-ri-jo-ro-ti (Different orientations)	Large amphora (?)	- Mark: Handle - Inscription: Handle	Post-firing	None reported	- Isolated 102 → A - Word with possessive(?) -o- ti (ownership/ provenance?)

<sup>81</sup> Valério 2016: 397-399.

<sup>82</sup> É. Masson 1971: 25-26; Duhoux 2009: 66-69.

<sup>83</sup> Valério 2016: 399-400. The evidence comes from two 1st millennium BCE Eteocypriot inscriptions from Kouklia-Palaepaphos in which sequences ending in -o-ti are used in a manner similar to inscribed Cypro-Greek personal names in the genitive.

KATY Avas 002 ##128	06 + 102-82-53-23 → PA, <i>a-sa-ma-ti</i> (The last sign may also be the number «3» or sign CM 56 ■)	Jug, Plain White Wheelmade piniform body	Mark: Handle Inscription: Shoulder	Post-firing (?)	Katydhata – Bronze Age necropolis beehive tomb II (first layer?), LC IIC-III A: I	Isolated 06 → PA Word, possibly followed by numeral «3»
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Table 5. Cypro-Minoan inscriptions that coexist with Cypro-Minoan potmark(s) on a vessel (data drawn from Olivier 2007 and Ferrara 2013; the transliterations are from Valério 2016)

Finally, there are two examples of ceramic containers on which Cypro-Minoan potmarks coexist with Cypro-Minoan inscriptions: ENKO Avas 005 ##112 (Fig. 12) and KATY Avas 002 ##128 (see Table 5). In both cases, the marks are represented by single signs inscribed on the handles (and thus meant to be readily visible), and the inscriptions as transliterated correspond to a single word with the possible genitive ending. But beyond that, these two cases do not allow us to make inferences about possible patterns of use. In any case, it is likely that the marks and inscriptions on these objects had different functions rather than being redundant<sup>84</sup>. It stands to reason that if the sequence had a possessive or genitive function, then the mark must have signalled something else.



Fig. 12. É. Masson's (1971: 24, fig. 29) drawing of inscribed handle ENKO Avas 005 ##112 (above) and Olivier's (2007: 195) corrected drawing of just the inscription (below) (not to scale; neither author provides a photograph with a full view of the object)

### Cypriot writing in marking systems: Conclusions and prospects for further investigation

Based on the preceding evidence, and in agreement with previous treatments of the problem, some tentative conclusions can be drawn as to who made the marks on these objects, and why:

- Marks on pottery were probably made by manufacturers or handlers of transport and storage containers, and most likely denote information related to the management and distribution of goods (ownership, provenance, destination, and so on)<sup>85</sup>. The people who incised the inscriptions and markings need not necessarily have been literate.

<sup>84</sup> Already Steele 2013: 135.

<sup>85</sup> Hirschfeld 2002.



- Marks and short Cypro-Minoan inscriptions on metal tools (such as shovels, hoes, axes, etc.) were probably made, at least some of the time, by the same people who created the longer Cypro-Minoan inscriptions on metal jewellery and vessels. Again, these people clearly had the technical skill to engrave the inscriptions and markings, but need not have been literate.

- Marks on ingots often depict objects of a marine or nautical nature, and so were probably made at coastal sites by people «closely involved with the sea»<sup>86</sup>. Interestingly: we have been unable to find any uncontroverted examples of Cypro-Minoan signs on ingots, suggesting that although Cyprus was a major source of metal, the systems for marking ingots were more at the behest of the (international) merchant rather than the manufacturer (even when the latter was Cypriot).

- Marks and two-sign inscriptions on tools (such as the above mentioned hoe from the Hishulay Carmel shipwreck, or the inscribed axe PYLA Mins 001 ##173 from Pyla-Kokkinokremos)<sup>87</sup> most likely denote ownership.

Three further conclusions are possible:

- A larger number of forms used as markings than hitherto acknowledged can be identified as signs from the Cypro-Minoan script.

- While not all marks can be seen as writing *stricto sensu*<sup>88</sup>, some of them – especially those of the «I+I» type – may very well constitute short inscriptions that convey linguistic information, e.g. in the form of abbreviations.

- The subset of evidence that we have examined displays no significant distribution patterns, suggesting that many different agent-specific marking systems were in use across the eastern Mediterranean, and that the use of Cypro-Minoan signs as marks was (again) agent-specific, and thus not systematic.

In particular, though, the latter conclusion regarding the unsystematic use of Cypro-Minoan signs as marks needs to be re-evaluated against a database that does not yet exist: a comprehensive census of Late Bronze Age marks (on all supports) corresponding to Cypro-Minoan signs throughout the entirety of the central and eastern Mediterranean. As Hirschfeld rightly notes, compiling such a database would «represent a multi-year, multi-person effort»<sup>89</sup> – yet such a database remains essential for clarifying the role of Cypro-Minoan signs as marks on all categories of objects. Here, perhaps, is an opportunity for a scholar, or a partnership of scholars, or even an enterprising PhD student, to add something truly significant to our understanding of the ways in which Cypro-Minoan signs were used as marks<sup>90</sup>.

## Acknowledgements

We would like to thank Silvia Ferrara, Ehud Galili, Nicolle Hirschfeld, Valérie Matoïan, James D. Muhly, Julien Zurbach and Wolf-Dietrich Niemeier for their permission to reproduce several of the illustrations included in this paper.

<sup>86</sup> Pulak 1998: 195.

<sup>87</sup> See Olivier 2007: 36, 51, 246; Ferrara 2013: 88.

<sup>88</sup> Cf. e.g. Hirschfeld 1999, 2014b: 267-268; Galili and Gale 2013: 19; Zurbach 2014: 229.

<sup>89</sup> Hirschfeld 1999: 79.

<sup>90</sup> Ideally, a primary component of such a study would be an online database containing all the relevant material – which is currently scattered through decades of publications of varying quality and scholastic rigor.

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# Writing «systems»: Literacy and the transmission of writing in non-administrative contexts

*Philippa M. Steele*

**Abstract**<sup>1</sup>: A wide range of document types have been preserved written in the undeciphered scripts of the Aegean and Cyprus (Cretan Hieroglyphic, Linear A, and Cypro-Minoan), with inscriptions appearing on a variety of media and object types. Some of these inscriptions are assumed to relate to centralised administrative structures, especially those on particular types of clay objects such as tablets and seals/sealings. This paper, however, will deal with the question of literacy existing outside of any centralised administrative sphere. Within an administrative context, we may envisage writing as an economic or bureaucratic tool, controlled to some extent through training in the structure and conventions of the script. Outside of such a context, however, we face the question of how and why writing is proliferated: Who is using it and how do they know how to do it? Do they have access to any kind of training? How standardised is the script they use? The Aegean and Cyprus provide us with some important parallels and differences. On Crete in particular, the concept of administrative writing, whether in seals and sealing practices or in centralised record-keeping, was probably always part of the story. The context in which the deciphered Linear B writing system was adapted from still undeciphered Linear A had a tangible effect on the type and composition of the new script, which was developed alongside administrative influence. Unlike its descendant Linear B, however, we must also remember that Linear A is well attested in non-administrative or «private» contexts, raising the question of whether individuals writing outside the administrative sphere were using the same model of script as the centralised administrations. On Cyprus, we must envisage a completely different context for script adoption. Although the need for writing was probably stimulated by economic development, and although the Late Bronze Age Cypriot script(s) was/were related to the Aegean ones, there is no evidence for Cypriot writing existing within a closely controlled and centralised administrative system. Instead we find a vast array of inscribed objects from a wide variety of contexts, many of which look decidedly non-administrative. It may be no accident that, alongside this diversity in attested written forms, there continues a longstanding scholarly debate concerning the number of writing systems in existence in Late Bronze Age Cyprus. Difficulties in

<sup>1</sup> This paper arises from an ongoing programme of research sponsored by the European Research Council, as part of the project *Contexts of and Relations between Early Writing Systems* (CREWS, grant no. 677758). I would also like to take the opportunity to express my thanks to everyone involved in the «Linear A self-help group» at Cambridge, for giving feedback on a presentation related to this topic and for the congenial and stimulating atmosphere they embody. Never was there a better place or time to be working on the Aegean writing systems. Further special thanks go to Torsten Meißner, Anna Judson, Sarah Finlayson and Ester Salgarella for sharing pieces of work/work-in-progress.

reconstructing the size and composition of the script(s) in use may correspond to real variation (as opposed to standardisation) in the written repertoire. An investigation of these factors has the potential to stimulate new debate on what we mean by 'writing', and what we are doing when we try to reconstruct an undeciphered writing «system».

When the Linear B writing system was developed from its predecessor Linear A, in perhaps the 15th century BCE, there can be no doubt that the context of the transmission of writing was administrative. That is to say that writing was adapted for a new language within a sphere of usage that already existed in Minoan Crete, namely the keeping of economic records on clay documents<sup>2</sup>. Changes were made to document types, especially in seal and nodule usage and in the form, size and layout of clay tablets<sup>3</sup>. To a lesser degree some developments occurred in the script repertory itself, with a few old syllabic signs discontinued and a few new ones created (although the potential degree of innovation in terms of sound values has not infrequently been overstated<sup>4</sup>), alongside an overhaul of the system of ideograms/logograms and weights and measures signs. Nevertheless, there can be no doubt that both the writing system and its use in administrative clay documentation were adapted directly from Linear A practice.

Linear A, however, which is first attested in the early 2nd millennium BCE, was not used on clay documents alone: inscriptions are also found on stone vessels often labelled as «libation tables», on various ceramic vessels and on a range of other items including pieces of jewellery, bronze axes and figurines. Linear B, as far as we can tell from surviving epigraphy found almost exclusively on clay documents, did not inherit these other contexts of script usage<sup>5</sup>. Nor was Linear B the only script to have been derived from Linear A, since it must be assumed that Linear A was also the direct inspiration for the syllabic writing system that appeared in Cyprus in about the 16th century BCE, which we label Cypro-Minoan<sup>6</sup>.

Cypro-Minoan is somewhat different in appearance from Linear A but somewhat similar in its range of uses, and the first part of this paper will consist of an excursus on the nature of writing in Late Bronze Age Cyprus and some trends in the scholarship on this system in the 20th and into the 21st century. Two questions are at issue here, namely on the one hand the specific impetus for and context of writing in Cyprus, and on the other the effect of modern analytical approaches on our view of it. The last part of the paper then brings these questions to bear on the Linear A material with a view to thinking about the sorts of writing that existed outside of the strictly administrative context of literacy that was in some sense the inspiration for Linear B.

The central questions here are related to writing systems. Outside of a controlled administrative context, where writing was a predominantly scribal activity (i.e. it was

<sup>2</sup> See Schoep 2002 on the administrative context of Linear A clay documents. Finlayson, however, has rightly questioned the usually unspoken assumption that administration = clay document usage (Finlayson 2014: 33-36).

<sup>3</sup> See e.g. Tomas 2011a, 2011b, 2012; Weingarten 1994. In sealing, a link between Cretan Hieroglyphic and Linear B cannot be overlooked: Hallager 1997/1998.

<sup>4</sup> Steele and Meißner 2017.

<sup>5</sup> Even if documents on «perishable materials» existed in Linear B, as had undoubtedly been the case for Linear A (on the problem, see Perna 2011), it remains the case that there is no evidence for the use of Linear B on the wider range of object types functioning as writing supports for Linear A. This makes it *a priori* more likely that Linear B literacy was relatively restricted in the variety of uses to which it was put: see Steele forthcoming I.

<sup>6</sup> For the compelling arguments in favour of direct descent of Cypro-Minoan from Linear A, see most recently Valério 2016.

proliferated by training designed for administrative literacy), does writing look different? Does non-administrative writing display a greater degree of variation, or any unusual features? Were authors of non-administrative texts using the same basic system as the administrators, or not? We will return to such questions after dealing with the Cypriot material, which has some lessons to teach us about variation in writing and the way we think about it.

## Writing in Late Bronze Age Cyprus

The earliest appearances of writing in Cyprus, dating from the Late Cypriot I period at the beginning of the Late Bronze Age, demonstrate that already at the outset of Cypriot literacy there was some awareness of the use of writing in administrative clay documentation in the Aegean and elsewhere: a flat, thick clay tablet (##001) and a clay label (##095), both from Enkomi, echo document types found inscribed in contemporary Linear A, while an early example of an inscribed cylinder seal (##225) shows writing appearing already on an object type inspired not by Aegean but by Near Eastern administrative practice<sup>7</sup>. Influence from both east and west is a characteristic feature of Cypriot literacy throughout the Late Bronze Age, but what is striking is that Cyprus did not borrow any system of administrative documentation wholesale. There is very little evidence that there ever existed, for example, any longstanding tradition of writing on clay tablets. Not only have very few clay tablets survived from Late Bronze Age Cyprus, but furthermore the few extant examples are quite different in type: the early tablet mentioned above and two recently discovered later examples from Pyla-Kokkinokremos are of a flatter type reminiscent of the Aegean, while three tablets from Enkomi (##207-9) are closer in type to «cushion»-shaped tablets used for cuneiform in Near Eastern administrations<sup>8</sup>. The small number of surviving tablets and the variety of their size, shape and method of incision points towards a significant difference in literate administration from those characteristic of both the Aegean and the Near East<sup>9</sup>. In Cyprus there may have been some degree of experimentation with clay documentation as a means of bureaucratic regulation or recording, at different times in different places, but what we do *not* have evidence for is any kind of centralised administrative control operated through and with clay documents as could be found in different societies both east and west of the island.

This is not to say that Cypriots were not keen to borrow trends that belonged broadly to an administrative sphere in other areas of the Mediterranean. Cylinder seals (sometimes bearing inscriptions, but much more often not) are a prime example of an object type that became suddenly very popular in Cyprus around the time when writing first appeared, i.e. from the end of Middle Cypriot III onwards. They were borrowed from the Near East, where impressions of cylinder seals played an important role in marking identity, authenticating transactions and overseeing economic activities (sometimes quite literally borrowed, as there are numerous examples of re-cut imported seals as well as local Cypriot creations). However, what Cypriots did not borrow was the context of the use of

<sup>7</sup> Steele forthcoming 2: ch. 1. Note that Cypro-Minoan inscriptions are referred to by the numeration found in Olivier 2007, Ferrara 2012/2013 and subsequent publications (prefixed with ##).

<sup>8</sup> Four Cypro-Minoan inscribed tablets (##212-215) found amongst an archive of otherwise cuneiform material at Ugarit can be mentioned here, but must be considered as local creations fitting in with Ugaritan literate culture.

<sup>9</sup> See Ferrara 2012/2013 vol. 1: 211-213.

cylinder seals, and in fact we have almost no evidence at all that these objects were ever used to seal anything in Cyprus; in the absence of evidence for sealing practices, it seems much more likely that cylinder seals were appropriated by elites as a mark of status than that they served the sorts of functions attested in the Near East<sup>10</sup>. Even more striking is the appearance in Cypriot cylinder seals of iconography that borrows heavily from Aegean glyptic, again showing a blend of influences from east and west.

Conversely, the Cypriot documents that look most likely to be related to administration in some sense are ones that do not have close parallels in either the Aegean or the Near East, namely clay balls and clay cylinders. The clay balls are a document type almost unique to Cyprus and with over 80 surviving examples (##002-091, 244, 247) they account for about a third of surviving Late Bronze Age Cypriot epigraphy<sup>11</sup>. The six surviving clay cylinders (##097-102) have signs inscribed around the outside that are intended to be read on the cylinder itself – i.e. they are not to be confused with cylinder seals, which are made usually of stone with images and inscriptions that are intended, going by Near Eastern parallels at least, to be read in impression. While cylindrical and conical clay documents are well known in the Near East, they do not provide close parallels for these distinctive Cypriot objects that bear text directed along the length of the cylinder with a line to show where to begin reading (Fig. 1).



Fig. 1. Cypro-Minoan inscribed clay cylinder from Enkomi. Photograph courtesy of Silvia Ferrara

In what sense the clay balls and cylinders can be labelled as «administrative documents» nevertheless remains open to question, especially given that we do not understand their content<sup>12</sup>. The degree to which we can «read» Cypro-Minoan remains a subject of debate: although it is often labelled an «undeciphered script», there are at least 10 or 11 signs, and perhaps numerous others, where we can be reasonably confident of some approximation of their phonetic value, and in many ways it is the diversity and brevity of the surviving texts that is a greater obstacle to a better understanding of the script<sup>13</sup>. However, it is important here to consider the find contexts of such inscriptions, and the discovery of many of them in contexts associated with industry and in buildings

<sup>10</sup> See Smith 1994; Webb 2002.

<sup>11</sup> See Steele 2014; Ferrara 2015.

<sup>12</sup> Several hypotheses have been put forward concerning the function of the clay balls, which are generally thought to contain personal names and other sequences and abbreviations: see Masson 1971; Steele 2014; Ferrara 2015.

<sup>13</sup> See, for example, Steele 2013 and Valério 2016 for different takes on the degree to which we can reconstruct Cypro-Minoan sign values.



associated with social hierarchy (such as the «fortress building» at Enkomi) indicates at least that these objects existed within a situation of social or economic control, however small-scale or varied such control may have been in Cyprus compared with the more deeply centralised administrative and power structures of the contemporary Aegean and Near East.

We can move on now to consider the question at the crux of this paper, namely what literacy looked like when it appeared outside of an «administrative context». Some inscription types seem to sit somewhere between what we might think of as an administrative sphere of literacy on the one hand and a more private sphere of literacy on the other. Important here are the many inscriptions found on pottery vessels, some of which have been considered as inscriptions proper in scholarship (i.e. the ones consisting of more than one sign) while others have been consigned to the category of «potmarks» (i.e. the ones consisting of one sign alone). While such a division is not entirely without merit in terms of attempting to understand a writing system and what is written in it (because single-sign inscriptions are by nature too brief to give an indication of what is being represented or abbreviated), in terms of understanding the function and context of such inscriptions the division is entirely a false one. Signs and sequences marked on the handles of storage vessels, for example, sometimes on Cypriot wares and sometimes on imported wares, must undoubtedly be understood as part of a tradition of potmarking that relates to the movement and trading of the vessels. The wide variety of the marks, however, points away from any highly standardised or centralised control of the commodities being transported in the vessels; otherwise we should expect a much higher degree of repetition and systematisation in the attested signs and sequences than has been identified<sup>14</sup>. Another feature of these inscriptions, especially the single-sign ones, may be important here: namely the appearance of some marks that do not appear to be very close to known Cypro-Minoan signs. Whether this suggests limited literacy on the part of the people making the marks (i.e. imperfect knowledge of a system used more competently in other inscription types), or simply constitutes a different system (i.e. a type of writing that includes signs not present in the type of writing used in different inscription types), is difficult to assess, and similar problems are encountered when studying, for example, the inscriptions found on Inscribed Stirrup Jars originating from the Mycenaean world<sup>15</sup>.

Inscriptions on pottery for the most part can be considered to belong to contexts related to trade and the movement of goods, and aside from the marks on handles some inscriptions on the rims of pithoi (one of which, ##145, includes a numeral) and other vessels can also be included in this category. However, there are also inscriptions found on vessels such as kraters and bowls that are more likely to be associated with the consumption of food and drink, potentially in feasting contexts that could be linked with elite status display. The incised Cypro-Minoan signs found on the bases of three Mycenaean vessels from Tombs 4 and 5 at Kition (##132-134) are an example probably best understood in such a context, although the use of the same two signs in each case is mysterious. Another inscribed object type occupying a nebulous position somewhere between administrative and non-administrative is the miniature ingot: three examples are attested, all bearing very similar sign-sequences (an abbreviation consisting of two

<sup>14</sup> See Hirschfeld 1992 and 2002.

<sup>15</sup> See Judson 2013.

signs, on one occasion with a further sequence added), and their inscriptions are perhaps best understood within the broader context of trade in copper and bronze, potentially as «branding» of a characteristically Cypriot product<sup>16</sup>. Again, when a document contains what appear to be numerals (a rarity in Cypro-Minoan), should we consider it to belong to a tradition of centralised or bureaucratic accounting or to a broader mercantile sphere where there remains an important need to keep track of numbers and quantities of the commodities being moved and traded? A unique Cypriot ostrakon bearing some isolated signs (one hapax, the other attested elsewhere only once) followed by series of dots and lines that look like numerals is difficult to categorise in this regard (##093), but this is the inscription that has most often been cited as evidence for the existence of some sort of logographic system in Late Bronze Age Cyprus (and hence a centralised accounting system), akin to what is seen in the Aegean (on this concept, however, see further below)<sup>17</sup>.

Moving further away still from administration, the final group of inscriptions we can consider are found on items that are most frequently associated with status, elite display and ritual activity. These inscriptions tend to appear on objects made from valuable materials and are frequently placed in such a position as to add decorative value to the item inscribed. The two most clearly linked with wealth and status display are two gold rings found at Kalavassos, in an extremely rich tomb assemblage, bearing identical inscriptions on their bezels (Fig. 2).



Fig. 2. Cypro-Minoan inscribed gold rings from Kalavassos. Photograph courtesy of Silvia Ferrara

The only difference between the two rings comes in the presumably exclusively decorative symbols appearing below the line in each one, where the symbol on the left is the same but the one on the right is different. As small, portable items linked with elite display, these recall also the cylinder seals, which can vary in decoration and material but at their most elaborate can be made of semi-precious stones such as lapis lazuli or amethyst and bear intricate designs that sometimes include writing (22 examples)<sup>18</sup>. Several examples of otherwise plain metal bowls have been discovered with inscriptions in a prominent position around the rim; usually they are made of bronze but one example of a silver bowl from Enkomi (##182) shows that precious metals could sometimes be used (Fig. 3).

Again these are thought to be high status objects that belong to a sphere of private consumption by elites, and, as often suggested for the gold rings, their inscriptions are assumed to contain the name of the bowl's owner<sup>19</sup>. These types of inscribed objects

<sup>16</sup> Bell and Ferrara 2016.

<sup>17</sup> See Palaima 1989: 43-44; Ferrara 2012/2013 vol. 1: 75-77.

<sup>18</sup> For cylinder seals the classification of Porada 1948, despite criticism of some details and associations, is still largely followed.

<sup>19</sup> See Buchholz and Matthäus 2003 and Steele forthcoming 2: ch. 2.

suggest that writing was a visible status symbol appropriated by elites and incorporated ostentatiously into the decoration of luxury items.



Fig. 3. Cypro-Minoan inscribed silver bowl from Enkomi. Photograph courtesy of Silvia Ferrara

Writing was also sometimes present in the religious sphere. In fact, some otherwise administrative-looking items such as clay balls have been found within religious spaces, although it is difficult to determine whether this means that they had some religious function, or whether they were simply carried by individuals in religious contexts as well as non-religious ones. Some ivory objects with inscriptions originate from a ritual context at Kition: a pipe (##161), a rod (##162; similar to the pipe but not hollowed out) and an elaborate plaque depicting the Egyptian god Bes (##163), all found within the same building. Also associated with religious practice is an inscribed bull figurine found at Psilatos (##103). Where the ivory objects from Kition show writing incorporated into decorative ritual objects made of expensive materials, however, the bull figurine is quite different, a common object made of clay (bulls being the most commonly depicted animal in coroplastic art at this stage), but one that happens to have had an inscription added to its side as well as a set of crossed lines engraved into its forehead (Fig. 4).



Fig. 4. Cypro-Minoan inscribed bull figurine from Psilatos. Photograph courtesy of Silvia Ferrara

Writing could appear in a range of different contexts, then, on different objects with different associations. Modern attempts to label the inscriptions as «administrative», «non-administrative», «religious» or «private» is potentially somewhat misguided given that it is difficult to reconstruct whether such categories would have had any intrinsic

meaning for Late Bronze Age Cypriots themselves. What is significant, however, is that there are no obvious restrictions on what writing could be and was used for, including everything from clay documents of different shapes and sizes, whether inspired from east or west or of innovative Cypriot design, through mundane-looking marks on pottery vessels, to decorative-looking sequences on luxury and ritual items. This is at first glance a situation comparable with the range of inscribed objects in Linear A, but there are also some differences. Before turning to Linear A, however, a brief excursus on Cypro-Minoan scholarship will be instructive in considering not only what range of evidence we find for Late Bronze Age literacy, but also how we think about and categorise it.

### Attempts to analyse and categorise Cypro-Minoan

The c. 250 surviving attestations of writing from Late Bronze Age Cyprus show a considerable degree of variation in date, geographical origin, object type, material, method of inscription and length of text<sup>20</sup>. Only a handful consist of 20 or more signs (e.g. the surviving tablets and cylinders) while most are considerably shorter than even this. Faced with such a disparity of material on which to draw conclusions about the size and composition of the syllabic signary in which the texts are written, scholars of Cypro-Minoan have faced serious difficulties when attempting to draw up a list of the script's signs. More significantly for our present purposes, scholars have reacted to these difficulties in different ways, and have taken different approaches to the problem of understanding the underlying systemic features of Cypro-Minoan writing.

Already in the first half of the 20th century, John Daniel made the important point that the shapes of signs are affected by the medium on which they are written, which means that study of palaeographic variation is key to understanding the structure of Cypro-Minoan writing<sup>21</sup>. The challenge of drawing up a Cypro-Minoan signary was taken up by subsequent scholars, most notably Émilie Masson, who published new inscriptions, discussed further epigraphic and palaeographic factors and drew up sign tables in a number of successive publications<sup>22</sup>. Masson's work provided a solid foundation for more recent studies, but also introduced some elements to research on Cypro-Minoan that have remained controversial up to this day, most notably the separation of the Cypro-Minoan inscriptions into four different groups, each hypothesised to represent a separate script with a different repertoire of signs. She labelled them CM1 (i.e. all inscriptions that do not fall into the other groups), CM2 (a small group of long inscribed tablets from Enkomi), CM3 (all the Cypro-Minoan epigraphic material from Ugarit and its environs) and «Archaic» (four inscriptions that she assumed to be relatively early and to show an earlier form of script). In some ways this can be seen as a reversal of Daniel's methodology: instead of using variation in medium, document type and chronological/geographical distribution to understand variation in sign shape within a single body of texts, Masson used such variations to divide up the whole corpus into smaller sub-corpora looking for internal consistency within the smaller groups.

<sup>20</sup> See Steele 2012.

<sup>21</sup> Daniel 1941.

<sup>22</sup> E.g. Masson 1971, 1972, 1974, 1985. Other works tackling similar problems include Nahm 1981 and Hiller 1985.

More recently, scholarship on Cypro-Minoan has aimed to reassess Masson's categorisations and incorporate a better appreciation of the degree of palaeographic variation that can exist within a single writing system<sup>23</sup>. In other words, can we retreat from the view of Cypro-Minoan as a multiplicity of scripts and reassess it as a single script with a high degree of internal variation? To a certain extent this is possible, although there remain some open questions that have allowed Masson's categories to retain some currency even in the latest scholarship. For example, a study of the numbers/shapes of the signs attested in the long «CM2» clay tablets from Enkomi (##207-9) reveals some discrepancies that seem to relate to the composition of the signary and cannot easily be ascribed to palaeographic differences alone<sup>24</sup>. For the very short inscriptions, meanwhile, especially ones that display unusual features, it can be difficult to reconcile all attested sign shapes with signs otherwise well known to be part of the Cypro-Minoan signary. In short, while a considerable number of well-attested signs (more than 50) can be attributed to the Cypro-Minoan signary with certainty, there are numerous *hapax* or sparsely attested signs or sign variants whose position with relation to the rest of the signary remains difficult to establish. Following on from this observation, it is even more difficult to be certain whether the size and composition of the signary used could vary in different types of inscription: were all authors of Cypro-Minoan inscriptions working from a basic signary of the same number and shapes and values of signs?

The last question posed above is a hypothetical one that is impossible to answer, but if we ask it from a different point of view we might be able to make better progress: how standardised was Cypro-Minoan writing? To put it another way, can we reconstruct any kind of stimuli that might cause writing to become more standardised over time, for example centralised political pressure, regulated scribal training or restricted contexts of literacy? The high degree of variation in inscribed object types illustrated in the previous section would militate against such suggestions, and even in the sphere of clay documentation that can most plausibly be linked to administration there is considerable disparity. The clay balls are the only document type that can be observed to consist of relatively large numbers of inscriptions manufactured in the same way and inscribed in a very similar ductus. These texts may indeed have made use of a writing system that was to some degree standardised for use in a particular context. Similarly, the three «CM2» clay tablets are very similar to each other not only in object type but also in method of inscription and in internal palaeographic features, again suggesting some degree of standardisation. Overall, however, the c. 250 surviving Cypro-Minoan texts show such great diversity that we should not be surprised to find that the heterogeneous contexts in which writing was being used corresponded to a high degree of variation in writing itself, whether of the palaeographic or, perhaps in certain circumstances, the systemic kind. Or, to put it another way, the persistent view that Cypro-Minoan constitutes more than one different script is no more than an uncompromising modern reflection of the lack of evidence for any single longlasting tradition of writing in Late Bronze Age Cyprus.

<sup>23</sup> Eg. Ferrara 2012/2013 vol. I, 2013; Steele 2013: 22-35; Valério 2016.

<sup>24</sup> Admitted, for example, even in the most comprehensive recent re-evaluation of Cypro-Minoan palaeographic variation, Valério 2016: 444.

## Writing in Linear A

Returning to the Aegean, what I want to pose is the possibility that Cyprus might be able to help us think about literacy in Linear A. In contrast with the striking homogeneity of later Linear B, Linear A is marked by a considerable degree of heterogeneity. While later Linear B is practically unknown outside of the sphere of administrative clay documentation<sup>25</sup>, Linear A inscriptions are found not only on clay documents but also on a variety of other objects, reminiscent to some degree of the diversity witnessed in Cypro-Minoan. There are, however, some differences between Linear A and Cypro-Minoan in terms of the evidence for administrative uses of each script: where Cypro-Minoan, as we have seen, shows very little evidence for long-term archival practice and what survives shows a considerable degree of variation, Linear A, on the other hand, is found on large numbers of clay tablets, nodules, roundels and other clay document types. In fact the administrative documents in Linear A far outnumber texts of any other kind, and they often come from clear archival contexts related to regional administrative complexes (most notably the archives from Haghia Triada, Khandia and Zakros, but with smaller numbers found at other sites across Crete and even in the islands<sup>26</sup>). There is greater potential here to consider the differences between administrative and non-administrative uses of writing.

With a smaller number of documents and a language that we do not understand, Linear A administrative documentation is not as well understood as that written in Linear B, which has far more documents (c. 6.000 Linear B compared with c. 1.500 Linear A) and is written in Greek, allowing detailed appreciation of the content and context of administrative writing. Nevertheless, there can be no doubt that Linear A clay tablets and other document types such as roundels and nodules of various kinds existed within a sort of scribal system and were being employed for the purpose of controlling commodities and personnel and recording information about them<sup>27</sup>. A word of caution is, however, necessary because to some extent our notions of «administrative», «private», «ritual», etc. may impose anachronistic distinctions that would have had little meaning for the people writing Linear A inscriptions. As John Bennet has pointed out, inscriptions that we consider to be non-administrative were often «bound up with practices of the elite, who may well have seen no distinction between recording on clay and inscribing on metal or stone»<sup>28</sup>. A case in point is the discovery of Linear A sealings (i.e. impressions from seals that bore Linear A inscriptions) and even a clay tablet in the Temple Repositories at Knossos, pre-burnt and placed in a ritual deposit alongside other ritual objects including elaborately painted shells and a Snake Goddess figurine<sup>29</sup>. What perfectly administrative-looking writing might be doing, or why it might be desirable, within such a context is mysterious and may lead us to challenge some of our preconceptions.

<sup>25</sup> Aside from the Inscribed Stirrup Jars, which are also plausibly interpreted as administrative texts, there is almost no trace of Linear B used for any other purposes than clay documentation: a lentoid seal found at Medeon and a stone weight from Dimini stand out as the only exceptions.

<sup>26</sup> On the inscriptions from the islands, see Karnava 2008.

<sup>27</sup> See e.g. Schoep 2002; Driessen and Schoep 1995.

<sup>28</sup> Bennet 2008: 9.

<sup>29</sup> See Hatzaki 2009: 20-28; Finlayson 2014: 165-166.

With the above caveat in mind, we can move on to consider what sorts of inscriptions existed outside of the administrative sphere as we understand it, i.e. ones that are not on clay tablets, nodules, sealings or roundels. These have in scholarship been classed as belonging to the Z-series of documents, with further subsets for stone vessels (Za), clay vessels (Zb if incised, Zc if painted), architectural supports (Zd for plaster, Ze for stone), metal objects (Zf: axes, pins and a gold ring) and various other items (Zg: various items made of stone or clay, including figurines)<sup>30</sup>. Again some caution is necessary because we may not always be dealing with texts that are completely removed from the administrative sphere, as we will see below. Conceivably, inscriptions of these types could differ from the clay documents in a number of different ways, including systemic differences (e.g. written using a different basic repertoire of signs), palaeographic differences, differences in direction of writing and differences in geographical or chronological distribution. These four types of potential variation will be considered briefly in turn; an extended analysis of the features discussed here in a preliminary way is in progress but is beyond the scope of the current paper.

### *Systemic differences?*

An assessment of all the signs attested in administrative and non-administrative inscriptions is beyond the scope of this paper, and so we will focus here on one of the more obvious systemic differences, namely the use or non-use of logograms. Logograms do appear in the Z-series texts, but they are rare and confined to particular types of object, for example clay storage vessels such as the large vase and pithos from Knossos that feature logographic signs and numerals (KN Zb <27> and KN Zb 35). The only exception is the intriguing appearance of two signs that elsewhere function as logograms at the end of syllabic sequences in one of the libation vessels, in conjunction with some words that commonly appear in the libation formula (SY Za 2: Fig. 5). The practice of ligaturing signs, commonly used with logograms or to create a sign with a logographic function<sup>31</sup>, is attested in another pithos from Knossos (KN Zb 34) and a jar from Kea (KE Zb 5). Numerals, which are frequently found alongside logograms in other texts such as clay tablets, are also rare in the Z-series but appear in the vessels mentioned above as well as one of the inscriptions on plaster from Haghia Triada (HT Zd 156).

The non-appearance of logograms in the majority of Z-series texts could perhaps suggest that they were written by authors who did not have, or at least did not need to have, knowledge of the logograms as used in administrative texts. In other words, the inventory of syllabic signs used to spell out words in Linear A could potentially have functioned independently of the system of logograms used to represent concepts and commodities. However, to speak of a logographic system in Linear A analogous to that found in Linear B could itself be an anachronism. Linear A lacks the advanced «neat» layouts and formulations that were characteristic of later Linear B, with clear places for logograms that often kept them quite visibly distinct from sequences of syllabic signs.

<sup>30</sup> As classified in *GORILA*.

<sup>31</sup> Presumably representing the word for the commodity, as with the MA+RU ligatured sign continued in Linear B as the logogram for «wool», linked with the word *mallos* attested in Hesiod (*Works and Days* 234) and *mallukes* in Hesychius where it is glossed as *triches*.

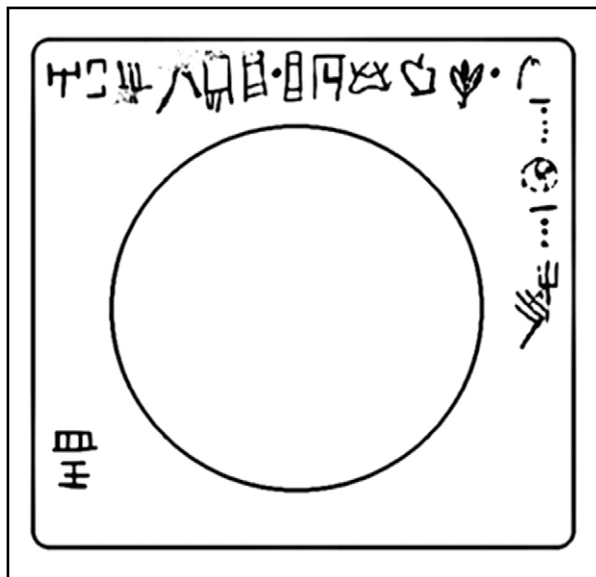


Fig. 5. Linear A inscription on a libation vessel from Kato Symi, SY Za 2. Drawn by the author after GORILA vol. 5: 64

More importantly, there is considerable diversity in the repertory of logograms used at different sites where Linear A was used, and this must point towards regional creativity in logography, and away from any widely employed single system; moreover, the lack of a clear logographic system could perhaps suggest a more *ad hoc* practice of abbreviations, as opposed to signs that were always dedicated to logographic representation<sup>32</sup>. The fact that some logograms used in Linear B can be shown to originate from abbreviations of Minoan words for the commodities represented, via the acrophonic principle (e.g. *NI* for «figs» related to the word *nikuleon*, which Hermonax glossed as a Cretan word for the fig<sup>33</sup>), could be seen as support for such a suggestion. It is furthermore probably significant that many signs used logographically in Linear A are also ones that can function as syllabograms and are attested within syllabic sequences.

It has been suggested that one of the reasons why Cypro-Minoan did not inherit the Aegean logographic system is that Cypriots never encountered it, i.e. that they encountered Linear A being used outside of any centralised administrative context where logograms strictly belong. This could support the suggestion that logograms were a separable element that did not need to be learned alongside the syllabic signs of Linear A. However, if Linear A had not developed a functioning logographic system by the time Cypriots borrowed and adapted it (not later than the 16th century BCE when Cypro-Minoan is first attested in the Late Cypriot IA-B period), then we need to interpret the transition in a different way. In fact, conversely, it could be possible that Cypriots did borrow the concept of abbreviating words by their first syllable, which could underlie the frequent use of single signs divided from longer sequences in a considerable number of Cypro-Minoan texts (most frequent in the clay balls but found in other inscription types as well), and also of a considerable number of inscriptions consisting of two single signs

<sup>32</sup> I am indebted to Ester Salgarella for these observations, based on discussion of her ongoing doctoral research.

<sup>33</sup> Neumann 1962.



divided from each other (a practice that continued into Cypriot Syllabic usage in the 1st millennium BCE). On the other hand, such a use of abbreviations in Cypro-Minoan could potentially have developed independently and it is striking that in Cyprus this never developed into a logographic system and remained by all appearances, and considering the high degree of variation in signs appearing as single signs (in such cases always signs that are otherwise known as syllabograms), an *ad hoc* referential tool.

Interpreting the practice of logography or abbreviation in one way or another therefore makes a considerable difference to the way we think about systemic features of Linear A and potentially obscures the central question asked here, namely whether there was a systemic difference between Linear A as used in administrative documents and Linear A as used in non-administrative texts. However, whether «logograms» in Linear A belonged to a developed system or not, it remains the case that they are almost entirely absent from inscriptions on items other than clay documents associated closely with administration, and most of the few logograms that appear in the Z-series can plausibly be connected with a broader administrative context.

### *Palaeographic differences?*

Palaeographic differences should be expected when writing appears on different materials and media, which is precisely the case outside of the administrative sphere of clay documentation. However, not all palaeographic differences are an effect of the medium written on or the tool used for writing, some rather being deliberate choices to, for example, simplify or elaborate signs (i.e. for motivations other than ease of execution, such as aesthetic features). In the Linear A Z-series, it is striking that we find some relatively elaborate sign forms, especially in the stone libation vessels, apparently a reversal of the tendency witnessed in the clay tablets to simplify signs to basic linear shapes in many cases. Two signs are chosen here as brief case studies to demonstrate the range of palaeographic variation, both deliberately chosen as ones that have available elaborate alternatives based on their real-world referents: sign 08 (*a*, the double axe) and sign 80 (*ma*, the cat's head).

Sign 08 is usually formed with a vertical and one or two crossing horizontal lines, the latter terminating in vertical strokes at each side, which is the typical form used in clay documents but also appears in many Z-series texts. A few of the libation vessels, however, feature a variant of sign 08 that depicts the full bowed form of the double axe (see Fig. 6): KO Za 1 from Kophinas and IO Za 2, IO Za 3 and IO Za 7 from Mount Iuktas. The only other similar object from Mount Iuktas to feature sign 08, however, uses the ordinary abstract linear version. Perhaps significantly, this elaborate variant is also identical to the most common form of sign 042 of the Cretan Hieroglyphic script, which was in use contemporaneously with Linear A. In Linear A clay documentation, only the occasional example of the elaborate axe form of sign 08 is found, for example in nodule HT Wa 1148 (and probably also HT Wa 1149) from Haghia Triada.

In the clay documents, the most common form of sign 80 involves a rounded or triangular centre with short single or double lines (the «ears») protruding upwards, although elaborated versions can also often be found, for example with a rounded «face» or added «eyes» (an extreme example is found in PH 7, side a). It is likely that, unlike the completely abstracted version of the same sign witnessed in Linear B (*ma*), in Linear A the sign was still associated with its real world referent, the cat's head, hence the sporadic

optional addition of facial features such as eyes and occasionally a mouth or nose. In the Z-series texts, where this sign appears it is very often of the more elaborate type (see Fig. 7): for example, it is found among the stone libation vessels (e.g. the rounded versions with eyes and looped ears in KO Za 1 and IO Za 2, and the triangular version with eyes and pointed ears in VRY Za 1), on a bronze bowl (KO Zf 2) and on gold and silver axes from Arkalokhori (AR Zf 1 and 2). The high level of variation in the shape of this sign may again be indicative that authors were sometimes aiming to replicate features of the sign's real world referent. A comparison with the cat's head sign of Cretan Hieroglyphic may again be instructive, although no Linear A variant of sign 80 approaches the high degree of elaboration found in the few examples of the Cretan Hieroglyphic sign.



Fig 6. Variants of sign AB 08 *a*. From left to right: IO Za 10 (Z-series variant closest to sign 08 found in tablets, etc), IO Za 2, IO Za 3, KO Za 1, HT Wa 1148. Drawn by P.M. Steele after the drawings in GORILA

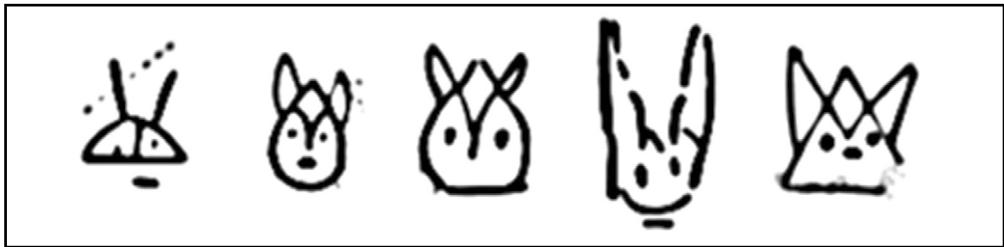


Fig 7. Variants of sign AB 80 *ma*. From left to right: PH Zb 4 (a relatively simplified version), IO Za 2, AR Zf 1, SK Zb 1, VRY Za 1. Drawn by P.M. Steele after the drawings in GORILA

The use of more elaborate signs may reflect the added decorative value of script signs on objects that were intended to impress visually. This can also be inferred from the incorporation of writing into particularly decorative sequences on items such as the fragment of female figurine PO Zg 1, painted around the skirt, or the extravagant sign forms spaced evenly around the luminous orange alabaster bowl IO Za 6, or the similarly elaborate sign forms drawn in individual facets around the dark green serpentine basin IO Za 2. In some of these inscriptions, the high degree of elaboration evidently goes hand-in-hand with the skilfully executed decoration of the item, and raises the question of whether these originate from skilled literate craftsmen. The further issue of competence in writing can also be raised here, as it has been for example with regard to the Linear B Inscribed Stirrup Jars, where some inscriptions show evident mistakes<sup>34</sup>, while others are more competently executed. Craftsmen could conceivably have been working from a drawing of the signs, or the inscription could have been added by another individual, making it difficult to assess the extent of literacy: would the ability to write have been considered a specialist skill, or not? The occasional appearance of signs that look close

<sup>34</sup> See e.g. Judson 2013: 78.

to ones commonly found in Cretan Hieroglyphic adds another intriguing element, since literacy does not necessarily have to have been confined to one of these scripts alone.

#### *Differences in direction of writing?*

It is commonly claimed of Linear A that administrative inscriptions are always dextroverse (i.e. reading from left to right), while outside of the administrative sphere writing can vary in direction, with examples of sinistroverse (i.e. right to left) and boustrophedon (i.e. alternating direction in different lines) inscriptions attested. One of the earliest inscriptions in Cypro-Minoan is almost certainly written in boustrophedon, a feature that has been suggested to be inherited from Linear A<sup>35</sup>. However, it must be emphasised that direction of writing other than dextroverse is incredibly rare in Linear A: just one example of sinistroverse (on the silver pin PL Zf 1) and one of boustrophedon (on the stone vessel KN Za 19); see Fig. 8. In both cases, asymmetrical signs are reversed to follow the direction of writing.

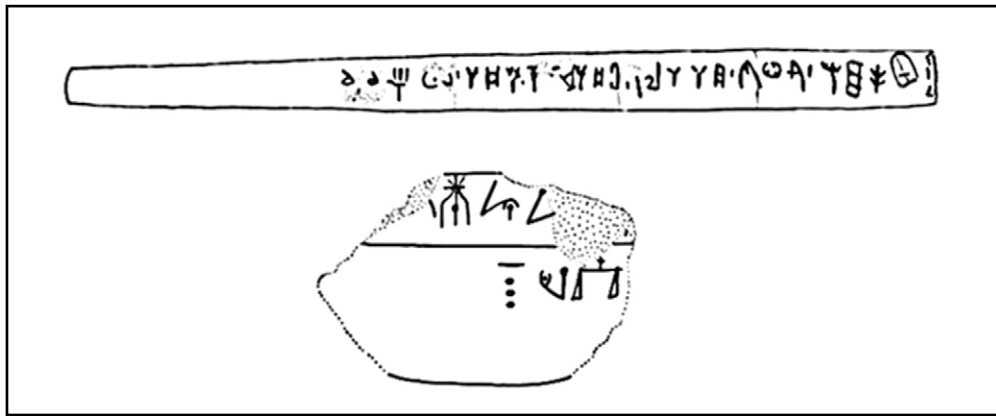


Fig. 8. Top: sinistroverse inscription PL Zf 1. Bottom: boustrophedon inscription KNZa 19. After the drawings in GORILA

It is perhaps dangerous to extrapolate from the paucity of the evidence, but what survives of Linear A does *not* suggest that variation in direction of writing was a common feature of non-administrative inscriptions. We could be dealing with limited experiments here, rather than a situation in which direction of writing was always optional, or in which sinistroverse and boustrophedon directions were always thought of as available alternatives. Given that the two objects in question here are both fragmentary (with only part of the pin's shaft surviving and only a very small fragment of the stone vessel), it is impossible to reconstruct potential design features of the objects that could have made an unusual direction of writing desirable.

#### *Significant geographical or chronological distribution?*

It is a significant feature of the geographical distribution of the Z-series texts that there are several sites where such inscriptions are the only sort attested (i.e. they do not co-occur with clay documents such as tablets, nodules, sealings, etc): Apodoulou (stone vessels), Arkalokhori (gold and silver axes), Mount Iuktas (stone vessels and a fragment of stone «altar»), Kardamoutsa (bronze axe), Kato Symi (stone vessels), Kophinas (a

<sup>35</sup> Janko 1987.

stone vessel and a bronze bowl), Larani (pithos fragment), Platanos (silver pin), Prassa (stone vessel), Psykhro (stone vessel), Sitia (rounded stone), Skhinia (pithos fragment), Traostalos (pottery fragment), Troullos (stone vessel) and Vrysinas (stone vessel). Outside of Crete we can also include Haghios Stephanos in mainland Greece (a plaque) as well as Kythera (a stone weight) and Thera (ceramic vessels including jugs and a pithos). While a few sites have produced clay documentation alone, there are some that are home to both clay documentation and Z-series texts, including Knossos, Mallia, Palaikastro, Phaistos and Tylissos, and outside of Crete, Kea and Melos.

The fact that writing could appear outside of palatial/administrative centres, and that when it appeared in such places it was on different types of object (i.e. not on clay documents), is in itself significant. This could strengthen the suggestion that there was a more widespread, «non-scribal» sphere of literacy, which underpins the issues explored in a preliminary way in this section. Out of the fifteen sites where Z-series texts alone have been found, nearly half (seven) have produced stone vessels, and elements of the «libation formula» typically appearing in these objects are found at all these sites (e.g. words such as *a-ta-i-301-wa-*, *(j)a-di-ki-t-*, *(j)a-sa-sa-ra-m-*, *u-na-ka-na-*, *i-pi-na-m-* and *si-ru-te*). So these particular inscriptions are appearing outside of centralised administrative contexts, and predominantly at sites associated with ritual activity, but they give evidence of not only common ritual practice but also common practice in writing in relation to such activity. While the palaeographic features and degree of incorporation of writing into decoration can vary in these texts, there is a clearly developed trend in inscription type and inscription content in these cases. This may lead us to reconsider the issue of scribal and non-scribal writing in such a context: who are the authors of these texts, and what is the motivation for this degree of unity? Other inscriptions found at isolated sites, however, seem to belong to far less unified traditions of writing, for instance the rare examples of writing on pins/jewellery and axes in previous metals and on clay figurines.

A final observation can be made concerning the chronological distribution of the Z-series texts, although it is important to state at the outset that around half of these inscriptions are of unknown date, and so cannot help us with a chronological reconstruction. The undated texts include a number of the stone vessels (e.g. some from Mount Iuktas, Knossos, Kophinas, Palaikastro, Psykhro and Vrysinas), although where stone vessels can be dated (e.g. some at Apodoulos, Mount Iuktas, Prassa, Symi and Troullos) they typically belong to Middle Minoan III – Late Minoan 1A. In fact, of the Z-series inscriptions a date in such a range is typical for most items, including also a ceramic lamp from Kea, inscribed ceramic vessels from Knossos (including the two painted cup inscriptions), the clay weight from Kythera, a pottery fragment from Mallia, a painted cup fragment from Palaikastro, ceramic vessels from Thera and the pithos and figurine from Tylissos<sup>36</sup>.

What are missing from the Z-series texts in general are ones dated to Late Minoan IB. There are a few: the inscriptions on plaster found at Haghia Triada (HT Zd 155-7), a cup (KE Zb 3) and jar fragment (KE Zb 5) from Kea and a pithos and pithos fragment from Zakros (ZA Zb 3, 34)<sup>37</sup>. There are good reasons, however, for considering these seven

<sup>36</sup> The inscribed ceramic fragments from Phaistos (PH Zb 4, 5 and 48) are dated less exactly but may also fit this pattern, though the last of the three could potentially be earlier than MM II.

<sup>37</sup> Also worth mentioning is a pithoid jar from Knossos (KN Zb 40) whose dating is uncertain but could potentially be

inscriptions as ones not wholly removed from the administrative sphere. At least one of the plaster inscriptions from Haghia Triada includes numerals, suggesting at least a function that involves accounting for quantities, while the cup from Kea bears a single sign (potentially therefore used as an abbreviation or logogram) and the jar fragment a single ligatured sign that is particularly reminiscent of logography as found in administrative clay documents. Pithoi like the ones from Zakros, meanwhile, are vessels that we have already seen can use logograms and numerals (as is the case for ZA Zb 3), and can plausibly be understood as relating to the control of goods moved in such containers. A date of Late Minoan IB also puts these texts close to the many administrative documents from sites such as Haghia Triada, Khania and Zakros, which belong to destructions at the end of this period<sup>38</sup>.

Of the Z-series inscriptions of other kinds, there is almost none that can be dated with certainty to a period as late as Late Minoan IB. The main exception here is the fragment of clay figurine from Poros (PO Zg 1), which should date stylistically to Late Minoan IIIA1, making it relatively very late<sup>39</sup>. However, this is a unique and isolated example, and we may furthermore note that the cursive ductus of the inscription's signs in some cases make them difficult to reconcile comfortably with known script signs (of either Linear A or Linear B). Two signs incised on the wall of the Kephala tholos tomb with a probable date of Late Minoan II present a similar problem (KN Ze 16)<sup>40</sup>: this is a late, isolated inscription, whose signs could as well be Linear B as Linear A. Very tentatively, we could suggest that the distribution of Z-series inscriptions, especially the majority that do not appear to be closely related to administration and date earlier than Late Minoan IB, could point towards wider literacy being a feature of the earlier period, followed by some degree of restriction of literacy already around the Late Minoan IB-II period; in turn this could have fostered the almost complete limitation of literacy to the administrative sphere witnessed in Mycenaean Linear B.

## Final thoughts

The survey of some Linear A material presented here is only a brief foray into the sorts of potential differences between scribal and non-scribal writing that may have existed in the Minoan world, and I will emphasise here that the intention of this paper is to offer some hypothetical thoughts rather than considered conclusions. We have seen some ways in which literacy in Bronze Age Cyprus is similar to, and some ways in which it differs from, literacy in the Aegean. The differences in terms of administrative documentation are perhaps the most telling, because while Cretan palaces had evidently developed regulated literate administrative systems (if not standardised to the degree that would be reached under Mycenaean administration), in Cyprus there is no evidence for such a phenomenon. It is at least possible that the existence, non-existence or scale of centralised administration may have an important correlation with types and extents of literacy: i.e. that the degree of regulation of literacy that may arise from centralised administration

as late as Late Minoan II: Popham, Pope and Raison 1976.

<sup>38</sup> See Schoep 1995.

<sup>39</sup> Dimopoulou, Olivier and Réthémiotakis 1993.

<sup>40</sup> Preston 2005.

may create a normalised or standardised version of a writing system with which we can compare writing in non-administrative contexts. The precise lack of any such longstanding administrative system is apparently characteristic of Late Bronze Age Cyprus, and with it the degree of variation seen in writing, which has typically been at the heart of its fragmentation into sub-categories in previous scholarship, should not be unexpected. In other words, decentralised contexts of literacy can equate to palaeographic and in some circumstances even systemic fluctuations in writing.

For Linear A we may be dealing with quite different circumstances from those of contemporary and later Cyprus. Despite some clear differences between administrative and non-administrative writing in Linear A, some of which are mentioned in the previous section, there has never been a temptation to break up Linear A into LA1, LA2, etc. I would not wish to imply that doing so would be a useful tool for understanding Linear A. On the contrary, I will finish by suggesting that we might take a prompt from more recent views in Cypro-Minoan scholarship, whereby there have been greater attempts to understand underlying variation in Cypro-Minoan writing as corresponding to not the existence of separate writing systems, but rather to fluctuations in the wider spectrum of Cypriot literacy. In this regard, there is a remaining open question concerning literacy in Bronze Age Crete, which there has not been space to address in this paper, namely: how do the co-existent Linear A and Cretan Hieroglyphic systems relate to each other? This is a question for another day, but instances of overlap and interrelation between the two suggest that it is a fruitful one to ask – and I hope that we may be better equipped to try to answer it in the light of some of the sorts of study proposed above.

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Near East and Egypt



# Making tokens talk

*Denise Schmandt-Besserat*

*Niloufar Moghimi*

**Abstract:** It is true that there is never just a single piece of information to be obtained from a given artifact<sup>1</sup>. A simple clay spindle whorl, for example, will tell about the wool or silk thread it produced, but also about the ceramic craft of its time: the quality of clay, the degree of firing, etc. It goes without saying that for semantic objects – objects carrying a meaning – the amount of information that can be retrieved multiplies exponentially.

For example, a cone shaped token, that bore the meaning «one peck of barley», communicates information on economy, administration, society, and cognition. In this paper we identify the information conveyed by a collection of tokens excavated at Tepe Zagheh, Iran.<sup>2</sup> We hope that the study will prove helpful to the archaeologists who have the chance of excavating tokens in their own sites.

## Tepe Zagheh

Tepe Zagheh, located in the Qazvin Plain of Central Plateau of Iran, exemplifies the important transition between the Neolithic and Chalcolithic Periods, ca. 5300-4400/4300 BCE<sup>3</sup>.

About 1000 square meters of the mound have been excavated by the University of Tehran in the course of some twenty seasons of excavations directed respectively by Ezzat O. Negahban<sup>4</sup>, S. Malek Shahmirzadi<sup>5</sup> and Mohammad Saleh Salehi<sup>6</sup>. Sixteen domestic compounds were exposed<sup>7</sup>, among which the so-called «Painted Building», a large decorated structure interpreted as a temple<sup>8</sup> or meeting hall<sup>9</sup> (Fig. 5).

<sup>1</sup> Devlin 1991: 16.

<sup>2</sup> Moghimi 2015.

<sup>3</sup> Fazeli Nashli *et alii* 2005: 73; Pollard *et alii* 2012: 120; Pollard *et alii* 2013: 45, table 9; Mollasalehi *et alii* 2006: 33-34.

<sup>4</sup> Negahban 1973: 15; Negahban 1977: 41-42.

<sup>5</sup> Malek Shahmirzadi 1977: 10-12.

<sup>6</sup> Salehi 1997: 250.

<sup>7</sup> Malek Shahmirzadi 1979: 183.

<sup>8</sup> Negahban 1979: 250.

<sup>9</sup> Talai 1999: 16.

## The Token collection

The collection of 238 tokens discussed in this paper were excavated in the seasons of 2011-12 under the leadership of Hassan Fazeli Nashli<sup>10</sup>. It was the topic of Niloufar Moghimi's Master Thesis at the Department of Archaeology of the University of Teheran<sup>11</sup>. We have not included the tokens recovered in previous campaigns, although some of them are illustrated in Figs 1, 2 and 3. The assemblage includes seven token types in fifteen subtypes as shown in Table 1.

Cones	94	Small isosceles: 49	Large isosceles: 5	Equilateral: 13	Truncated: 11	Round apex: 8	Long: 8
Spheres	84	Plain: 43	Half: 41				
Disks	31	Flat: 23	Lenticular: 8				
Tetrahedrons	2						
Ovoids	14						
Quadrangles	9	Flat: 1	Cubes: 8				
Hyperboloids	4						

Table 1. Tokens from Tepe Zagheh, Iran

None of the tokens from Zagheh were recovered *in situ*. As it is generally the case for accounting records of all periods, including the cuneiform economic tablets, the tokens were seemingly routinely discarded after the deals they featured were settled. 206 tokens, or the bulk of the collection, were recovered in a trash deposit (garbage) where they were mixed with ashes and burned mud-bricks.

Unfortunately, no organic material was present that could identify the season when they were discarded<sup>12</sup>. A far smaller number, 32 tokens, were recovered in a large excavated section (1050 m<sup>2</sup>) of a residential area, where they were not associated with any particular architectural features<sup>13</sup>.

## The Token system

Tokens used for counting goods appeared in the ancient Near East at the same time as agriculture ca. 7500 BCE<sup>14</sup>. The artifacts can be regarded as a hallmark of the Neolithic and Chalcolithic periods since there were no tokens during the preceding Paleolithic and Mesolithic periods and they disappeared during the following Bronze Age. The Paleolithic and Mesolithic nomadic bands had no use for counting since the hunters distributed their game according to a tradition that attributed each morsel to one particular kin. In the Bronze Age, tokens were replaced by writing – which itself evolved from tokens.

As decoded by the earliest written tablets of 3100 BCE, each token shape was the symbol for a particular commodity<sup>15</sup>. Isosceles cones, (Fig. 1) spheres (Fig. 2) and disks (Fig. 3) stood for various measures of cereals<sup>16</sup>.

<sup>10</sup> Moghimi and Fazeli 2015.

<sup>11</sup> Moghimi 2013.

<sup>12</sup> Wright, Miller, Reding 1980: 277.

<sup>13</sup> Malek Shahmirzadi 1977: 12.

<sup>14</sup> Schmandt-Besserat 2016: <http://sites.utexas.edu/dsb>.

<sup>15</sup> Schmandt-Besserat 1992: 137-142; 1996: 63-68.

<sup>16</sup> Schmandt-Besserat 1992: 150-151; 1996: 80-81.



Fig. 1. Cones from Tepe Zagheh. Courtesy the Archaeology Institute of Tehran University, Tehran



Fig. 2. Spheres from Tepe Zagheh. Courtesy Dr. H. Fazeli Nashli, Tehran University, Tehran

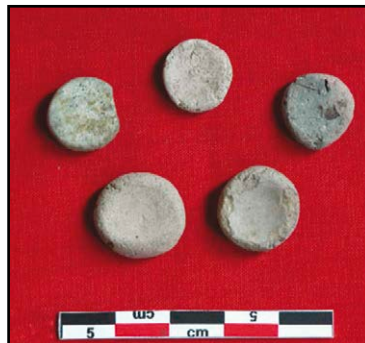


Fig. 3. Disks from Tepe Zagheh. Courtesy the Archaeology Institute of Tehran University, Tehran

A small cone and a small sphere were respectively equivalent to one peck and one bushel of cereals. A large cone, a large sphere and a flat disk stood for larger measures, perhaps corresponding to one bag (3 bushels), one cauldron (36 bushels) or one load (40 bushels). Ovoids represented jars of oil; each lenticular disk stood for «a flock» of domesticated small cattle (10?)<sup>17</sup>, while tetrahedrons were units of work. The remaining 2 types and 5 subtypes are still unidentified.

## Economy

Because they were not recovered in situ, the tokens of Tepe Zagheh do not represent meaningful accounts such as the product of a harvest or the amount of a contribution. Nevertheless, the collection makes it clear that a number of different goods were managed in substantial quantities at the site. The fact that 102 of the 238 tokens referred to grain shows that cereals constituted the most important resource of the community. The quantities of grain represented by the collection can tentatively be computed as follows<sup>18</sup>:

49 small isosceles cones	49 pecks
43 spheres	43 bushels

<sup>17</sup> Schmandt-Besserat 1992: 152; 1996: 82-83.

<sup>18</sup> Schmandt-Besserat 1992: 150-151; 1996: 80-81.

5 large cones	5 sacks (?) = 15 bushels of grain
23 flat disks	23 loads (?) = 184 bushels of grain

The cones, spheres and disks, which represented a range of units – from very small to very large or from a peck to a load – show that these tokens stood for an everyday commodity. It is therefore reasonable to assume that Tepe Zagheh's major crop was barley, the all-time common staple of the ancient Near East.

The 4 ovoid tokens, standing for jars of oil,<sup>19</sup> imply that sesame seeds, which produced oil, were another significant crop.

The 8 lenticular disks representing 8 «flocks» of domesticated sheep or goats (80?) show that the Tepe Zagheh economy also relied on livestock<sup>20</sup>. The fact that the animals were counted by ten suggests sizeable herds.

The 8 quadrangular tokens are particularly interesting because these shapes never appear in any other Neolithic or Chalcolithic token assemblages of Iran, and for that matter anywhere else in the ancient Near East. The quadrangles may therefore be expected to stand for products that were unique to the site.

Finally, the 2 tetrahedrons differed by not referring to foods, but to units of service or labor<sup>21</sup>. They suggest that individuals were compensated for public works such as, for instance, irrigation works.

It is likely that the still unidentified tokens stood for typical Neolithic crops of the region, such as wheat, emmer, lentils, chickpeas, horse beans, vetches, or flax.

In sum, the variety and percentage of tokens included in the collection disclose that Tepe Zagheh's economy was based on as many as 15 commodities, among which cereals, oil and livestock were the most important. Perhaps more significantly, the token collection highlights that the bulk of the goods counted consisted of non-perishable goods. This illustrates how the settled agricultural communities accumulated and stored food in order to survive during the lean season.

### The administration

The relatively numerous tokens indicating substantial quantities of non-perishable goods, and sizeable numbers of animals on the hoof, do not seem to correspond to the accounting of single households. The large amounts rather point to a larger operation. In particular, the many tokens representing big units of cereals suggest the presence of an organization in charge of accumulating, storing and managing communal goods.

The large volume of non-perishable goods represented by the cones, spheres and tokens tell how the early farmers banded together to face the rigors of the winter by accumulating food reserves. The management of agricultural crops meant long term planning from sowing to harvesting and redistribution. In order to evaluate amounts of goods, budget their use and control their movement at each step of the way, the budding communal administration needed new technologies for counting and measuring. By their mere presence, the tokens acknowledge the creation of a system of counters for counting

<sup>19</sup> Schmandt-Besserat 1992: 144, 194; 1996: 70, 120-121.

<sup>20</sup> Schmandt-Besserat 1992: 151-152; 1996: 181-183.

<sup>21</sup> Schmandt-Besserat 1992: 150; 1996: 79.

and accounting. By the symbolism attached to the shapes of the cones, spheres and disks, the tokens signal the existence of a metrological system covering a wide scale of units. It is interesting to note that the seals, which were so important in the following Bronze Age administration, were not yet part of the Tepe Zagheh accountants' tool kit.

Although archaic, the token system was able to carry out the multiple operations necessary for the management of a communal economy:

1. Establish the amounts of goods or labor each household was to contribute to the community.
2. Control the actual delivery of goods.
3. Supervise the protection of the reserves from weather, pests and thieves and, finally,
4. Oversee the redistribution. Without tokens such communal management could not have taken place.

The «Painted Building» may add more information on the emerging token administration. It certainly is not by chance that the plan of this remarkable structure at Tepe Zagheh was similar to that of the 4th millennium Near Eastern «temples»<sup>22</sup>. Like the Uruk temples, the Painted Building had a large central hall with a number of adjacent small rooms on each side<sup>23</sup> (Fig. 5).

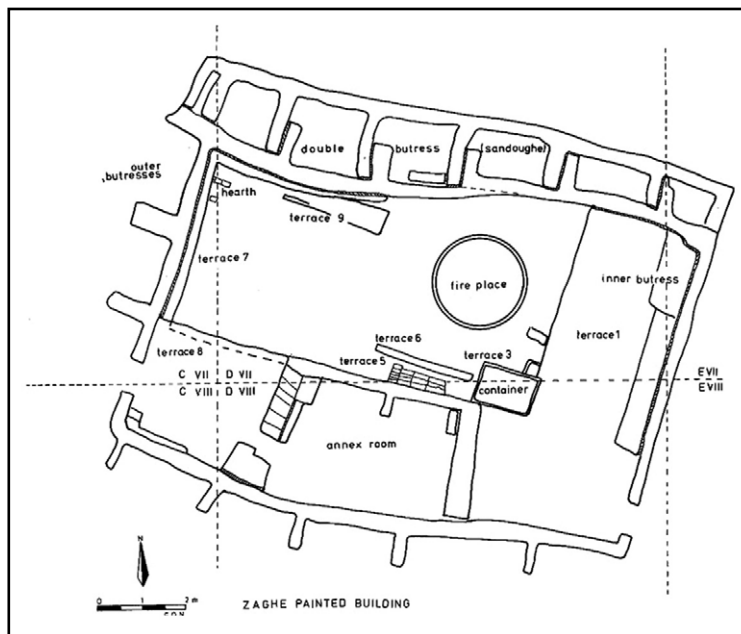


Fig. 5. The Painted Building of Tepe Zagheh. After E.O. Negahban, 1979. A Brief Report on the Painted Building of Zagheh (late 7th to early 6th millennium BCE), *Paléorient* 5: fig. 2

Like the Tell Uqair temple<sup>24</sup>, it was decorated with bold designs painted in red, white and black. In 3100 BCE, it was in such «temples» that the first scribes registered on tablets the in kind contributions delivered by citizens. It is likely that, 2000 years earlier, the Tepe Zagheh Painted Building fulfilled exactly the same function. Its central hall

<sup>22</sup> Negahban 1979..

<sup>23</sup> Nissen and Heine 2009: 24, fig. 15.

<sup>24</sup> Nunn 1988: fig. 52.

featured platforms upon which the farmers unloaded the heavy sacks of grain and the jars of oil levied for the community, which the administrators checked by matching them with tokens. Later, the dry goods were stored in the 6 small rooms situated to the north, where they were well protected from the sun. The sheep and goats were kept in the pen located on the east side. Finally, in the rooms oriented towards the south to be warm in winter, tokens were made, budgets were established and accounting took place.

The fact that Tepe Zagheh was not unique in using tokens, but that the same artifacts, used for the same function, were ubiquitous throughout the Neolithic Near East from Syria to Afghanistan, speaks for the emergence of a far reaching phenomenon of food administration in the 8th millennium BCE. The fact that tokens remained in use for 4000 continuous years until they were replaced, without hiatus, by writing in the city state administration, shows the direct link between the Neolithic and the Bronze Age administrations. Tokens, as well as the «temple» architecture, prove that, what is known as the «Near Eastern economy of redistribution» had its roots deep in prehistory. It is likely that, starting with the very beginning of agriculture, farmers organized themselves to contribute a given amount of their crops to be redistributed at a later date. The redistribution could either take the form of food rations in times of need, or of communal festivals deemed to propitiate the gods<sup>25</sup>.

## Society

Forensic science may one day say a great deal about the Neolithic administrators who left their finger prints on tokens while the clay was soft. For now we can say that counting being a new and difficult technique, only few individuals had the expertise to take on the responsibilities of managing the common goods and derive prestige and power from it. The tokens therefore speak of the rise of a new Neolithic elite of administrators based on mental capacities.

We may assume that the first public administrators were farmers, like everyone else in the community, since there were no visible status symbols in the village. For instance, three of the sixteen mud brick compounds show only minimal differences in size and decoration<sup>26</sup>. Likewise, none of the burials located below the house floors, displayed any particular sign of wealth<sup>27</sup>. There were also no seals to single out particular individuals or indicate a hierarchy. In fact, because counting was a novel technology, the new elite may not have been recruited among the elders, but rather among the most gifted sons of farmers. It is also not inconceivable that women could manage the village assets. After all, Nisaba, the patron of the Sumerian scribes, was deemed to have invented writing because she was in charge of the gods' granaries. The idea of female Neolithic/Chalcolithic managers may even be supported by the fact that eight burials, located close to and oriented towards the Painted Building, were those of women (Fig. 4)<sup>28</sup>. The female graves also stand out by yielding strands of agate and turquoise beads.

<sup>25</sup> Schmandt-Besserat 2001: 399-401.

<sup>26</sup> Malek Shahmirzadi 1979: 187-191.

<sup>27</sup> Malek Shahmirzadi 1990: 8-9; 1999: 334-335.

<sup>28</sup> Talai 1999: 16-17.





Fig. 4. Skeleton of one of the eight women buried in close proximity of the Painted Building. After H. Talai, 1999. Funeral Rites at Zagheh: a Neolithic Site in the Qazvin Plain, Iran, *Documenta Praehistorica* 26: fig. 5

The tokens show that, in prehistoric societies, leadership was acquired through socio-economic prowess. The Paleolithic chief was the capable hunter, who brought the most game to camp; the Neolithic leaders were the smart managers who drew power from controlling the communal resources. However, the Neolithic elite was in sharp contrast with the preceding Paleolithic leadership. The Paleolithic chiefs relied on their physical dexterity to catch their preys, whereas the Neolithic leaders depended on brain power to perform additions, subtractions, multiplications and divisions. Hunting demanded quick action, but management implied reflection and a long term vision. The hunter relied on his bow; the Neolithic manager on tokens. The hunters most desired quality was generosity; that of the Neolithic managers was fairness. They were expected to levy reasonable contributions and to redistribute the goods equally. Since neither the Paleolithic nor the Neolithic leadership claimed the right of using force against their peers, both had to rely on their charismatic personalities to achieve their goals.

As farming advanced and population multiplied, the economy of redistribution gained in volume and importance. The managers were confronted by ever increasing amounts of goods to manage, and compute. The challenges improved their cognitive skills and at the same time arithmetic and mathematics developed.

## Cognition

Counting with tokens was performed in the most basic and simplest way possible: in one-to-one correspondence. In other words, each unit of goods to be recorded was matched with a token: two jars of oil were shown by two ovoids and ten jars of oil by ten ovoid tokens. The archaic principle of one-to-one correspondence was inherited from as far back in the past as the Paleolithic period. However, whereas counting during the Paleolithic meant only matching a set of items with pebbles while just repeating «and one more», Tepe Zagheh had mastered cardinality.

Cardinality is the ability to assign number words – for us, for example, we count «one, two, three...» pointing to each item of a collection, with the final number word of the series representing the number of the set. Tokens such as the lenticular disk, which stood for «10 sheep», provide evidence that Tepe Zagheh had acquired the principle of

cardinality<sup>29</sup>. It was, of course, an extraordinary cognitive step since cardinality meant the beginning of arithmetic. Cardinality brought also a considerable economy of notation: 30 sheep were expressed by 3 tokens instead of 30.

On the other hand, the multiplicity of token shapes illustrates that Tepe Zagheh had no abstract numbers such as «one», «two», «three...» that could be used indifferently to count animals, jars of oil or measures of grain<sup>30</sup>. Instead, the fact that sheep were counted with disks, jars of oil with ovoids and small measures of grain with cones denotes concrete numbers – numbers applicable to a single category of goods. The tokens of multiple shapes, each used exclusively to count one product, mirror a time when, at Tepe Zagheh, sheep were counted with special number words, while jars of oil were counted with a different numeration. This archaic way of counting, prior to the acquisition of abstract numbers, is referred to as concrete counting.

Tokens provide a unique insight into the stage of cognition of the individuals who used them. They demonstrate that during the 8-5<sup>th</sup> millennium BCE, numbers were not conceived abstractly. The tokens thus corroborate Luria's, Mc Luhan's, Ong's and Goody's ideas who characterize the preliterate societies as shunning abstraction<sup>31</sup>. There was no such concept as oneness, twoness and threeness. Instead, plurality was still viewed as series of separate concrete sets. At the same time, the Neolithic tokens highlight the extraordinary contribution of the Bronze Age accountants who achieved to transcend the concrete world and work in abstraction.

## Conclusion

The collection of tokens of Zagheh has much to say to the attentive archaeologist. By the symbolism attached to their shapes, by their number and frequency, the 238 tokens of Tepe Zagheh disclose the types and quantities of foods generated and accumulated to survive over the winter months by a typical Iranian Neolithic/Chalcolithic village.

By their wide extension and by their endurance over 4000 years, the tokens acknowledge the emergence of an archaic but efficient administration responsible for managing stored foods in early agricultural communities throughout the Near East. More importantly, the tokens speak of the relation between the management of agricultural communal goods and the invention of counting and metrology. And as agriculture progressed and population expanded, the accumulation of unprecedented wealth challenged the human brain to compute larger and larger numbers and greater and greater quantities. It was the steady progress of these new mental processes that led to the development of arithmetic, writing and civilization.

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<sup>29</sup> Lakoff and Nunez 2000: 54-55.

<sup>30</sup> Schmandt-Besserat 1996: 114-116.

<sup>31</sup> Ong 1982: 31-56.

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# Seal impressions on jars: Images, storage and food

*Stefania Mazzoni*

**Abstract:** The paper focuses on the seal impressions on jars documented in the Levant and the Aegean in the Early Bronze Age. The problem of the function of the seals with their images will be re-appraised in the light of the mechanisms of social complexity which emerged across the area during this period. An important component in this process was represented by the growth of agricultural productivity thanks to the intensification of mixed farming (crops and livestock), and the spread and regional specialisation of grape and olive-growing. Food wealth was a major factor in the economic prosperity of the Early Bronze Age societies; inequalities in the distribution, scale and types of farming favoured mechanisms of reciprocal interaction and fluctuating exchanges. Zones of food-surplus capacity could emerge with their networks of accumulating centres and hinterlands of farmers and herders, but less favourable zones were also marked by flourishing subsistence economies. Alongside new and different instruments for regulating and controlling the movement of food (and also goods and raw materials), seals were adopted as an efficient system of communication of social activity.

Seals with their shapes, materials, usage practices and depicted motifs, constituted the markers of activities and roles performed by communities, groups of people, individuals, officials and traders.

As the clay sealings of Tell Sabi Abyad have documented for the Late Neolithic and Halaf phases (second half of the 7th millennium BCE)<sup>1</sup>, a system of impressing seals on lumps of clay was created to guarantee and regulate access to goods and food. Storage vessels containing provisions for communities were closed and stamped by seals attesting to the integrity and good state of preservation of the contents, as well as providing a system of controlling the accumulative and redistributive activities carried out by villages and, later, by centralized institutions. It is in the framework of the storage activities and the functional interrelation between seals and storage vessels that a distinct practice emerged during the course of the 3rd millennium BCE, which consisted of imprinting with seals – mainly cylinder seals, but also stamp seals – vessels and especially storage jars, generally on the rim and shoulder but occasionally on the handle and base, before the vessels were fired so as to obtain a permanent impression. This practice is attested from the final Late Chalcolithic in Byblos but spread mainly during the Early Bronze

<sup>1</sup> Akkermans, Duistermaat 1996; Duistermaat 1996.

Age through different and far distant regions, the Levant and Mesopotamia, Anatolia and Greece (Fig. 1)<sup>2</sup>.

More occasionally, jars stamped in this way by cylinder seals appeared in Syria and Mesopotamia in the Middle and Late Bronze Age<sup>3</sup>, while stamps on the handles and bodies of jars were diffused from the Early Bronze Age (EB), especially on the Greek mainland, in Euboeia, the Cyclades and western Anatolia<sup>4</sup>, and in the Levant during the Iron Age as the principal mark of property and identification.

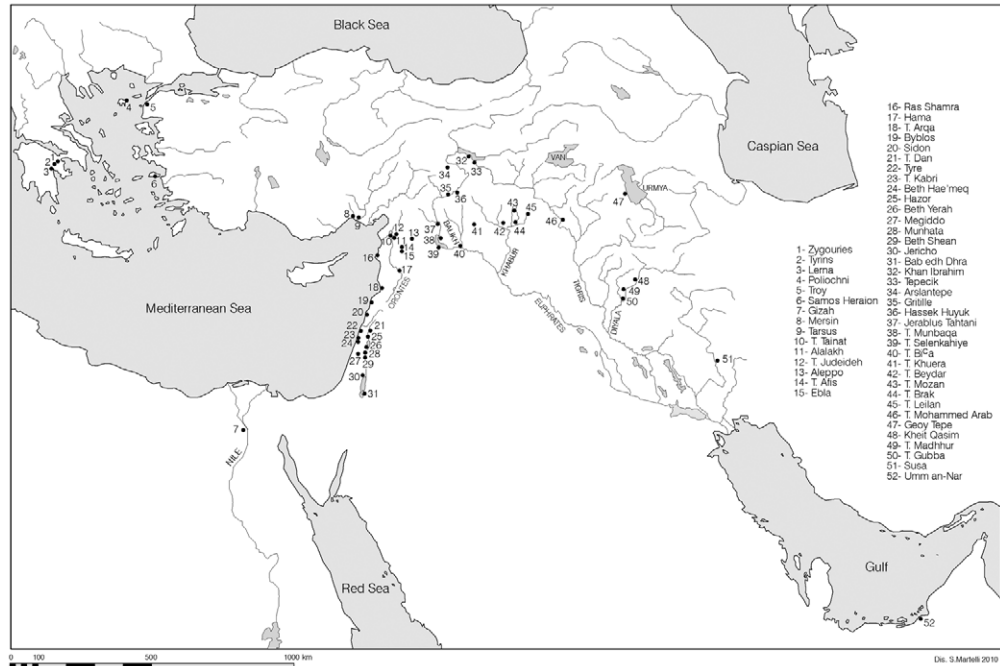


Fig.1. Map of the distribution of the 3rd millennium seal-impressed jars

The geographical diffusion of this style of marking jars (and occasionally other vessels) during the Early Bronze Age was, however, unparalleled in later times.

Two factors were especially significant for the development and success of this practice: *in primis* was the growing role of storage activities in the EB societies, and the resulting need to create systems for identifying producers and consumers and marking the access to and circulation of food. With this aim, seals constituted an efficient and an already well tested technical device which had, in fact, been used since the Late Neolithic and Chalcolithic periods precisely for imprinting clay sealings on different containers, jars, boxes and baskets. A second not negligible element was constituted by the associated seal imagery which could be easily perceived as a common system of

<sup>2</sup> For an up-dated list of impressions after Ben-Tor 1978 and Mazzone 1992, see Mazzone 2013: 193-195. Other examples in: Grei Virike (eastern Anatolia), Ökse 2006; Tell es-Sur: Al-Maqdissi, Ishaq 2012: 8-9, Fig. 3a-b (central Syria); Tell Khuera: Helms et alii 2013 : 155-159, Figs. 18-19 (north-eastern Syria); Tell Fadous: Genz et alii 2010: 255-256, Pl. 7; Genz 2010: 105-108, Figs. 13-14: 300, Fig. 21.4, and at Tell Arqa:Thalmann 2013 (Lebanon).9, Fig. 3a-b; in Lebanon at Tell Fadous: Genz et alii 2010: 255-256, Pl. 7; Genz 2010: 105-108, Figs. 13-14: 300, Fig. 21.4, and at Tell Arqa:Thalmann 2013.

<sup>3</sup> Mazzone 1992: 215-219.

<sup>4</sup> Aruz 2008: 23.

communication: the diffusion of the flexible and portable seals entailed the richness of a repertory of visual images, most often with geometric and animalistic motives and, as time progressed, herding and ritual scenes of symbolic value and social appeal.

The permanent impressions of seals on vases have, therefore, to be evaluated as both a consequent extension of the process of sealing stored food and an exception in sealing practices. It is important to note that the practice came about when distinct storage containers such as pithoi and jars, and pots of large size and capacity were produced, often specialised in terms of their destination and functions, and when they were accumulated in discrete numbers in private houses and in public buildings. As the archaeological and epigraphic documentation indicates, the Early Bronze Age was characterized by widespread and long-lasting economic wealth, which was primarily connected with a successful agrarian and agro-pastoral organization of the land and a dynamic strategy of exploitation and control of the more fertile and productive zones, which also impacted marginal areas such as the more arid steppe and the highlands. Further elements of note here are the geographical extent and the chronological duration of this flourishing economy with its food wealth that embraced the Near East with the Levant and Anatolia, the Aegean and Greece throughout the entire 3rd millennium BCE. When this process reached its peak, around the middle of the millennium, long-standing connections between even distant areas were increasingly fostered and a flow of raw materials, resources, technological instruments, ideological and cultural elements were then exchanged over long distances.

Both factors, the economic and agrarian prosperity and the geography of interaction, have to be kept in mind when investigating the mechanisms and the trajectories of the diffusion of the use of seal impressed vessels. The first studies on these materials concentrated on the images and styles of the original seals which were analyzed in their regional dimension and in a wider comparative framework<sup>5</sup>. The increasing evidence of vessels in place in well dated archaeological contexts drew attention towards the functions of the vessels and the purposes of the sealing method<sup>6</sup>. Different interpretations were consequently proposed and compared but no consensus was reached. Listing again the hypotheses offered by the scholars, we can note that economic and social considerations actually prevail, often resulting from new archaeological evidence which offers relevant cases of sealed vessels in their functional context: Ben-Tor<sup>7</sup>: mainly decorative marks or potter's trademarks, but then expressing more skeptical views<sup>8</sup>; Mazzoni<sup>9</sup>: for marking distinct sets of jars for special high-quality products; or Mazzoni<sup>10</sup>: for marking special jars with their products for special occasions and feasts; Matthews<sup>11</sup>: marking a system of control of the making of pots out in the country for the packaging of agricultural produce; Forest<sup>12</sup>: for protecting the content of the jars with magic images; Joffe<sup>13</sup>: used

<sup>5</sup> Ben-Tor 1978.

<sup>6</sup> Mazzoni 1992; Li 1988.

<sup>7</sup> Ben-Tor 1978: 103-104.

<sup>8</sup> Ben-Tor 1992, 1993, 1994.

<sup>9</sup> Mazzoni 1992: 188-196.

<sup>10</sup> Mazzoni 1993.

<sup>11</sup> Matthews 1996: 135-142.

<sup>12</sup> Forest 1996: Fig. 136.

<sup>13</sup> Joffe 2001.

for communication as symbols of emic concepts in EBI Palestine; Wengrow<sup>14</sup>: used as administrative marks, or commodity branding; Graff<sup>15</sup>: used for marking pots for cooking special vegetables, such as bitter vetch, from the Tell Qarqur evidence; Thalmann<sup>16</sup>: marking jars used for special occasions such as marriages. It is certainly clear that in the wide-ranging geography of documents attested, regional groups have to be examined in their local contexts of use and specific destination, which may have been correlated with the native alimentary strategies and economic and social organizations. However, despite the role of regionalization that may imply differences in the use and finalities of such impressed vessels, affinities between distant groups of materials do suggest common mechanisms of identification with similar motifs and symbols. These affinities were first outlined by A. Ben-Tor<sup>17</sup> and were re-appraised in the context of a northern Levantine process of diffusion<sup>18</sup> and of Aegean-Anatolian interaction<sup>19</sup>. Similarities in the practice of the impressions on jars with common motifs were then focussed upon, against the background of a process of international circulation of technical innovations<sup>20</sup>, such as balance weights, scales, spool-shaped weights, decorated tubes, and as well decorative elements, pins, and distinct elitarian (?) vessels (depas)<sup>21</sup> (Fig. 2). Finally, while jar impressions have been cited among the non-textual marking systems<sup>22</sup>, a communicative role has also been assumed inside a large international area, mostly in relation to the diffusion of a common repertory of motifs and symbols of fertility<sup>23</sup>.

When evaluating once again the documentation in its broad geographical diffusion, considering also the distinct regional circuits and the primary archaeological contexts of use, we are drawn back to some distinct characteristics of this class; on the basis of these we can finally consider the economic and communicative value of the impressions. Two elements characterize, in fact, this sealing method: the impressions were made before the vases were fired so as to obtain a permanent sign connected to the container; by consequence, this process of stamping must have been carried out in the pottery workshops. The second element is that only a very limited selection of vessels were impressed in this way by seals, and only a few classes of storage jars were impressed in this style (Pattern-Combed and Metallic ware jars in Palestine, ovoid jars and globular corrugated pots in north-central Syria, pithoi in Greece and western Anatolia, and large storage jars in eastern Mesopotamia (Hamrin); while other vessels, such as middle-sized jars, vats, bowls and other objects (lids and fireplaces) appear to have been impressed only occasionally and constitute a negligible part of the documentation. Furthermore, the socio-economic and functional environment of the impressed vessels constitutes a significant aspect of this sealing practice. As for the socio-economic background of use, the archaeological evidence furnish indication of a large circulation in various contexts:

<sup>14</sup> Wengrow 2008.

<sup>15</sup> Graff 2012.

<sup>16</sup> Thalmann 2013.

<sup>17</sup> Ben-Tor 1978.

<sup>18</sup> Mazzoni 1992.

<sup>19</sup> Aruz 2008: 20-22; Mazzoni 2013.

<sup>20</sup> Rahmstorf 2006a.

<sup>21</sup> Rahmstorf 2006b, 2008, 2010, 2015.

<sup>22</sup> Waggersonner 2009.

<sup>23</sup> Mazzoni 2013.



impressed vessels have been found in domestic and private buildings, as well as in palaces and official areas, in villages, towns and regional capitals. By contrast, the functional environment is apparently restricted to the cases of storage areas and kitchens; only in Mesopotamia (Hamrin) were tombs occasionally provided with seal stamped jars.

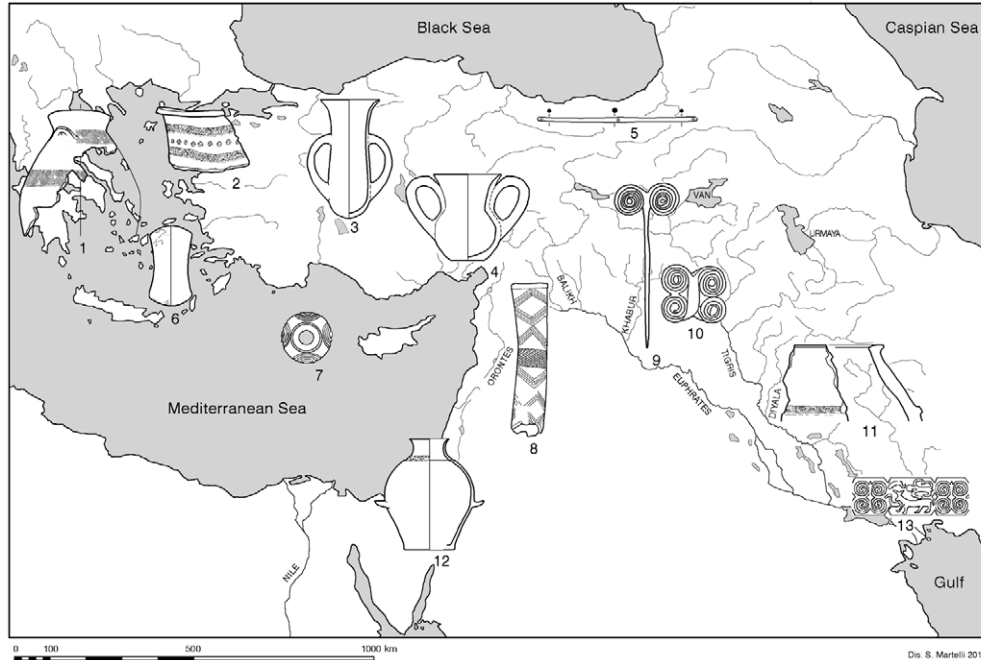


Fig. 2. The diffusion of distinct tools, marking instruments and symbols between the Aegean and the Near East in 3rd millennium BCE (1. Banded Pithos, Lerna III, after Mazzoni 2013c: Fig. 7; 2. Storage jar with impressions of seals, Troy, after Mazzoni 2013c: Fig. 12; 3. Depas Amphikypellon, Tell Selenkahiyeh, after Rahmstorf 2006b: Fig. 7.2; 4. Tankard, after Yılmaz 2010: Typ 1, Harita 2; 5. Bronze scale, Küllüoba, after Rahmstorf 2006b: Fig. 3.9; 6. Double-spiral pin, after Huot 1969: Pl. I.6; 7. Quadruple spiral amulet, Huot, Pardo, Rougelle 1980: Fig. 1.15; 8. Spool-shaped weight, Phase 8 Tyrens, after Rahmstorf 2006b: Fig. 4.7; 9. Incised biconical spindle whorl, after Rahmstorf 2015: Fig. 4; 10. Decorated bone tube, Tell Judeideh, after Rahmstorf 2006a: Fig. 6.11; 11. Jar impressed by seal, from Tell Ghubba, after Mazzoni 2013c: Fig. 2; 12. Jar impressed by cylinder seal, Numeira 1301, after Lapp 1989: Fig. 7; 13. Seal impression on Jar, Susa, after Mazzoni 2013c: Fig. 6)

Concerning the seals used, their styles and images, we can recognize different regional groups for different phases. Southern and coastal Levant show a homogeneous development and a similar repertory. The Palestinian EB I-IV impressions present a large corpus of geometric designs and rows of animals, predation scenes, and a few examples of ritual scenes<sup>24</sup> (Fig. 3.1-5). In the same way, geometric motifs, animal friezes, and humans in different attitudes characterize the impressions from Byblos<sup>25</sup> (Fig. 4.1-2); similarly, other EB Lebanese impressions present mainly the scene of lions attacking various animals and geometric designs<sup>26</sup> (Fig. 4.3). Mesopotamia and Syria were also strongly interrelated. The Hamrin impressions were made by seals of the Piedmont or Glazed Steatite linear style (International Style) and also Brocade and degenerative Uruk designs<sup>27</sup> (Fig. 5.1-4).

<sup>24</sup> Ben-Tor 1977, 1978, 1992; Lapp 1989; Flender 2000; Greenberg 2001; de Miroschedji 2011a,b.

<sup>25</sup> Mazzoni 1992: 90-98.

<sup>26</sup> Genz 2007, 2009, 2010; Thalmann 2013.

<sup>27</sup> Pittman 1994: 113-119.

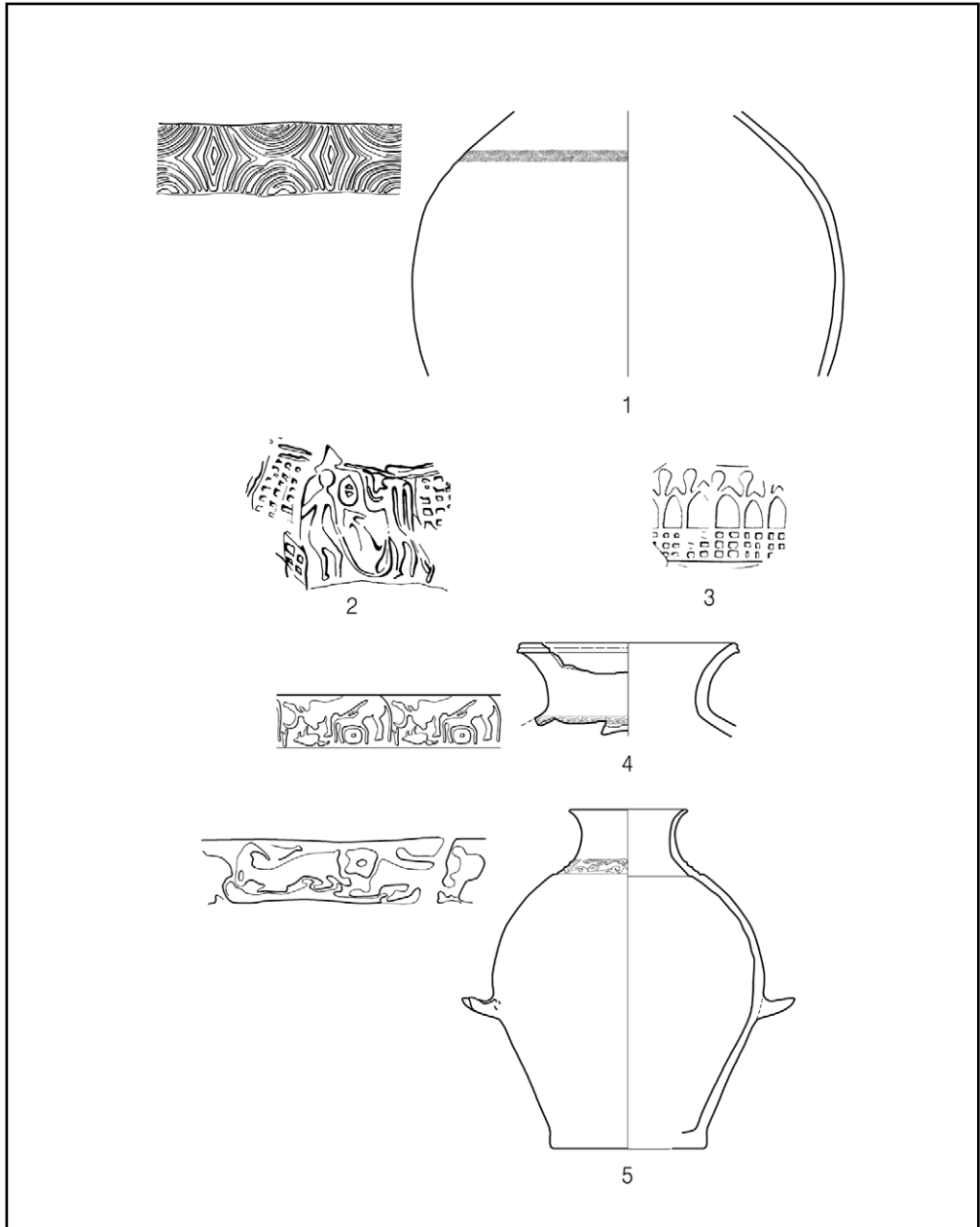


Fig. 3. Seal-impressed jars from southern Levant: 1. EB II/III, Bab edh-Dhra<sup>c</sup>, after Lapp 1989: Fig. 3; 2. EB III, Beth-Yerak, after Ben-Tor 1978: Fig. 10, n. 68; 3. EB II/III, Bab edh-Dhra<sup>c</sup>, after Lapp 1989: Fig. 5; 4. EB IV, Beth-Yerak, after Bar-Adon 1973: 100; 5. EB III, Numeira, after Lapp 1989: Fig. 7

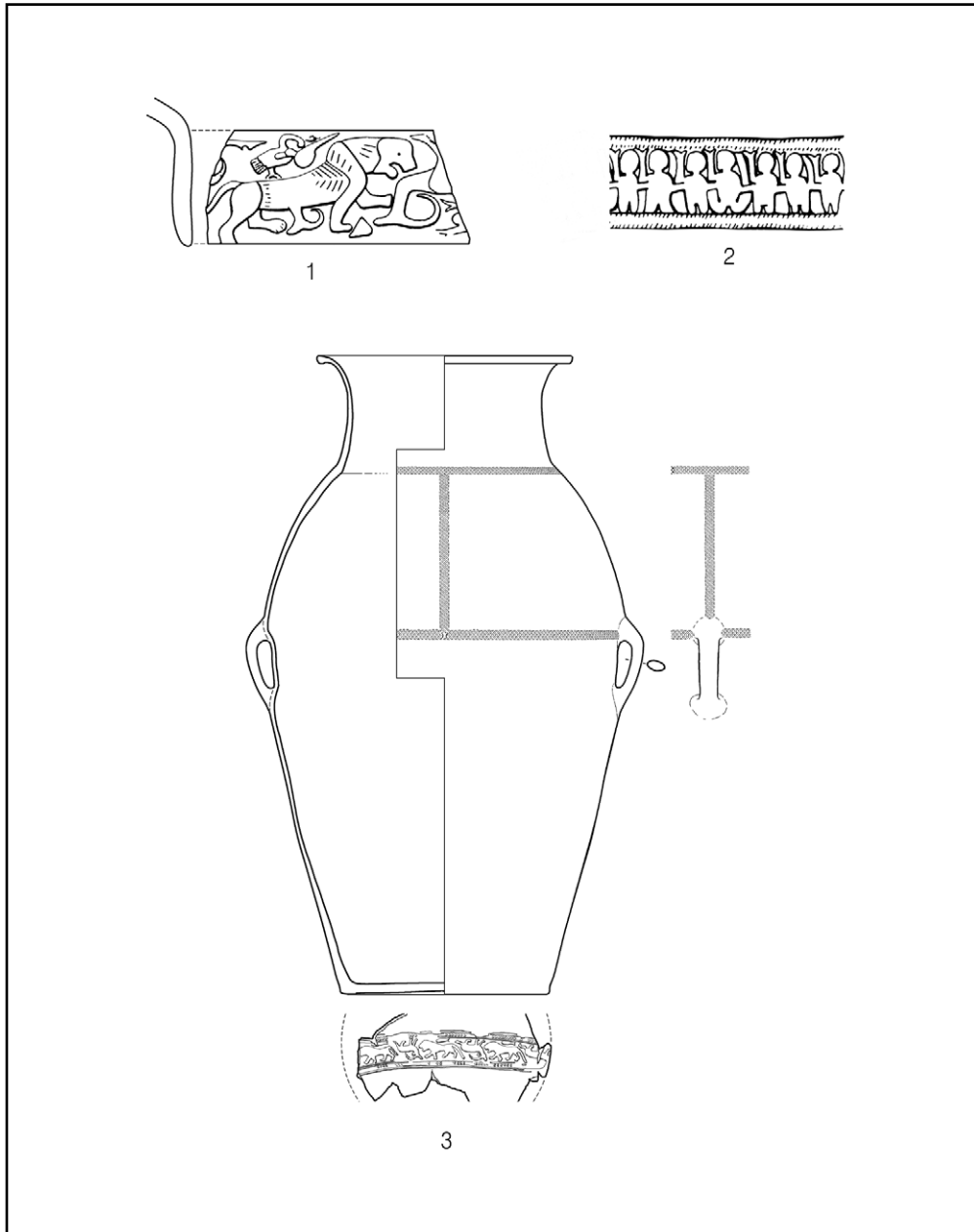


Fig. 4. Seal-impressed Jars from coastal Levant: 1. EB II, Byblos, after Mazzoni 1992: Tav. XXVIII, B. 57; 2. EB/MB, Byblos, after Dunand 1950: 201, Fig. 209; Tell Arqa, after Thalmann 2013: Fig. 15

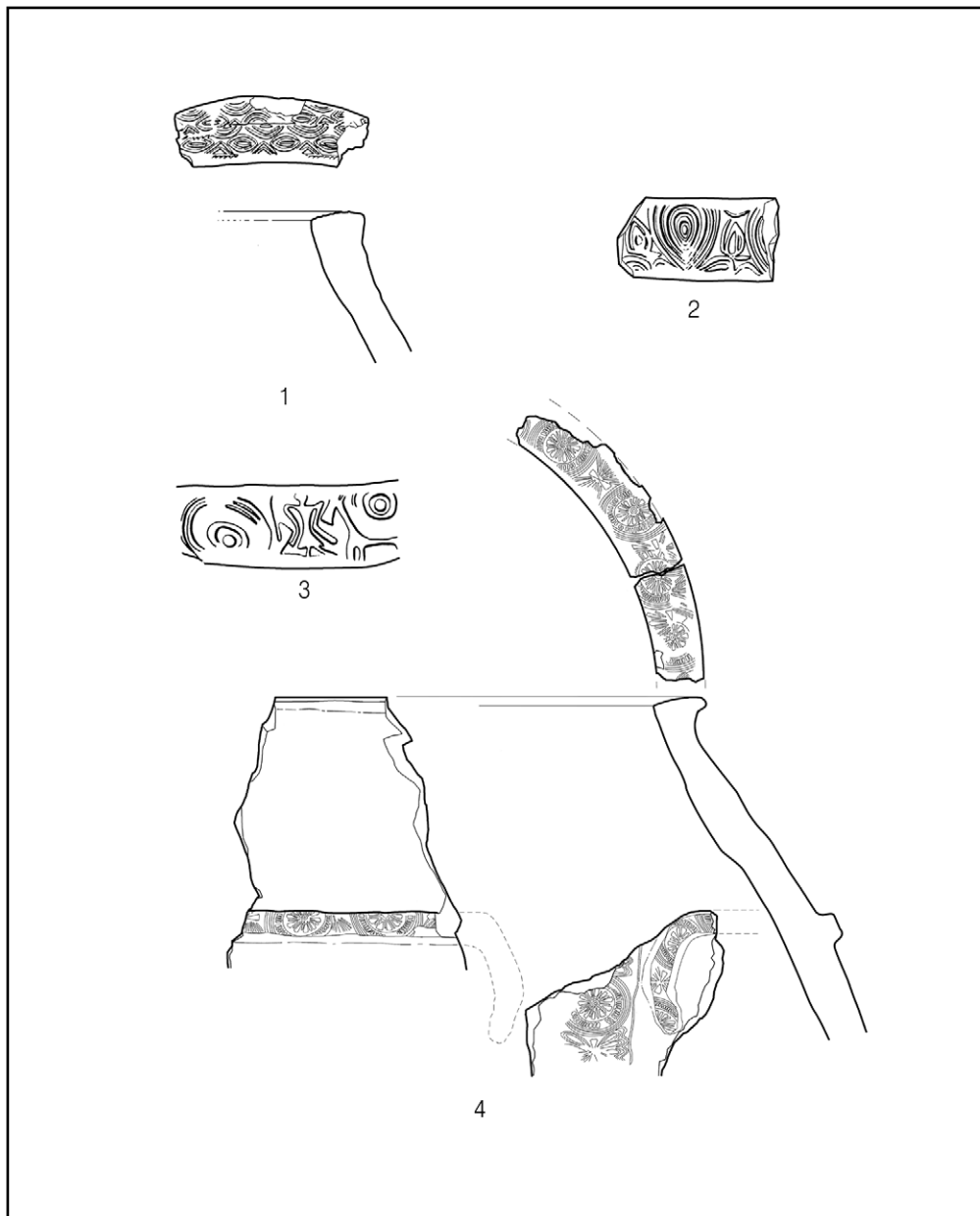


Fig. 5. Seal-impressed jars from the Hamrin region (eastern Mesopotamia): EB I, Tell Gubba, after Li 1988:1. Fig. 22.116; 2. Fig. 16.28; 3. Fig. 6.3; 4. Fig. 17.46

In north-western Syria in EB III-IV, geometric, vegetal motifs, rows of animals, hunting, herding, defence of the flock and predation scenes of linear style largely prevailed (Fig. 6.1-5), but a few impressions present also ritual scenes of Levantine tradition (Fig. 6.6), dots, hatched, diamond and ladder patterns of the International style tradition<sup>28</sup> and contest scenes of derivative Early Dynastic (ED) style (Fig. 7.1), especially in the northern and north-eastern regions.

<sup>28</sup> Felli 2015: 208.

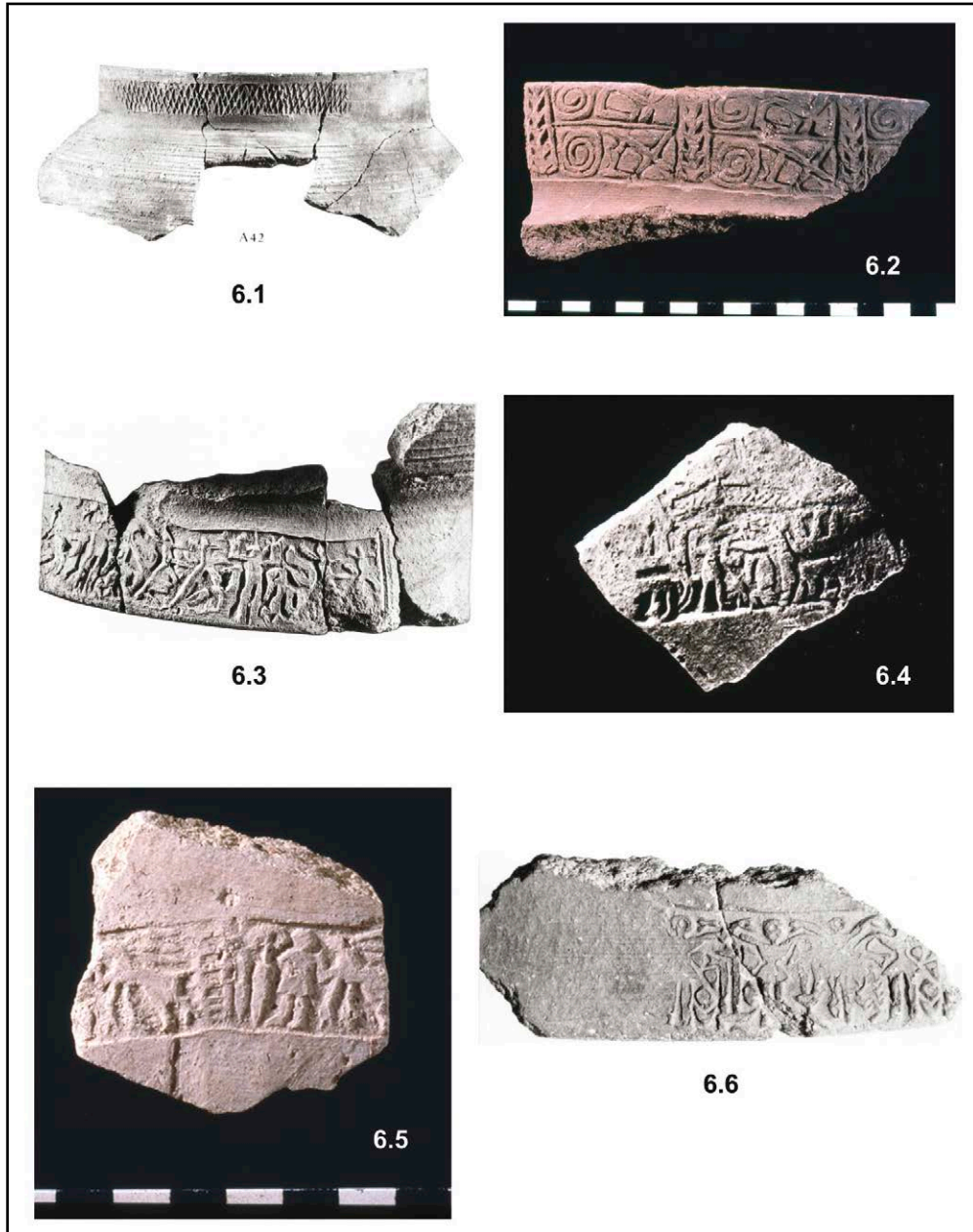


Fig. 6. Seal-impressed jars from central Syria: EB IVA, Ebla, after Mazzoni 1992: Pl. XIX.A.42; 2. after Mazzoni 1993: Pl. 73.3, A47; 3. after Mazzoni 1992: Pl. XVIII.A41; 4. *Ibidem*: Pl. XI.A3; 5. After Mazzoni 1993: Pl. 73.2, A43; 6. EB IVB, Hama, after Mazzoni 1992: Pl. XXXIII. B100

This ED imprinting is certainly stronger in Upper Mesopotamia and in the Jezirah; here we find in fact local motives, such as the herding scenes (Fig. 7.2-3) together with complex scenes such as ploughing, the transport of jars and threshing, all known from the Uruk period repertory<sup>29</sup> (Figs. 7.4-6) and the scenes of military triumph<sup>30</sup>.

<sup>29</sup> Felli 2015: 206.

<sup>30</sup> Rova 2006; Bretschneider *et alii* 2009.

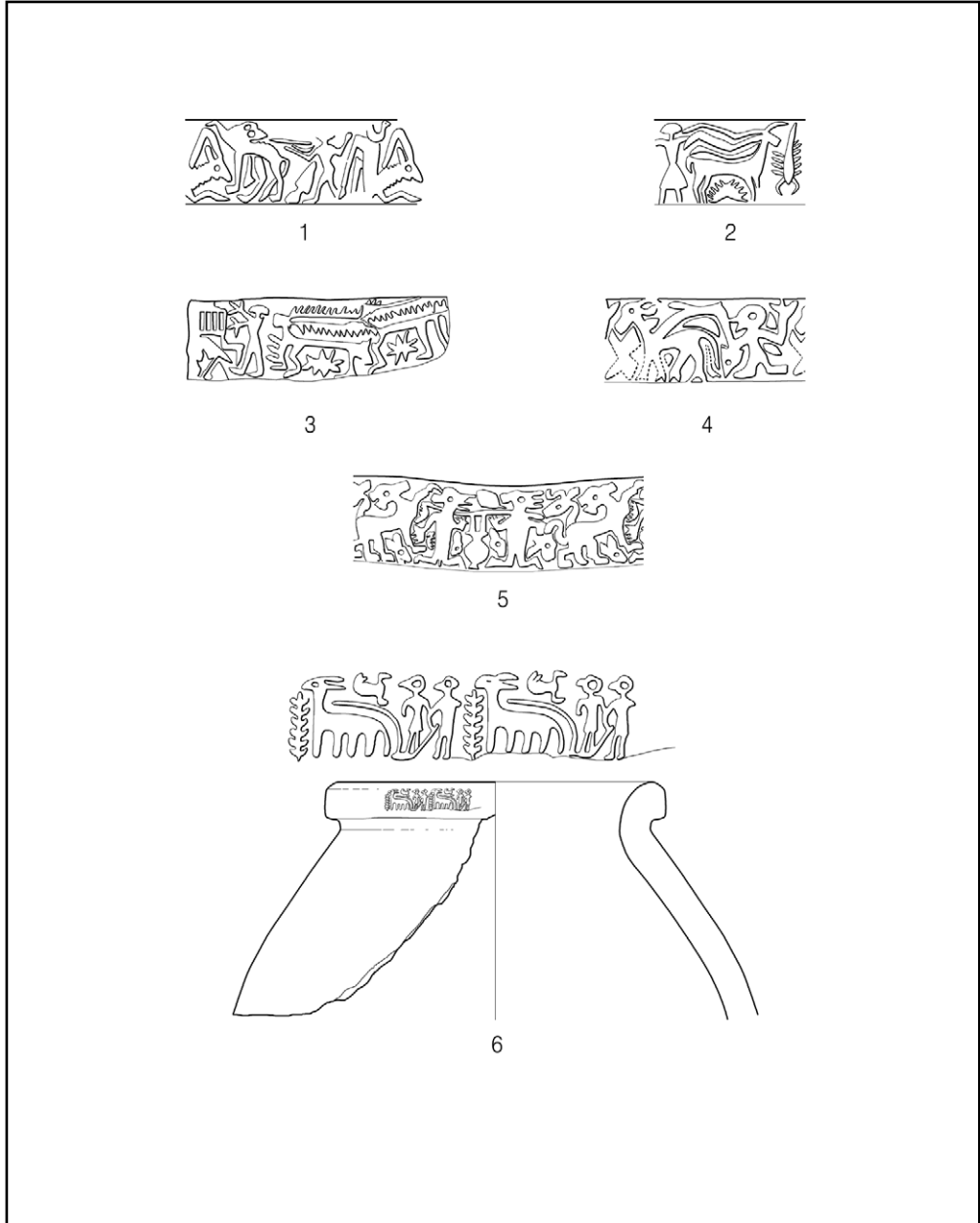


Fig. 7. Seal-impressed jars from north-eastern Syria: 1. EB IVB, Umm el Marra, after Schwartz *et alii* 2003: Fig. 4; 2. Tell Leilan, after Parayre 1990: Fig. 28; 3. Grei Virike, after Ökse 2006: Fig. 4; 4. EB I, Hassek Höyük, after Behm-Blancke 1993: Fig. 2.4 ; 5. EB I, Hassek Höyük, after Behm-Blancke 1984: Pl. I.1.1.; 6. Tell Khuera, after Helms *et alii* 2013: Fig. 19

In western Anatolia vegetal and geometric motifs and herding scenes in linear style are also prevalent in EB III (Fig. 8.1-2). The impressions from Greece show geometric patterns with, rarely, animals rendered in a linear style<sup>31</sup> (Fig. 8.3-5). This very synthetic overview provides us with some elements for further consideration.

<sup>31</sup> Aruz 2008.

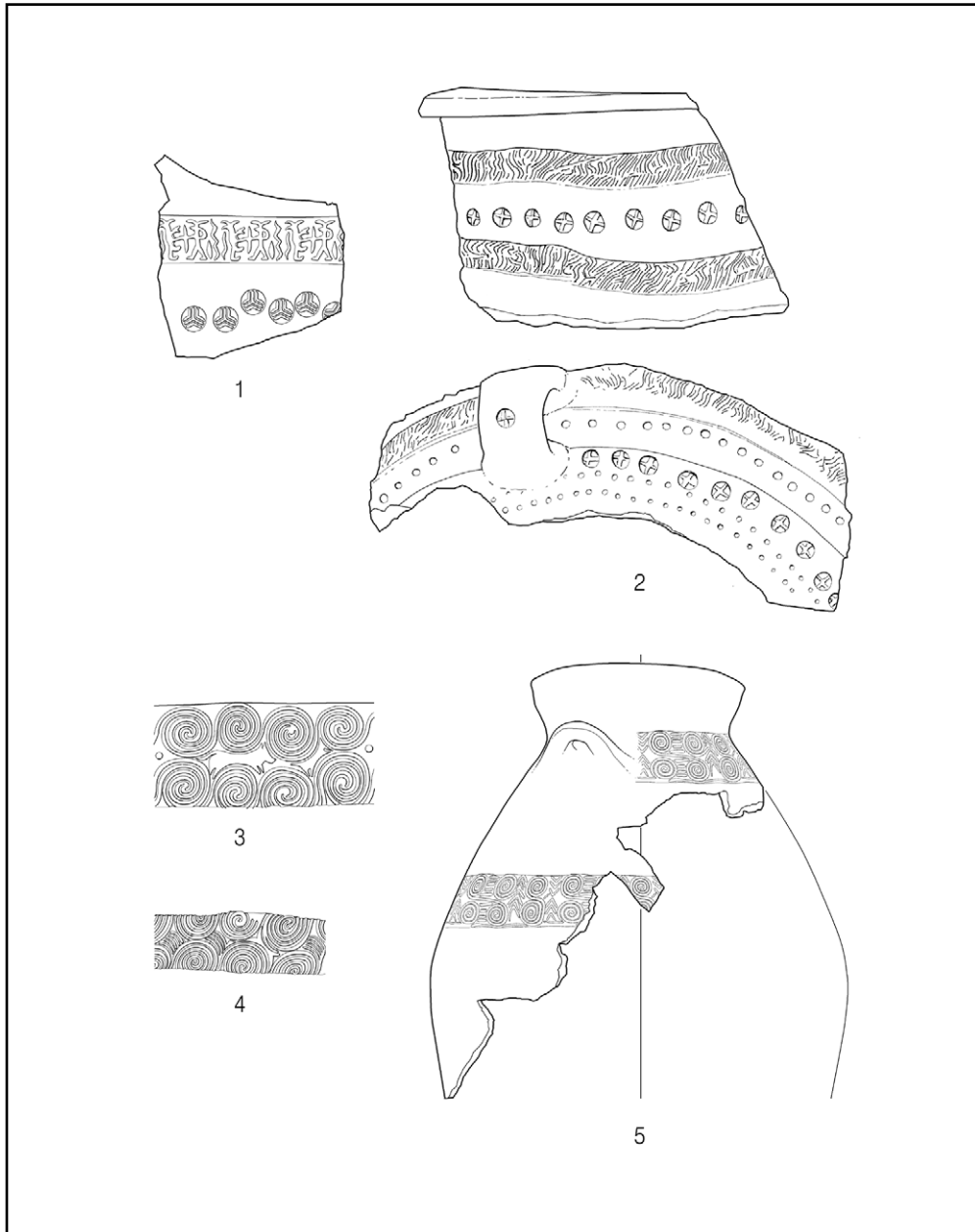


Fig. 8. Seal-impressed jars from western Anatolia and Greece: 1. Mersin, after Mazzoni 1992: Pl. XXXVIII. B1 43; 2. Troia, after Mazzoni 2013: Fig. 12; 3. Lerna, after Wiencke 1970: Pl. 27. S87; 4. Lerna, after Wiencke 1970: Pl. 27. S90; 5. Lerna, after Mazzoni 2013: Fig. 7

Looking for the communicative value of the impressions, we must proceed by identifying and analysing three interpretative levels, the destination of the seal stamped vessels, the meaning of the seal impression imagery and finally the function of the marking system. The first issue, concerning the function of the vessels impressed, is apparently more easily detectable from the archaeological documentation since, as already noted, with a few exceptions storage vessels, or pithoi, for food and liquids, and large pots for cooking were stamped by seals. The system was part of the activities involved in the preparation

and conservation of food in private and institutional, in domestic and public structures. In some areas and periods there may have been a local use and distinct purposes of stamped vessels. However, the documentation from different sites and geographical areas throughout the whole of 3rd millennium is remarkably coherent and concerns mainly storage and cooking containers, found chiefly in storage rooms or multi-functional domestic spaces (Figs. 3.3, 4.3, 5.4, 7.5, 9.1-4). In the initial period of development of this practice, as in the so-called «Eneolithic Cemetery» of Byblos, to be dated now to local EB I in 4th millennium BCE<sup>32</sup>, pithoi with their handles impressed by seals were clearly re-used as pot burials<sup>33</sup>. In the sites of the Hamrin area, seal stamped pithoi are documented also in graves (Ahmad al Hattu: 20-25 percent of the grave inventory<sup>34</sup>), alongside buildings used for the storage and preparation of food<sup>35</sup>. In Ebla, the corrugated jars with rim impressed by seals were found on fireplaces<sup>36</sup> (Fig. 9.2) and the ovoid jars in storerooms (Fig. 9.1, 3-4).

At Lerna the raised rims of the hearths were also impressed<sup>37</sup>. Again, it is important to note that seals marked only a few batches out of the total inventories of vessels (or other containers and hearths) belonging to the same class of ware and fabric. Furthermore, the same seal could be rolled over more than one specimen; vessels stamped by the same seal are certainly only a few, but nonetheless they are documented (Ebla and Hama<sup>38</sup>; Lerna, Zygouries, Tyrins<sup>39</sup>). The evidence therefore suggests that the impressions were destined to mark a very select number of food containers.

The second interpretative level concerns the communicative function of the images represented in the seals which were stamped on the vessels. A significant number of impressions consist of vegetal, geometric and animalistic images rendered in a common and often linear style. These are popular designs which spread across the eastern Mediterranean, the Aegean and Mesopotamia in various contexts. As noted above, there is no evidence of a social or economic patterning in their use or, consequently, in the comprehension of the symbolic values of the images at different levels. The style, as also often noted, may reflect the adoption of soft materials for cutting the seals, such as wood, bone, ivory and clay, and we possess, in fact, seals made of these materials, also belonging to the class documented by the impressions on jars. The most notable examples are certainly represented by a group of bone and ivory seals from Byblos<sup>40</sup> and one in ivory from the École Biblique of Jerusalem<sup>41</sup>. Seals made of clay in the linear style are also not infrequent in this period<sup>42</sup> and the case of the clay seal from Hassek Höyük with a herding or master of animals scene dating to EB I is certainly relevant for understanding the infrequent procedures of manufacture of these seals, which implied a

<sup>32</sup> Artin 2009.

<sup>33</sup> Mazzoni 1992: 82-86; Mazzoni 2009: 44-48.

<sup>34</sup> Pittman 1994: 117.

<sup>35</sup> Renette 2009.

<sup>36</sup> Mazzoni 1993.

<sup>37</sup> Wiencke 1970: 95-96.

<sup>38</sup> Mazzoni 1992: 58, 106; Matthews 1996: 130.

<sup>39</sup> Aruz 2008: 21.

<sup>40</sup> Mazzoni 1992: 91, Pl. XLVII.6 (5182)-7; XLIX.1 (4995)-2.

<sup>41</sup> Ben-Tor 1978: 104, Pl.VII, no. Bb-2.

<sup>42</sup> Felli 2015: 208-209.



«high degree of experimentation»<sup>43</sup>. The seal was in fact obtained from an original (not preserved) seal impression which was probably rolled on a label and then presenting the scene in relief and not carved; this was used to mark a jar while the original one was used to imprint a sealing<sup>44</sup>.

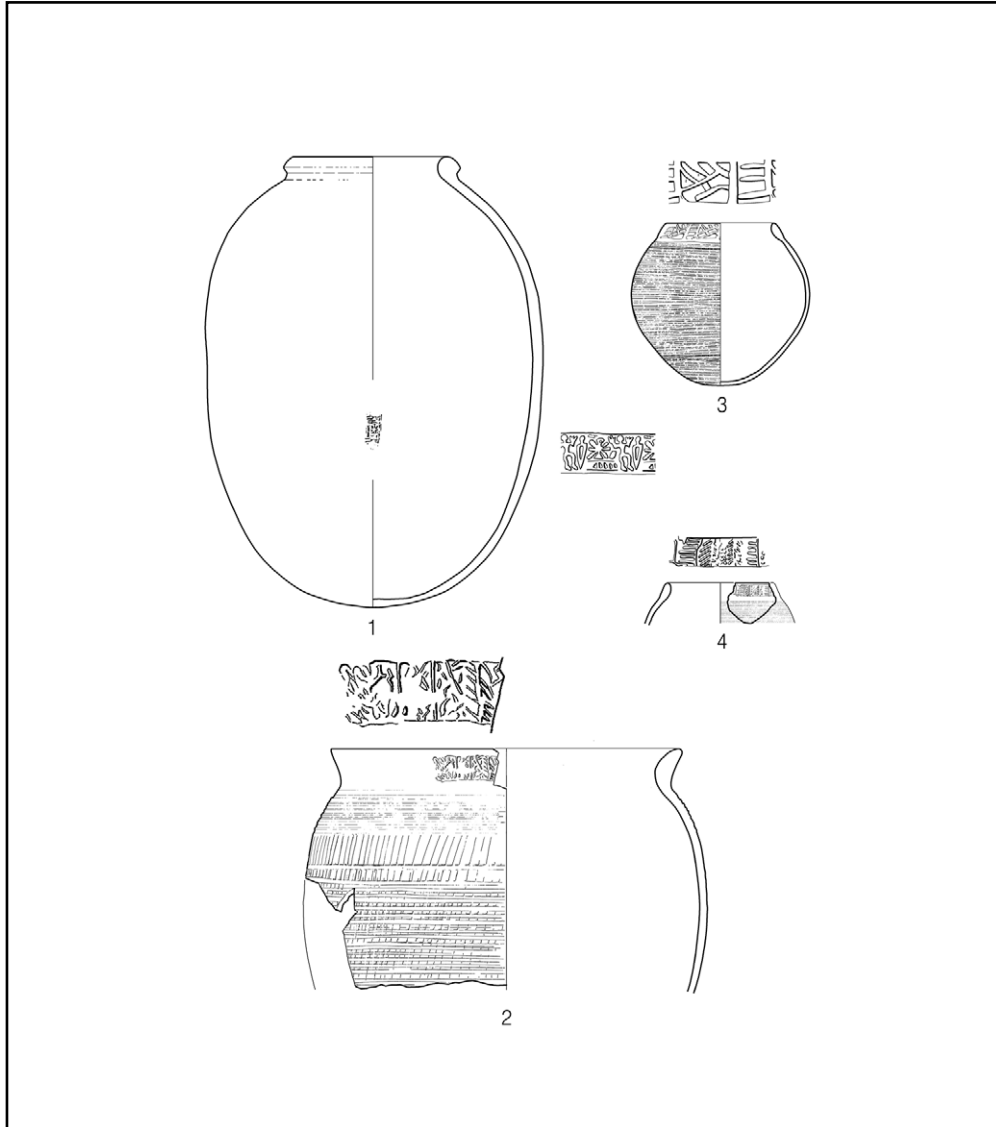


Fig. 9. Seal impressed jars and pots from central Syria: 1-2. EB IVA, Ebla, A16, TM.75.G.280/22; A44, TM.89.G.395/2; 3. Hama, after Ravn 1960: n. 123.3 H417 (Mazzoni 1992: B110); 4. Al Rawda, after Castel *et alii* 2008: Fig. 19.3W1.2251.12

<sup>43</sup> Felli 2015: 206.

<sup>44</sup> Small seals in terracotta decorated by simple lines and dots were also found in this site: Behm-Blancke 1981: 25, Pl. 11.5-6; Behm-Blancke 1984: 64, Pl. 12.2-3; Felli 2015: 207. Behm-Blancke 1981: 24-28, Pl. 11.1-2; Mazzoni 1992: 126, Pl. XVIII: B157.

Furthermore, there are cases of seals made of bone but displaying elegant designs of Early Dynastic inspiration, such as a seal from Ebla<sup>45</sup> (Mazzoni<sup>46</sup> later identified it as being made of bone). It is again interesting to note that ivory seals are also known from Troy, Poliochni and Archanes in Crete<sup>47</sup>. In any case, the style with its schematizations especially in the rendering of vegetal and geometric elements often in a cursive manner, may mirror the use of readily available materials and also respond to the rather occasional production of these seals, which were employed in the pottery workshops for stamping the vessels before firing. The need to reproduce seals for such a use, with small variants, was probably the reason behind the schematic style and the images, as is clearly indicated by the case of the duplicated seal of Hassek Höyük. Consequently, these characteristics are indicative of the manufacture of the seals used for imprinting vessels being located outside the craft workshops of the official institutions.

As for the images represented in the seals, there is a large repertory of designs and depicted scenes which were diffused throughout the area and periods covered by the documentation. We can, however, observe some predominant subjects and motifs, as already stressed above, such as different geometric patterns, friezes of animals, contests of animals, predation of lions and wild beasts, defence of the flocks by humans and herding and hunting scenes. The success and lengthy duration of some of them are certainly remarkable, and affect not only the motif that could be more easily reproduced and duplicated (vegetal and geometric elements), but also more structured designs (herding and hunting scenes, animal friezes) that alluded to the basic subsistence activities of the communities. This largely comprehensible visual imagery appears in the first Prehistoric seals of the Near East and would play a significant role over a long period of time. Later, during the Chalcolithic period, the repertory expanded to include scenes of fertility and rituals. Only at a later stage of this early phase, during the 4th millennium BCE, thanks to the introduction of the cylinder seals fitting well the communicative goals of the centralized administration of Uruk, were new themes (scenes of war and triumph, cult, working activities, such as storing, spinning, harvesting and threshing) added to the old corpus of motifs. However, the old corpus still maintained its widespread symbolic appeal, as is well exemplified by the rows of animals and the assault of lions and wild beasts which constituted the formative nucleus of the ED contest scene. At the beginning of the 3rd millennium in the Levant and northern Mesopotamia, cylinder seals replaced the earlier stamp seal production, consequently displaying derivative Uruk and Jemdet Nasr traits and iconographies<sup>48</sup>, especially in the areas which had enjoyed connections with the Urukian enclaves (northern Syria, the upper Euphrates bend, and upper Mesopotamia); here the International Style seals could easily spread and overlap the late Uruk types. In other regions, which were less influenced by the pervasive Urukian cultural diffusion and the International style, cylinder seals were gradually adopted but did not replace completely the traditional stamps with their lingering styles and images of the local tradition (Byblos, northern Syria, Anatolia)<sup>49</sup>. However, both the Uruk derivative

<sup>45</sup> Mazzoni 1992: 42-45, 242, Pl. XLIII.8

<sup>46</sup> Mazzoni 1995: 330, no. 122.

<sup>47</sup> Aruz 2003: 248.

<sup>48</sup> Mazzoni 1992: 230-231; Peltenburg 1997: 142.

<sup>49</sup> Mazzoni 1992: 231-233; Felli 2015: 208-209.

and the local lingering Late Chalcolithic images could all be easily understood: herd and flocks, assault of wild beasts, protective shepherd, and also ritual scenes less direct and evident (for us), such as the rows of men performing social activities or rituals. All these images could be perceived as a shared visual repertory that alluded to the social and subsistence spheres of the communities at the time of their emergence to complexity, a process undergoing through different stages from an overall increasing ruralisation (EB I-II), different forms of centralization, and, in some regions, secondary urbanization and state formation (EB III-IV). The increased diffusion of the seals with their repertoires of meaningful images was consistent with the growing economic and storing capacity of the Near Eastern communities; and they could respond to the necessity for communication between social groups that were more intensively interacting.

Vegetal and geometric motifs were most appropriate for the communicative aim, as they belonged to this basic tradition of images and meanings: flowers and branches, reeds, grains, ropes, crosses, stars, circles, bands, triangles could be easily combined and selected as individual or communal emblems. Other more complex designs may have alluded to ladders, fences or nets, signifying spaces and activities. The most elusive motif is certainly the quadruple spiral which may represent some not obscure (apart from for us) and ubiquitous emblem: it is documented from stamps of the late Ubaid period, seals of the Uruk and EB periods, but also as a decorative element or finial on metal pins, jewels and amulets<sup>50</sup> over a vast geographical area of the Near East (Aruz<sup>51</sup> showing the distribution of the quadruple-spiral beads).

That these images may have constituted a system of communicating concepts and symbols has been inferred for the International Style seals and the impressions on jars from the sites of the Hamrin. They show, in fact, a repertory of designs which were shared over a very wide area of interaction including Mesopotamia and Susiana. Holly Pittman<sup>52</sup> has suggested that the images of the so-called «Glazed Steatite Glyptic Style» or International Style belonged to a system of administrative communication: the structure of the imagery was formed by various designs (hatched bands, crosses, trees and S-shaped curves), which could be combined to create variants. Their distributions in the sites of the piedmont zone is not coherent but apparently denotes the presence of a center of diffusion and origin in Proto-Elamite Susa, where a complexity of variants is documented, emerging and developing alongside the local Proto-Elamite scripts. This system has been compared with the so-called city-seals found in the Seal Impression Strata (SIS) at Ur with similar abstract motifs that represent the names of the local towns and which are related to tablets concerning fruits and vegetables exchanged between these same towns<sup>53</sup>. In the same way, the images of the Glazed Style seals could convey specific meanings as a language; but, unlike language, they were not restricted to a specific verbal communication; the glyptic imagery could, instead, «develop a capacity for connotatively layered pictorial communication as narrative and decoration»<sup>54</sup>.

<sup>50</sup> Peltenburg 1997: 140-142; Felli 2015: 209.

<sup>51</sup> Aruz 2003: 243-244, Fig. 73.

<sup>52</sup> Pittman 1994: 243-264.

<sup>53</sup> Matthews 1993: 30-32.

<sup>54</sup> Pittman 1994: 264.

It is appropriate to move farther west, to Greece where, in the mid 3<sup>rd</sup> millennium, pithoi were decorated with raised bands impressed by large seals with continuous patterns of motives comparable to the eastern repertory of seal imagery. In fact, as already noted, it was precisely these affinities in the seal practice and imagery which attracted the interest of scholars who proposed a process of contacts and diffusion from east to west. The Greek impressions were made by seals which were apparently not created to fit the bands, as noted by J. Aruz<sup>55</sup>: «The inconsistency in size between the (large) cylinder and band, however, is a puzzle: the one does not seem to have been made specifically to fit the other». This might probably indicate an occasional use of the seals for stamping the bands of the jars. Furthermore, as in the case of the impressions of the Hamrin area, and from Syria, the same seal could be impressed on various pithoi (Aruz<sup>56</sup> quoting items from Lerna, Zygouries and Tyrins (CMS V,1 no. 120; CMS V,2 nos. 504: Zygouries, 529: Tyrins). It is interesting to note that in this case spirals are associated to quadrupeds, as can be seen in some Levantine seals. Another factor to be considered is that the seals destined to mark the local pithoi were used in the pottery workshops where the jars were made, being impressed before their firing. To conclude, the process of imprinting, the local manufacture of the pithoi with their bands, and the presence of motifs displaying a common local style point to a local production of the original seals, despite the many documented affinities with eastern seals and practices. We cannot, of course, exclude the possibility that the circulation of Levantine and west Anatolian seals may have introduced the sealing system to the western area, encouraging the production of local seals. Foreign seals circulated in the eastern Aegean islands<sup>57</sup>, as is documented by the case of a locally-made jar, impressed three times by a Syrian imported seal with a row of animals, found under the Heraion of Samos (Aruz<sup>58</sup> referring to Isler<sup>59</sup>). The silver cylinder seal from Mochlos<sup>60</sup> and the Amorgos seal<sup>61</sup> furnish direct evidence of this process of assimilation and probably local reproduction of oriental seals with their motifs, such as the circle-and-chevron of the seal from Amorgos; this was a design which was well represented in the eastern Mediterranean and in Mesopotamia. These images could be then transmitted to the western Mediterranean through the import of seals with their images to be appreciated for their simple forms and ease of imitation and reproduction, fitting the communicative aims of the local communities.

We can, therefore, conclude that the images had a function of communicating values and concepts which were easily grasped and were shared over a vast area. The fact that in certain periods animals, vegetal motifs and herding scenes were the prevailing subjects of the iconographic corpus of impressions on jars seems to suggest that they were evocative of farming activities, and their products; this seems to be vividly exemplified by three impressions on jars: one from Hassek Höyük shows the transport of jars on a pole<sup>62</sup> (Fig.

<sup>55</sup> Aruz 2008: 21.

<sup>56</sup> Aruz 2008.

<sup>57</sup> Aruz 2003: 248.

<sup>58</sup> Aruz 2008: 53-55.

<sup>59</sup> Isler 1973: 175.

<sup>60</sup> Aruz 1984.

<sup>61</sup> Aruz 2008: 35-36.

<sup>62</sup> Mazzoni 1992: 127, no. 160, Pl. XXXIX; Felli 2015: 206, Pl. I.8.

7.5) (Behm-Blancke<sup>63</sup> related it with a banquet theme); the second probably represents a man ploughing<sup>64</sup> and the third from Tell Khuera shows two men threshing<sup>65</sup> (Fig. 7.6). These representations constituted a clear visual reference to farming and storing activities and could conform and allude to the contents of the jars and the agricultural produce. It is here clear that the images were a visual label of the jars indicating their function of storing, processing and serving aliments for feeding the community. It is certainly more difficult to grasp what were the meanings of the different single motifs appearing in the field and what was alluded to by the different symbols, particularly the aniconic and geometric motives. Some of the geometric elements, such as the curved bands, may be connected with liquids; others with grains.

In any case, there was a system for indicating agro-pastoral activities and the produce of the community to which the jars belonged, be it the consuming house or the producing hamlet, village or farming groups or the accumulating and distributing institution, which was also a large-scale consumer. However, as the various impressed vessels were imprinted before firing, we have to locate the practical process in the context of the pottery workshops and, therefore, on a more speculative basis, in the farming communities. This interpretation is consistent with the style of the seals and their often cursive and even occasional manufacture and the use of available and economic materials for carving them, such as clay and bone.

Lastly, the third interpretative level concerns the function of the impressions. We have, in fact, argued that on an initial interpretative level, the vessels impressed were containers of aliments used in domestic and institutional contexts and, on a second interpretative level, that the imagery was related mostly to farming activities possibly indicating the foodstuffs contained in the vessels to be stored, prepared, cooked and consumed. These conclusions do not provide precise boundaries for determining the question of the final function of the impressions. Besides, that this practice was carried out in the pottery workshops in the context of farming activities, which is also suggested by the visual imagery of the seals, does not preclude any of the various interpretations proposed and mentioned before. In dealing first with the impressions from Ebla, I have used the well-investigated model of the Graeco-Italic *figlinae* for comparison<sup>66</sup>; these were pottery workshops located on the farms producing olive oil and the transport jars were marked with the seal of the producer, owner of the land<sup>67</sup>.

The mass production of standardized Roman amphorae is certainly far from the organization of the workshops producing storage jars and cooking pots in the 3<sup>rd</sup> millennium BCE which were not, in fact, standardized. Unlike the table vessels (bowls, goblets, jugs, small jars) which were produced following standardized procedures (in wares, fabrics and firing), pithoi, storage jars and large pots, all hand-made, show a high variation in pastes and firing conditions, and also quite limited patterns of regional distribution. However, the comparison can serve to illustrate a system of integration between pottery workshops and farming communities. The interpretation of an organization of vessels

<sup>63</sup> Behm-Blancke 1984: 60-61, 64, Pl. 11.1.

<sup>64</sup> Behm-Blancke 1993: Fig. 2.3; Felli 2015: 206, Pl. 1.7.

<sup>65</sup> Helms et alii 2013: Figs. 18-19.

<sup>66</sup> Mazzoni 1984: 33; Mazzoni 1992: 195.

<sup>67</sup> Manacorda, Pallecchi 2012.

with their visual markers produced in the farming communities can better account for their non-selective distribution between élite and non-élite, domestic and institutional contexts, and in kitchens, tombs, storerooms and multi-functional domestic spaces. Again, the multi-economic and social landscape of the circulation of these impressed vessels apparently precludes any more in-depth analysis, beyond the interpretation of a system for marking, with images connected with the primary subsistence strategies, vessels used for containing the products of these same alimentary strategies.

Finally, the question of whether the impressions on vessels indicated a specific producer, foodstuff or occasion on which the contents were to be used and consumed remains unanswered. Here too, however, we have to consider a quite substantial factor: only a limited selection of a same class was impressed. This is why the impressions could not represent workshops' marks, or marks of property. They had to identify some distinct units, individual allocations of foodstuffs, which could be replicated in very small numbers. I have discussed the case of the Hama and Ebla impressions as a significant document of the circulation of the same seals impressed on similar jars in very different economic and social contexts; in this case, we can presume two different directions for the allocation of the vessels: from Hama to Ebla as a result of accumulation by the centre, or the contrary, from Ebla to Hama, as a result of the activity of redistribution by the centre. We cannot, however, exclude other trajectories, from the farming communities to both. As this case relates to the grooved pots for cooking (as indicated by the items found on fireplaces at Ebla), the possibility that they were obtained by both sites for the preparation of special foodstuffs, as well as for special occasions, remains also open to further discussion.

A concluding observation concerns the communicative function of the seals used for this sealing method. They allude to farming and food and the content of the vessels; their diffusion across the Near East and the Mediterranean and Greece is further evidence for the wealth of food which was the basic factor for the economic and social development of the 3rd millennium societies, and their emergence from a process of widespread successful ruralisation (Mesopotamia, Syria, Anatolia) to different forms of centralization and social complexity (Levant, Anatolia), to secondary urbanization and the state (Mesopotamia, Iran, Syria).

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# Non-scribal communication in the Southern Levant during the Middle and Late Bronze Ages

*Assaf Yasur-Landau*

**Abstract:** In contrast to the cultures of Egypt, Syro-Mesopotamia and even the Aegean, the 2nd millennium BCE culture(s) of the southern Levant did not use script frequently. Cuneiform or Egyptian Hieroglyphs were never used for regular administrative purposes in the Canaanite palaces. The use of alphabet, although present from the beginning of the Middle Bronze Age, was exclusively limited to short inscription of personal commemoration. In this reality the non-scribal modes of communications had several interesting roles in sending messages of personal statements (of ownership?) as well as common belief systems. Among the case studies that will be treated are:

1. Inscribed and marked weapons and tools
2. Artisans' marks on ivory and ceramic
3. Non administrative scarab stamps on loomweights and jar handles
4. Potmarks and symbolism of the Canaanite goddess Ashera found on pottery.

It seems that none of these signs were a part of a local Canaanite administrative system, none relate to either Akkadian or Egyptian script, and none is connected with commercial activities of branding.

## A land of many scripts?

The number of texts from the Middle and Late Bronze Age southern Levant (ca. 1950-1150 BCE) appears impressive at first. There are more than 140 Egyptian hieroglyphic and hieratic texts (not including scarabs); 61 cuneiform texts (including seals); 6 Hittite hieroglyphic texts (mostly on seals); 17 (Proto-) Canaanite texts; 2 examples of Ugaritic script; and 2 examples of Aegean script<sup>1</sup>. Contrary to the cultures of Egypt, Syro-Mesopotamia and even the Aegean, the 2nd millennium BCE culture(s) of the southern Levant did not use script frequently<sup>2</sup>. Cuneiform or Egyptian hieroglyphs were never used for regular administrative purposes in the Canaanite palaces. Cuneiform inscriptions are a very rare find in Middle Bronze Age contexts (ca. 1950-1550 BCE), consisting of only three inscribed cylinder seals and a total of ten documents – eight of which are from Tel Hazor, which belonged culturally to the Syrian sphere. The same goes for sealings on bullae, with the exception of the moat deposit at Ashkelon, connected with Egyptian

<sup>1</sup> Horowitz and Oshima 2006: 5; Sparks 2013: 75-76.

<sup>2</sup> Shai and Uziel 2010.

activity at the site<sup>3</sup>. During the Late Bronze Age (ca. 1550-1200 BCE), cuneiform was still not used for administrative purposes in most sites, with the exception of Hazor, but rather mainly for epistolary purposes, that is, for correspondence involving Egyptian officials, Canaanite governors and the Egyptian court. This is especially evident in the largest cuneiform collection in Late Bronze Age Canaan, found in Ta'anach and dating to the 15th century<sup>4</sup>, and in the vast corpus of 14th century diplomatic correspondence between numerous Canaanite rulers and the Egyptian court found at Amarna<sup>5</sup>. When Egyptian hieroglyphs were used in Canaan it was mostly by the Egyptian administration of the province, with the most conspicuous examples being inscriptions on stelai and on architectural features in Garrison sites such as Beth Shean and Jaffa<sup>6</sup>. Hieratic ostraca found at sites in southern Israel are connected exclusively with Nineteenth and Twentieth Dynasties Egyptian administration<sup>7</sup>. Ugaritic inscriptions found on only two objects – a metal blade and an axe model – are not connected with any administrative activity<sup>8</sup>. Lastly, Hittite inscriptions on seals and rings, mentioning Hittite owners, were associated, perhaps, with envoys traveling between Hatti and Egypt<sup>9</sup>, further emphasizing that the presence of inscribed finds in Canaan should be attributed to Canaan's location at the intersection between the great powers in Mesopotamia, Anatolia and Egypt, rather than to the activities of local scribes.

The (Proto-) Canaanite alphabet, invented by Canaanites as a result of contact with the Egyptian hieroglyphic tradition, has a most curious trajectory in the second millennium. Although present from the very beginning of the Middle Bronze Age, as indicated by the Wadi-el Hól and Serabit inscriptions of the 20th and 19th centuries BCE, it was exclusively limited to short inscriptions of personal commemoration<sup>10</sup>. During the Late Bronze Age, short inscriptions on pottery sherds became slightly more common, yet they amount to fewer than twenty, and none seems to be an economic document<sup>11</sup>.

This reality of very limited literacy, on the one hand, and a relatively high exposure of the illiterate to various non-local scripts and symbols, on the other hand, resulted in a plethora of non-scribal uses of symbols. It seems that none of these signs was a part of a local Canaanite administrative system; none relates to either Akkadian or Egyptian script; and none is connected with commercial activities of branding. Rather, these signs had roles in relaying messages of personal nature as well as propagating common belief systems. The following examples do not profess to constitute an exhaustive list of examples of the use of signs, but rather the signs are presented as representatives of several categories connected with the behavioral pattern of marking objects and of the proposed meaning of each category.<sup>12</sup>

<sup>3</sup> Horowitz and Oshima 2006: 10-15; Stager *et al.* 2008: 224; Yasur-Landau *et al.* 2016.

<sup>4</sup> Horowitz and Oshima 2006: 139-142; Rainey and Notley 2006: 76.

<sup>5</sup> Rainey 2015.

<sup>6</sup> Ben-Tor 2016: Figs. 19, 22, 23, 27, 30.

<sup>7</sup> E.g. Goldwasser 1982, 1984.

<sup>8</sup> Sanders 2006.

<sup>9</sup> Gilan 2013.

<sup>10</sup> Darnell *et al.* 2005; Goldwasser 2010.

<sup>11</sup> Finkelstein and Sass 2013.

<sup>12</sup> The current article addresses signs found in land excavations. The important set of signs found on objects from underwater excavations and surveys, such as copper and tin ingots as well as anchors (e.g., Galili *et al.* 2012) deserves a treatment as a special set of symbols connected with trade, and will be discussed in a separate article.

## Inscribed weapons and tools

Two Anatolian examples illuminate the use of inscribed weapons. The inscription may refer to the ownership of the weapon. This is the case of the dagger or spearhead found in an official storage building in Kanish/Kültepe Karum Stratum Ib in 1954, inscribed in cuneiform, stating that it belonged to the *palace of Anitta, the king*, who reigned in the 18th century BCE<sup>13</sup>. In more rare cases, weapons were inscribed with short biographies of objects and their owners: thus, a 15th century BCE Mycenaean-style long sword found at Hattusa, the Hittite capital, bears the inscription «As Tudhaliya the Great King shattered the Assuwa-Country he dedicated these swords to the Storm god, his lord»<sup>14</sup>. This cuneiform inscription connects the object – which was no doubt exotic looking to the spectator – to two of the deeds of the Great King Tudhaliya: one is his military victory in Assuwa, possibly Classical Lydia, and the other is a pious act of dedication to the Storm God.

A rare example of the use of script to render ownership is seen in Canaan on a bronze dagger from Tomb 1502 at Lachish, dated to the MB II. It is inscribed with a four-letter (Proto-) Canaanite alphabetic inscription reading «xRNx» – possibly the owner's name<sup>15</sup>. This example is consistent with other uses of (Proto-) Canaanite script in the context of personal commemoration, such as the inscribed ewer from Lachish, mentioned below. Another example of an inscribed weapon comes from the LB II Canaanite tomb at Tel Dan, denoted as the «Mycenaean Tomb» for the large amount of Mycenaean imports found in it<sup>16</sup>. A spearhead found in it is inscribed with two signs that have not yet been deciphered, but are clearly not simply decorative motifs. They may imitate Akkadian script<sup>17</sup>. The use of script in this case may indicate ownership in the context of an elite burial.

There were also attempts to personalize weapons without using script, but rather by applying incised decoration to the weapon after its production. Such is the case of dagger blades decorated with intricate geometric patterns, found in the double pithos burials at Tell es-Sa'idiyeh, dating to the transition between the Late Bronze and Iron Ages<sup>18</sup>. Another example is a dagger decorated with an incised palm leaf motif found in a 12th century context at Giloh (Fig. 1)<sup>19</sup>. During the Iron Age, inscribed weapons became more common, as indicated by the inscribed Iron IIa arrowheads from el-Khadr, Ruweise and elsewhere<sup>20</sup>. Besides these examples of letters or signs used by Canaanites to indicate ownership, there are Late Bronze Age examples of inscribed tools or weapons belonging to other traditions: the contemporaneous Ugaritic tradition of inscribing tools and precious objects to mark ownership is evident in a bronze adze found in a hoard in the house of the High Priest, inscribed with *hrznrbkhnm* «adze of the high priest»<sup>21</sup>. This

<sup>13</sup> Macqueen 1986: 21, Fig. 11; Özgüç 1999: 123, 126-127, Pl. 107: 1a-c.

<sup>14</sup> Hansen 1994; Cline 1996.

<sup>15</sup> Sass 1988: 53-54, Fig. 141.

<sup>16</sup> Ben-Dov 2002: 36.

<sup>17</sup> Ben-Dov 2002: 123, Fig. 120.

<sup>18</sup> Tubb 1998: Fig. 66; 2000: Fig. 9.12.

<sup>19</sup> Mazar 1990: Fig. 4.

<sup>20</sup> Sass *et al.* 2015: 238, 241.

<sup>21</sup> Schaeffer 1956: Figs. 229-233.

tradition is represented in Canaan as well, as demonstrated by the Ugaritic inscription on a bronze knife found in Naḥal Tabor (= KTT 6.1). It is inscribed with a personal name and a patronym:

*lš[l]bšl bplš bšl* (belongs) to Šillibaal son of Pilšibaal<sup>22</sup>.

A hoe inscribed with two possibly Cypro-Minoan signs, found among a Late Bronze Age sunken ship cargo at the site of Hishulei Carmel, is indicative of the mechanism through which some inscribed objects reached Canaan, aboard a ship<sup>23</sup>.

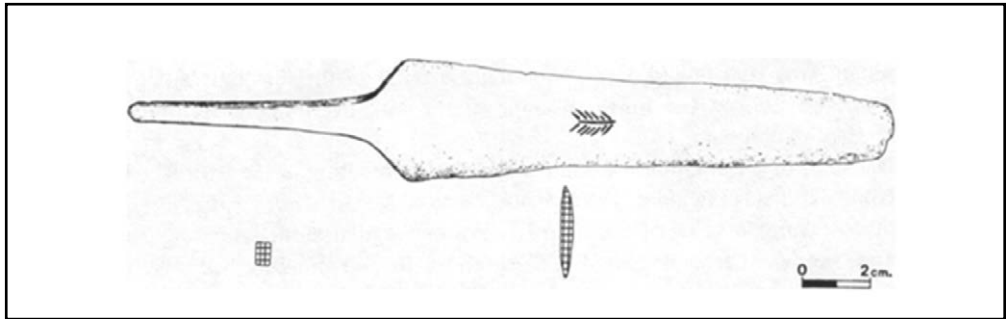


Fig. 1. An Iron I dagger from Giloh (Mazar 1990: Fig. 4)

### Artisans' marks

Megiddo Ivories nos. 21, 24 and 26 are plaques that were intended as inlays for luxurious furniture (Fig. 2).

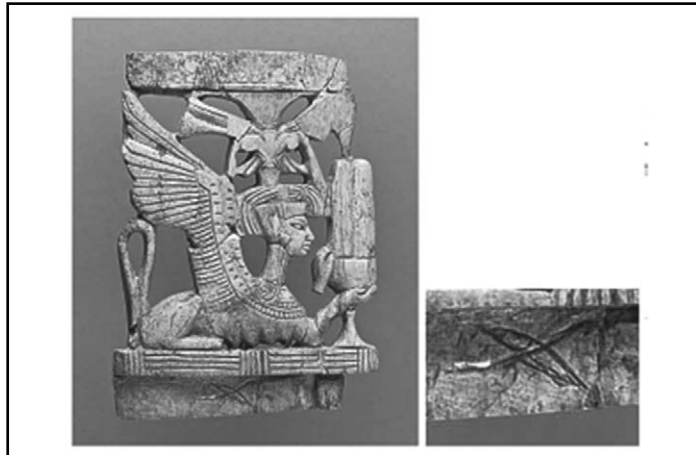


Fig. 2. Megiddo Ivory no. 21, after Finkelstein and Sass 2013: no. 58a. Usage of photo courtesy of the Oriental Institute, University of Chicago

They were elaborately carved in Egyptianizing style; one shows a sphinx and the other two show Bes figures. The ivories were found in the «Treasury» of the stratum VIIb

<sup>22</sup> Sanders 2006: 163-166.

<sup>23</sup> Galili et al. 2012: 11-12.

palace, violently destroyed in the 12th century, but they were likely manufactured as early as the 13th or even 14th century BCE. The lower socket of each of the plaques is incised with a different sign. While these were thought at first to be Proto-Canaanite letters, they do not conform to this script. Rather, these signs likely marked the place or order in which the plaques were to be inlaid into the furniture; they would be invisible once the furniture was assembled. Thus, these symbols were probably carved by the artisans who made the objects or by those artisans who later dismantled the furniture and saved the plaques for future reuse<sup>24</sup>.

Another example of signs made by artisans are two 13th century BCE molds for standing nude female figurines found in two adjacent work areas at Deir el-Balah (Fig. 3).

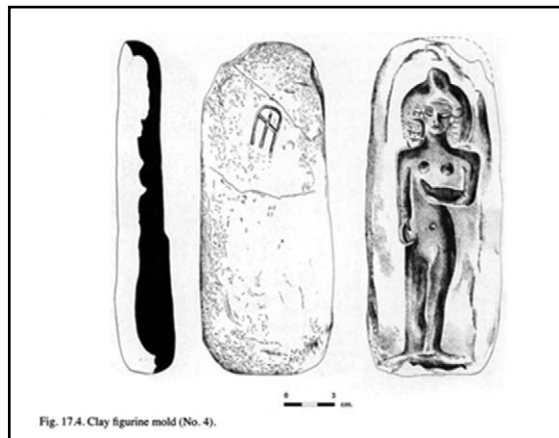


Fig. 3. Deir el-Balah figurine mold; after Dothan and Nahmias-Lotan 2010: Fig. 17.4

The molds, made in Egyptian rather than Canaanite style, are very similar and would have produced very similar figurines. Despite their resemblance, each mold was marked with a different sign, probably indicating that each was produced or used by different artisans<sup>25</sup>. These may have been either Canaanite or Egyptian artisans that worked in the Deir el-Balah Egyptian garrison.

### Scarab stamps on loomweights and jar handles

Scarab-stamped loomweights are well known in Middle Bronze Age Levantine contexts at sites such as Kabri, Ta'anach, Megiddo, Tel Nami and Gezer<sup>26</sup>. The largest collection of such stamps comes from the MB II palace and residential quarter of Tel Kabri. Six of 73 loomweights found at the site bear scarab impressions; of these one was impressed by a Twenty-second–Twenty-third Dynasty scarab<sup>27</sup>. While Kempinski attributed an administrative significance to these stamps, arguing that they marked the ownership

<sup>24</sup> Loud 1939: nos. 21, 24, 26; Novacek 2011: 53; Finkelstein and Sass 2013: 156 note 23, 217-218.

<sup>25</sup> Dothan and Nahmias-Lotan 2010: Fig. 17.4, 17.5.

<sup>26</sup> Goshen *et al.* 2013, with references to sites.

<sup>27</sup> Oren 2002: Fig. 10.8-11; Mizrachi 2002: 338-339, Fig. 9.5.

of the loom, stamped by local officials<sup>28</sup>, the practice of stamping seems to have been anything but uniform or methodical. The stamped loomweights share no common traits in terms of size or weight, and even the location of the stamp differs between one loom weight and another. The weights were found in both palatial and residential contexts, and the spatial use patterns of scarabs in Kabri, and likely in other sites, indicates that they were used for amuletic rather than administrative purposes. This notion is strengthened by the common occurrence of scarabs in Middle Bronze Age tombs as personal items and by the extreme rarity of bullae, discussed above<sup>29</sup>. In the absence of evidence connecting stamped loomweights with any form of administrative practice, the scarab impressions may be better described as a personal, *ad hoc* expression of the identity of the producer of the weight. The practice of stamping loomweights may be associated with scarab stamps on jar handles, which is also a well-attested phenomenon in the Middle Bronze southern Levant, as demonstrated at Tel Akko<sup>30</sup> and Megiddo<sup>31</sup>. Alongside these sporadic occurrences of scarab-stamped weights and handles, there is no indication of a regulated stamping system of the type and extent represented later by the stamped Iron Age IIB *lmlk* jars<sup>32</sup>. It seems that, in the Middle Bronze, potters would express their identity by spontaneously pressing their personal scarabs into the clay before it had dried. The assertive pronunciation of self-identity through pottery may also be identified in the phenomenon of thumb prints that sometime appear alongside incised lines on LB II storage jars handles from Megiddo, Beth Shean, Palmahim and Tell Abu Hawam. These impressions do not seem to have a functional purpose, making the thumb print an unmediated expression of self-identity of potters, who used a thumb instead of a seal to leave their mark<sup>33</sup>.

### Potmarks

Pre- and post-firing potmarks were quite common in Canaan during the Late Bronze Age, and appear on both local and imported vessels. A list of these marked vessels composed in 2004 includes 23 Mycenaean vessels, a Cypriot one and less than a hundred local vessels<sup>34</sup>. This list grows rapidly with the publication of new excavations<sup>35</sup>. It is beyond the scope of this paper to deal with all aspects of this complicated topic, which likely reflects several local and non-local marking practices. Instead, I will refer here to two distinct cases: the first is a group of signs found on imported Mycenaean and Cypriot pottery and, more rarely, on Canaanite Amphorae, which may relate to Late Cypriot II–III marking practices. The second is a group of painted signs related to Late Bronze Age Canaanite cultic symbolism. A small percentage of Mycenaean pottery imported to the Levant was marked with post-firing Cypro-Minoan and related signs. These include examples from

<sup>28</sup> Oren 2002: 372.

<sup>29</sup> Ben-Tor 2010; Goshen *et al.* 2013.

<sup>30</sup> Beeri 2008: 330.

<sup>31</sup> Loud 1948: Pl. 164:8.

<sup>32</sup> e.g., Lipschits *et al.* 2010; Ussishkin 2011, with literature.

<sup>33</sup> Martin 2013: 382–383.

<sup>34</sup> Hirschfeld 2004: 102.

<sup>35</sup> E.g., Cross and Stager 2006; Panitz-Cohen 2006: 188; Hirschfeld 2007.



Deir el-Balah<sup>36</sup>, Tell Abu Hawam<sup>37</sup> and Lachish<sup>38</sup>. Such marks on Mycenaean pottery on Cyprus and in Ugarit and the Levant led Hirschfeld<sup>39</sup> to assume that Cypriots played an important role in the trade of Mycenaean pottery. She suggested that some vessels may have traveled between Cyprus and the Aegean more than once<sup>40</sup>. This opens up the possibility that at least some of the Mycenaean vessels marked with Cypro-Minoan signs were recycled objects, refilled on Cyprus and reshipped to the Levant<sup>41</sup>. A Canaanite amphora handle found at Aphek<sup>42</sup> may be evidence of these recycling practices. While it was incised post firing with Cypro-Minoan sign no. 38; petrographic analysis demonstrated that the vessel itself was made in the Levantine Coastal Plain, somewhere between Tyre and Akko. It is therefore plausible that the amphora was exported first from Akko (or Tell Abu Hawam) to Cyprus, marked and then refilled and shipped back to the Levant.

Handmade and wheel-made plain white jugs are the most commonly marked vessel types on Cyprus<sup>43</sup>, but they are rather uncommon imports to Israel, especially when compared with White Slip I and II bowls and Base Ring I and II juglets and jugs of which many thousands were shipped there. The marks found on several of these vessels found in Canaan may indicate their initial use on Cyprus. These include an example of a plain handmade jug with a Cypro-Minoan mark from Tell Abu Hawam<sup>44</sup> and another jug from Tel Mor (Fig. 4), probably a plain white wheel-made ware, which is marked with an elaborate sign found also on Cyprus<sup>45</sup>. Another example of a mark on a Cypriot vessel is a simple «X» incised post firing on the handle of an imported Cypriot plain white handmade jug from Late Bronze Age Megiddo<sup>46</sup>.

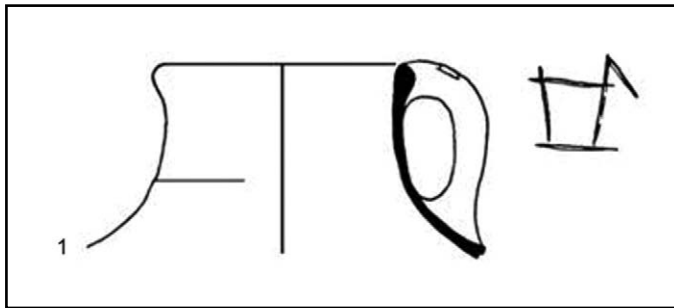


Fig. 4. A jug from Tel Mor stratum VII (Hirschfeld 2007: Fig. 6.1:1)

In contrast to these post-firing symbols made by the users of the vessels, a large group of Canaanite vessels present pre-firing painted symbols made by the potters, thus connected to a markedly different practice. The ibex and palm tree and related motifs connected with the sacred tree are the most common composite figural motifs on LB

<sup>36</sup> Dothan 1979: 12, 14 no. 15.

<sup>37</sup> Hamilton 1935: 53 Figs. 310A, 311.

<sup>38</sup> Tufnell *et al.* 1940: Pl. LXIII: 4.

<sup>39</sup> Hirschfeld 1993; 2004.

<sup>40</sup> Hirschfeld 1993: 313.

<sup>41</sup> Yasur-Landau 2005.

<sup>42</sup> Yasur-Landau and Goren 2004.

<sup>43</sup> Hirschfeld 2007: 184.

<sup>44</sup> Balensi 1980: Pl. 15: 311.

<sup>45</sup> Hirschfeld 2007: Fig. 6.1:1.

<sup>46</sup> Yasur-Landau 2013: Fig. 11.3:2.

I-III pottery from Canaan, continued into the early Iron Age. It often appears on vessel handles, sometimes in schematic form, resembling a «Union Jack» pattern<sup>47</sup>. The tree is often shown flanked by deer, gazelles and birds, as well as by other animals<sup>48</sup>. The connection of this motif to a Canaanite fertility goddess is depicted on two figurines of a goddess nursing two infants next to a palm tree, her thighs flanked by goats or ibexes. Examples for this were found at Tel Miqne-Ekron and at Aphek<sup>49</sup>. The connection of this motif to a Canaanite goddess of earth and fertility Elat/Athirat/Asherah, the consort of El, is evinced by an ewer (Fig. 5) from the 13th century Fosse Temple III, displaying two scenes of ibexes and trees with a (Proto-) Canaanite inscription below them mentioning that it was a gift to the goddess Elat<sup>50</sup>. The fact that Fosse Temple III was especially rich in finds displaying such ibex and tree iconography may indicate that it was a temple for the cult of this goddess<sup>51</sup>. I would suggest that the use of the schematic palm tree motif on the handles of Canaanite pottery, especially on jar handles, was an apotropaic use of the symbol of the goddess Elat/Athirat/Asherah meant to invoke her protection of the jar and its nourishing contents.

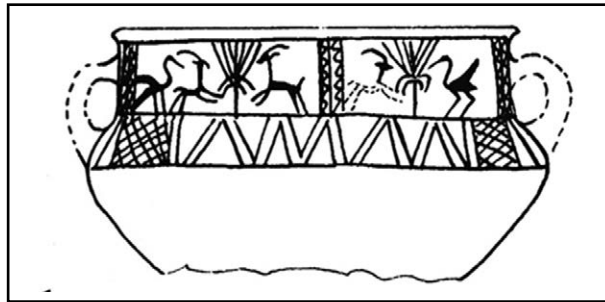


Fig. 5. Krater from Lachish, Fosse Temple III. After Tufnell, Inge, and Harding 1940: Pl. XLVIII: 250

### A land of many marks?

The marks discussed in this article do not belong to a single writing system, nor does their appearance conform with a specific pattern use. In fact, none of them seems to belong to any regulated writing or marking system and neither do they seem to follow scribal or administrative patterns that are designed to create uniformity. Rather, they present a variety of ways in which people conveyed messages through objects in the Middle and Late Bronze Ages. Many of the examples presented here are connected with the manifestation of the self by informal, non-systematic marking of items such as pottery vessels and loomweights. Non-systematic practices of pre-firing marking on pottery are found also in Middle and Late Bronze Age Anatolia, where they also seem to be unconnected to any practice of production regulation. It does not even seem as if potters were marking their wares to differentiate them from other potters' wares, as

<sup>47</sup> Choi 2016: 241.

<sup>48</sup> Keel and Uehlinger 1998: 56-58; Yasur-Landau 2008: 215-216.

<sup>49</sup> Keel and Uehlinger 1998: 73-74, 75, Fig.82; Guzowska and Yasur-Landau 2009: 389.

<sup>50</sup> Keel and Uehlinger 1998: 72; Choi 2016: 121-122, 241.

<sup>51</sup> Tufnell et al. 1940: Pl. XLVIII B, 249-251.

marked vessels comprise only 10-15% of vessels at the Anatolian sites with the highest frequency of marks<sup>52</sup>.

Other non-systematic marking practices are those enabling owners to recognize their property among similar items, such as the marks made on imported Cypriot and Mycenaean vessels. In other cases, high-valued items, such as weapons or tools, were marked to personalize them. Finally, the non-systematic markings presented here are apotropaic symbols protecting the vessels they appear on. As such they are connected with notions of the potter's piety that are transferred to the clients who use the vessels.

The combination between non-systematic and personal expression, separated from formal scribal traditions, opens a window to the unexplored world of symbolic behavior practiced by non-elite individuals in Bronze Age society. An extreme example of symbol making as an individual's personal manifestation is the tale of the king-to-be David, entering the Philistine city of Gath, pretending to be mad and marking the gate of Gath («And he changed his behaviour before them, and feigned himself mad in their hands, and scabbled on the doors of the gate, and let his spittle fall down upon his beard» 1 Samuel 21:13 KJV). In the original Hebrew, the verb used to describe «scabbled» (גָּרַר) is related with the letter *tav*, which had the form of a simple X in Iron Age Hebrew and Phoenician, and was indeed the most common sign incised on pottery in the Bronze and Iron Ages. One can easily imagine how this attempt to personalize the huge doors of the city gate in the same manner one would mark personal mobile property was considered an act of lunacy, crossing the boundaries between the private and the public or official<sup>53</sup>.

We should see the use of signs in 2nd millennium Canaan as stemming from a reality in which several forms of writing were present and used on a small scale, with none being dominant or even fairly visible to the non-elite populace<sup>54</sup>. This created a curious situation: while script was very rarely used by either elite or commoners, the notion that abstract signs could be used to manifest ideas was widespread. At the same time, the apparent disinterest of Canaanite rulership in administrative practices left the general population with abroad creative license. The local population, as well as merchants and other foreigners frequenting Canaan, was free from the strict conventions of scribal schools. At the same time, the lack of government commitment to a single script contributed nothing toward any formalized uses of signs. The Canaanite were also not burdened by a central authority aiming to control sealing practices or to formalize marking on vessels designating container volume. This allowed considerable segments of the population to experiment in mark-making. It seems that potters and other artisans, merchants and indeed anybody that had an item they liked and held a sharp implement made their mark without hesitation, demonstrating their connection to the object they possessed or created. To my mind, this approach, connecting sign making with personal expression, unhindered by the rulership's control over these practices, resulted, in the Iron Age, in a widespread use of the alphabet script that was not restricted by official administration

<sup>52</sup> Glatz 2012.

<sup>53</sup> In more recent fiction, the wizard Gandalf, making his mark on Bilbo Baggins' door in Tolkien's 1937 *The Hobbit*, is met with a the rage of the Hobbit over his defaced property. To add insult to injury, it turned out that the sign signified Bilbo as a burglar looking for a dangerous job. Like the signs of the Bronze Age Levant, here too, the interpretation is context related and requires prior knowledge.

<sup>54</sup> Shai and Uziel 2010.

or government sanctioned activities<sup>55</sup>. We come, therefore, full circle with the use of alphabet letters as potter marks, indicating the swift dissemination of this system of writing among the non-elite populace<sup>56</sup>.

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<sup>55</sup> Rollston 2010.

<sup>56</sup> Shai and Uziel 2010: 78.

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# Predynastic Egyptian iconography: Contributions and relations with the hieroglyphic system's origin

*Gwenola Graff*

**Abstract:** Roots of ancient Egyptian hieroglyphic writing system can be found during the 4th millennium, in the iconography. Iconography seems to contribute to the invention of writing at the end of the Naqadan culture. Different types of iconographic supports are included in this contribution: Decorated Ware, «powerfacts» (like palettes, maceheads, combs, knife handles), potmarks and ink inscriptions. In the Egyptian context, images maintain a close relationship with writing signs and the boundaries between both are tenuous. In their monumental form, called «*medou netcher*» in Egyptian tongue, that is to say «divine words», the hieroglyphs never lose their iconographic character and their iconicity. In this particular context, this article would explore how and how far the iconography of the 4th millennium contributes and prepares the emergence of writing. And why they are not themselves writing.

Since the end of the 4th millennium BCE, a complex writing system using pictorial, Sphonic signs and classifiers was elaborated and used in the Egyptian Nile valley. Immediately after its invention, it seems that the system quickly spread to the urban centers of the country and soon its employ became widespread. We know its durability, too, because, *mutatis mutandis*, it will remain in use until the Roman period: the last inscription is dated to the 5th century A.D. This paper will discuss rather its genesis, the context in which it was created and the reason(s) which led to its finished form: for it did not issue from an accounting system for goods or cattle (like cuneiform writing in Mesopotamia), nor from divinatory practices (like scapulomancy in China), or a calendar system (as some Mesoamerican script). One other particularity of the Egyptian hieroglyphic script, which is very important if we are to understand the mechanisms underlying its creation, is its very pronounced iconic character which continues throughout all its history.

## Appearance of writing in Egypt and its rapid dissemination

Most scholars agree that the first hieroglyphic inscriptions are represented by the little labels made of bone, ivory or ebony found close to storage containers in the U-j tomb in the Umm el-Qaab necropolis in Abydos. This tomb of the king Scorpion (III) was discovered in 1988 by the team of the German archaeologist Gunter Dreyer. These labels, squares or rectangles a few centimeters across, are perforated in one of the

upper corners and each bears one or more signs incised on a flat surface. The signs can be divided into two categories: on the one hand, there are numeric signs – the first attestation of a mathematical counting system<sup>1</sup>, and on the other, signs which appear to be the first hieroglyphs. Their reading continues to be debated. When discovered, Dreyer thought that they were royal names<sup>2</sup>, but others scholars prefer to read them as toponyms, in particular the names of towns which had contributed their gifts or tributes to the equipment of the royal tomb<sup>3</sup>. Later, Dreyer<sup>4</sup> modified his interpretation and gave greater importance to the names of the royal establishments that had contribute to the royal equipment.

The incised inscriptions are very short, probably corresponding to one word per label. Some signs already bear the phonetic values that are later known, while others are used like pictograms. No classifiers are present: these only appears ca. 150 years later, during the 1st Dynasty. Archaeologists have found fewer than 200 labels in U-j tomb, including both numerical and hieroglyphic items. Some inscribed signs appear only once, others more frequently<sup>5</sup>. Their classification reveals different categories of represented *realia*, the result of intentional choices made by the first scribes. So we find few human representations (4 examples; male only), different species of wild animals, isolated horned-animal heads, different species of birds, one possible fish, three snakes and three scorpions, plants, signs related to the environment (sky, mountain, water points), buildings or outdoor structures, boats, a siege scene(?), a sign interpreted by G. Dreyer as a piece of cloth, and some signs that resist interpretation.

Very succinct in the beginning, the system quickly becomes more elaborated with a multitude of new signs<sup>6</sup>. The 51 signs at the beginning will double during the reigns of the two first kings of the 1st Dynasty, Narmer and Aha, and the creation of new signs continues during the reigns of their successors, Djer and Djet. Afterwards, the number of signs decreases, becoming stabilized and harmonized during the reign of Djoser in the 3rd Dynasty. Summing up, during Early Dynastic period (1st and 2nd Dynasties), the corpus consisted of around 900 signs, and more than 1.000 signs in the middle of the 1st Dynasty. This number is not very much much larger than the 700 signs traditionally recognized during the Old Kingdom. There would be 1500 to 2000 signs at the end of the Old Kingdom<sup>7</sup>.

We shall doubtless never know if the principle of writing was invented by an individual person or within a small group. Nevertheless, archaeological discoveries demonstrate that the idea was very quickly adopted after its invention. Hieroglyphic writing was born in Abydos, probably in the royal residence, but surely in the royal necropolis. One hundred years later, during the reign of Iry-Hor (end of the Dynasty 0), we find inscriptions in South Cairo, in Zawiyet el-Aryan; during the following reign of Sekhen/Ka, we discover inscriptions there and in Tarkhan (Cairo region) and in the Eastern Delta (Tell Ibrahim Awad) as well.

<sup>1</sup> See Graff 2016.

<sup>2</sup> Dreyer 1998.

<sup>3</sup> O'Connor 2009.

<sup>4</sup> Dreyer 2011: 134.

<sup>5</sup> See the sign-list in Dreyer 1998: 183-187.

<sup>6</sup> See Regulski 2010.

<sup>7</sup> After Collombert 2007.

During the reign of Narmer (beginning of the 1st Dynasty), inscriptions are found not only in the Luxor and Cairo areas and the Eastern Delta, but also in the Egyptian establishments in the Palestinian region<sup>8</sup>. In just 150 years, this new tool demonstrably circulated and was adopted in ever larger circles. Writing had become a tool of royal power, in the hands of an administration which issued from the ruling elite.

### Accounting systems before and contemporary with writing

Accounting *per se* does require the development of a writing system. Accounting systems existed before writing's creation and the use of writing did not make them immediately disappear.

The first system was based on the cylinder seal. This object is not an Egyptian invention, but was introduced from Mesopotamia before the end of Naqada II, before the creation of the writing system. The oldest cylinder seals are engraved with motifs from Mesopotamian tradition, especially the Master of the Animals motif. The Egyptians quickly adapted its iconography and replaced Mesopotamian themes by others of their own<sup>9</sup>. The seals were used to mark containers (e.g., vases, baskets, boxes), affixing the owner's mark to the container while also ensuring that they were not previously opened. Soon after the invention of writing, script was added to the seals, in particular the name of the supplier of the goods and their nature.

Another way to mark containers of foodstuffs is to incise signs on the body or shoulder of pottery before firing – so-called «potmarks» – a practice that existed in Egypt since Naqada I. Of course, this marking way stay fixed whatever are the jar's contents. Potmarks appear sporadically from Naqada I to early in Naqada III, and become more numerous during the dynasties 0 and 1<sup>10</sup>. They are most common during the second half of the 1<sup>st</sup> Dynasty. From the reigns of Andjib and Semerkhet, they quickly decrease in number until they all but disappear from the archaeological record<sup>11</sup>.

Like the U-j tomb's labels, the potmarks are composed of 1 to 4 signs, with more than half being with 2 signs<sup>12</sup>. Until now, we understand what the potmarks are *not* indicating rather better than what they do mean: they do not give the contents of storage jars, nor the quality of foodstuffs, nor provenance, nor indicate the original owner of the vase nor of the tomb in which it was deposited. Hence, this system is still almost entirely mysterious.

Closely related to potmarks are ink-marks traced on the shoulder or body of storage jars but inked after the firing of the pots. They appear at approximately the same time as writing, continue until the end of the 3rd Dynasty and then, more sporadically, during the rest of the Old Kingdom.

The U-j tomb contains both incised labels and ink-marks on pottery. The marks differ not just in having different supports and technique, but in the signs represented on them which show strong disparities. Some of the ink-marks never appear on labels (and *vice versa*), and moreover are not prototypes of later known hieroglyphs. Some signs appear

<sup>8</sup> Tables of diffusion: Kahl 2001: 109-110, fig. 5 à 8.

<sup>9</sup> Hill 2016.

<sup>10</sup> Van den Brink 1992: 265.

<sup>11</sup> For a synthetic presentation of the types of the jars and their provenances, see Kolinski 2003: 85-86.

<sup>12</sup> Van den Brink 1992: 276, note 5.

only as ink-marks and on no other supports. Even the *realia* (for example, scorpion or bird) which do appear on both ink-marks and labels are not close in their schematization's pattern<sup>13</sup>. This led the scholar I. Regulski<sup>14</sup> to consider ink-marks as an independent and autonomous graphic-support category. For her, ink-marks are not writing. Three arguments support this hypothesis:

1. The almost complete absence of parallels on other writing supports.
2. The very short inscriptions and very limited sign list.
3. The notation system seems not be phonetic.

Thus, while cylinder seals, potmarks and ink-marks could all serve in an accounting system, they are not writing.

### Other contributions (D-Ware and «Powerfacts» = Objects of Power) and the iconographic environment during the 4th millennium

In contrast to what we believe to be the context from which cuneiform writing arises in Mesopotamia, writing in Egypt does not evolve from an accounting system, although it is closely related to the management of surpluses and the importation of luxury products. «... la répétition du graphème pictural hautement motivé qui renvoie au signifié a pu créer une «image-concept» stable implantée dans l'esprit du lecteur.»<sup>15</sup>. Figurative and non-arbitrary, hieroglyphic writing has its roots in the iconography of the millennium before its emergence<sup>16</sup>. This justifies a short excursus into the development of the iconography during the 5th and 4th millennia BCE in Egypt.

#### *a. Synthesis of iconography on all supports during the 5th and 4th millennia BCE*

The first occurrence of figurative images in the lower Nile's valley is dated from the Late Palaeolithic, with the rock art of Qurta and Wadi Abu Subeira<sup>17</sup>. The first three-dimensional representation is known from the site of Merimde Beni Salame, in the Western Delta, around 6.000 BCE in the shape of a human head pinched out from a ball of clay.

However, it is with the **Badarian** Neolithic culture in Middle Egypt that we began to find varied and plentiful iconographic production. This culture, dated to the end of the 5th millennium is a culture of farmers and cattle breeders, and sometimes hunters and fishermen. We know it mostly from funeral material placed in graves. In this funeral context were found some female statuettes and animals representations. The statuettes are made from clay, except for one in ivory (British Museum EA59648). They represent standing women, nude, more or less stylized. The animals representations occur in ivory and bone.

Badarian ceramics, frequently red with black rim («Black-topped Ware»), were sometimes decorated with fishbone or hatched motifs. One vase has an applied figure, though it is uncertain if it is a human or animal figure.

<sup>13</sup> Regulski 2008: 986 et fig. 1.

<sup>14</sup> Regulski 2008: 990-991.

<sup>15</sup> Goldwasser 2009: 350.

<sup>16</sup> See Graff and Jimenez Serrano 2016.

<sup>17</sup> Huyge 2009; Kelany 2015.

The **Naqada I** culture follows the Badarian (after ca. 3,900 BCE), without any evidence for a sharp break but extending further into Upper Egypt. No settlement dating from Naqada I has been excavated, with only a few archaeological tests having been made. Hence, the Amratian period (another name for Naqada I) is known only from funeral contexts, in all some 20 necropoleis, dotted along the Nile, in the borders of the cultivable valley, from Matmar in Middle Egypt in the north, to Hierakonpolis, in Upper Egypt, in the south. There is little evidence for social hierarchy.

Part of the funeral material are the painted vases named White-Cross lined Ware. The ceramic is divided into two types, corresponding to two periods: red ceramics with white decorations, dated from Naqada I to IIa-B, the White-Cross lined Ware (C-Ware); and pinkish beige with red and brown decoration, dated from Naqada IIC-D, and perhaps IIIA, called Decorated Ware (D-Ware). Until now, there are around 800 painted vases, whether complete pots or sherds<sup>18</sup>. Of the complete vases, fewer than 15% are C-Ware, the rest D-Ware. Predynastic painting is mostly known from this vase decoration with rare human representations and no female images.

On the other hand, female representation exists on *ronde-bosse* (sculpture in the round), carved in ivory or bone or made of clay. The females are depicted nude and generally standing. Stone carvings, still of small size, are also known from Naqada I and later. Volumes are simplified and geometric and the accent is generally on the face and, especially, the beard (long and pointed). Most of these figures seem to wear long pleated or straight coats, which fall to the feet. If the triangular beard is not yet the narrow false beard of the Pharaoh, it seems undeniable that it is already a metaphor of male power<sup>19</sup>.

The iconography of violence seems very important in Naqada I. In addition, hunting scenes appear on a number of incised or painted vases and animals also appear, for example, on grinding stones (square during the Badarian period, and later zoomorphic: e.g. in the shape of tortoises, tilapias, elephants or Barbary sheep [British Museum EA36368]).

The iconographical choices in Naqada I attest to a valorisation of wild fauna and, in particular, of Nilotic fauna. The African megafauna (elephants, ostriches, and felines) were still present in the Nile valley during Naqada I, but later withdrew southward. Yet, some tombs with young male elephants found in Hierakonpolis<sup>20</sup> attest that occasional pachyderms, usually young males between 10 and 12 years, presumably rejected by the herd, were found in Upper Egypt during the beginning of Naqada II.

The fauna is of great importance, not only as representations but also for raw materials, with ivory, above all, from the hippopotamus, and bone predominating. Clay is an important material too, while stone still plays a secondary part. At this time, carving in low relief is non-existent and high relief very rare.

Among human representations, male and female images are at opposite poles. While men are marked by their triangular beards, women are naked, and with no other attribute than their nudity. Men and women are never represented together on the same artefact but are isolated. This isolation of figures, which don't interact with each other, is characteristic of Amratian iconography. The subject exists by itself in splendid isolation.

<sup>18</sup> For a complete and recent study of painted vases, see Graff 2009; or more concisely, Graff 2016b.

<sup>19</sup> Hendrickx and Eyckerman 2011: 531-532.

<sup>20</sup> Friedman 2004.

In those cases where several elements are present, as on vases or elements fixed to walls, they are simply juxtaposed one next to the other.

During **Naqada II**, we find the development of more complex social organization and the emergence of new social stratification. Some graves in necropoleis are bigger than others and filled with rich and plentiful equipment. Sometimes, the rich tombs are grouped together in a special place for the elite, as in Hierakonpolis, locality 6. One can now speak for the first time of a monumental architecture, albeit built of wood, wattle and daub.

This is the content in which we must place Naqada II iconography. In the earlier stage, male representations are still pictured with triangular beards, as during Naqada I. But this model of masculinity signification eventually disappears and is replaced by a virility iconography (so to speak) which emphasizes the male sex organ and penis sheath. Female figurines in the round are increasingly pictured with bird-like heads.

A unique group of representations, which dates from the beginning of this period (Naqada I-IIAB), was found in Tomb 100 at Hierakonpolis<sup>21</sup>, a tomb discovered by the English archaeologist F.W. Green in 1897/1898. After 1899, its location was lost and the painted wall, which had been removed, was destroyed while being transported to London; a few surviving fragments are now in the Egyptian Museum in Cairo. The whole painting is known only from drawings made at the time of discovery. The main panel, about 4.5 m long, covered the south-western wall of the tomb. A wall divided the burial chamber and was decorated, too. The decoration centres on five large boats arranged in a central band. Around them were many smaller sequences, with humans and animals (antelopes/gazelles, lions, bull), picturing events in the hunt and war. Such images (and, especially, scenes of human confrontations) are uncommon during this period, becoming more common in Naqada III.

There is no break between Naqada I and Naqada IIA and B (perhaps emphasizing the artificial character of these cultural archaeological subdivisions). The iconographic division comes with Naqada IIC and D, when new supports, techniques and themes are introduced. For example, the iconography of violence that we saw in Naqada I, now fades into the background. The artists switch from sculpture in the round (*ronde-bosse*) to low relief. Iconographic themes are reduced, or concentrated, but the subjects are no longer isolated. The combinations of subjects on the same artefact and the rules governing these associations seem to indicate new importance given to common objectives, super-individuals, and to interactions. Animals, whether wild or domesticated, seem to be now only represented in connection with their relationship to humans.

During the second part of the period, the male figure takes the initiative in action among hieratic but passive women and, sometimes, ferocious but dominated animals.

In the next phase, **Naqada III**, painting on vases disappears and the new supports are chosen to express complex scenes. These are the new «Powerfacts», prestigious objects on which the images become more important than whatever was the primary function of the object. Such objects are characteristic of Naqada III and, even more so, the 1st Dynasty, after which they essentially disappear.

Sculpture in the round (*ronde-bosse*) becomes standard. There was also a notable development of stone vases and stone statuary. Images of the reigning king is the most

<sup>21</sup> Case and Crowfoot-Payne 1962.

important icon. He is shown wearing the crown and other *regalia*, which become part of the visual vocabulary of kingship. Monumental architecture, now built of bricks, is constructed for the king and his very close entourage. Brick-built mastabas, enclosed by thick walls with the distinctive paneled construction, that probably imitate the façade of palaces – of which we know regrettably nothing.

These new tendencies, which appear in Naqada III, are centred on the key character of the king. We recognize the same tendency in related themes.

The first point is the importance of dynastic memory. Royal activities are the measurement of time's division. This is the first relative chronological system developed by Egyptians.

A second point is the frequency and importance of representations of foreigners and captives, a theme almost unknown earlier. Frequently, the captives are foreigners who were taken prisoner by Egyptian troops during a *razzia* or military clash.

Naqada III is time when Egyptian civilization extends from North (Sinai and Palestine) to South (Lower Nubia). It seems likely that this expansion was motivated by the predynastic kings' desire to control sources of exotic and precious raw materials. Thus, when not pictured as prisoners, foreigners are represented as offering tribute. The raw materials coveted by the kings of Upper Egypt included gold, ivory, animals skins from the South, and timber, wine, oil, semi-precious stones from the North. The domination of iconography by the king and elite male circles (dignitaries, servants or enemies) led, perhaps as a consequence, to a remarkable lack of female representation in this period.

All converges at this moment in Egyptian history to establish a cosmogonic vision, with Egypt as the centre, supported by Powerfacts as propaganda to extol both a pyramidal-hierarchical society and the regulating role of the Pharaoh. Everything depended on the king and his legitimacy and dynastic continuity – as much for the raw materials as time and power. He is the human being *par excellence*. It is therefore not surprising that, in this place and at this moment, in order to answer his needs for keeping accounts and memorization, that his close entourage invented hieroglyphic writing. Two categories of objects produced during the second half of the 4th millennium will help us understand how the first attestations of writing are anchored in the iconographic substratum.

*b. D-Ware example: uses, functions and relationship with graphic systems*

D-Ware appears for only a short moment in predynastic iconographic production, at the end of Naqada IIB (around 3650 BCE) and it disappears at the end of Naqada IID (around 3400 BCE). Although classified as D-Ware, the pottery of Naqada III with geometric decoration (alternating full and empty squares, points, spirals, and so on) seems not part of the same group as the vases with figurative pattern<sup>22</sup>. At this time, there is a corpus of approximately 600 items (complete or fragmentary). Most are known from graves but some were found during excavation of settlements.

D-Ware is of pinkish-beige (marly) fabric with red and brown decoration. Ornaments consist of different signs placed next to each other<sup>23</sup>. The signs are categories of men and women, wild animal species (except dogs), small cattle of the desert, canidae, birds (mostly ostriches), reptiles and saurians, some fish, plants (generally unidentified),

<sup>22</sup> See Graff 2009: 121-122.

<sup>23</sup> See Graff 2016: fig. 4.

geographical elements (mountains, waterholes, rivers) and man-made artefacts: boats, mats, weapons, animal skins, and other elements not yet identified.

These elements are combined into scenes, following strict rules of association or exclusion. These rules produce patterns that give no information on how people lived nor their environment, nor social structures, nor productive activities. Some patterns evoke natural biotopes or activities such as navigation or the hunt. More especially, they seem to evoke contemporary ritual practices.

In an earlier work<sup>24</sup>, we drew parallels between the lay-out constraints of D-Ware and some syntactical rules used in the hieroglyphic script. These parallels allow to highlight deep convergences between the two systems. For example, the plural is indicated by the triple repetition of an element, the marked duality between male and female, opposition of passive and active forms, absence of marked temporality but use of accomplished and unaccomplished forms, formation of a predicate adding some preposition to the verbal root to modify the sense. Clearly, D-Ware's contribution to writing, like a system of encoding data, proves to be more important at the syntactical level. Indeed, a study of the signs used in the decoration of the D-Ware as prototypes to hieroglyphs yields only a short catalogue, most often of determinatives<sup>25</sup>.

*c. Powerfacts: categories of objects, use and non-functionality; relation to the social system; iconography as added value*

The name of Powerfact (by analogy with «arte-fact») is given to a series of prestigious items that appear at the end of Naqada II and are characteristic of Naqada III. They are linked to the finalization of the process that establishes the social hierarchy characteristic of this period. Unlike the earlier iconographic supports, these were more often discovered in cult deposits than in burials (in particular, in the Main Deposit, archaeological trenches filled with outdated cultic material when the Archaic Temple in Hierakonpolis was restored at the end of the 6th Dynasty).

Powerfact categories include palettes to grind eye pigment, maceheads, knife handles, and combs, all decorated in low relief. The materials are graywacke (palettes), fine sandstone (maceheads), gold and hippopotamus ivory (for the knife handles and combs). Whether mineral or organic, the raw materials are of local origin despite the quantities of luxury items and materials imported from distant lands that also marked social distinctions in this period. Even if the real function is ignored, we qualify palettes with the term of «ceremonial».

The Powerfact objects had been functional, objects principally used by men (with the combs perhaps used by both sexes) but they lost their utilitarian role when covered with iconographic patterns. Only an empty cup, for example, on one of the faces of the palette is a reminder that it had been used to crush make-up. During the first half of the 4th millennium, they were still used, either in the context of war (macehead, grinding palette) or to enhance social preeminence (knife handle, comb). The main subject of Powerfacts is violence and domination. They are mostly scenes of war and hunt. In the war and tribute-presentation scenes, the scene is built around the opposition between the warrior/hunter as opposed to the foreigner/enemy defeated. The relationship with «the other»

<sup>24</sup> Graff 2009: 108-111.

<sup>25</sup> See Graff 2009: 111.



can only have one of two outcomes: either the enemy is subdued and pays tribute or he is defeated, dead or taken prisoner.

Wild animals – and the artists or theoreticians of power were only interested in wild fauna, not domesticated beasts – are very often pictured on Powerfact objects, obviously in scenes of hunting, but also in association with war scenes. Some animals represent the king – like a lion, a wild bull or a falcon. African megafauna, among them giraffes, lions, and ostriches, already then in the course of disappearing from the northern Nile valley, are often represented. Except in the case of Davis' comb<sup>26</sup>, the elephant does not appear among the megafauna. The African wild dog, on the other hand, appears for a relatively short period after which it drops out of the iconographic repertory. In addition to real animals, each with its particular meaning, the iconography includes a number of fantastic and composite animals, like griffins or serpopards.

Put all together, Powerfacts are the important elements that affirm the purpose of the iconography in which order, represented by the king (that is to say, the predynastic state and society) battles against the chaos emanating from foreign lands and wild forces of the desert. This is the pre-eminent issue at the time when pharaonic power was being established.

### Situating the borders and the links between archaic writing with very high level of iconicity and prehistoric iconography

Even if 4th millennium iconography is not the direct ancestor of writing, writing is nonetheless deeply anchored in the predynastic iconographic substratum.

The continuity does not lie in the sign list but more, in the beginning, in the relationship between the sign and its support: the prevalence of the three-dimensional support-sign (in *ronde-bosse*, where the sign is confused with its support) gives way to a sign shared by a three-dimensional support (as with the sign represented on a vase, an ostrich egg, and so on).

Relatively soon, a different scenario appears with a bi-dimensional support which does not rely on the depth of field (as, now, the Gebelein's cloth or painted walls of Tomb 100 in Hierakonpolis). The change comes when the sign is freed from the depth of its support and is no longer situated in three-dimensional space but is put on a flat surface that is significant in himself. The value of the sign no longer evaluated in relation to the support but in and of itself.

At this moment, after the sign's emancipation from the global sense of the object which is constituted together with its support, we see a withdrawal from the support with interest now more focussed on the sign as an autonomous element. This evolution, of course, did not cause the disappearance in any way of the earlier supports of images, like *ronde-bosse* or tri-dimensional figural objects (see Table 2).

Egyptian writing never loses either its iconic character nor its deep links with figurative image, unlike the Chinese and Mesopotamian scripts. At first glance, the distinction between writing and image is not evident. Egyptians themselves maintained this ambiguity during all the time that they use hieroglyphic script.

<sup>26</sup> See Patch 2011: cat. n 178, p. 261.

Nevertheless, P. Vernus<sup>27</sup> distinguished three criteria to mark a difference of status. This primarily relies on the linearity of the language encoded in the written signs:

1. Orientation: «Les signes non symétriques sont tous tournés dans une même direction, en général celle du point de départ de la lecture»<sup>28</sup>.

2. Habitual rectilinear division of the space: «Les signes se suivent en ligne droite, horizontalement ou verticalement, en lignes ou en colonnes le plus souvent matérialisées et délimitant étroitement l'espace dévolu à l'écriture»<sup>29</sup>.

3. Calibration: «A l'intérieur des lignes ou des colonnes, les proportions mutuelles des signes d'écriture dépendent de leur répartition en unités idéales, les quadrats.» [that is, the virtual «cells» in which it has to fit]<sup>30</sup>.

From a later vantage point, the invention of writing appears as a breakthrough moment. Nevertheless, in the predynastic context, it is far from sure that it can be considered as such. Rather, it could be seen as an off-shoot of a method of treating images that had begun a few centuries earlier. What seems to be new (if it really was new at this time) was the application of phonetic values to the signs. Painted vases, Powerfacts, painted linen cloths could have been used as *aides-mémoire* to support structured or ritualized speech. Certain elements suggest this use, like the «parallelistic» sequences<sup>31</sup> in D-Ware iconography, that we find again in the repetition of sentences in the Pyramid Texts. However, the link between speech and image was neither arbitrary nor rigid<sup>32</sup>. In the case of script, every sign bears a phonetic or ideogrammatic connection that is fixed and codified. A long apprenticeship of the discourse was unnecessary: what needed to be known was the code and the value of the signs. However, as we saw, the first inscriptions do not at all reproduce the fluidity of speech; they use just a few signs every time. Jar labels were clearly not supports for narration or ritual discourse. They contain limited and practical information (contents, provenance, owner, quality). However, if, as P. Vernus<sup>33</sup> remarks, these labels are probably only connected to a mundane administrative context, why are such prestigious and durable supports like ebony, bone, ivory or wood used to make them? Why is so much care expended in their manufacture? The labels come from the funeral offering chambers in the king's grave; its architecture and the rich funeral offerings allow us to imagine, even in such an early period, the complexity and ostentation of royal funeral rituals. Our knowledge of the ritual performances practised on similar occasions remains tenuous and indirect. Using the new and still experimental system of encoding data, the labels are charged with memorizing which locality or which foundation (in the Egyptian language «*hout*», the domain) had contributed to the grave equipment. Writing is the registration which is made durable of a presence and a gift. The first written inscriptions are marks of vassalage and loyalty to the royal person, coming

<sup>27</sup> Vernus 1985: 46-47.

<sup>28</sup> Vernus 1985: 46.

<sup>29</sup> Vernus 1985: 47.

<sup>30</sup> Vernus 1985: 47.

<sup>31</sup> Elaborating an anthropology of the memory, C. Severi (2007) highlight a construction, called by him parallelistic, of the pictograms used like memorial support (Severi 2007: 153). These images, bearing memory, are always used in a «contexte d'énonciation rituelle» (Severi 2007: 153). This image' structuration is called parallelistic, because built by image repetitions which contain constants into which are introduced some variants. This defines very exactly the construction of the images such as we were able to recognize it on Decorated ware from Naqada II (Graff 2009: 111).

<sup>32</sup> See Deleage 2013.

<sup>33</sup> Vernus 2012: 161.

from persons not sacrificed in the burial. The attendants give their name and the price paid for a (more or less) voluntary contribution to the assemblage of funeral equipment.

During Early Dynastic times, in the centuries immediately following the invention of script, young men and some women, too, will be sacrificed to follow or serve the king in the afterlife. They are the ones that A. Testart<sup>34</sup> called «Les Morts d'accompagnement». The collective entities, localities or land foundations listed in these first inscriptions thus register their allegiance to the king and accompany him – but without human sacrifice – by giving wealth (imported wine, first quality oil...) consecrated in their name. Writing affirms the links of the society represented by towns and rural domains with the person of the king. The question then arises: what is the nature of the debt that these institutions and collectivities were paying? What was the royal service? This probably refers to the king's primary role, which, as we have seen, is so prominent in contemporary iconography: the king maintains the universe and social cohesion and order in the country, linking the worlds of humans and gods. This is the concept that Egyptians of the pharaonic period called «Maât».

The development of the code which was going to become writing was probably created by a person or a small group of people within the very close royal entourage. It is in Abydos, the capital of the kingdom that it took place. Thus, writing was not created by the contributors of the royal funerary hoard from the liminal provinces of the kingdom, but by people closely linked to the king (family? vassals?). Although this word is anachronistic, it is fair to say that the theoreticians of royal power elaborated this new encoding system as one element in the program that justified the monopolizing of power by the king and his close entourage. To do this, they used what already existed and they contributed to its further development: iconography already in the service of the ideology that was then in the course of elaboration.

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<sup>34</sup> Testart 2004.

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# Identity marks in ancient Egypt: Scribal and non-scribal modes of visual communication

*Ben Haring*

**Abstract:** Writing – of any type – is a highly complex system of visual communication, but it is by no means the only such system in societies that make use of it. It is always accompanied by other graphic codes, some of which present striking resemblances to writing. The interchange between these codes (including the exchange of systemic features and of graphic morphology) is fascinating. Examples of such interchange can be seen in Ancient Egyptian marking systems as related to hieroglyphic and cursive writing<sup>1</sup>.

## Writing in Ancient Egypt

Ancient Egypt and Mesopotamia have left us the earliest evidence of writing in the strict linguistic sense of the word. In order to qualify as true writing, notations must be capable of conveying messages that are language-specific. Phonetic notation can do this, and indications for phonetic writing are found on hieroglyphic labels from Umm el-Qaab in Southern Egypt, and on proto-cuneiform tablets from the Uruk-IV/III strata of various Mesopotamian sites, all dating from the last centuries of the 4th millennium BCE<sup>2</sup>.

In Egypt, the earliest writing known to us is hieroglyphic, either scratched on bone or ivory labels, or painted on pottery vessels. The characters of this writing system are discrete, and show the high degree of iconicity that would remain a conspicuous characteristic of the script throughout its history, lasting until the end of the 4th century CE<sup>3</sup>. It was apparently not until the 29th-27th centuries BCE that cursive variants of

<sup>1</sup> The present article includes results of the research programme «Symbolizing Identity. Non-textual identity marks and their relation to writing in New Kingdom Egypt», carried out at Leiden University, 2011-2015, and supported by the Netherlands Organization for Scientific Research (NWO). The research team included PhD students Kyra van der Moezel and Daniel Soliman, who were supervised by Olaf Kaper and the author. Advisory members of the team were Robert Demarée, Alex de Voogt and Dirk de Vries. The resulting PhD theses were both defended in September 2016 (Soliman 2016; Van der Moezel 2016). A synthesis of the results of the entire project and previous research is to be published shortly (Haring forthcoming). The English of this paper has kindly been corrected by Mervyn Richardson.

<sup>2</sup> See e.g. Cooper 2004 and Baines 2004.

<sup>3</sup> This article offers no room for an extensive explanation the hieroglyphic script and the language it was used for. For a brief introduction see Collier and Manley 1998; a more extensive and widely used manual is Allen 2014.

hieroglyphs developed into a separate type of script, called hieratic by Egyptologists<sup>4</sup>. Many hieratic characters retained some degree of iconicity, but most underwent drastic graphic simplification, and with the coming of ligatures (signs graphically joined) by the mid-3rd millennium BCE, hieratic had acquired its most distinctive characteristic as a separate type of script. Hieroglyphic, meanwhile, further developed its own cursive variant, which became another type of script, different from both monumental hieroglyphic and hieratic<sup>5</sup>. These three Egyptian scripts would endure, following their own palaeographic developments, for millennia to come.

Most of the select number of people in Ancient Egyptian society who could read and write to any extent would write in hieratic on papyrus, writing boards and ostraca. Hieroglyphs were for religious and funerary monuments. These monuments with their hieroglyphic script dominate our modern perception of Ancient Egyptian culture. But they were the products of specialized draughtsmen, or as they were literally called in Egyptian, «outline scribes» (*sš-*qd**)<sup>6</sup>. Egyptologists consider that never more than one percent of the population in pre-Hellenistic times and throughout Pharaonic history achieved full literacy in any type of script. The role of written texts in society was very limited<sup>7</sup>.

### Writing, marks and other notations

At this point, indeed throughout this paper, it is important to reflect on the very notion of literacy. Scholarly discussions of the subject obviously focus on writing in the strict linguistic sense of the word, usually without including other types of visual notation and expression. Yet writing is part of a much more extensive spectrum of visual and material communication that includes many other types of systematic notation or sign systems. Without downplaying the important role writing may have in society, or the very specific nature of writing as a sign system, one should bear in mind that writing shares its working field with other sign systems, and interacts with them<sup>8</sup>. Together with writing, these systems can be brought together under the heading «graphic information processing», which also includes such things as marking systems, graphic memory aids, numerical notations and pseudo-script<sup>9</sup>. Studies that ascribe to writing a role of central importance are inclined to see other systems of graphic information processing as marginal, or even as predecessors of writing from an evolutionary perspective. Yet writing is not necessarily the ultimate product of a historical development that went from one graphic mode to another. It is true that societies without writing may have other notation systems, such as graphic memory aids (e.g. the «winter counts» of native North American cultures) or numerical notation (e.g. tally systems). But these same genres also flourish in societies heavily involved in writing. Pictorial bibles in late medieval and

<sup>4</sup> As argued by Reguluski 2009.

<sup>5</sup> See Caminos and Fischer 1979: 39-44 with fig. 4 for the different types of Ancient Egyptian script.

<sup>6</sup> On Ancient Egyptian draughtsmen, see most recently Andreu 2013.

<sup>7</sup> On literacy in Ancient Egypt, see Baines 2007: 31-178; on the role of texts in society, see Eyre 2013.

<sup>8</sup> For the spectrum of visual expression and communication, including writing and other notational and pictorial modes, see e.g. Elkins 1999 and Harris 1995; 2000, both building on the earlier theoretical work by Jacques Derrida, Nelson Goodman, and Ludwig Wittgenstein, among others.

<sup>9</sup> Kammerzell 2009.

Renaissance Europe were not the tools of illiterate worshippers, but of intellectual clerics, to be instrumental in the *ars memorativa*. The English tally sticks of the Middle Ages and later centuries could be used by owners of cattle and sheep who might conceivably have been semi-literate or even illiterate, but they were also filed and provided with supplementary written docketts by government administrators<sup>10</sup>.

The same is true for marking systems, some of which appear to have come into being at the same time as writing, or even in the later stages of literate cultures. Pot marks are among the oldest types of identity marks found in Egypt and the Near East, and the oldest specimens seem to date from about the middle of the 4th millennium BCE<sup>11</sup>. The earliest known Egyptian and Mesopotamian writing is from a little later, and is dated to 3400-3100. The team marks of the Egyptian pyramid builders are attested on stone blocks from the middle of the 3rd millennium onward, with a repertoire heavily influenced by hieroglyphic characters (Fig. 1).



Fig. 1. Old and Middle Kingdom team marks. From Andrásy 2009: 18, fig. 9

A striking characteristic of Ancient Egyptian pot marks and team marks is that many of the individual signs resemble hieroglyphs, while others are pictorial, depicting objects, animals or human beings, without necessarily being hieroglyphic. Yet another type of sign within the same systems has abstract geometric forms. This triple morphology (written – pictorial – abstract) is universal<sup>12</sup>. It is reflected in the graphic repertoire of marking systems, not only Ancient Egyptian ones but others also (e.g. medieval masons' marks). Even written documents include aspects that can be typified as «pictorial» and «abstract» (e.g. illustrations and layout). James Elkins considers that these three components, writing, pictures and abstract notation, are present in all visual sign systems, from notation systems to the arts<sup>13</sup>.

### The Deir el-Medina marks

A particularly well-attested system of identity marks was used by the workmen of the royal necropolis at Thebes during the Egyptian New Kingdom (ca. 1550-1070 BCE).

<sup>10</sup> For these and other examples see Kammerzell 2009: 286-294; Haring forthcoming: chapter 3.

<sup>11</sup> Pre-fired pot marks become frequent in Egypt towards the end of Naqada II (Bréand 2015: 188) but their first attestations are older; Mesopotamian pot marks are attested from the middle of 4<sup>th</sup> millennium onward (e.g. Oates and Oates 1997: 291 – ref. brought to my attention by Bleda Düring).

<sup>12</sup> Haring 2009a: 2-3; Haring forthcoming: chapter 2.

<sup>13</sup> Elkins 1999: 82-91.


The New Kingdom pharaohs and members of their families were buried in rock-cut tombs in the Theban mountains, notably in the so-called Valley of the Kings and the Valley of the Queens. The workmen who excavated and decorated these tombs were living in a settlement adjoining the Valley of the Kings, at a place nowadays called Deir el-Medina. Remains of the settlement itself, surrounded by the workmen's own tombs and cult chapels, can still be admired there. Archaeologists have brought to light many domestic and funerary objects and, most importantly, thousands of ceramic and limestone ostraca bearing hieratic and hieroglyphic texts as well as artisans' sketches. Many similar ostraca, textual and pictorial, have been found at the ancient work spots in the Valley of the Kings. Several hundred papyri connected with the necropolis workforce have also survived. By taking the archaeological and textual data together it becomes possible to reconstruct life in the settlement and the work procedures at the royal tombs. For much of the Ramesside Period (Nineteenth and Twentieth Dynasties, ca. 1300-1070 BCE), it is possible to trace individual lives and to reconstruct the histories of workmen's families, even over as many as eight generations. Such a combination of archaeological and textual documentation is unique in premodern history, and provides an excellent basis for the study of locally used identity marks. Unlike many other historical marking systems, including Ancient Egyptian ones, the Deir el-Medina marks can be assigned to historically documented individuals and families. The written records and materials bearing marks over such a long period make it possible to study the history of the marks in families and in the context of the royal necropolis workforce.

The system probably originated from earlier marking systems used in monumental building projects of the Old and Middle Kingdoms. The construction of temple complexes at Thebes, near the royal necropolis, was possibly the channel through which the practice of builders' marks reached the community of royal necropolis workmen<sup>14</sup>. The repertory of the marks closely follows the morphology of these earlier systems, and it includes signs inspired by hieroglyphs as well as pictorial signs not related to writing and abstract geometric marks. In the earliest documented phase of the Deir el-Medina system, ca. 1450-1350 BCE, hieroglyphic marks make up approximately fifty percent of the repertory (see Fig. 3); in later centuries the percentage grew to approximately eighty-five percent<sup>15</sup>.

Two things, however, make the Deir el-Medina system quite different from its predecessors, not related to morphology but to function. The first difference is that the marks, unlike those previously used to identify teams of workmen, now refer to individuals<sup>16</sup>. They are arguably the earliest Egyptian marks to have functioned in this way<sup>17</sup>. The masons' marks on temple blocks from the second half of the 14th century, at Thebes and el-Amarna, similarly seem to refer to individual masons<sup>18</sup>. The second difference is that

<sup>14</sup> It is even possible that these workmen also participated in local temple building; Haring 2017.

<sup>15</sup> For details see Haring forthcoming: chapter 6.

<sup>16</sup> Although identifications for the earliest marks cannot be made, due to the absence of local written records, two circumstances suggest they were personal: (1) complete ostraca show numbers of different signs that correspond with the size of the gang of workmen as known from later sources; (2) the use of the marks seems to have been much similar to the identifiable ones of the Ramesside Period. One important earlier identification can be made: the mark of Kha, overseer of royal tomb construction in the early 14th century BCE, whose tomb has been found intact, with many items of the burial assemblage showing his mark  (Schiaparelli 1928). The same mark is found on pottery from the workmen's settlement; see e.g. Bruyère 1953: pl. XXI.

<sup>17</sup> The question if pot marks (other than the ownership marks at Deir el-Medina) ever denoted individuals is exceedingly difficult to answer; see Haring forthcoming: chapter 2.

<sup>18</sup> Haring 2017.



clusters of identity marks appear on ostraca, apparently for administrative purposes, whereas the earlier builders made their marks on the blocks of stone monuments. Moreover, the marks used by the necropolis workmen were multifunctional. We also find them on the personal property of the men and their families, such as pottery vessels and dishes, cloth, furniture and tools. During the Ramesside Period the marks are found as graffiti on rocks throughout the Theban mountains, mostly isolated but also in clusters. From the same period we find also hundreds of hieratic graffiti, mainly personal names, and it is likely that both the marks and the hieratic of these graffiti served the same purposes (Fig. 2)<sup>19</sup>. The marks carved in monumental dimensions (20-30 cm wide) on the stone pavement of the local temple of the goddess Hathor may have served as votive inscriptions<sup>20</sup>.

The use of marks to identify personal property and individuals on graffiti find parallels in other periods and in different cultures across the globe<sup>21</sup>. But the use of the same marks for producing administrative records is unique. It is this practice in particular that concerns us here, since it shows remarkable developments in the relation between identity marks and writing within a single community.



Fig. 2. Theban graffiti nos. 1138 (hieratic, left) and 2102 (marks, right). From Černý 1956: pl. 11; Černý and Sadek 1970: pl. XX

## Marks and writing at Deir el-Medina

Being a body of highly specialized craftsmen under the direct supervision of government officials, the community of royal necropolis workmen of the Ramesside Period was exceptionally literate<sup>22</sup>. Local literacy and cultural expertise were much less evident in the earlier New Kingdom, the Eighteenth Dynasty. This can be inferred from the poor quality of local private tomb inscriptions and decoration, and the absence from the archaeological record of locally produced and discarded hieratic texts<sup>23</sup>. Very probably the organization and local expertise of the workforce were significantly different from the norms of later centuries, at least prior to ca. 1350 BCE. This is also reflected in the identity marks, which are mainly found on domestic and funerary pottery, and on ostraca. Approximately fifty

<sup>19</sup> Fronczak and Rzepka 2009. Basically, graffiti in the Theban mountains show the same graphic variety as ostraca: hieratic, hieroglyphic, marks, and pictorial graffiti of different kinds.

<sup>20</sup> Bruyère 1952: pl. IX.

<sup>21</sup> For comparative studies of marking systems see Andrassy *et al.* 2009; Budka and Kammerzell 2015; Evans Pimet *et al.* 2010; Haring and Kaper 2009.

<sup>22</sup> Baines 2007: 89-94, 174; Janssen 1992: 81-91.

<sup>23</sup> Haring 2017.

percent of the marks can be seen to have been inspired by hieroglyphs (e.g.  $\text{𐀀}$   $\text{𐀁}$   $\text{𐀂}$   $\text{𐀃}$   $\text{𐀄}$  in Fig. 3), whereas other signs are seen to be pictorial but not hieroglyphic ( $\text{𐀅}$   $\text{𐀆}$ ), or even abstract (such as  $\text{𐀇}$   $\text{𐀈}$   $\text{𐀉}$ )<sup>24</sup>. The distinction between these three categories is often difficult to make. Since most Egyptian hieroglyphs are also pictorial, it can be difficult to decide if a mark was inspired by writing or if it simply depicts an object, animal, or human being without any reference to writing. The frequency or rarity of the supposed hieroglyph will often be the deciding factor. For example, the headrest  $\text{𐀊}$  is attested as a hieroglyph but it is one which occurs in hieroglyphic inscriptions exceedingly rarely. Yet it would have been a common object among domestic and funerary furniture. Therefore, this mark is taken to represent a concrete object rather than a hieroglyphic character. An additional argument is that hieroglyphic writing was an artistic expertise not widely disseminated in Eighteenth Dynasty Deir el-Medina. Furthermore, hieratic writing (probably equally rare at the time) included less graphically specific signs but favoured simpler generic ones: for «headrest» it used the generic classifier for «wood» ( $\text{𐀋}$ ) with phonograms and not the image of the headrest itself.



Fig. 3. CG 24105, Eighteenth Dynasty, reign of Amenhotep II. From: Daressy 1902: pl. XVIII

Some of the marks thought to be of hieroglyphic origin present similar problems. While there is every chance that  $\text{𐀁}$  in Fig. 3 was inspired by the ubiquitous bird signs of the hieroglyphic script, it is difficult to say which hieroglyphic bird in particular would have been the example. Is there any hieroglyphic reference at all, or is the actual «sign» the general notion «bird» (hieroglyphic or concrete pictorial)? The Eighteenth Dynasty samples suggest that the sign represents one or several species of duck or goose, but whereas carefully made hieroglyphs make it possible to distinguish between the species (and thus between different signs), the producers of the marks, if they were familiar with the differences, were indifferent to showing them.

The «bird» mark was still used locally in the Ramesside Period, but it was now accompanied by other types of birds ( $\text{𐀌}$   $\text{𐀍}$   $\text{𐀎}$   $\text{𐀏}$   $\text{𐀐}$ ) which may represent vulture, falcon, owl, ibis and duckling<sup>25</sup>. The falcon is particularly frequent on Ramesside ostraca to represent a workman called Hor. His name is identical with that of the falcon deity «Horus», and very probably it was the workman's own name that inspired the design of his mark. Some examples of this mark do seem to depict the characteristic profile of

<sup>24</sup> The marks are defined here by means of font types that have been created in the course of the research project (see note 1) for the purpose of classification and for the publication of the project's results. The types suggest much more uniformity in shape and orientation than is shown by the actual samples of marks, as can be seen from the illustrations to this article.

<sup>25</sup> For an extensive palaeographic discussion of these and other Deir el-Medina marks see Van der Moezel 2016.

a falcon (Fig. 4 left, second sign in the right column), but most have a much simplified form, not remotely resembling the bird itself (Fig. 4 right, second line in the right column). Characteristic features of the mark include a long, curved tail, and a head turned slightly backwards and not showing a beak. These are features which in fact belong to the hieratic character of the Horus falcon. Palaeographic features of many other marks together indicate a growing influence of the hieratic script, which was more and more widely used in the workmen's community in the course of the Ramesside Period<sup>26</sup>. In this case, features of the local writing system were clearly the points of departure for developing the graphic of a workman's identity mark.

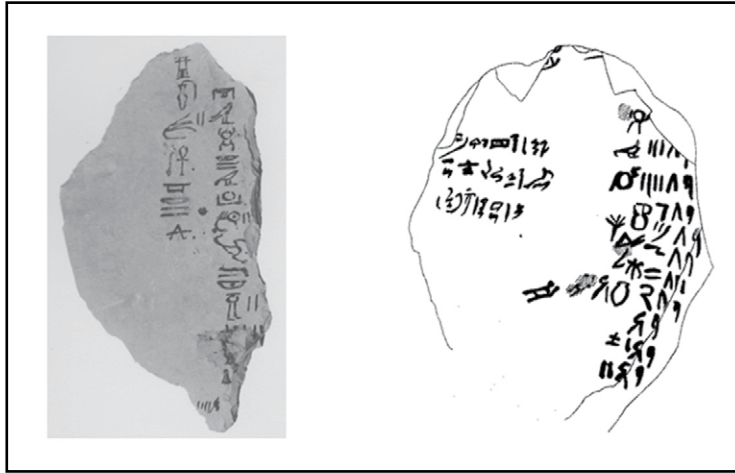


Fig. 4. Ostraca CG 25317 (left) and CG 25651 (right), both from the Twentieth Dynasty. From Daressy 1901: pl. LIX; Černý 1935: LXVI

Writing had, of course, been an important inspiration for the marking system already in the early New Kingdom as well as in earlier periods. The team marks of the pyramid builders already included hieroglyphic signs (Fig. 1), and so did the marks of the New Kingdom necropolis workmen. On ostraca the marks were arranged in rows or columns, formats also inspired by writing practice (Figs. 3-5). In the course of the Ramesside Period these scribal formats were taken a step further. The marks were incorporated in grid cells or in horizontal lines on ostraca, in combination with hieratic numbers and other signs (Fig. 5)<sup>27</sup>.

These ostraca represent a very specific type of document that mimics similar texts in hieratic. The essential components of the variant types of document with marks are these: (1) a duty roster, being a rota of individual workmen on duty, one man a day, with a number in hieratic for the calendar date<sup>28</sup>; (2) a mark specifying the workman on duty on each separate day (e.g.  $\text{𓆎} \times \text{𓆏}$  and  $\text{𓆏}$  in Fig. 5); (3) signs representing commodities supplied (such as loaves, beer, firewood and fish); (4) signs representing persons responsible for the supplies (such as woodcutters and fishermen;  $\text{𓆏}$  in Fig. 5, line 3, extreme left, is for a woodcutter named Usermaatrenakht).

<sup>26</sup> Haring 2003.

<sup>27</sup> For cells (Dyn. XIX) see Soliman forthcoming; for lines (Dyn. XX) see Haring and Soliman 2014.

<sup>28</sup> The purpose of this duty roster is not entirely clear; it is generally thought to have been used for the reception of supplies, but it may have been of more general use; see Haring 2015a.

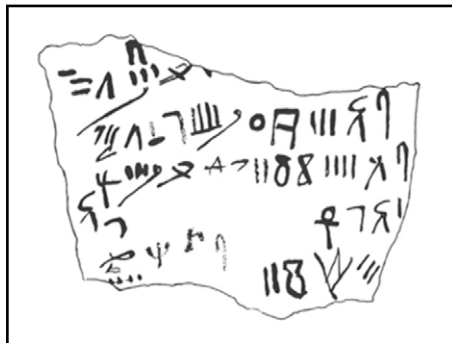


Fig 5. Ostracum Strasbourg H 13, late reign of Ramesses III. From Koenig 1997: pl. 6

In this particular type of ostraca, many dozens of which have survived from the Twentieth Dynasty, the marks have become components of what one may regard as pseudo-script. This system was actually an advanced stage in the older practice of arranging marks on ostraca, which may itself already be classified as pseudo-script. The advanced variant shares even more characteristics with writing: horizontal lines, signs borrowed from hieratic and, more generally speaking, conventional signs in a conventional order that may even be described as syntactical<sup>29</sup>.

Such ostraca were probably produced by an extremely limited number of persons, who acted as assistants to the scribes who produced the hieratic ostraca and papyri<sup>30</sup>. This explains the substantial overlap of information between hieratic texts and ostraca inscribed with marks. Even the hieratic scribes themselves occasionally used the marks, as is shown by several ostraca displaying marks in a clearly hieratic ductus and in combination with hieratic text<sup>31</sup>.

On most ostraca, however, the crude style of the hieratic numbers combined with marks, or indeed the crudely made marks themselves, betray the hands of persons not fully trained in hieratic writing (or hieroglyphic). These individuals represent a specific type of semi-literacy: «scribes» with a restricted knowledge of writing and of other visual codes, including the local marking system. Their «texts» remind us that literacy exists in different degrees and types. They also make clear that «literacy» is not necessarily only about writing in the strictest possible sense. Rather they represent a separate type of notation system resourced from at least two codes, hieratic writing and a system of identity marks.

The often crude forms of the hieratic numbers make it clear that they were not formed by fully trained scribes. In addition, the way the numbers were used betrays a very limited knowledge of the cursive script. The clearest case is of calendar dates, which are given the same form of ordinary hieratic numbers as those for the quantification of supplies. Hieratic scribes used a different numbering format for dates, so that dates could be recognized immediately as such in administrative texts, which were organized


<sup>29</sup> Of course, some of these characteristics also apply to earlier ostraca with marks only, arranged in horizontal lines or in vertical columns. Pseudo-script may be defined in different ways; my understanding of the expression is similar to the one proposed by Elkins 1999: 143-163; see also Kammerzell 2009: 298-301.


<sup>30</sup> As is argued extensively in Soliman 2016.

<sup>31</sup> See e.g. Haring 2009b: 132. Marks are not found on any of the papyri produced by the royal necropolis administration.

principally by dated entries<sup>32</sup>. Another striking phenomenon, although relatively rare, is adopting a left-to-right ductus and even mirroring the images for hieratic characters for numbers, which in hieratic are invariably written from right to left<sup>33</sup>.

### A system?

In the previous sections, the expression «marking system» has been used without an explanation of its supposed systematic nature. The use of marks on ostraca is systematic to the extent that it has been inspired by writing, but the morphology of the marks themselves, which is quite diverse, is not particularly suggestive of a system. It includes signs inspired by writing, but also pictorial marks from different derivations, as well as abstract signs. All three of these categories were involved at any point in time during the New Kingdom, although the hieroglyphic category was always dominant and made up the majority of marks during the Ramesside Period. Considering these different derivations, and the fact that some workmen had marks inspired by their own names (such as Hori's falcon ) whereas others had not, one might be inclined to conclude that anything goes. Moreover, the differences in morphological typology imply different semiotic processes for «reading» the marks and identifying their owners by members of an Ancient Egyptian community<sup>34</sup>. A prerequisite for interpreting the marks would seem to have been a personal acquaintance with their owners, a familiarity with their names and genealogies, and some knowledge of hieroglyphic writing. Most important, however, would have been a familiarity with the system behind the marks, that is, being aware that the sign was a distinctive mark which referred to an individual within the community of the necropolis workmen.

Indeed, whereas the marks represent an open system morphologically speaking, it was their functional context that posed restrictions. Marks referred only to workmen and their immediate superiors (foremen and scribes), and reflected their official position in the gang, in the local hierarchy, and in the duty roster. The number of different marks in use could be no more than the number of workmen active at any given time (approximately forty in the Eighteenth and Nineteenth Dynasties, sixty or more in the Twentieth). In addition to the context of work and employment, there were family traditions. The position of a royal necropolis workman was usually passed on from father to son, and this practice is reflected in the use of the marks, which often also went from father to son. Just as often, however, a mark could skip a generation and pass from grandfather to grandson. This occurred when a son took up his position as a workman while his father still kept his. In such a case, the grandfather's mark could be used, if that was different from the father's, or a new mark could be created. The latter practice explains why some marks were inspired by the owners' names while others were not. In the later part of the reign of Ramesses III, for instance, a workman called Meryre inherited the mark  from his

<sup>32</sup> In addition to special hieratic signs (proceeding from horizontal signs for units and tens instead of vertical ones), the scribes would often use red ink for calendar dates, which is never done on the pseudo-script ostraca.

<sup>33</sup> Entire entries have been written from left to right on unpublished ostraca Asmolean Museum HO 1084. Eight other unpublished pieces feature the writing of units to the right of tens; mirror images of the hieratic sign for «20» occur on Fitzwilliam Museum EGA 6120.1943 obv. 1 and rev. 5 (Hagen 2011: 77 and 119); Strasbourg H 10 rev. 6 (Koenig 1997: pl. 4).

<sup>34</sup> The semiotic processes involved are thoroughly discussed by Van der Moezel 2016.

father Neferhotep (one of them is represented by that mark in Fig. 5, line 2). The mark, which was probably inspired by a hieroglyph depicting the sky (*pet* in Egyptian)<sup>35</sup>, does not seem to be related to either of the two names. Meryre's elder brother, who was called Neferhotep just like his father, used a different mark,  $\lambda$ , resembling the hieroglyphic sign for the hoe (Egyptian *mer*). Neferhotep had inherited that mark from his paternal grandfather who was called Meryre. The sign is probably related to that name and may have been created for Neferhotep's grandfather, or for an earlier ancestor with the same name. Thus a newly created mark could take the owner's name as its inspiration, but end up being used by a descendant with a different name. Another example is Hori, who used the falcon mark  $\mathcal{A}$  inspired by his own name. His father Huynefer had used  $\text{𐀀}$ , a mark inspired by the hieroglyphic sign *ankh* «to live», which seems unrelated to Huynefer's own name, and may have been in the family for some time already. The same mark  $\text{𐀀}$  was used by his grandson (and son of Hori), Minkhau, who is the one represented in Fig. 5, line 4. This paper is not the place to go deeply into the prosopography of individual workmen and their families, so these examples must suffice to outline the difficulties<sup>36</sup>.

### The Deir el-Medina marks as a case of *bricolage*

The sources of the Deir el-Medina marking system were an older marking system (or more than one), and the hieroglyphic and hieratic scripts. The marking system and hieratic writing were sources, in their turn, of the pseudo-script on ostraca, from the simple horizontal rows of marks in the Eighteenth Dynasty to the mixed code including marks and hieratic in the Twentieth. Both processes may be labelled as *bricolage*, a term coined by the anthropologist Claude Lévi-Strauss to refer to the creation of a new structure (in our case, a code) incorporating elements of one or more already existing, or which had existed. The result of such a process is «a system of paradigms with the fragments of syntagmatic chains, leading in turn to new syntagms»<sup>37</sup>. What we see here is the creation of new sign systems on the basis of existing ones, a process repeated numerous times in the history of visual and material sign systems. Although writing systems are often regarded only as the products of such processes, it is fairer to say that there is ongoing contact and interchange between different sign systems, including writing. This paper has demonstrated that writing was an important source of inspiration for the development and use of marking systems. The reverse may have applied in other historical cases. For instance, the Beria or «camel» script, one of the 20th century alphabetic scripts developed in northern Africa, was based on marks as they were made on the skins of camels<sup>38</sup>. But in that particular case the camel marking system merely supplied the graphs, and the society in which they were used was already familiar with the notion of alphabetic writing through existing scripts. In other words, both marks and alphabetic writing were the sources of this particular process of *bricolage*, which resulted in the creation of a new alphabet.

<sup>35</sup> Actually *pt*. Hieroglyphic and hieratic writing does not include vowels; vocalized transcriptions of words and proper names as given in this paper are purely artificial Egyptological conventions.

<sup>36</sup> The identifications and prosopographic particulars of this and many other cases are worked out fully in Soliman 2016.

<sup>37</sup> Chandler 2007: 205 – this quote incorporates one by Lévi-Strauss himself.

<sup>38</sup> Rovenchak and Glavy 2011.

Many examples can be given of processes in which one writing system is a source of inspiration for another. Egyptian hieroglyphic and cursive writing inspired the development of the monumental and cursive scripts of the kingdom of Meroe, in what is now the northern Sudan, perhaps from the 3rd century BCE onward<sup>39</sup>. The original scripts provided the graphs as well as their Egyptian phonetic values, but whereas Egyptian hieroglyphic and cursive were consonantal scripts, their Meroitic counterparts rendered a different language and were syllabic, therefore conceptually different. A similar conceptual difference can be seen in the development of what is regarded as the earliest known alphabetic writing system, so-called Proto-Sinaitic, attested at Serabit el-Khadim (Sinai) and Wadi el-Hol (southern Egypt)<sup>40</sup>. Here also Egyptian hieroglyphs were at least one of the sources of inspiration, while some signs of the supposed alphabet may have been concrete pictorial and abstract geometric. In that case the script would show the triple morphology that also characterizes a number of marking systems. The resulting signary probably encoded a West Semitic language, and its individual signs all stood for single consonants, whereas Egyptian hieroglyphs denoted one, two or three consonants. The phonetic values were not those of their Egyptian counterparts but new ones arrived at by means of acrophony, such as an ox-head for ' (the consonant known to Semitists and Egyptologists as 'aleph; cf. Hebrew 'eleph and Akkadian *alpu* «ox») or a house plan for *b* (cf. Hebrew *bayit/bet* «house»). Both the Deir el-Medina marks and the Sinai alphabet may well be similar examples of the process of *bricolage*.

The question as to whether and how the earliest known writing in Egypt and Mesopotamia was inspired by already existing sign systems is difficult to answer. Marks of the types discussed in this chapter (pot marks and workmen's marks) may not be essentially older than writing; hence they were not necessarily the starting points of the *bricolage* that resulted in the hieroglyphic and proto-cuneiform scripts. Yet it is conceivable, even very likely, that writing developed out of existing graphic codes, including ones that we are inclined to call «art», and it certainly remained in touch with these after having grown into a well-defined system.

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<sup>39</sup> Rilly 2007: 231-358; Morenz 2009: 205-207.

<sup>40</sup> At both sites possibly going back to the 18th century BCE; see Haring 2015b.

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# Final reflections

*John Bennet*

We live our lives surrounded by text; illiteracy – the inability to read text – is almost unheard of in modern, western societies. We take this for granted and can imagine neither a world *without*, nor a world *before* text. Yet such a time existed and indeed for most millennia of its existence *homo sapiens* has been illiterate as a species. However, communication is part of the essence of humanity, one might say as old as our species and therefore much older than written communication. E.B. Tylor, Britain's first post-holder in Anthropology, argued that human communication developed from gesture to image to writing<sup>1</sup>. Although communication science is much more sophisticated in the early 21st century than it was in the late 19th, clearly writing had to emerge from some other human practice, even if some ancient traditions portray its appearance as fully-formed, a gift from the gods.

Definitions of writing abound, but the following has the advantage of being concise: writing is «a system of markings on a material substance with a conventional reference that communicates information»<sup>2</sup>. Such a definition can, of course, apply to other systems of notation, such as music or algebra, which are conventional, but do not depend on any specific linguistic or phonetic realisation, even any particular language. The key is the word «conventional»: it is convention that allows *anyone* (within a given community sharing that convention) to understand a particular set of marks, if not necessarily to realise them as a linguistic message. For this reason, some definitions of writing (as Militello and Haring in this volume remind us) insist on a relationship to language: for example «a set of visible or tactile signs used to represent units of language in a systematic way, with the purpose of recording messages which can be retrieved by everyone who knows the language in question and the rules by virtue of which its units are encoded in the writing system»<sup>3</sup>.

In one direction, then, marks can be made highly specific by linking them to language. It is this quality of specificity of meaning that enables us to distinguish between correct and incorrect decipherments, for example. It also contributes to the assignment of a superior status to textual information in interpreting the past, because whatever the

<sup>1</sup> Tylor 1881: 114-181.

<sup>2</sup> Powell 2009: 262.

<sup>3</sup> Coulmas 1999: 560.

actual *meaning* behind any text (its context of production, as it were) the sense of the text itself is not in doubt; it is as if the text speaks to us directly. Other conventional systems – particularly images, including those depicting gesture, to echo Tylor above – are less legible to us, precisely because the convention is embedded in whatever society produced them. Revealing those conventions is more difficult, because it is not tied to the syntactic and semantic structures of a language.

Even in the rich, textual world of modernity there exist a plethora of conventional sign systems that guide our movements through public spaces, prevent traffic chaos on our roads (sometimes), or help us to operate complex machinery, such as photocopiers, smartphones, or the computer on which I am typing these words. These signs are conventional, but do not necessarily translate outside the community who uses them, even sometimes across generations within that same community. In that sense, we live in a hybrid world where verbal and non-verbal visual communication exist side-by-side. In the case of the study of past sign-systems – the topic of this volume – we exist by definition outside that community, so have to seek to understand the conventions behind the use of signs without a specifically linguistic reference. Where there is no convention, however, our challenge becomes overwhelming: if a sign can mean one thing to its creator, another to its «reader», or the same sign can mean different things to multiple creators, then interpretation in the modern world becomes a virtual impossibility. This volume explores past worlds in the Bronze Age of the Aegean, Anatolia, Cyprus, Egypt and the Near East where (in most cases) writing existed, but also marking practices, some of which clearly had a relationship with writing («para-literacy», as the editors characterise it), others of which did not; many conventional, some probably not.

One of the points clearly demonstrated by the contributions in this volume, at least in most of the case studies explored here, strictly written media regularly combined with other forms of communication as they still do today. A major difference is in the accessibility of the *range* of media in the past. A vanishingly small proportion of society was capable of full literacy – reading and writing with ease – while many other visually-based media (for example, seals) were only regularly used by the (elite) few, not the many. That said, the case study of Deir el-Medina, presented by Haring, shows that non-elite groups were capable of considerable creativity in developing hybrid systems of marking – one might almost say «graphic creoles or pidgins» – in response to literate, elite management of their world.

If we use our modern experience as a «touchstone» for the various ancient situations sketched in these contributions, then another difference that emerges is the fragmentary nature of the ancient material, depending, as it does, on physical materials being deposited, being preserved and, finally, recovered archaeologically.

Stone and ceramics are fairly robust bearers of image and / or text, but others, from less easily preserved media such as painted wall plaster to rarely preserved textiles, parchment or papyrus, are less so, certainly in the Aegean. Preservation plays a crucial role here. For example, as Perna reminds us in this volume, in the Minoan Neopalatial period pieces of parchment were tied up with fine cords and sealed in clay; we assume these bore writing. The clay was preserved by burning, the parchment destroyed, leaving its imprint tantalisingly in the clay that sealed it. Perna's convincing proposal that the documents might have held more text than many have thought makes their loss all the more frustrating in a period and region where textual documentation is hardly abundant.

It is worth bearing in mind, however, that despite the materiality of the physical objects – phones, tablets, TV screens, computers, music-players – that enable much of *our* multi-media experience, the actual text and images are impermanent, composed of electro-magnetic stimuli on various media that generate light or sound. Recovering the content of our multi-media world in the future may well be every bit as difficult as recovering examples from the ancient world, rather like a wooden writing-board, whose wax has disappeared, erasing the text it once bore.

Waal's hypothesis in this volume also depends on an absence: we have no surviving examples *in corpore* of the wooden writing media that appear to have existed in 2nd millennium BCE Anatolia, but their existence is highly plausible, especially since other texts refer to wood as a support for text. Unfortunately the fact that none survives makes it impossible to verify Waal's further argument that Anatolian hieroglyphic writing was practised on wood from as early as the turn of the 3rd/2nd second millennia BCE. One of the more compelling arguments for their existence at this early date is, in fact, the similarities with signs in the so-called Cretan Hieroglyphic, whose first examples appear at exactly the same time, as explored here by Ferrara and Jasink. Waal systematically attempts to identify the reflection of this absent category of material in marks – chiefly on pots – that sometimes show similar form to signs accepted as belonging to the repertory of Anatolian hieroglyphics. As it happens, the most convincing parallels seem to exist in the Late Bronze Age, the period by which the conventional view would accept that a hieroglyphic writing system had already come into existence.

The reflection of signs from a formal writing system in marking systems (mason's, potter's marks, and so on) that arguably do not depend on phonetic realisation is a pattern observed elsewhere: it was noted by Bikaki in an early study of the potter's marks of the site of Ayia Irini in the Aegean (as noted by Waal), but also appears in the mason's marks and other marks at the site of Phaistos on Crete, as Militello demonstrates, as well as among the marks made on Cypriot pottery and pottery destined for Cyprus (Valério and Davis) and in the poly-graphic environment of the southern Levant (Yasur-Landau). In these contributions there is much discussion of the reference of such marks: did they bear the same value as they did when used in a writing-system, or was the resemblance purely formal? The lack of a convention accessible to us impedes our interpretation.

What of situations where there was no parallel writing system? There are two ways of considering this: «horizontally», that is seeking to understand a system in its contemporary context, or «vertically», where a relationship in time may exist, such as a predecessor to a writing system. There are two examples of such situations in this volume: Schmandt-Besserat and Moghimi present a new group of tokens from late 6th/early 5th millennium BCE Tepe Zageh in Iran, while Graff explores the 4th millennium BCE iconographic background to the appearance of Egyptian hieroglyphic writing towards the end of the millennium. In these two different, but parallel cases, a similar process of back-interpretation is performed: the known value of signs in later writing systems is applied to earlier manifestations.

In the Iranian case, Schmandt-Besserat has long argued that such parallels with later inscribed tablets give a clue to tokens' signification of specific commodities, even specific quantities of those commodities. Here, she and Moghimi use tokens with identifiable values to suggest the presence of a general cognitive development (the notion of «cardinality») and specifically sketch the economy of Tepe Zagheh. Whether their sample is sufficiently

representative (none of the tokens was found in anything like a primary context) to bear the quantitative inferences they draw is debatable, but the apparently conventional usage of token forms at least allows an insight – «horizontally» – into life in a community at the transition from Neolithic to Chalcolithic. The Egyptian example depends not on numbers, but on images, and references the earliest use of hieroglyphic writing attested in the now well known elite Tomb Uj at Abydos. Graff accepts the view, as do others, that Tomb Uj demonstrates writing, the coalescence of iconographic developments from earlier periods into a conventional system, while others are less willing to define the stage represented in Tomb Uj as writing<sup>4</sup>.

Debates surrounding such predecessor systems raise the question of the «finality» or purpose of writing: how did actors in the past view their practices? In short, did people know they were *writing* and for what purposes did they consider writing *appropriate*? In the case of the contributions on early Mesopotamian and Egyptian «predecessors» to writing, contemporary users of the sign systems clearly did not have the creation of a writing system in mind, although that notion is often implicit in our teleological views of the development of writing systems. Haring is right to draw parallels between these «inventions» of writing systems emerging from conventional systems and the creation in the New Kingdom of a hybrid system at Deir el-Medina. One might also suggest that the creation of simplified systems – simple syllabic or alphabetic – within, or on the margins of regions with either multiple writing systems (Anatolia, Crete, the Levantine coast<sup>5</sup>) or complex logo-syllabic systems (Egypt) is a similar process, but one of selection and simplification, not one of elaboration and systematisation? Even when writing indubitably exists, as it did by the early 2nd millennium BCE on Crete, there can be blurring between image and text, as Ferrara and Jasink clearly demonstrate: the shared function of early seals, only some of whose carved signs are recognised as writing according to our modern definition of the sign repertory of the Cretan Hieroglyphic script, suggests a much broader range of significant signs, calling into question the definition of a writing system<sup>6</sup>.

In relation to the purposes of writing, in their different ways the contributions by Valério and Davis and by Steele (on Cypro-Minoan and related phenomena) explore usages that appear unfamiliar in comparison to Cypro-Minoan's point of origin in the Linear A script of Crete; in short, the Bronze Age script(s?) of Cyprus (also attested at Ugarit) are used in many more contexts than those in which the Aegean scripts appear to have been used and there is a greater overlap with marking systems long regarded as non-linguistic. Yasur-Landau makes some similar points for the non-scribal systems he sees in the southern Levant and the geographical proximity of Cyprus to that area might suggest that the similarities are not coincidental.

Taking the issue of the «unfamiliar» use of writing further, Schoep suggests that the context of deposition in the palace at Knossos of a collection of materials inscribed in Linear A (including some of the flat-based nodules discussed by Perna) implies they were not just documents cast aside from administrative practices, but that they shared a purpose with the many other rich artefacts deposited in the same context related to

<sup>4</sup> See, for example, Baines 2004; Piquette 2013.

<sup>5</sup> For example, Sparks 2013; the Byblos syllabary is imperfectly understood, but may be another early example: Daniels and Bright 1996: 29-30.

<sup>6</sup> For similar arguments, see also Decorte 2017.

ritual. She links this pattern to contemporary sealing practices, seeing echoes of more recent interpretations of the earlier use of seals both on the Early Helladic mainland, and Middle Minoan/Protopalatial Phaistos (and Monastiraki) by Peperaki and Relaki respectively<sup>7</sup>.

Weingarten, too, explores the relation of seal use and writing in Minoan Crete in the case of the strange, but widely attested class of objects known as «roundels». She reverses their widely accepted interpretation as receipts for *outgoing* commodities released from store by an authority, suggesting instead that they record *incoming* products, their number notated – as she observes, in an apparent suspension of the notion of «cardinality» – by application of a seal the appropriate number of times. Her interpretation draws not just on the objects themselves, but also on the find contexts and associations of the seal impressions on roundels and elsewhere, as well as their iconographic content. As with Ferrara and Jasink, and other contributions in this volume, it is refreshing to see interpretations that draw on multiple lines of evidence, including seal iconography as well as use.

Mazzoni documents a widespread use of seals to mark vessels, a phenomenon that seems to originate in the 3rd millennium BCE, broadly the Early Bronze Age in the eastern Mediterranean. Unrelated to any writing system, the seals were applied to particular types of vessels – normally associated with storage – from Mesopotamia to the Aegean. She associates the vessels with agricultural production, suggesting a stimulus for the practice in the intensification of mixed farming and the development of grape and olive production in this period. Moreover the content of the images also reflects agricultural practice. One striking feature in the pattern sketched is the appearance of (an admittedly small number of) examples in the contemporary Aegean, especially as the decoration, primarily on pithoi, was created by rolling, whereas the almost universal sealing practice in the Aegean in the later 3rd and especially the 2nd millennia BCE was stamping (despite the existence of cylinder seals in the region, most famously perhaps in the Thebes treasury<sup>8</sup>). One wonders if this is an example where the convention was not shared across the entirety of this vast region and perhaps in the Aegean this phenomenon appeared as one of a small number of practices that «spun out» of the eastern Mediterranean, without being fully understood, or being incorporated decisively into material practices. Broodbank has described the Aegean in the 3rd millennium as «marginal» to the eastern Mediterranean<sup>9</sup>, in the sense intended by Schneider and Sherratt when defining – in a world-systems context – an area beyond the periphery, relatively unaffected by, but occasionally receiving elements from, the core<sup>10</sup>.

This volume begins with a quite long and complex discussion by Alberti of a system (or systems) that involves convention, metrology in Minoan Crete. Here the markers are physical – like the Mesopotamian tokens – comprising either objects manufactured to metrical standards or objects designed to ensure standardised measures of commodities (weights and containers of various sorts). We also possess textual references to measures, although, as Alberti notes, they are difficult to reconcile with the physical manifestations

<sup>7</sup> Peperaki 2016; Relaki 2012.

<sup>8</sup> For example, Kopanias 2008. The stamping impulse is so strong that, even when a cylinder seal is used, as the Akkadian cylinder seal CMS II.6 144 at LM IB Ayia Triada, it is stamped, not rolled on the clay.

<sup>9</sup> Broodbank 2000: 46-47, 284, Fig. 93.

<sup>10</sup> Schneider 1977; Sherratt 1993.

of measure. It is difficult at this distance in time, given the vagaries of preservation and the fragmentary nature of much of the material, to determine how refined this system, or systems were, but one suspects – perhaps evident in the disjunct between written and physical evidence – that there was an uneasy relationship between practical management of measurement and theoretical construction of metrical systems, a feature not confined to the ancient Aegean<sup>11</sup>. A conventional system developed in theory might have a different realisation in practice, almost a *langue* vs. *parole* relationship. *Mutatis mutandis* it may be that similar relationships existed between scribal practice, linked clearly to language, and other forms of marking, as documented in other contributions.

This volume makes two points very clearly. Firstly, that a narrow, restrictive definition of marking that confines itself only to sequences of marks that relate to language will miss many aspects of human communication in past societies. And here we might mention gesture, a feature often depicted in two- and three-dimensional representations in the Aegean, for example<sup>12</sup>. Secondly, and partly as a consequence, our understanding of the context of scribal and non-scribal communication in the past depends on material objects – how else would our texts survive unless they were on «more or less permanent» media? – and on a broad range of those objects and their contexts of deposition and discovery. In short, to develop the fullest possible understanding of life in the past, we need to draw on the broadest range of data and techniques possible. This often requires working across modern disciplinary boundaries that separate artificially different areas of life in the past. Logically this may also require team work, since the range of knowledge and skills necessary is rarely commanded by individual scholars today. By exploring situations that straddle ancient «disciplinary boundaries» between scribes and non-scribes, this volume offers a tantalising glimpse of what is possible, but hopefully it will also act as a stimulus to further, even richer research along similar lines.

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<sup>11</sup> Especially at Mari and Ugarit, see the volume edited by Alberti, Ascalone, Peyronel, 2006.

<sup>12</sup> See, for example, Morris and Peatfield 2002.



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# List of contributors

ALBERTI, MARIA EMANUELA  
Università degli Studi di Firenze  
mariaemanuela.alberti@unifi.it  
memalberti@gmail.com

BENNET, JOHN  
British School at Athens  
University of Sheffield  
d.j.bennet@sheffield.ac.uk

DAVIS, BRENT  
University of Melbourne  
Victoria 3010, Australia  
bedavis@unimelb.edu.au

FERRARA, SILVIA  
Sapienza, Università di Roma  
silvia.ferrara@uniroma1.it

GRAFF, GWENOLA  
French Institute of Research for Sustainable  
Development  
Joint Laboratory of Local Heritage and  
Governance (UMR 208 PALOC) - Paris  
- France.  
gwenola.graff@ird.fr

HARING, BEN  
Leiden University Institute for Area Studies  
b.j.j.haring@hum.leidenuniv.nl

JASINK, ANNA MARGHERITA  
Università degli Studi di Firenze  
jasink@unifi.it

MAZZONI, STEFANIA  
Università degli Studi di Firenze  
stefania.mazzoni@unifi.it

MILITELLO, PIETRO  
Università degli Studi di Catania  
milipi@unict.it

MOGHIMI, NILOUFAR  
University of Tehran  
moghimin@yahoo.com

PERNA, MASSIMO  
Università degli Studi di Napoli  
Suor Orsola Benincasa  
maxperna59@gmail.com

SCHMANDT-BESSERAT, DENISE  
University of Texas at Austin, USA  
dsb@mail.utexas.edu

SCHOEP, ILSE  
University of Leuven (Belgium)  
ilse.schoep@arts.kuleuven.be

STEELE, PHILIPPA  
University of Cambridge  
pms45@cam.ac.uk

VALÉRIO, MIGUEL  
University of Barcelona  
mfgvalerio@outlook.com

WAAL, WILLEMIJN  
Leiden University  
w.waal@hum.leidenuniv.nl

WEINGARTEN, JUDITH  
British School at Athens  
judith@judithweingarten.com

YASUR-LANDAU, ASSAF  
University of Haifa  
assafyasur@hotmail.com

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