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Chapter 6

From Linear B to Linear A: The problem of the backward projection of sound values

1. Introduction

This paper addresses the apparently simple question of whether, and if so to what extent, it is legitimate to use the sound values of Linear B in order to read the texts written in Linear A. This is hardly a new topic; already shortly after the decipherment of Linear B scholars were using its sound values to identify names in Linear A, most notably Furumark (1956, 28), Pugliese Carratelli (1957) and Palmer (1958), without, however, necessarily reflecting in depth on the methodology and the implications of doing so. It was Hooker (1975) and Olivier (1975) who first looked at the problem in detail, and subsequently a number of scholars, in particular Pope and Raison (1978, 38ff.), Godart (1984) and Duhoux (1989), have put forward good reasons why it is legitimate, at least in part, to apply Linear B sound values to the earlier Linear A. Still, it does remain a relevant issue as doubts about the legitimacy of this approach can still be seen and found in print. For example, one author recently writes: "...taking into account that the discussed words are attested in a very poor and unreliable way, the fact of finding the above mentioned connections between them does not seem to be an incontrovertible proof confirming the validity of the substitution of phonetic values of Linear B to Linear A."[2]

In what follows, we try to provide arguments that it is legitimate *in principle and as an approximation* to read Linear A with the sound values of Linear B. To this end, we shall look at the problem in detail and, at the same time, take a broader approach. In principle, of course, reservations are quite in order from a methodological point of view. A great amount of time and effort has been spent elucidating the development from Linear A to Linear B in all of its aspects, and with impressive results.[3] Although difficult in detail, this is at least

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[2] Zadka (2010, 183).

[3] See, for example, Palaima and Sikkenga (1999), Tomas (2003, 2011, 2012a).

methodologically straightforward, as the method of the archaeologists, historians and epigraphists is correct: the explanation of a later state of affairs on the basis of an earlier one. Anyone currently attempting to read Linear A, however, does exactly the opposite: by taking the sound values of Linear B and applying them to Linear A, one tries to explain and, crucially, interpret something earlier on the basis of a later state of affairs, and that is, of course, highly questionable from a methodological point of view, especially given that we have very little check on the results. For if we apply the sound values of Linear B to Linear A the result is a language of which we understand neither the grammatical structure nor, with a few minor exceptions, the content. *A priori* it is difficult to decide whether this is so because the underlying language is so different to the Greek that we see in Linear B, or because we are incorrectly inferring the sound values, or both.

Of course, even if, as we shall argue, it is entirely legitimate *in principle* to "read" Linear A with Linear B sound values, this must be qualified immediately. Whatever the nature and structure of the Minoan language may be, it can be taken as certain that the Minoan language underlying Linear A, which we assume to represent a single language at least in the context of the administrative documents,[4] did not have the same phonological inventory as the Mycenaean Greek encoded in Linear B, meaning that an at present incalculable degree of phonological adaptation and realignment must have taken place in the process of creating Linear B from Linear A. A close phonetic interpretation, however, is not necessary. A reinterpretation or adaptation must from our vantage point be regarded as unproblematic if it is both plausible in phonetic terms and systematic. It is evident, then, that in the absence of secure phonetic correspondences and linguistic reconstruction typology provides an important, though of course not fool-proof, check on the linguistic interpretation.

2. Linear B as a descendant of Linear A

A good first argument supporting the view that a backward projection of sound values is legitimate comes from our evolving view of the scripts themselves.

It is a trivial fact that the two scripts are extremely close, indeed arguably closer than any of the other Bronze Age scripts of the Aegean and Eastern Mediterranean are to one

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[4] See in this sense also Davis (2014, 179ff).

another. Indeed, sometimes the relationship is so close that in short or fragmentary texts it is very difficult to decide, on the basis of the sign shapes alone, whether we are dealing with a Linear A or Linear B document.[5] The view used to be common that there was a Proto-Linear ancestor out of which Linear A and Linear B developed independently.[6] The main reason for arguing this position was that overall the correspondences between Linear A and Linear B were not as numerous as one would expect for two scripts of which one evolved out of the other.

However, this was difficult from the beginning, as such a hypothesis fails to account for the stark discrepancy in the chronology of the attestation of the scripts. Put differently, if a Proto-Linear script had existed out of which Linear A and Linear B were developed independently as sister scripts, we would be at a complete loss to explain why Linear A was attested hundreds of years earlier, with no trace of Linear B all that time, and why Linear A falls out of use soon after Linear B enters the stage.

Such a view can be put to rest now, and it is abundantly clear that *essentially* Linear B was adapted out of Linear A and nothing else, meaning that the core part of the Linear B script, i.e. its syllabograms, go back, except for those that are Linear B innovations, directly to Linear A.[7] This is not just borne out by the chronology, the striking similarity of the scripts and their use, the likely historical context and the administrative set-up. Even though we are

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[5] E.g. KN Ze 16 (see *GORILA*[4]: 138) which, assuming the dating to LM II is correct, is either an unusually late example of Linear A or an early example of Linear B on an unusual support.

[6] Still found, for example, in Coulmas (1996, 96): "During the Middle Minoan period (about 1700-1550 BCE) the proto-linear signs developed into two scripts known as Linear A and Linear B".

[7] This is not to be taken to mean that the relationship between the two scripts is entirely straightforward, and almost every treatment of the subject begins by stressing how complex this relationship actually is. Thus, Melena (2014, 6) stresses the difference between Linear A and Linear B when it comes to measuring smaller quantities. This is undoubtedly true and could point to another source of input for the administrative reform that took place at the time of adaptation though Melena's suggestion that Miletus may have been the place of adaptation (Melena 2014, 7) is speculative and, as he himself admits, does not sit comfortably with the archaeological data currently available; for the administrative reform that led to certain changes in the overall use and structure of the script, cf. the papers by Tomas and Petrakis in this volume. Whatever the case regarding the place of adaptation, this issue has no bearing on the use of the syllabograms. A finely balanced view is expressed in Palaima and Sikkenga (1999, 606) who see Linear B as the product of "certain features of Linear A" on the one hand and a "considerable understanding of the phonemic and morphological structure of the Greek language" on the other, thus accounting for the new signs in Linear B and, at least in part, the loss of certain Linear A characters.

far from a complete understanding of the Bronze Age scripts from this area, there is, quite simply, no room for any other script out of which Linear B could have developed.[8] Crucially, the further we go back in time within Linear B itself, the greater the similarities with Linear A become.[9] Steady progress has been made both in the archaeological and historical understanding of the relationship between the Minoan and Mycenaean societies and administration, and in the epigraphy. The table in *Docs*[2] (p. 33) identifies 53 out of 89 signs as shared between Linear A and Linear B, a 60% identity. By now, due to new finds and better epigraphic study, this figure has risen to about 64 out of 89, giving a figure of 72%. So, for example, sign 48 𐀷 *nwa* had previously been attested in both Cretan Hieroglyphic and Linear B, and it was always reasonable, therefore, to assume that it must also have existed in Linear A,[10] and indeed a recently edited Linear A inscription apparently shows precisely this.[11]

 This 72% identity is comparable to the relationship of the Latin alphabet of the end of the 3rd century BC to the Old Italic alphabet out of which it developed (Table 6.1). 20 out of 27 original signs are identical, and Latin has also developed an extra one, giving a sign identity of 74%, a figure quite comparable to what we see between Linear A and Linear B; and if we compare, a few hundred years later on, the local Cretan alphabet to the post-Euclidean alphabet which eventually replaced the autochthonous variety, the figures are again comparable.[12] On the other hand, it is quite clear that some signs were invented within Linear B and specifically on the basis of the Greek language, and this likewise should not surprise us since scripts do evolve. Also, given that no two languages have the same sound system, there may well be a need for additional signs. Likewise, of course, some of the old signs might not be useful in the context of the new language for which the script is adapted (see on this topic Judson, this volume). The best known case clearly is the complex sign 𐀄 *dwo* which is "two

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[8] There is little to be gained from Hooker's assumption (Hooker 1979, 33) that Linear B which he characterises as "more cursive and florid" partially owes its existence to a different – but unattested – form of Late Minoan writing on Crete and was not "developed expressly for writing on clay".

[9] See Driessen (2000, 224-228), Bennet (2008, 20).

[10] Cf. the comment in *Docs*[2] (p. 40): "Only one Mycenaean syllable, 𐀷, *nwa*, has a close parallel in the 'hieroglyphs' […] but none in Linear A, and even here the omission from A may be due to the accidents of history."

[11] SY Za 4, see Muhly and Olivier (2008, 207-08 and 216). The drawing of the text is done with confidence while the photograph seems less clear.

[12] See the "Table of Letters" at the end of Jeffery (1990; not paginated).

wo", or in Greek "duo *wo*", in other words, a completely iconic formation by way of doubling the sign for *wo*, 𐘈, a process that is dependent on an element in the Greek language, namely the word for "two" (see Meißner and Steele forthcoming). All in all the correspondence between Linear A and Linear B is substantial, and if gaps still exist we should not be surprised. After all, the amount of text we have written in Linear A is very small; as Younger states: "There are some 1427 Linear A documents with a total occurrence of 7362-7396 signs (Schoep 2002, 38); if there are 4002 characters (font Times, pitch 12, no spaces) on a 8 1/2 x 11 inch sheet of paper with 1 inch margins, all extant Linear A would take up 1.84 pages."[13] Schoep's figures now have to be revised upwards slightly; still, all of Linear A would not take up much more than 2 full pages. If the total amount of Latin transmitted to us were similarly limited, it is extremely likely that the very rare sign <K> would not be attested.

[TABLE 6.1]

3. The relationship between Cretan and Cypriot Scripts

A second argument comes from a much more long-distance comparison. It is evident that Linear A and Linear B are only one part of a writing tradition that was significantly more widespread, and even before the decipherment of Linear B it was clear that the script was related to the syllabic scripts on Cyprus: the undeciphered and unintelligible Cypro-Minoan, mostly in the second millennium BC, and, descended directly from it, the later Cypriot Syllabary that was used to denote the Cypriot dialect of Greek from the beginning of its attestation by the 8th century BC right down to its demise in the 3rd century BC; the latter script was also used to write at least one further language, the so-called Eteocypriot, a language that remains poorly attested and understood (Steele 2011; 2013a, 99-172). The exact details of the relationship between Cypro-Minoan and the Linear scripts from Crete are not clear, and the Cypriot inscriptions show a smaller degree of confirmed correspondence in sign shapes and values than is evident between Linear A and Linear B, pointing towards a script adaptation made in very different circumstances from the creation of Linear B and probably making more radical alterations to the source script (see Steele forthcoming, ch. 1).

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[13] Younger, http://www.people.ku.edu/~jyounger/LinearA/#5 under 5. "Basic Statistics".

Nevertheless, it cannot be denied that the Aegean and Cypriot scripts are related, owing to a number of signs in Linear B and in the first millennium Cypriot Syllabary that have clear shared shapes and values (see below). Both of these scripts were adapted to write varieties of the Greek language at different stages.

Cypro-Minoan is first attested in Late Cypriot I, i.e. the first phase of the Late Bronze Age, probably corresponding to the later 16th or beginning of the 15th century BC. This is maybe 100 years, more or less, before the first attestations of Linear B in perhaps Late Minoan IIIA1 at Knossos (the Room of the Chariot Tablets) / Late Helladic IIIA1 at Iklaina near Pylos, which rules out any direct descent from Linear B.[14] It does not necessarily follow that Cypro-Minoan must be a direct descendant of Linear B's ancestor, Linear A, but the timescale must be approximately correct: assuming that the earliest known Cypro-Minoan inscriptions do not date more than 100-200 years after the transmission of writing to Cyprus, the Linear A script is the only well attested candidate for being its direct ancestor.[15] Assumed direct descent from Linear A would leave some unanswered questions, for example why the number of obviously shared signs is quite low (see below), although it is possible that the form of some signs has changed beyond recognition (though see further Valério, this volume), or that the creation of Cypro-Minoan involved the invention of a significant number of new signs alongside the inherited ones, as argued for example by Bombardieri and Jasink (2010). An alternative hypothesis is available, namely that Linear A and Cypro-Minoan could be sister scripts, descended from a common ancestor; however, this would require an assumption that they are descended from a script of which no examples have survived, as was long ago suggested by Lejeune (1958a, 328; see also Steele 2014b). This latter hypothesis could potentially be seen to fit in well with the view that there is little in the way of archaeological evidence pointing towards an obvious situation of contact between Crete and Cyprus at the time when the transmission of the script ought to have taken place. However, a non-Cretan origin for Cypro-Minoan (e.g. Sherratt 2013) not only is not any better supported by the archaeological evidence, but also requires an assumption that a related script was

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[14] The basis for the dating of the Room of the Chariot Tablets documents is laid out in Driessen (2000). The Iklaina tablet fragment is published in Shelmerdine (2012).

[15] A link with Cretan Hieroglyphic is not impossible, but there is little positive evidence to support it, either in terms of shared signs or of palaeographic similarities, whereas Linear A shows much more convincing parallels. The relationship between Cretan Hieroglyphic and Linear A is itself far from straightforward: see the papers by Ferrara, Decorte, Tomas and Petrakis in this volume for various aspects of the problem.

widely in use in an area such as Anatolia but has left no traces whatsoever – making it a not very attractive alternative hypothesis. At present, no definite decision can be made between these possibilities.

However Cypro-Minoan is related to Linear A, it is striking that we can identify a certain number of signs that have the same morphology, i.e. shape, in Linear B and the first millennium Cypriot Syllabary, as well as sharing the same or a closely related phonetic value. Eleven signs can be identified with a high degree of certainty: *a, i, da (=ta* in the Cypriot Syllabary*), na, pa, po, ro (=lo* in the Cypriot Syllaary but *ro/lo* in Linear B*), sa, se, ti* and *to* (see Table 6.2). Without quite going as far as Masson (1987), who thought that she could understand exactly a large set of correspondences between the Aegean and Cypriot scripts based mainly on formal resemblance, we can perhaps add others to the list: *si*, for example, is a good contender. Analysis of other possibly related signs in Linear A and Cypro-Minoan, as conducted for example by Valério (this volume), has the potential to reveal further links.

[TABLE 6.2]

Some of the shared signs raise phonological questions. For example, what can it tell us about Minoan phonology that the sign borrowed into Linear B as *da* /da/ (as opposed to /ta/, /tʰa/) was borrowed into Cypriot Syllabic as *ta* (i.e. /ta/, /tʰa/, /da/), while the signs borrowed into Linear B as *ti* and *to* (i.e. /ti/, /tʰi/ but NOT /di/, etc.) also ended up as part of the Cypriot Syllabic t-series (*ti, to* representing /ti/, /tʰi/, /di/, etc.)? Various explanations have been put forward to explain how Linear B *da* and Cypriot Syllabic *ta* are related to each other, including a proposal by Lejeune (1958a, 327) that the Linear B d-series originates from a series representing a Minoan /l/ phoneme of some sort, but none adequately accounts for the mixed affiliations of the Cypriot Syllabic t-series (see Steele 2014b). There is also the perhaps related problem of how Cypriot Syllabic developed two different series for /r/ and /l/ while Linear B developed a single series used for both. The crucial question is whether Linear A or Cypro-Minoan had separate series to represent /r/ and /l/, and there are several possibilities, including: Linear A always had a distinction between /r/ and /l/ but one series was reinterpreted as /d/ in Linear B (cf. Lejeune's suggestion) while the /r/ and /l/ distinction was maintained in Cypro-Minoan; Linear A did not distinguish /r/ and /l/ and passed this lack of distinction on to Linear B as well as to Cypro-Minoan, while Cypriot Syllabic later made the innovation of distinguishing between them; or a situation similar to the last but with the

innovation made in Cypro-Minoan and passed on to Cypriot Syllabic. It does not help that we do not know for certain whether Cypro-Minoan is a descendant of or sister to Linear A.

Admittedly the number of definite correspondences across the four scripts is not high, suggesting a complex development process, but it is striking that wherever there is such a correspondence the sound values also correspond very closely (notwithstanding the aforementioned examples). Cypriot Syllabic can only have inherited these values from Cypro-Minoan, and further back from Linear A or the ancestor of both Linear A and Cypro-Minoan, just as Linear B has inherited them directly from Linear A. This suggests that we can be quite confident of the values of these signs in Linear A, a few caveats notwithstanding. The exact phonetic values in Linear A cannot be recovered with precision, as highlighted especially by the more complex cases outlined above, but the shared values are close enough to reconstruct the values approximately. The fact that the obviously shared signs cover several consonant series, as well as the vowel-only signs, gives one further confidence. In other words, despite the facts that both writing traditions went through at least one change of language each (Linear A > Linear B, concomitant with the transition from Minoan to Greek on Crete as the language of administrative documents, and Cypro-Minoan > Cypriot Syllabic representing a change from a completely unknown language to the Cypriot Greek dialect), the sound values attached to the signs are tenacious and remain pretty much constant over a long period of time, even though they are attested in different places and used for various unrelated languages. This means that the much smaller step leading from Linear A to Linear B is even more likely to operate with the same sound values not just in the 11 cases where it is incontestable, but across the board.

4. Shared sign sequences

Next, there is the argument that Hooker (1975) and others started out from. There seems to be a large number of names shared between Linear A and Linear B and if they indeed be identified as being the same name then this will imply the same or similar sound values for a given sign between Linear A and B. One problem here is word length, and chance graphic identity disguising substantive differences can often not be ruled out entirely. Evidently, the longer a sequence of signs in Linear A and Linear B respectively, the greater, statistically speaking, the likelihood that the identity is real. In this context Duhoux (1989, 69) points out that in a sequence of 3 signs, the likelihood of identity is in the low 80% range, while in the

case of a sequence of 4 identical signs, this likelihood rises to 99%.

The list of putative Linear A – Linear B equations between names containing sequences of 3 identical or sufficiently similar (identity in the consonantal structure with some vocalic alternations) characters is quite considerable (see Table 6.3: personal names unmarked, place names in bold). This is an impressive list, and if we could take it at face value, we would gain 39 signs that have the same sound value between Linear A and Linear B, effectively settling the matter. However, things are not quite so straightforward, for the evidence is of mixed value. Personal names are not a particularly good guide as there usually is no independent confirmation available that two identically or very similarly written forms render the same name; in addition it can be hard, even within Linear B, to tell whether a given form is a personal name or an appellative title, indication of a profession or the like. There must be particular doubt concerning the identification of personal names especially when parallels from Pylos are invoked. Further problems with such identifications can be illustrated by the equation *a-ka-re-u* = *a-ka-ru*. *a-ka-re-u* in the Linear B tablet from Knossos is undoubtedly a man's name, but Linear A *a-ka-ru*, as would appear from its position in the tablet, is a heading and may be a transactional term.[16] Linear A *a-ka-ru* would thus have nothing to do with Linear B *a-ka-re-u*. Likewise, *i-ja-te* in Linear B, attested at Pylos, is probably the entirely Greek word for doctor, ἰατήρ, and has nothing to do with the Linear A term *i-ja-te*. Where, however, the Linear B personal names are limited to Knossos and/or do not have a ready explanation from within Greek, such as *sa-ma-ru* or *qa-qa-ro*, the identification across the two scripts and languages is clearly tempting. It also needs to be pointed out that Duhoux's figures of 81% and 99% likelihood of identity are blind to the relative frequency of the signs in Linear A and Linear B respectively. If we take these into account, even a 3-character sequence like Linear B *qa-ra$_2$-wo* = Linear A *qa-ra$_2$-wa*, containing the sign *ra$_2$*, relatively rare in both Linear B and Linear A,[17] reaches a higher likelihood of indicating the same name.

[TABLE 6.3]

If we wish to remove the uncertainties connected to the personal names and only

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[16] See http://www.people.ku.edu/~jyounger/LinearA/lexicon.html.

[17] There are about 68 instances of this sign in Linear B and a maximum of 38 in Linear A (18 of which, however, are found in the name *sa-ra$_2$*).

accept evidence from place names from Crete (Table 6.4):

we are reduced to much less, and Olivier (1975) and Godart (1984) arrive at 15 or 16 shared signs and sound values, depending or not whether we are prepared to admit a two-character place name, *i-da*, to be part of this list, which would add the identification of the shared sign ├ as *da* to the list.

[TABLE 6.4]

If we add the sign values confirmed by the place names to those confirmed through comparison with the Cypriot scripts (section 3 above), then our grid of secure correspondences fills up (Table 6.5). In this way, we arrive at 19 or 20 signs likely to share the same or very similar sound values in Linear A and Linear B, including, crucially, a whole consonantal series (the t-series).

[TABLE 6.5]

5. Variations in Linear A sign sequences

As well as looking for words that appear in both Linear A and Linear B, we can consider words that recur in Linear A in multiple attestations, sometimes with small variations in the sign sequence usually appearing at the end of the word. Provided that the sequences contain enough shared signs, it is reasonable to assume that these are variations within the same word (as with comparisons across Linear A and B, a four-sign sequence is a very secure indicator, and a three-sign sequence still very likely to indicate the same word). Looking for morphological patterns in this way is important for anyone attempting to identify the language underlying an undeciphered script, putting us in mind of the methods applied to Linear B before its decipherment, especially by Alice Kober (see Kober 1945); but at a basic level it can also give us access to sign values by allowing us to identify signs that share a consonant or vowel (see Duhoux 1989, 66-8). For example, as well as the place name *su-ki-ri-ta* (also attested in Linear B, see above), we find in Linear A *su-ki-ri-te-i-ja*, which looks like the same word with a different suffix (in this case, since *su-ki-ri-ta* is a known place name, we might guess an ethnic adjective suffix describing the content of the jar on which it is found). This confirms that the *ta* and *te* signs share the same consonant and differ in only

the vowel, i.e. that *ta* and *te* belong to the same consonant series. Further attested sequences can be considered:[18]

m-series:	(*j*)*a-sa-sa-ra-me* (*ja-sa-sa-ra-me*: IO Za 6; IO Za 12; IO Za 16; PS Za 2.2; TL Za 1b; *a-sa-sa-ra-me*: PK Za 11.b-c; PR Za 1.c)
	ja-sa-sa-ra-ma-na (KN Za 10a-b)
	i-pi-na-ma (IO Za 2.1; KO Za 1c-d; AP Za 2.1)
	i-pi-na-mi-na (PK Za 10; PK Za 11.d)
t-series:	*su-ki-ri-ta* (PH Wa 32)
	su-ki-ri-te-i-ja (HT Zb 158b)
	(*j*)*a-di-ki-te-te* (*ja-di-ki-te-te*: PK Za 15; *a-di-ki-te-te*: PK Za 11.a-b)
	ja-di-ki-tu (IO Za 2.1)
u and w-series:	? *qe-ra₂-u* (HT 1.1-2; HT 95a.4-5, b.4-5)
	? *qa-ra₂-wa* (HT 86a.3)
	ja-ta-i-*88-u-ja (AP Za 1)
	a-ta-i-*88-wa-ja (IO Za 2.1; IO Za 3; IO Za 7; KO Za 1a; PK Za 12.a; SY Za 1. SU Za 2a; SY Za 3; SY Za 4; SY Za 8; TL Za 1a)
s-series:	? *tu-ru-sa* (KO Za 1b-c)
	? *a-tu-<u>ri</u>-si-ti* (KN Zb 5)

The alternations seen in these pairs, especially the ones that are better attested and share longer sequences of signs, allow us to identify some signs that must belong to the same consonant-series in Linear A.[19] The crucial point to note is that these are signs that in Linear

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[18] Only certain attestations are listed.

[19] The pair demonstrating an alternation between *u* and *wa* (*ja-ta-i-*88-u-ja*, *a-ta-i-*88-wa-ja*; the fluctuation between word initial *a-* and *ja-* is attested elsewhere, most notably in (*j*)*a-sa-sa-ra-me*) gives two signs that do not *sensu stricto* belong to the same series, but they can both be seen as reflexes of a semi-vowel.

B also belong to the same consonant series, making it all the more probable that they were transferred from Linear A to Linear B as whole consonant series – and making it all the less likely that there were random reallocations of signs' values, such as is often suggested based on an assumption that Linear A only had (and only had signs for) three vowels.[20]

As well as ones already identified, this procedure confirms the consonant-value of some signs that were not confirmed by the other methods already discussed, for example three signs in the m-series (*ma*, *me*, *mi*). We could add a fourth sign to the m-series by another, admittedly less certain, method: the sign *mu* doubles as the ideogram for 'cow' in Linear A just as it does in Linear B, perhaps suggesting an onomatopoeic origin for the ideogram. Further slots begin to fill up in the grid of signs with confirmed approximate values (Table 6.6).

[TABLE 6.6]

6. A caution from Caria

But caution is still in order. When some signs have the same or roughly the same sound value, this does not mean that every sign needs to behave in the same way. In this context, it may be salutary to look at the situation from somewhere nearby, Caria, several hundred years later.

The Carians adopted, like many people in the Aegean and Eastern Mediterranean, the alphabet, and given the letter shapes, it is most likely that they adopted it from the Greeks in whose Ionic hinterland they lived. It is attested from about the 7th century BC onwards, and given the apparently higher number of phonemes in their language a few signs were added

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[20] See e.g. Younger at http://people.ku.edu/~jyounger/LinearA/, section 7b: "It is well-known that Linear A uses three main vowels, A, I, U; Linear B adds e- and o-series, and complex phonemes (e.g., dwo, two)"; and Palaima and Sikkenga (1999, 603): "Linear A has a 3-vowel system, using a, u and i." Davis (2014, 240-2) accepts that Linear A had three main vowels but argues that the e- and o-vowels attested are the results of monophthongisation of i- and u-diphthongs respectively. Beekes (2014, 8) accepts a five-vowel system: "Originally, I thought that Pre-Greek had only three vowels: a, i, u... Recently, I have become more inclined to assume a system with the usual five vowels." A comparative and statistical analysis may well show that, whatever the vocalic system of the underlying Minoan language, Linear A did have full sets of signs for five vowels: see Meißner and Steele (forthcoming).

(Table 6.7). What is highly remarkable is the sound values of the signs.[21] Compared to Greek, only the signs for a, o, s and u are kept with the same sound value. Other signs look as if their sound value was almost deliberately distorted, and in any case they have nothing to do with the Greek *Vorlage*. It is unsurprising, therefore, that Carian for a very long time resisted decipherment, and had it not been for the digraphs of some names and eventually an Greek-Carian bilingual inscription that was found at Kaunos it is almost certain that we would still be in no position to read and understand Carian. The Carian situation may serve as a stark reminder to us that even if some sound values are shared it must not be assumed automatically that this is true for all signs.

[TABLE 6.7]

7. Morphological trends

However, there are reasons to think that, in fact, for Linear A we can be more optimistic. For a) it would appear that whole consonantal series are identical between Linear A and Linear B, in particular the impressive s-series and t-series, even if we only accept the place names as evidence; and b) it is encouraging to see certain patterns: personal names ending in -Cu in Linear A tend to end in -Co in Linear B, an expected adaptation to the morphological structure of Greek where male PNs end in /-os/ much more often than in /-us/ (Table 6.8). But the opposite is, curiously, also attested (Table 6.9). At least it shows precisely the same alternation though it does raise questions as to the phonological status of the o- and u-series in Linear A.[22] Likewise, male PNs in Linear A -Ce were, unsurprisingly, adapted in Linear B in the same way (Table 6.10).

[TABLE 6.8]
[TABLE 6.9]
[TABLE 6.10]

8. The statistical approach

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[21] For the sound values of the Carian alphabet and how to determine them see, above all, Schürr (1992), and Adiego (2010).

[22] See Davis (2014, 189, fig. 111, and 240ff.) and Meißner and Steele (forthcoming).

A completely different type of argument for the legitimacy of applying Linear B sound values to Linear A was provided by Packard,[23] further developed recently by Davis.[24] As is well known, Packard carried out a number of statistical experiments. Particularly impressive are his "expected frequencies": assuming the sign we read as "*da* were twice as frequent as *di*, one might predict that *ka* should be roughly twice as common as *ki* and that *ma* should be twice as common as *mi*",[25] and indeed this relationship is borne out. Packard even constructed 9 random, and therefore in all likelihood false decipherments, where signs of relative similar frequency were randomly distributed, but none of these produced anything like as coherent a result as the application of Ventris's sound values for Linear B did. In other words, this is good statistical confirmation.

This could then be used for the names as well. And indeed Packard was able to show that applying Ventris's sound values to Linear A yields five times as many parallels with Knossian Linear B words as does the average of random, fictitious decipherments. One would not, however, expect the same number of correspondences between names in Linear A and those in Linear B from the mainland, and even this "negative" correlation is borne out by Packard's study. For there is no significant difference between the results obtained by applying Ventris's values and those obtained by "random" decipherment.

This does constitute good confirmation of the validity of the application of Ventris's sound values to Linear A from a completely different corner.

9. Ideograms and the acrophonic principle

A further argument comes from within the Minoan language itself. Linear B uses a number of syllabograms and ligatures almost like ideograms. This use is apparently based on the acrophonic principle of representing the first syllable (or, in case of the ligatures, two or three syllables) of a commodity term; the same sign is used both syllabographically and ideographically. Thus, *ni* serves, apart from its syllabic value, as the sign for "fig" (as also *sa* for "flax", *ra₃* for "saffron", etc). Linear A also uses the same sign, *ni*, ideographically. It is important to note that those signs that consist of one syllabogram only never abbreviate a

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[23] Packard (1974).

[24] Davis (2014, 246ff).

[25] Packard (1974, 82).

Greek word: the Greek word for "fig" is σῦκον, and similarly the word for "flax" is λίνον, i.e. they do not begin with ni and sa, in the same way that the Greek word for saffron, κρόκος (itself not an inherited word), does not begin with rai-/lai-. So one might well wonder where these come from – a Minoan word for fig beginning with ni-? We are helped further here by the much later Greek glossographers. We owe to Günter Neumann (1962) the discovery of the gloss νικύλεον· τὸ σῦκον ἐν ταῖς Κρητικαῖς γλώσσαις (attributed to Hermonax in Athenaeus *Deipnosophistae* 76e). In other words, Hermonax's νικύλεον and the use of *ni* as the ideogram for fig in Linear B very likely are derived from this Minoan word.

An important ligature encountered in the texts is *ma + ru*,[26] thus *maru* or *malu*, which designates "wool" as an ideogram in Linear B and is used in the same way in Linear A - but of course the Greek word for wool is λῆνος. Hesiod has μαλλός for "fleece" (*Works and Days* 234), and in Hesychius we find a gloss μάλλυκες· τρίχες. If we assume exactly what we already saw in the personal names, namely the substitution of a Minoan u with Greek o so as to integrate the word into the productive o-stem noun class, then we have a very good match indeed. This provides further justification for reading 𐘂 as *ni* in Linear A, 𐘃 as *ma* and 𐘄 as *ru*, and indeed we also have very rare direct evidence for some Minoan words here.

More recently, the word for the sycamore fig has been identified in Linear A.[27] On HT 88.2 the sequence which if we apply Linear B sound values reads as *ki-ki-na* follows the ideogram NI "fig" and clearly qualifies them. Now, in Hesychius' lexicon there is a gloss κεικύνη· συκάμινος which means sycamore or sycamore fig, a less sweet variety of figs, and Theognostos (*Kanones* 101.7) states that this word is one of the first declension words in -α that are proparoxytona, i.e. accented on the 3rd syllable from the end: τὰ διὰ τοῦ υνα προπαροξύτονα διὰ τοῦ υ ψιλοῦ γράφονται· οἷον χέλυνα, ἄμυνα, εὔθυνα, ἔρυνα, Δίκτυννα, σίγυννα, κίκυνα.

Thus we can add *ni* and *ru* to our grid and confirm some other entries (*ma*, *ki*, *na*) (Table 6.11).

[TABLE 6.11]

10. The context of adaptation

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[26] Note that in Linear B this is not a functional ligature any more as it often looks like *ma + re* or *ma + ro*; see Nosch (2007, 11 and 15-21) and Petrakis (2012, 529-531).

[27] See Zadka (2010).

These considerations lead to the final justification for reading Linear A with Linear B sound values. And for this we do not have to look into the language or even the writing system at all but should rather regard the context of Linear A and Linear B writing. Many of the document types used by Mycenaean scribes are not new inventions: although they differ in some significant ways, they are clearly adopted and adapted from the Minoan administration(s) on Crete. The most obvious continuity is found in the use of clay tablets, which are found inscribed in both Linear A and Linear B, as well as parallels in sealing practices. The most striking similarity here is found in the use of a syllabic script to spell out words alongside the use of ideograms, numerals and other signs to denote commodities and quantities: in both Linear A and Linear B, the whole system of writing, and with it a range of document types, was being used with broadly similar administrative and economic purposes (on the Linear A system see Schoep 2002).

Despite this very important similarity, there were also some major changes made in the size, shape, function and arrangement of documents in the development of the Linear B bureaucratic system. While page-shaped and palm leaf type documents are attested in both administrations, there are a number of differences in their physical form and layout (Tomas 2011), as well as in the arrangement of information and the tidiness with which it is recorded (Tomas 2012a). This, in turn, may well point to differences in administrative practice and the uses to which the tablets were put.

There is also continuity to be found in the use of some types of sealings and nodules, but here again major changes were made as the Linear B administration discontinued some types and made its own innovations (Tomas 2012b).[28] However, in seal use the stylistic continuity is so striking that, as Webb and Weingarten (2012, 97) put it recently, "if we had only seals to go by, we should never have guessed that the Mycenaeans took control of Crete in LM II/IIIA", pointing towards other kinds of influence and continuity.

It is not surprising that the Mycenaean administration was not identical to the administrations that preceded it on Crete, necessitating changes to document type, format, arrangement and, eventually, complexity. However, it is obvious from those forms that were continued, even with adaptations, that the early writers of Linear B documents must at least have observed the work of Linear A scribes, and perhaps been trained in their methods before

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[28] There are in fact some striking similarities in sealing practices between Linear B and Cretan Hieroglyphic (Hallager 1997/8, and see also the papers by Tomas and Petrakis, this volume).

going on to make their own adjustments and improvements. Indeed, it has sometimes been suggested that Linear A scribes were heavily involved in the beginnings of the new administration (e.g. Palaima 2011, 115) and that there may therefore have been real continuity in the personnel writing the documents as well as the techniques used. The adaptations and innovations made in the creation of Linear B were undoubtedly aimed at making the documents better suited to the Mycenaeans' own administrative techniques, and were probably implemented over time as new methods of documentation were tried and tested. Long-term rather than sudden adaptation is also suggested by the early adoption of some document types that are attested only in early Linear B administration and must later have been abandoned, such as the flat-based nodule.[29] The technology of writing and the administrative purposes for which it was used seem to have gone hand-in-hand, which further suggests that the Linear A script did not undergo a sudden and drastic overhaul to create Linear B, just as changes to document type probably did not take place overnight.

All of this means that writing was passed on in a very tightly controlled and finite context. For one thing, the deliberate restriction of Linear B to administrative usage suggests a decisive initial adaptation, followed by later development within a restricted situation. The tightly controlled context of Linear B writing also makes it very likely indeed that reinterpretations on the part of the scribes were kept to a minimum, and there simply was little room for random reallocations of sign values. The Linear A script was borrowed as a whole system.

And it is here where we think the greatest difference with the Carian situation that we saw earlier can be observed. The context in which the Carians adopted the script is unknown but there is absolutely no reason to think that it occurred in the context of a centralised bureaucracy or administration. Much more likely, it was a sort of spill-over which then at some point was worked on and, up to a point, standardised. Up to a point because, in fact, Carian characters typically have a certain variety of morphological shapes which in turn suggests that writing was passed on in a looser, less tightly controlled way and context, and the fact that 90% or so of the documents that we have are graffiti from Egypt would seem to support this.

11. Conclusion

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[29] A small number of flat-based nodules have been found in the early deposit of the RCT at Knossos: see e.g. Driessen (1990, 64).

To sum up, therefore, despite the methodological problems mentioned at the beginning there are very strong arguments from a variety of different angles that all point in the same direction. Of course, uncertainties still remain. Given that the sound systems of no two languages are the same, a certain amount of adaptation must have taken place, but the point here is that these are likely to have worked on a principle of phonetic similarity, and to have been done in a relatively systematic fashion. It has often been said that it is likely Linear B had no use for certain Linear A signs, and the fact that some of the signs in Linear B (e.g. *18, *47, *49) are extremely rare, confined (or nearly so) to Knossos and employed here only to write seemingly non-Greek names such as *49-sa-ro is taken to support this. Here, however, caution is in order. For *18 has no clear Linear A antecedent, and some signs that were thought to be restricted to Knossos are now attested elsewhere. This is true in particular for *47 for which a doubtful attestation at Mycenae had long been known[30] but which may now also attested at Ayios Vasileios (HV Oq 18.2). Likewise, Bennet is clearly right in pointing out that Linear B does not appear to have created entire new series of signs,[31] a possible implication being that in theory Linear B could have redeployed Linear A signs to fashion a consonantal series non-existent in Minoan Linear A in a more "pick and mix" way; i.e. in order to represent consonants not found in Minoan, Greek would have assembled otherwise superfluous "debris" signs.[32] But it is at least equally possible that Greek at the time of transfer did not possess any phonemes that could not be aligned – for the purposes of script adaptation – with phonemes existing in the Minoan language.

The overall conclusion, then, is clear: there is, quite simply, very little room for a random reallocation of sound values, and positive identifications of sound values in Linear A are so numerous, systematic, and based on a whole number of approaches supporting one another that, on the basis of the evidence so far, in principle the backward projection of sound values from Linear B to Linear A must be regarded as legitimate.

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[30] *me-ta-*47-wa* at MY Go 610.1; *TITHEMY* read *me-ta-je-wa*.

[31] Bennet (2008, 15): "The fact that no sign-series in Linear B is entirely new, combined with the probable difference in consonant values, suggest that *some* modification of phonetic values of borrowed signs took place […]".

[32] Cf. again Bennet (2008, 15): "[…] meaning that great caution should be exercised in using Linear B-derived values to 'read' Linear A inscriptions".