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GRAPHICAL ORIGINS OF ‘INITIAL-*A*-FINAL’ IN HIEROGLYPHIC LUWIAN

James Burgin

Summary

The paper proposes to trace the graphical development of ‘Initial-*A*-Final’ from the Hittite Empire Period seals through the early and late Transitional Periods of Hieroglyphic Luwian Inscriptions and demonstrate that an intermediate category, termed ‘Initial-*A*-Displacement’, is required to describe the earliest Iron Age data. This graphical development occurred separately from any linguistic development, though it is acknowledged that IAF/IAD must have had some origin in Luwian phonology, and brief discussion of the relationship is offered at the end of the paper. Additionally, an appendix of every attestation of the *a* sign in the Hieroglyphic Luwian Corpus, from the Empire seals to the end of the Transitional Period in the mid-ninth century BCE is provided.

INTRODUCTION

‘Initial-*A*-final’ (henceforth IAF) is a feature of some stages of Hieroglyphic Luwian writing where words which are known to begin with an ‘*a*’ sound are sometimes written with their initial ‘*a*’ not at the beginning, but at the end of the word. A word like /amis/ ‘my, mine’ will appear written as *mi-sa-a*, which is transliterated after Hawkins 2003 (155-169) as **a-mi-sa*.¹ The graphical phenomenon of IAF occurs in digraphic seals and rock monuments of the Hittite Empire, but its use peaks in the period falling between the end of the Hittite Empire and the middle of the ninth century (termed the Transitional Period by David Hawkins), before disappearing almost completely in the Late Period. When the use of IAF declined, it did so rapidly and universally within the Luwian corpus.

IAF was noted very early by Emmanuel Laroche (Laroche 1956, 131-141) but was only discussed and named by David Hawkins in 2003 (Hawkins 2003, 159-161). Since then it has defied full explanation. Part of the difficulty is the presence of two signs conventionally transcribed with an ‘*a*’: *a* (L.450) and *á* (L.19). There has been debate as to whether there was a phonological distinction between the *a* and *á* signs. Alwin Kloekhorst proposed that the *á* actually represented a glottal stop /ʔ/, in contrast to *a* representing an open vowel /a/ (Kloekhorst 2004, 26-49). He would like to see *á* as the evidence for a Luwian reflex of Proto-Indo-European *h₁ (interpretation supported and elaborated upon by Simon 2010; 2013). Jens Rasmussen rejected this interpretation, arguing instead for an interpretation of *á* sign as /e/ (Rasmussen 2007). Craig Melchert opposed any distinction between *a* and *á* on the grounds that the signs interchange freely in writing after the mid-ninth century, with the *á* replacing *a* almost everywhere (Melchert 2010).

Melchert’s article advanced the study of the IAF problem in two important ways. First, in preparing his argument he marshaled a considerable amount of data on the distribution of *a* and *á*, made available online (Melchert 2008), which definitively demonstrated the mid-ninth century break in the treatment of the two signs (though as Simon 2013, 8 rightly pointed out, this does not vitiate the distinction prior to the ninth century). Second, Melchert also offered perhaps the first attempt to explain the graphics of IAF, suggesting that phenomenon had to do with space considerations: because the *a* sign is relatively tall, it is difficult for a scribe or stone mason to fit more than one sign after it. Thus in words beginning in *a* and longer than two signs, the *a* was moved to the end so as not break up the shorter signs. In later texts, when IAF was abandoned, the *a* sign was replaced almost everywhere

¹ The signs *ta*₄ and *ta*₅ will be read as *la/i* and *la/i* respectively, following Rieken, Yakubovich 2010, 199-219. For the most recent grammar of Hieroglyphic Luwian, including an overview of transliteration, see Payne 2014.

by the shorter *á* sign, except in the ubiquitous clitic chain where the *a* was simply omitted (Melchert 2010, 148–149). Unfortunately the specifics of Melchert’s graphical explanation are difficult to maintain. The *á* sign is not any more space efficient than the *a* sign, and, as will be seen, Hieroglyphic Luwian had other ways of saving space when needed, such as shrinking or canting the signs to fit. Yet his methodological approach of separating the graphics of IAF from the phonological question of *a* vs. *á* is insightful, and is pursued in this study.

A reexamination of the graphical distribution of the *a* sign in seal impressions, rock monuments, and inscriptions from the Empire Period to the end of the mid-ninth century Transitional Period, yields the following results:

1. Agreeing with Kloekhorst and Simon, the distinction between the *a* and *á* in writing (with very few exceptions) pertains until the Late Period. It can be observed that IAF only occurs with words originally beginning with *a*, and never *á*.

2. The description ‘Initial-*A*-Final’ is in most cases a misnomer. The majority of examples previously labeled IAF actually show the initial *a* being moved not to the end of the word but to the top of the next sign column, such that the *a* is proximate to the word’s new head sign. This practice of ‘Initial-*A*-Displacement’ (IAD) is especially common in the earliest corpus and may have had its origins in the Empire Period seals. ‘True’ IAF probably developed from cases of IAD in unusually long words, but became increasingly prevalent in the later Transitional Period corpus.

3. The five techniques of ‘*a*-movement’ – namely IAD, IAF, *á* substitution, deletion and no change – are present in all periods of the Hieroglyphic Luwian corpus, occurring at different frequencies.

The *a* sign behaved very differently from almost every other sign in the Hieroglyphic Luwian corpus. Its mobility is unique, and it is the only free-standing sign that regularly violates Hieroglyphic Luwian sign order.² Hitherto no explanation has covered all of its uses. From the results it will be argued that the *a* sign functioned in most cases as a phonetic complement. When placed before (initial *a* position) or behind (IAD, and eventually IAF position) a sign, it indicated an onset vowel ‘*a*’. When after (plene position) it emphasized or disambiguated a coda vowel ‘*a*’. Like other phonetic complements in Hieroglyphic Luwian (such as the *mi* in combination, or the *-r* everywhere), the *a* sign was graphically dependent on a neighboring sign. This is evidenced in ligature writings in initial *a*, plene, and sometimes IAD position (ligatures regularly occur with *za* and *ya*, but also revealingly with *a+ta* and *a+wa/i* which were two of the holdouts of the initial *a* sign in the Late Period). Finally, as a phonetic complement, the initial *a* was optional – it served by convention to clarify readings, but was not necessary. This was possible because the ‘*a*’ sound was the graphically unmarked vowel in Hieroglyphic Luwian, and was potentially implicit in most signs both at the end (like in the *Ca* series), *but also at the beginning*. Thus cases of deletion of initial *a* are in fact permissible instances of graphical under-determination, just as words normally spelled with plene *a* can be spelled without.

The results of the reexamination of the *a* sign, including an explanation of the transition of initial *a* to IAD and IAF, and evidence for the argument of treating *a* as a phonetic complement, are presented below. Additionally an attempt will be made to explain why and how this system of complementary *a* was replaced by the *á* in the Late Period.

A VS. Á IN THE EARLY CORPUS

The distribution of *a* and *á* has been thoroughly discussed, culminating with a list provided by Simon of words regularly beginning with *a* and *á* prior to the mid-ninth century (Simon 2013, 2–8). Simon’s assessment is correct with one exception. The first person possessive pronoun *ami-* ‘my, mine’ must be classed as beginning with *a*, except in the neuter nominative-accusative, both singular and plural, where it begins with *á*. David Hawkins noted this distribution in passing in his edition of the ALEPPO 7 inscription (where he came across the first attested exception to the rule): “(t)he forms of *ami-*, ‘my’, ending in *-i-* are regularly written with initial-*a*-final (*mi-^{*}a*, = *ami-*)

2 The *ra/i* sign, which always appears in ligature with and dependent on another sign, regularly appears *after* the *i* sign in the combination *i+ra/i* = ‘*ri*’. See Hawkins 2000, 30–31. Seeming examples of irregular word order on Bronze Age seals, such as MONS+*TU* ‘Tudhaliya’ and LABARNA+*LA* should be read as cases of acrophonic disambiguation, *i.e.* the “(Divine) Mountain, which begins with a ‘*tu*’ sound,” and “the (image represented by the LABARNA sign), which begins with a ‘*la*’ sound.”

in Empire, Transitional and early Later periods, while those ending *-a(-)* (nominative/accusative singular/plural N *amanza*, *ama*) are written with initial *á*- in the early Late period, but are hitherto unattested in Empire or Transitional ...” (Hawkins 2011, 50). To put an exact number on the distribution, in the early corpus (see definition in Appendix 3) there are a total of 19 examples of the first person possessive in neuter nom.-acc, all from post-Empire texts. Of these 17 show *á* and only 1 (ALEPPO 7) shows IAF/IAD:³

Neuter 1st Person Possessive Pronouns (*amanza*, *ama*)

initial <i>a</i>	IAF/IAD	initial <i>á</i>
-	1	17

In contrast, the common gender forms show mostly IAF/IAD, except in the earliest inscriptions. The exact distribution is:

Common 1st Person Possessive Pronouns (*amis*, etc.)

initial <i>a</i>	IAF/IAD	initial <i>á</i>
5	47	1

All of the examples showing initial *a* (*a-mi* EMIRGAZI Block A.3; *a-mi-zi/a* YALBURT 4, §2 and 11, §4; *a-mi-zi/a* KARAHÖYÜK §13; KARAHÖYÜK §22 *a-mi-i(a)*) come from the Empire or immediately post-Empire Period (the one example showing *á* comes from a later text KELEKLI §2). Simon considers these forms to be exceptional, adopting a suggestion of Kloekhorst that they can be explained away because they come from a period when the IAF system was not fully developed (Simon 2013, 8). However, instead of being seen as exceptional they should be considered revelatory.

The graphic/phonological identity of *ami*- is concealed by a paradox: if it appears (almost) exclusively with IAF/IAD, how does one determine which sign was it originally written with? To put it another way, does IAF/IAD reflect words originally beginning with *a*, or also those with *á*? Turning to the data, the answer to the last question is an emphatic no. Words beginning with *á* do not show IAF/IAD, and almost no word beginning with *á* regularly substitutes *a* (see comment on *as-/ás-* ‘to be’ below). In contrast there are words beginning with *a* that regularly show IAF/IAD: the conjunction and particle combination *a-wa/i* is an ubiquitous example that appears with *a* in isolation and IAF/IAD when followed by clitics. Additionally, of the six common gender examples of *ami*- that do not show IAF/IAD earliest data, five show *a* and only one *á*. Thus a corollary can be added to Kloekhorst and Simon’s proposal: there is an ironclad distinction between *a* and *á*, and only words with *a* can take IAF/IAD.

As a result, the spelling of the neuter forms *amanza/ama* with an *á* should be taken seriously. There was apparently a phonological distinction between the common gender *a-mi-*, which ends in an ‘I’ vowel as Hawkins noted, and neuter *á-ma-*. It is probably of significance that *á-ma-* preserves the original *a*-stem of the word, while *a-mi-* shows an appended /i/ resulting from i-motion.⁴ The varying spellings of *as-/ás-* in the Empire Period (12 with *a*, 27 with *á*) must also represent a real (dialectal?) difference, though the pattern behind their distribution is elusive.

The fact that IAF/IAD only occurs with words with *a* reduces the complexity of the problem, in that it is no longer necessary to explain why words beginning in *á* had the sign replaced with an *a* at the end. This makes a simple graphical explanation more likely.

³ To this number might be added a questionable form **a-mi-ya-za* [neut. N-A Sg.] in TELL AHMAR 6 §10 (an already unusual text to begin with), which Hawkins considers as the possessive pronoun *ami*- plus a **yo* extension. See Bunnens *et al.* 2006, 23.

⁴ On i-motion, which occurred in all Anatolian languages but was especially productive in Luwian, see initial discussion of Starke 1982, 407-425; discussion of opinions on its origins in Zeilfelder 2001; and more recently Rieken 2005.

THE GRAPHICAL ORIGINS OF IAF

In Hieroglyphic Luwian writing, signs are written top-to-bottom in short columns, typically of two to three signs, arranged in lines/rows. Words can run until the end of a column and then continue at the top of the next column, which is either to the left or right depending on the direction of boustrophedon writing. So a word written with the signs A B C D E ... could be arranged in the ways indicated in Fig. 1.

In theory there is no limit to the height of the columns, but in practice the columns are contained in registers which allow for around four signs at the most.

A	A D	A B C D E
B	B E	
C	C	
D		
E		

Fig. 1. Possible arrangements of Hieroglyphic Luwian signs.

Some of the earliest specimens of syllabic Hieroglyphic Luwian script come from seal impressions.⁵ Because seals contained mostly onomastic material and titles, not full inscriptions, the default writing was an axial arrangement that could appear as single column arrangement (e.g. Herbordt 2005, 170), or sometimes doubled in antithetical ('mirror image') arrangement (e.g. Herbordt 2005, 387). Seal-cutters often had limited space to work with on seals, especially with longer names, and as a result had to be creative with sign arrangements.

Within the corpus of Hieroglyphic seals, all of which come from the Empire period, there are thirteen examples of names known to contain an initial *a* (see Appendix 1, seals 1-13; seals numbered in the order in which they are discussed). Surprisingly, the *a* sign already exhibits in this oldest stage of Hieroglyphic Luwian writing a range of positions much more fluid than the initial/final binary.

There are no unambiguous examples of fully initial *a* among the thirteen seals: the closest is found in two examples of 'Incompletely Initial *A*' position in Beyer A5 and A26, where the *a* begins at the top of a column, but trails diagonally such that its end is placed below and behind (in the direction of reading) the top of the following sign. A similar arrangement can be found in other early inscriptions, such as EMIRGAZI §2 where the particle chain *a-wa/i*, which normally appears with the *a* positioned vertically above the *wali* (sometimes in ligature), instead extends the *a* below and behind. A third, but very borderline case of incompletely initial *a* can be found in Singer Text 2, Seal 4 where the *a* is the topmost sign but clearly displaced to the left of the main sign column. (It should be noted that this seal is unusual in other ways. The only onomastic solution is to read the name Abi-lalu, which corresponds to the name in the cuneiform tablet on which the seal is impressed. If the *la/i/u* is the last sign, then the inscription should be read left-to-right, which places the *a* at the beginning of the word though facing the wrong direction. While sign-directions can vary in seals (sometimes changing direction within the same word, e.g. the *ka* signs in *ka-pi-tá-ka* of Beyer A32), the *a* is usually consistent. Alternatively, it could be that both the *a* and *lalilu* signs are displaced from the main column. Though this solution is impermissible in the inscription corpus, seals seemed to be much more fluid in their arrangement. Interestingly, the name Abi-lalu appears in Beyer B20 spelling with an initial *á*, providing what is perhaps the earliest example of *á* substitution which will become pervasive in the Iron Age inscriptions).

In the majority of Hieroglyphic seals with initial *a* (ten versus the three presented above), the *a* has been pushed fully into the next column. This displacement does not necessarily mean the *a* occupies a true final position. In Beyer B1 and B7, the *a* sign is not in the same column as the signs which (now) begin the word, but neither is it in final position. In Beyer B1 there is a *hi* sign below the *a*, and in B7 a *li* directly underneath. Beyer B18 has a very small *li* sign which may or may not extend directly underneath the bottom of the *a* sign in the break. Seen

⁵ See Appendix 1 for list of seals discussed.

on a continuum with the 'Incompletely Initial *A*' arrangement, where the sign extends below and behind the following sign, the logic of displacement has been taken to the next step: the *a* sign is now pushed behind and level with the following sign in an 'Initial *A* Displacement' arrangement.

There are two seals, Beyer A23 and Herbordt 11, in which an *a* sign has been displaced but occupies the next column by itself. The question becomes one of semantics whether this arrangement should be described as 'final *a*' or 'displaced *a*': in a sequence of two, the second position is also final. Formally, the seals have the same arrangement as the previous examples of 'Initial *A* Displacement', in that the *a* is level with and behind the new head sign. The only difference is that the rest of the word's signs are contained in one column.

There is only one unambiguous example, Beyer B19, in the Hieroglyphic seal corpus of an *a* in final position. In this seal, final position is ensured because the *a* sign is separated by not one but two columns from the start of the word. This raises the question, if initial *a* signs can appear in final position, how did seal-cutters write words which took final *a* signs as a rule, and not as a result of IAF? There are seven seals that fall into this category (seals 14 through 19 in Appendix 1), and the arrangement is the same in each: the *a* was placed in the same column as the rest of the signs in positions ranging from near vertical (Herbordt 2005, 390), diagonal (Herbordt 2005, 170, 387, 388, 425, 521), to near horizontal (Herbordt 2005, 470).

From the preceding evidence (and looking ahead to the inscription corpus), a typology of initial *a* placement, or '*a*-movement' can be constructed (Fig. 2).

1. Initial *A* (including Incomplete Initial *A*) - normal position, where all or most of the *a* sign is above the beginning of the next sign.

2. Initial *A* Displacement (IAD) - a type of *a*-movement where the *a* sign is moved to the next column, such that it is immediately behind and proximate to the new head sign. Any remaining signs of the word are below the *a* sign. If the sign occupies the column by itself, it can either fill the entire column, or be placed at the bottom (occasionally with other signs *not belonging to the same word* positioned above it).

3. IAD/IAF - a transitional category where the *a* is clearly in the next column but separated from the head sign by a larger than usual amount, or is otherwise partially impeded by another sign.

4. Initial *A* Final (IAF) - *a*-movement where the *a* sign is at the end of the word, either in the same column (in inscriptions), in the next column with a sign belonging to the same word above it, or separated by one or more columns from the head of the word.

The general principle for distinguishing IAD from IAF is this: in a Hieroglyphic Luwian word ABC(D...) can a line be visually traced connecting the *a* sign (A) and the head sign (B) such that there are no intervening signs and no sign from the same word is above the line? If yes, then it is IAD.

The IAD line test is resonant with the origins of IAD (and by extension IAF). As was seen with the examples of incompletely-initial *a*, the *a* was moved for space-saving reasons increasingly below and behind the following sign. In IAD the *a* sign continued along this path and into the next column, but *still proximate to the head sign*, hence the possibility of drawing a line between the two. It was only cases of extremity that saw the *a* sign moved out of contact with the head sign, like in the cramped conditions of ring-seals or (as will be seen) in especially long words in inscriptions.

	initial a	IAD	(IAD/IAF)	IAF
	A C	B A	B	B D
	B D	C D	C	C A
	A	B A	D A	B D A
	B	C A		C E A
	C	B		B C D A
		C A		

Fig. 2. Typology of *A* Sign Placement (for a given Hieroglyphic Luwian words spelled with signs 'A, B, C, D...', where A = the *a* sign).

DISTRIBUTION OF *A*-MOVEMENT IN MONUMENTS AND INSCRIPTIONS

The typology constructed above implies that the initial *a* arrangement is the ‘default’ setting (closest to the normal rules of Hieroglyphic Luwian sign order) from which IAD and IAF progressively deviate. The deviation is expressed diachronically as well. Because *a*-movement is a graphical phenomenon, it is the product of convention. It resulted from generations of experimentation by scribes who inherited, refashioned, and passed on new styles of the writing to their students. Each stage of the history of *a*-movement is an accretion of ultimately arbitrary creative choices. Over the course of the Transitional Period these choices tended towards an increased use of IAF.

In Appendix 2 of this work is listed nearly every appearance of the *a* sign in the Hieroglyphic Luwian corpus prior to the mid-ninth century, organized by *a*-movement typology, and including plene and disambiguating spellings and cases of deletion where a word known to start with *a* appears without. A subset of this data, excluding certain words that never show *a*-movement, like *a-wa/i* without further clitics, *a-ta/tá* and its derivatives, words beginning with *a+ra/i* (see Kloekhorst 2004, 29), and proper names, is considered below. The Transitional Period has been arbitrarily divided into two parts: Early Transitional (eleventh to tenth centuries, excluding any texts which might date to the ninth century), and Late Transitional (any text which might have a ninth century date). The dates themselves are not necessarily significant, but the division does allow shifts in distribution to emerge. From this data set the following observations can be made:

1. The *a* sign shows a shift from initial *a* and IAD in the Empire Period, to mostly IAD in the Early Transitional Period, and then to mostly IAF in the Late Transitional Period (see Appendix 3 for breakdown by text). If *a*-movement can be classified as least (initial *a*) to most (IAF) dislocated, it can be seen that the overall dislocation of the system increases with time. (The category of initial *a*/IAD comprises those cases of incompletely initial *a* that are borderline between the two categories, and could reasonably be included in either) (Fig. 3).

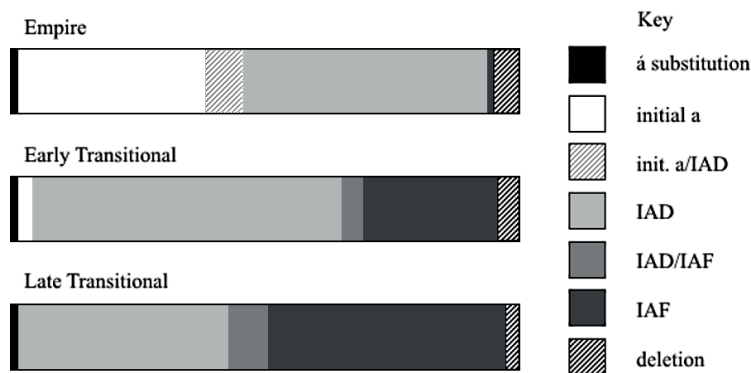
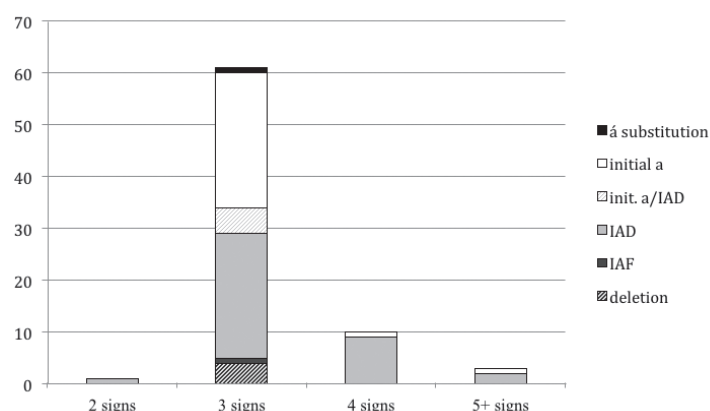


Fig. 3. *A*-movement by percentage in Empire and Transitional Periods.

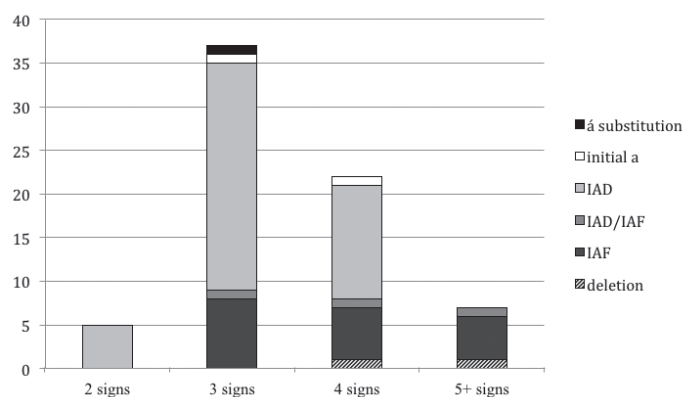
2. Examining the same data by graphic length, it can be seen that chance for dislocated forms increases with word-length. In the Empire Period initial *a* is most common in shorter words (3 signs in length), and IAD is the most common arrangement in longer words. IAF in this period is nearly non-existent.



Empire Period	2 signs (n=1)	3 signs (n=61)	4 signs (n=10)	5+ signs (n=3)
<i>á</i> substitution	-	1 (2%)	-	-
initial <i>a</i>	-	26 (43%)	1 (10%)	1 (33%)
initial <i>a</i> /IAD	-	5 (8%)	-	-
IAD	1 (100%)	24 (39%)	9 (90%)	2 (67%)
IAF	-	1 (2%)	-	-
deletion	-	4 (7%)	-	-

Fig. 4. Distribution of *a*-movement by word-length in Empire Period.

3. The Early Transitional Period sees the near disappearance of initial *a* and the rise of IAD as the dominant *a*-movement technique. IAF has a significant presence in every category of word-length, but is more frequent in longer words and is the near exclusive arrangement for words of 5+ signs (Fig. 5).



Early Transitional Period	2 signs (n=5)	3 signs (n=37)	4 signs (n=22)	5+ signs (n=7)
<i>á</i> substitution	-	1 (3%)	-	-
initial <i>a</i>	-	1 (3%)	1 (5%)	-
IAD	5	26 (70%)	13 (59%)	-
IAD/IAF	-	1 (3%)	1 (5%)	1 (14%)
IAF	-	8 (22%)	6 (27%)	5 (71%)
deletion	-	-	1 (5%)	1 (14%)

Fig. 5. Distribution of *a*-movement by word-length in Early Transitional Period.

4. In the Late Transitional Period, IAF has overtaken IAD as the most common arrangement, primarily through an increase in representation among shorter words (2 and 3 signs) (Fig. 6).

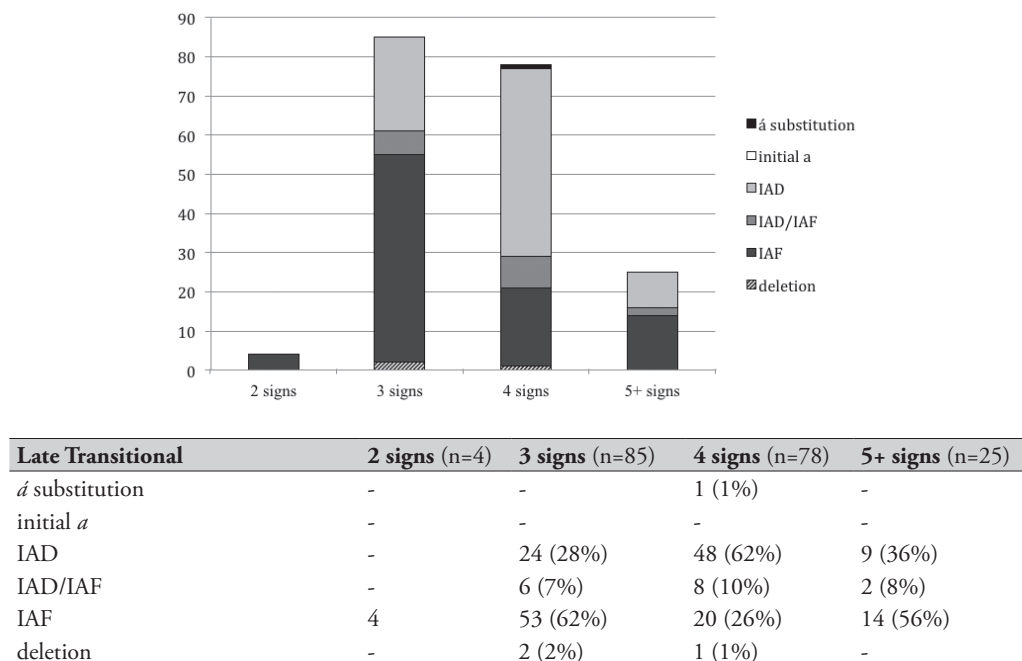


Fig. 6. Distribution of *a*-movement by word-length in Late Transitional Period.

What this data suggests is that *a*-movement developed as a self-reinforcing aesthetic trend, becoming unmoored from utilitarian origins and developing according to an internal logic. Incomplete initial *a*, which saved space for seal-cutters, became IAD by degrees. IAD, where the *a* sign retained at least a sensible proximity to the new head sign,⁶ became IAF in especially long words. IAF in long words was generalized to short words, until *reductio ad absurdum* examples such as the 1st person pronoun *amu* ‘I’ spelled *mu-a* (KARKAMIŠ A23 §8) are reached. The trend of *a*-movement developed uni-directionally, towards more separation from the head sign, until it no longer worked. The replacement of initial *a* with *á* nearly everywhere after the mid-ninth century was a reaction to the extremes of IAF, a paradigm shift that discarded an ungainly system for a new technique.

MECHANICS OF THE *A* SIGN IN HIEROGLYPHIC LUWIAN

The question left unanswered by the historical distribution is why did movement only happen with the *a* sign? The answer most likely has to do with the ‘a’ sound’s position as the graphically unmarked vowel in Luwian Hieroglyphics. When single consonants need to be written in Hieroglyphic Luwian, such as in consonant clusters or at the end of words, only signs belonging to the *Ca* series are used. Thus a sequence /zaspawa/ “but this...” would be written *za-sa-pa-wa/i* and never *za-si-pa-wa/i*, and a word /tatin/ ‘father’ (acc. sg.) is spelled *tá-ti-na*, and not *tá-ti-ni*. The ‘a’ sound is always optional in the *Ca* series, while the *Ci* and *Cu* series are always read with their vowels.⁷

⁶ The technique of dislocating graphemes to that they are out of line with, but still proximate to, a neighboring grapheme is not without parallel in other writing scripts. The development of the umlaut from *ue* > *ü* or the iota subscript of *ωι* > *ω̣* are two such examples. The rough breathing mark in Greek *τοι* > *οι* is an especially nice analog to IAD, where the *daseia* reflex of the consonantal *hēta* is moved above and then one letter beyond the omicron it originally preceded and on top of the iota.

⁷ A different situation could pertain when Luwian speakers attempted to render loan-words, e.g. *ta-mu-ki-na* for “Damqina,” *ma-ru-ti-ka* for “Marduk,” as discussed by Giusfredi 2012, 163-164.

In the older stages of Hieroglyphic Luwian script, there is evidence that the 'a' sound could be optionally added to at least some of the signs of the *Ci* series. The *za/i* sign and the *i/ya* sign, which in their default readings end in 'i', could be optionally read as 'za' and 'ya' without writing the sign any differently. Only in the post-Empire Period, readings with the 'a' sound were indicated with an *a* sign attached in ligature, creating the *za* and *ya* signs, while the unmodified signs became restricted to their *zi* and *i* values. The principle seems to be that more signs could in the oldest stages of the language have a 'simplex' value based on the first consonant or vowel of their acrophonic (rebus) readings, whereas later this function was restricted to signs with acrophonic readings beginning in *Ca*.⁸

If an unmarked 'a' vowel could be added after single consonants, is it possible that it could also appear before? If this were the case, it would look exactly like the cases of *a* deletion noted in the previous section, but the 'a' sound would no longer be missing, rather implicitly and optionally to be supplied by the reader, just like at the end of a syllable. There is evidence for this on seal Herbordt 3 (seal 20 in Appendix 1), a digraphic ring-seal from the Nişantepe corpus, where the name 'Alalime' appears written in two ways: *la/i-lá/i-mi* in hieroglyphics, and ^m*a-la'-li-mes* in cuneiform. In trying to resolve the spelling discrepancy, Ilya Yakubovich proposed that *la/i* have an optional value *alal/i*, and cited other cases of seeming *a* deletion with this sign, like (DEUS)*la/i-zu* for ^dAllanzu at Yazilikaya, and *la/i-tara/i-ma*(URBS) for ^{URU}Alatarma in the KÖYLÜTOLU YAYLA inscription (II.1, 3).⁹ But why not apply this maneuver to every case of *a* deletion?¹⁰

Such an explanation would also clarify a Late Period distribution previously been unnoticed, or at least unremarked upon. While it is conventionally thought that *á* replaced *a* everywhere in the Late Period (excepting *a-tá*, *a-wa/i*, etc; *i.e.* precisely the words that never show *a*-movement in the earlier periods), there is a subset of texts geographically centered on Maraş (*e.g.* MARAŞ 4, 14; BOYBEPINARI 1, 2; ANCOZ 7; MALPINAR; MEHARDE; but also some of the later KARKAMIŞ texts) that show *a* deletion with enough frequency that the technique must be considered a regular, perhaps regionally specific, alternative to *á* substitution. Since aphaeresis is generally opposed by most linguists in the Luwian language, it must be assumed that the readers of the inscriptions were able to restore the missing 'a' sound, either because it was already there implicitly in the script or because such restoration was a permissible reading operation (the two solutions being functionally the same).¹¹

While allowing implicit 'a' vowels before syllables would increase the complexity of the Hieroglyphic Luwian writing system, the script is no stranger to polysemy, and has regular mechanisms of resolving ambiguity that can be mapped on to the typology of *a*-movement. IAD can be interpreted as a type of phonetic complementation, where one sign is attached in ligature to another to clarify some portion of its pronunciation (like INFANS+*MI* (Luw. *nimuwanza* 'child') and *u+mi* = *mu*, or the *i+a* = *ya* discussed above). The attached complement can be placed anywhere on the sign, not necessarily in relation to its phonological position, *e.g.* in the *mu* sign, the *mi* is inscribed within the *u*, not beginning the combination as one would expect, or the *-ra/i* sign which is not always attached below the head sign, but sometimes to the side. While not appearing in ligature, IAD makes use of the same principle of 'modification by proximity' (recall the line test used in the definition of IAD).

The last feature to explain is the substitution of *á* for *a*. While occurring as early as KARAHÖYÜK (twelfth century) in inscriptions, and possibly in Empire Period seals (cf. Beyer B20), the technique only became ubiquitous in the Late Period. It was argued that this was as a result of the *a*-movement system becoming too cumbersome, but for such a transition to work the two signs would need to be somewhat interchangeable. Linguistically speaking,

8 Another relic of this system is the use of the *mi* sign in combination (like *u+mi=mu*, INFANS+*MI*, and PURUS.FONS-*MI*), where it indicates an 'm' sound, but not necessarily 'mi', found somewhere in the resulting word or syllable. See below, and Hawkins 2000, 28.

9 Yakubovich 2009, 13.

10 As a side note, this would re-open the debate on deriving Syria from Assyria in the ÇINEKÖY inscription, where Luwian *su+ra/-wa/i-za-ha*(URBS) was translated by 'ŠRYM in Phoenician (see Rollinger 2006).

11 It may be that in the earliest script vowels other than 'a' could be left implicit or underdetermined: see for example the Empire Period use of the sign FINES, read as Luw. *irba* 'border', but also used for *arba* 'away'. This would only work if the sign had a syllabic value of something like (V)RHA.

the relationship of the *a* sign's vowel /a/ and the *á* sign's glottal stop /ʔ/ (or pharyngeal approximate?) is that of a vowel and its semi-vowel: that is, it is a way of marking a glide across a syllable boundary. This interpretation would complete the semivowel schema in Hieroglyphic Luwian script: i_a > ya (*ya* sign), u_a > wa (*wa/i* sign), a_a > ʔa (*á* sign). The infrequent *á* substitutions in the earlier periods showed the two sounds were close enough to be plausibly interchangeable, and so when *a*-movement was discarded, the *á* was a logical replacement.¹²

CONCLUSIONS

The fact that *a*-movement declined so rapidly after the mid-ninth century speaks to the interconnectedness of the city-states using the Hieroglyphic Luwian script. It is probably no coincidence that the shift occurred right around the time of Shalmaneser III's Syrian campaigns in the 850's BC, which forced the political entities of the region to assemble in coalition twice, at Alimuš and Qarqar, to fight the incursions of the Neo-Assyrian Empire (see narrative of Shalmaneser III's Syrian conquests in Bryce 2012, 218-240)¹³. There is also the possibility that innovation was occurring in the private sphere during this time, perhaps in the same tradition that produced the letters of the KULULU and AŠŠUR lead strips. Ultimately a deeper investigation into the graphic distribution of the *á* sign is needed to explain how it came to replace *a* in the Late Period.

Regardless of how and why it ended, *a*-movement becomes much more understandable when it is viewed historically. It developed by degrees from initial *a* signs in cramped conditions until it became regularly placed at the end of a word. That the *a* sign could move at all was due to its unique position in Hieroglyphic Luwian script. And while graphical underdetermination is permissible in Hieroglyphic Luwian, when scribes did wish to indicate the *a* sign, they did so in ways analogous to other mechanisms of disambiguation. In short, the *a* sign may be unique, but its behavior is fully explainable with the rules of the script.

APPENDIX 1

Seals

Beyer = Beyer 2001.

Herbordt = Herbordt 2005.

Singer = Singer 2000.

Seal 1 [Beyer A5]

a-pa-nu ("Abbanu")

Arrangement: initial *a*

Seal 2 [Beyer A26]

a-pu-nu ("Abunnu")

Arrangement: initial *a*/IAD

Seal 3a [Singer Text 2, Seal 4]

a-pi-la-la/i/u ("Abi-lalu")

Arrangement: idiosyncratic (IAD, but *la/i/u* sign is displaced to front of word column)

Seal 3b [Beyer B20]

á-pi-la-la/i/u ("Abi-lalu")

Arrangement: *á* substitution

Seal 4 [Beyer B3]

**a-la-pu* ("Ala(la)bu")¹⁴

Arrangement: IAD

12 Petra Goedegebuure suggests (pers. comm.) that the switch from initial *a* to *á* in the Late Period may be more than just a graphical convention, reflecting the influence of Semitic phonology which prohibits words beginning with open vowels.

13 It must be admitted that few inscriptions from this period can be dated with the precision necessary to prove such a hypothesis. Rather it should be emphasized that the political conditions which would allow for military coalitions to be twice assembled among the Neo-Hittite states in the ninth century, namely frequent and amicable communication among the royal courts, would also be conducive to the rapid spread of any stylistic innovations in the Hieroglyphic script. Details about the conditions surrounding the end of *a*-movement will require either the discovery of more securely-datable monumental inscriptions, or (more hopefully) multiple caches of private letters written on lead strips.

14 Like with Seals 3a and 3b, there seems to be an alternate spelling of the name with *á*: cf. *á-la-á-pa* [Beyer A90].

Seal 5 [Beyer A23]
**a-pa-ti-li* (“Abdi-ili”)
 Arrangement: IAD

Seal 6 [Beyer B1]
**a-ma-za-hi i(a)-hi-la-i(a)* *INFANS*
 (“Amazahi, son of Ehliā”)
 Arrangement: IAD

Seals 7a and 7b [Beyer B7 and Beyer B18]
**a-hi-ma-li* (“Ahi-mali(k)”)
 Arrangement: IAD

Seal 8 [Beyer B17]
**a-tara/i-pi* (“Adrabu”)
 Arrangement: IAD

Seal 9 [Beyer B19]
**a-zi-á* (“Aziya”)
 Arrangement: IAF

Seal 10 [Herbordt 11]
**a-s[a]-mu-ha-pa* (“Asmuhepa”)
 Arrangement: IAD

Seal 11 [Herbordt 75]
**a-sa-mi-SARMA* (“Asmisarruma”)
 Arrangement: IAD

Seal 12 [Herbordt 90]
**a-za/i+ra/i-su²* (“Azarasu(?)”)
 Arrangement: IAD

Seal 13 [Herbordt 80]
**a-wa/i-na-mi* (“Awanami”)
 Arrangement: IAD

Seal 14 [Herbordt 390]
tá-a (“Tā”)
 Arrangement: plene *a* (vertical)

Seal 15 [Herbordt 170]
ku-la-a (“Kulā”)
 Arrangement: plene *a* (diagonal)

Seals 16 a, b [Herbordt 387, 388]
tá-a (“Tā”)
 Arrangement: plene *a* (diagonal)

Seal 17 [Herbordt 425]
ASINUS-tà-la-a (“Tarkasnatalā”)
 Arrangement: plene *a* (diagonal)

Seal 18 [Herbordt 521]
za/i-a (“Zā”)
 Arrangement: plene *a* (diagonal)

Seal 19 [Herbordt 470]
tu-wa/i-a (“Tuwā”)
 Arrangement: plene *a* (horizontal)

Seal 20 [Herbordt 3]
la/i-lá/i-mi (“Alalime”)
 Arrangement: implicit *a*(?)

APPENDIX 2

Inscriptions

Sources:

ALEPPO 6, 7 = Hawkins 2011.

AFYON = Şahin, Tekoğlu 2003.

TELL AHMAR 6 = Bunnens *et al.* 2006.

SUDBÜRG, YALBURT, EMIRGAZI = Hawkins 1995.

ALL OTHERS = Hawkins 2000.

A note on transcription: the following tables use an idiosyncratic transcription to distinguish between IAD and IAF. The former is represented by an **a* at the beginning of the word (which is the system used by Hawkins 2003, 159-69 for what he terms “initial-*a*-final”), and the latter is represented by an -‘ (which is used in earlier works for cases of IAF misinterpreted as “word-divider *a*”). Liminal cases take parentheses, like initial *a*/IAD = (**a*) and IAD/IAF = (**a*)...(-‘).

1. ŠŮDBURG (Empire)	signs	type
“ §4a	a-tá	initial <i>a</i>
“ §7	(*)a-ti-sa	initial <i>a</i> /IAD
“ §18	(*)a-pa-ti	initial <i>a</i> /IAD
“ §18	za/i-a-ti	plene
2. EMIRGAZI (Empire)	signs	type
“ §2 [altar A]	a-wa/i	initial <i>a</i>
“ §17 [altars A,C]	a-wa/i	initial <i>a</i>
“ §17 [altar C]	a-sa-tu	initial <i>a</i> (cf. A = IAD)
“ §21 [altars B,C]	a-wa/i	initial <i>a</i> (cf. A = initial <i>a</i> /IAD)
“ §23 [altars A,B,C]	a-wa/i	initial <i>a</i>
“ §21 [altars A]	(*)a-wa/i	initial <i>a</i> /IAD
“ §3 [altar A]	*a-pa+ra/i	IAD
“ §4 [altar A]	*a-wa/i-tá	IAD
“ §4 [altar A]	*a-mi-sa	IAD
“ §6 [altar A]	*a-wa/i-ti-tá	IAD
“ §6 [altar A]	*a-pa-sa	IAD
“ §12 [altars A,C]	*a-pa-sa	IAD
“ §14 [altars A,C]	*a-wa/i-na	IAD
“ §15 [altar A]	*a-wa/i-ti-i(a)	IAD
“ §17 [altar A]	*a-sa-tu	IAD (cf. C = initial <i>a</i>)
“ §20 [altars A,B]	*a-wa/i-tá	IAD
“ §21 [altar C]	*a-sa-tu	IAD
“ §22 [altars A,B,C]	*a-pa-na	IAD
“ §26 [altars A,B]	*a-wa/i-tu-tá	IAD
“ §28 [altars B,C]	*a-wa/i-tá	IAD
“ §29 [altar B]	*a-wa/i-na	IAD
“ §35 [altar C]	*a-wa/i-ti-i(a)-na	IAD
“ §37 [altars B,C]	*a-wa/i-tu	IAD
“ §21 [altar A]	sa-tu- ⁶	IAF (cf. IAD in C, deletion in B)
“ §12 [altar A]	wa/i-tá	deletion
“ §20 [altar C]	wa/i-tá (ma-na a) ¹⁵	deletion
“ §21 [altar B]	sa-tu	deletion (cf. IAF in A, IAD in C)
“ §18 [altars A,B,C]	AVIS ₂ -wa/i-na-a	plene
2a. EMIRGAZI Blocks (Empire)	signs	type
“ A.3	a-mi-p[a]-wa/i+ra/i-na	initial <i>a</i>
“ A.5	a-wa/i	initial <i>a</i>
“ A.2	*a-wa/i-mu	IAD
“ A.2	*a-mi-sa	IAD
“ A.3	*a-wa/i-mu	IAD
“ B.1	*a-mi-sa	IAD
“ B.3	*a-tà-mi-sa	IAD
“ B.4	*a-wa/i-mu-i(a)	IAD

15 I suspect a miscopying here, but photograph is insufficient to confirm.

3. YALBURT (Empire)	signs	type
“ §3.1	a-sa-tá	initial <i>a</i>
“ §3.2	a-mi-zi/a	initial <i>a</i>
“ §4.3	a-wa/i	initial <i>a</i>
“ §5.2	a-wa/i	initial <i>a</i>
“ §6.2	a-wa/i-mu	initial <i>a</i>
“ §6.3	a-wa/i	initial <i>a</i>
“ §7.1	a-wa/i	initial <i>a</i>
“ §7.2a	a-wa/i-tà	initial <i>a</i>
“ §8	a-wa/i	initial <i>a</i>
“ §9.2	a-wa/i	initial <i>a</i>
“ §11.1	a-wa/i-[mu?]	initial <i>a</i>
“ §11.2	a-wa/i-mi	initial <i>a</i>
“ §11.4a	a-wa/i-mu	initial <i>a</i>
“ §11.4a	a-mi-zi/a	initial <i>a</i>
“ §12.2	a-wa/i	initial <i>a</i>
“ §12.3	a-wa/i-mu	initial <i>a</i>
“ §12.4	a-wa/i-mu	initial <i>a</i>
“ §13.1	a-wa/i-mi	initial <i>a</i>
“ §13.3	a-wa/i	initial <i>a</i>
“ §13.4a	a-wa/i-mu	initial <i>a</i>
“ §14.2	a-wa/i-mi-tá	initial <i>a</i>
“ §14.3	a-wa/i	initial <i>a</i>
“ §14.5	a-wa/i-mu	initial <i>a</i>
“ §15.2	a-wa/i-mu	initial <i>a</i>
“ §16.2a	a-wa/i-mi	initial <i>a</i>
“ §17.2	a-wa/i	initial <i>a</i>
“ §2.2	(*)a-wa/i-mu	initial <i>a</i> /IAD
“ §10.2	(*)a-wa/i-mi	initial <i>a</i> /IAD
“ §14.4	(*)a-wa/i-tá	initial <i>a</i> /IAD
“ §2.3	*a-wa/i-mu	IAD
“ §4.3	*a-mu-pa-wa/i-i	IAD
“ §2.2	URBS+ <i>MI</i> -a	plene/disambig.?
“ §13.3	á-wa/i+ra/i-na-a(REGIO)	plene (or IAD?)
“ §2.2	POST-a	disambiguating
“ §4.2	NEG-a	disambiguating
4. AFYON (Empire)	signs	type
“ §2	a-wa/i	initial <i>a</i>
5. KARAHÖYÜK (12th c.)	signs	type
“ §3	a-wa/i	initial <i>a</i>
“ §4	a-wa/i-tá	initial <i>a</i>
“ §5	a-wa/i	initial <i>a</i>
“ §8	a-wa/i-ní	initial <i>a</i>
“ §10	a-wa/i-tá	initial <i>a</i>
“ §12	a-wa/i-mu	initial <i>a</i>
“ §13	a-wa/i	initial <i>a</i> ¹⁶

16 Or deletion if *a* belongs to previous line.

“ §13	a-mi-za/i	initial <i>a</i>
“ §20	a-sa-ti	initial <i>a</i>
“ §21	a-sa-ti	initial <i>a</i>
“ §22	a-mi-i(a)	initial <i>a</i>
“ §23	a-wa/i-sa	initial <i>a</i>
“ §24	a-sa-tu	initial <i>a</i>
“ §1	*a-la-mi-ni	IAD
“ §11	*a-wa/i-mi-tá	IAD
“ §15	*a-mi-i(a)-ti	IAD
“ §12	sa-tá	deletion (or IAF if taken with following <i>a</i>)
“ §10	á-sa-ha	á substitution
“ §16	POCULUM.PES.*67 (REGIO)-wa/i-mu-tá-a	plene
“ §22	tara/i-pa-a-ti	plene

6. GÜRÜN (12th/11th c.)	signs	type
“ §5 [lower]	a-wa/i	initial <i>a</i>
“ §2 [upper]	*a-wa/i-ta	IAD
“ §4 [upper]	*a-wa/i-mu	IAD
“ §7 [upper]	(*a)-pa-ti-pa-wa/i-(‘)	IAD/IAF
“ §7 [lower]	pa-ti-pa-wa/i-‘	IAF (see upper)

7. KÖTÜKALE (12th/11th c.)	signs	type
“ §2	a-wa/i	initial <i>a</i>
“ §4	a-[wa/i]	initial <i>a</i>
“ §6	*a-wa/i-tá	IAD
“ §7	*a-wa/i-tu	IAD

8. DARENDE (11th/10th c.)	signs	type
“ §2	a-wa/i	initial <i>a</i>

9. IZGIN 1 (11th/10th c.)	signs	type
“ §4	a+tá	initial <i>a</i> (ligature)
“ §5	a+tá	initial <i>a</i> (ligature)
“ §18	a+wa/i	initial <i>a</i> (ligature)
“ §19	a+wa/i	initial <i>a</i> (ligature)
“ §2	*a-mi-i	IAD
“ §4	*a-wa/i-tá	IAD
“ §9	*a-mi-ia-ti	IAD
“ §2	wa/i-mi-ta-‘	IAF
“ §3	wa/i-mu-‘	IAF (next line)
“ §4	mi-ia-za	deletion

10. IZGIN 2 (11th/10th c.)	signs	type
“ §2	a-wa/i-tà	initial <i>a</i>
“ §3	a+wa/i	initial <i>a</i> (ligature)
“ §4	a+tá	initial <i>a</i> (ligature)
“ §5	a+tá	initial <i>a</i> (ligature)
“ §6	a+tá	initial <i>a</i> (ligature)
“ §9	a+wa/i	initial <i>a</i> (ligature)
“ §4	*a-wa/i-tá	IAD
“ §8	*a-pa-sa-na	IAD

“ §9	*a-pa-sa-ha ²	IAD
“ §10	*a-pa-sa-na	IAD
“ §11	*a-wa/i-tú	IAD
“ §4	pi-[na]- [‘]	IAF

11. ALEPPO 6 (11th c.)	signs	type
“ §2	a-wa/i	initial <i>a</i>
“ §10	a-wa/i	initial <i>a</i>
“ §12	a-wa/i	initial <i>a</i>
“ §2	*a-mi-i	IAD
“ §3	*a-mu	IAD
“ §5	*a-wa/i-sa	IAD
“ §10	pa-sa-ha- [‘]	IAF

12. ALEPPO 7 (11th c.)	signs	type
“ §4	*a-wa/i-na	IAD
“ §11	*a-pa-sa-ha	IAD
“ §10	*a-ma- wa/i-tá	IAF
“ §11	*a-pa-sa-na	IAF
“ §13	*a-pa-sa- pa-wa/i	IAF (next line)

13. MARAŞ 8 (11th/10th c.)	signs	type
“ §4	a-wa/i	initial <i>a</i>
“ §10	a-wa/i	initial <i>a</i>
“ §11	a-wa/i-ta-ya	initial <i>a</i>
“ §14	a-wa/i	initial <i>a</i>
“ §16	a-wa/i	initial <i>a</i>
“ §2	*a-wa/i-tá	IAD
“ §6	*a-wa/i-tá	IAD
“ §13	*a-wa/i-sa	IAD
“ §1	EGO-wa-mi- [‘]	IAF ¹⁷
“ §15	REL-sa-pa-wa/i-sa-a	plene
“ §11	[...h]a ² -ta/i-ta+ra/i-a	disambiguating

14. KARKAMIŞ A4b (11th/10th c.)	signs	type
“ §2	*a-wa/i-tu-tá	IAD
“ §3	*a-wa/i-tá	IAD
“ §5	*a-wa/i ¹⁸	IAD (or deletion)
“ §6	*a-wa/i-tá	IAD

15. KARKAMIŞ A18d (11th c.?)	signs	type
“ §2	*a-wa/i-tá	IAD
“ §2	*a-mu	IAD

16. KARKAMIŞ A14b (10th c.)	signs	type
“ §2	a-wa/i	initial <i>a</i>
“ §4	*a-wa/i-tu	IAD

17 It is unusual to have EGO take IAF at beginning of inscription.

18 Hawkins interprets the *a as part of the FORTIS sign, but I would prefer to read IAD instead of deletion.

17. KARKAMIŠ A14a (10th c.)	signs	type
“ §6	a+tá	initial <i>a</i> (ligature)
“ §7	a+tá	initial <i>a</i> (ligature)
“ §3	*a-wa/i-mu	IAD
“ §7	*a-wa/i-tà	IAD
“ §7	*a-mu	IAD
“ §6	(*a)-wa/i-ma-za-(')	IAD/IAF
“ §9	pa-ti-pa-wa/i- ^ε	IAF
“ §3	pi-ya-ta-a	plene
18. KARKAMIŠ A1a (10th c.)	signs	type
“ §3	a-wa/i	initial <i>a</i>
“ §12	a-wa/i	initial <i>a</i>
“ §30	a-wa/i	initial <i>a</i>
“ §31	a-wa/i	initial <i>a</i>
“ §34	a-wa/i	initial <i>a</i>
“ §37	a-wa/i	initial <i>a</i>
“ §37	a-ta	initial <i>a</i> (ligature)
“ §38	a-ta	initial <i>a</i> (ligature)
“ §4	*a-mu-pa-wa/i	IAD
“ §7	*a-pa+ra/i-ha	IAD
“ §10	*a-wa/i-tú	IAD
“ §10	*a-pa+ra/i-i-ha	IAD
“ §14	*a-mi-i-sa	IAD
“ §16	*a-pa+ra/i-i	IAD
“ §19	*a-pa-sa-na	IAD
“ §20	*a-pa-sa-na	IAD
“ §22	*a-mi-i-sa	IAD
“ §35	*a-pa-na	IAD
“ §38	*a-pa	IAD
“ §19	(*a)-wa/i-ta-(')	IAD/IAF
“ §2	wa/i-sa- ^ε	IAF
“ §7	wa/i-tu- ^ε	IAF
“ §14	wa/i-sa- ^ε	IAF
“ §18	wa/i-mu- ^ε	IAF
“ §22	wa/i-mu- ^ε	IAF
“ §25	wa/i-mi-i- ^ε	IAF
“ §33	wa/i-tú- ^ε	IAF
“ §35	pa-pa-wa/i-ta- ^ε	IAF
“ §38	pa-ti-ha-wa/i (*a-pa)	deletion ¹⁹
“ §4	za-a-zi	plene
“ §6	za-a-zi	plene
“ §17	PES-wa/i-i-ha-a	plene
“ §18	za-a-zi	plene
“ §31	za-a-ti-i	plene
“ §35	za-a-zi	plene
“ §38	za-a-zi	plene

19 Maybe haplography due to the following *a-pa?

“ §16	SUPER+ra/i-a	disambiguating
“ §21	REL-a	disambiguating
“ §37	REL-a-za	disambiguating

19. KARKAMIŠ A1b (10th c.)	signs	type
“ §2	*a-wa/i-ti	IAD
“ §2	*a-mi-i-sa	IAD
“ §3	mu-pa-wa/i-ta- [‘]	IAF

20. KELEKLİ (10th c.)	signs	type
“ §2	*a-wa/i-ti	IAD
“ §1	^l su-hi-a+sa	?? (idiosyncratic)
“ §2	(MONS) <i>TU</i> -a+sa	?? (idiosyncratic)
“ §2	á-mi-na	<i>á</i> substitution

21. KARKAMIŠ A11a (10th/9th c.)	signs	type
“ §8	a-tá	initial <i>a</i>
“ §14	a-wa/i	initial <i>a</i>
“ §16	a-wa/i	initial <i>a</i>
“ §7	*a-mi-i-sa	IAD
“ §7	*a-mi-ya-ti	IAD
“ §8	*a-wa/i-mu-tá	IAD
“ §11	*a-mu-pa-wa/i	IAD
“ §11	*a-pi-na	IAD
“ §12	*a-wa/i-tu-tá	IAD
“ §17	*a-sa-tá	IAD
“ §18	*a-wa/i-tá	IAD
“ §4	*a-wa/i-mu	IAD/IAF
“ §26	*a-wa/i-tú-ta	IAD/IAF
“ §26	*a-wa/i-tú-ta	IAD/IAF
“ §4	mi ¹³ -ya-ti- [‘]	IAF
“ §5	mi-zi-pa-wa/i-mu-ta- [‘]	IAF
“ §7	wa/i-mu- [‘]	IAF
“ §10	mi-ya-za- [‘]	IAF
“ §13	mu- [‘]	IAF
“ §15	wa/i-mu-tá- [‘]	IAF
“ §17	wa/i-tà- [‘]	IAF
“ §22	wa/i-tà- [‘]	IAF
“ §24	LOCUS-za-a	plene
“ §6	REL-a-ti	disambiguating
“ §8	REL-a-ti	disambiguating
“ §21	REL-a-ti	disambiguating

22. KARKAMIŠ A4d (10th/9th c.)	signs	type
“ §2	(*a)-[wa/i]-[t]u-t[á]-([‘])	IAD/IAF

23. KARKAMIŠ A11b+c (10th/9th c.)	signs	type
“ §2	a-wa/i	initial <i>a</i>
“ §7	a-wa/i	initial <i>a</i>
“ §12	a-wa/i	initial <i>a</i>
“ §13	a-tá	initial <i>a</i>

“ §14	a-wa/i	initial <i>a</i>
“ §32	a-wa/i	initial <i>a</i>
“ §34	a-wa/i	initial <i>a</i>
“ §2	*a-mi-sá	IAD
“ §4	*a-wa/i-na	IAD
“ §5	*a-wa/i-ma-zá	IAD
“ §5	*a-mi-i-na	IAD
“ §6	*a-wa/i-ma-na	IAD
“ §9	*a-mu-pa-wa/i	IAD
“ §9	*a-mi-i-sa	IAD
“ §9	*a-mi-ya-ti	IAD
“ §10	*a-wa/i-ma-tá	IAD
“ §11	*a-wa/i-ma-tà	IAD
“ §12	*a-pa-ya	IAD
“ §16	*a-wa/i-mi-ta	IAD
“ §16	*a-mi-i-na	IAD
“ §22	*a-[wa/i]-tá	IAD
“ §34	*a-mi-i	IAD
“ §8	(*a)-mi-i-zi-(')	IAD/IAF
“ §17	(*a)-wa/i-ma-tá-(')	IAD/IAF
“ §2	sa-tá-‘	IAF
“ §3	wa/i-sa-‘	IAF
“ §8	pa-tá-za-pa-wa/i-ta-‘	IAF
“ §13	wa/i-ta-‘	IAF
“ §14	pi-i-na-‘	IAF
“ §15	pa-ti-i-‘	IAF
“ §19	MALUS-la/i-ti-i-‘	IAF
“ §20	MALUS-la/i-ti-i-‘	IAF
“ §25	pa-ti-pa-wa/i-tá-‘	IAF
“ §26	wa/i-tú-‘	IAF
“ §28	wa/i-tú-‘	IAF
“ §30	mu-‘	IAF
“ §34	pa-ti-i-‘	IAF
“ §2	za-a-sa	plene
“ §18a	za-a	plene
“ §23	za-a-zi	plene
“ §24	za-a-ti-ya-za	plene
“ §32	za-a-zi	plene
“ §33	za-a-ti-ya-za	plene
“ §34	za-a-zi	plene
“ §7	REL-a-ti-i	disambiguating
“ §8	NEG-a	disambiguating
“ §14	SUPER+ra/i-a	disambiguating
“ §21	REL-a-ti	disambiguating
“ §33	“LIGNUM”-sa-pa- wa/i-mu-tá-a	plene?? ²⁰
“ §33	REL-a-za	disambiguating

20 “LIGNUM”-sa (/tarus/) is unlikely to start with an *a*. Maybe the scribe/stonemason mistakenly thought clitic chain began without noun because of line break.

24. KARKAMIŠ A2+3 (10th/9th c.)	signs	type
“ §3	a-wa/i	initial <i>a</i>
“ §3	a-tá	initial <i>a</i> (ligature)
“ §4	a-tá	initial <i>a</i> (ligature)
“ §5	a-tá	initial <i>a</i>
“ §6	a-tá	initial <i>a</i> (ligature)
“ §7	a-tá	initial <i>a</i>
“ §8	a-wa/i	initial <i>a</i>
“ §13	a-tá	initial <i>a</i> (ligature)
“ §15	a-tá	initial <i>a</i> (ligature)
“ §23	a-wa/i	initial <i>a</i>
“ §3	*a-mi-i	IAD
“ §8	*a-mi-ya-za	IAD
“ §12	*a-wa/i-tu-ta	IAD
“ §15	*a-wa/i-ta	IAD
“ §20	*a-wa/i-tà-tá	IAD
“ §21	*a-pa-pa-wa/i	IAD
“ §6	(*a)-su-ha-na-ti-(‘)	IAD/IAF
“ §7	(*a)-wa/i-ta-(‘)	IAD/IAF
“ §7	(*a)-mi-ya-za-(‘)	IAD/IAF
“ §9	(*a)-mu-pa-wa/i-tu-(‘)	IAD/IAF
“ §2	wa/i-mu-‘	IAF
“ §4	mi-i-‘	IAF
“ §5	wa/i-sa-‘	IAF
“ §5	mu-‘	IAF
“ §11	pa-ti-pa-wa/i-ta- ²¹	IAF
“ §14a	wa/i-sa-‘	IAF
“ §15	pa-sa-‘	IAF
“ §18	POST+ <i>RA</i> /I-wa/i-sà-ti-pa-wa/i-ma-za-‘	IAF ²²
“ §22	wa/i-sa-‘	IAF
“ §22	sa-ti-‘	IAF
“ §24	wa/i-sa-‘	IAF
“ §6	wa/i-mu-ta	deletion
“ §3	za-a-sa	plene
“ §13	za-a-ya	plene
“ §20	za-a-ti-i	plene
“ §21	za-a-sa	plene
25. KARKAMIŠ A12 (10th/9th c.)	signs	type
“ §4	a-tá	initial <i>a</i>
“ §9	a-wa/i	initial <i>a</i>
“ §14	a-w[a/i]	initial <i>a</i>
“ §3	*a-mu-pa-wa/i	IAD
“ §8	*a-wa/i-mu-tá	IAD
“ §10	*a-mi-ya-ti	IAD
“ §! 1	*a-wa/i-tú[-ta]	IAD

21 Reading *a* with the clitic chain, and not following *za-sa* contra Hawkins.

22 If the final *a* is read as a phonetic complement to POST+*RA*/I = *appara*, then this is an example of IAF. Otherwise plene *a*.

“ §13	*a-wa/i-tú-wa/i-na	IAD
“ §14	*a-pi-na	IAD
“ §4	wa/i-tá- [‘]	IAF

26. KARKAMIŠ A13d (10th/9th c.)	signs	type
“ §7	a-wa/i	initial <i>a</i>
“ §8	wa/i-na- [‘]	IAF
“ §3	á-tá-na-wa/i-na - [‘]	plene (next line)
“ §5	za-a-ti	plene
“ §10	za-a-ti	plene

27. KARKAMIŠ A23, A26a1+2 (10th/9th c.)	signs	type
“ §4	*a-wa/i-mu	IAD
“ §5	*a-mu-pa-wa/i	IAD
“ §6	*a-mu-pa-wa/i	IAD
“ §6	*a-pi-na	IAD
“ §7	*a-wa/i-tà	IAD
“ §10	*a-wa/i-ta	IAD
“ §11	*a-pa-sa	IAD
“ §e	*a-wa/i-sa-[tá]	IAD
“ §4	mi-zi - [‘]	IAF
“ §4	la/i-ni-zi- [‘]	IAF
“ §5	la/i-na-za- [‘]	IAF
“ §8	wa/i-tà- [‘]	IAF
“ §8	mu- [‘]	IAF
“ §9	wa/i-tà- [‘]	IAF
“ §11	wa/i-ti- [‘]	IAF
“ §7	REL-a-ha	disambiguating
“ §a	SUPER+ra/i-a	disambiguating

28. KARKAMIŠ A20a1 (10th/9th c.)	signs	type
“ §1	*a-mi-i	IAD

29. KARKAMIŠ A25a (10th/9th c.)	signs	type
“ §1	a-wa/i	initial <i>a</i>
“ §2	*a-mi-zi	IAD
“ §2	*a-wa/i-na	IAD
“ §7	*a-pa-ti-i	IAD
“ §2	pa-tá-za-pa-wa/i- [‘]	IAF

30. TELL AHMAR 2 (10th/9th c.)	signs	type
“ §13	*a-mi-i	IAD
“ §16	*a-mi-i-na	IAD
“ §2	wa/i-mu- [‘]	IAF
“ §3	wa/i-mu- [‘]	IAF
“ §4	wa/i-tá-[']	IAF
“ §8	wa/i-ti-i- [‘]	IAF
“ §10	wa/i-mu- [‘]	IAF
“ §13	MALUS-wa/i-za- [‘]	IAF
“ §19	wa/i-ta- [‘]	IAF
“ §20	wa/i-tá- [‘]	IAF

“ §14	mi-i INFANS-ni- [‘]	deletion ²³
“ §10	á-na-i-ta(REGIO)-wa/i-na-a	plene
“ §22	za-a-ti-wa/i	plene
“ §13	NEG ₂ -a-pa-wa/i	disambiguating
“ §14	NEG ₂ -a-pa-wa/i	disambiguating
“ §16	[NEG ₂]-a-pa-wa/i-ti	disambiguating
“ §17	NEG ₂ -a-pa-wa/i	disambiguating
“ §18	NEG ₂ -a-pa	disambiguating

31. BOROWSKI 3 (10th/9th c.)	signs	type
“ §5	a-wa/i	initial <i>a</i>
“ §7	a-wa/i	initial <i>a</i>
“ §9	*a-mi-i	IAD
“ §4	*a-wa/i-ta	IAD
“ §2	(*a)-wa/i-mu- [‘]	IAD/IAF
“ §3	wa/i-mu- [‘]	IAF
“ §6	wa/i-na- [‘]	IAF
“ §11	wa/i-tu-ta- [‘]	IAF
“ §2	za-a-sa	plene
“ §4	(PES ₂)tara/i-zi-ha-a	plene
“ §5	za-a-na	plene
“ §11	za-a-sa	plene

32. TELL AHMAR 5 (10th/9th c.)	signs	type
“ §2	a-wa/i	initial <i>a</i>
“ §4	a-wa/i	initial <i>a</i>
“ §10	a-tá	initial <i>a</i>
“ §2	*a-mi-i-sa	IAD
“ §8	*a-m[i]-sa-pa-wa/i	IAD
“ §10	*a-mu-pa-wa/i	IAD
“ §11	wa/i-mu- [‘]	IAF
“ §11	pa-si-i- [‘]	IAF
“ §12	SA ₄ (-)li-li-ya-wa/i-na- [‘]	IAF
“ §2	za-a-zi	plene
“ §4	za-a-ti-i	plene
“ §5	za-a-zi-wa/i	plene
“ §10	za-a-sa	plene
“ §16	za-a-zi-pa-wa/i	plene
“ §12	SUPER+ra/i-a	disambiguating
“ §17	NEG ₂ -a-pa-[wa/i]	disambiguating

33. ALEPPO 2 (10th/9th c.)	signs	type
“ §9	a-wa/i	initial <i>a</i>
“ §10	a-wa/i	initial <i>a</i>
“ §11	a-tá	initial <i>a</i> (ligature)
“ §7	*a-mu-pa-wa/i	IAD
“ §14	*a-pa-pa-wa/i	IAD
“ §17	*a-mi-i-pa-wa/i	IAD

23 Could the *a* after INFANS-*ni* be taken with *mi-?* It would be difficult graphically, but would resolve the deletion and unexplained *a* after INFANS-*ni*.

“ §21	*a-pa-ti-pa-wa/i-ta	IAD
“ §24	*a-MALUS-la/i-ti	IAD ²⁴
“ §2	(*a)-wa/i-mu- [‘]	IAD/IAF
“ §2	(*a)-mi-i-sa- [‘]	IAD/IAF
“ §3	wa/i-mu- [‘]	IAF
“ §5	w[a/i]-mu- [‘]	IAF
“ §8	wa/i-mi- [‘]	IAF
“ §9	mi-na- [‘]	IAF
“ §10	pa-sa- [‘]	IAF
“ §15	wa/i-tú- [‘]	IAF
“ §22	wa/i-tú- [‘]	IAF
“ §26	pa-pa-wa/i- [‘]	IAF
“ §6	wa/i-ta	deletion
“ §4	za-a-zi-pa-wa/i-mu	plene
“ §23	á-pa-si-zi	á substitution
“ §7	NEG ₂ -a	disambiguating
“ §9	NEG ₂ -a	disambiguating
“ §11	NEG ₂ -a	disambiguating
“ §16	SUPER+ra/i-a	disambiguating
“ §7	URBS-ni-zi-a	?

34. TELL AHMAR 1 (10th/9th c.)	signs	type
“ §5a	a-[wa/i]	initial <i>a</i>
“ §7	a-wa/i	initial <i>a</i>
“ §9	a-wa/i	initial <i>a</i>
“ §8	*a-pa[-sa]-na	IAD
“ §11	*a-mi-pa-wa/i	IAD
“ §11	*a-LITUUS-na-tà	IAD
“ §14	*a-mi-i	IAD
“ §20	*a-mi-i-ha-wa/i	IAD
“ §21	*a-m[u]-pa-wa/i	IAD
“ §26	*a-mi-i-na	IAD
“ §28	*a-pa-si-pa-[wa/i]	IAD
“ §29	*a-pa-si-pa-wa/i	IAD
“ §17	(*a)-wa/i-mu- [‘]	IAD/IAF
“ §2	wa/i-mu- [‘]	IAF
“ §4	wa/i-mu- [‘]	IAF
“ §8	sa-tá- [‘]	IAF
“ §11	pa-si- [‘]	IAF
“ §12	pa-sa-wa/i- [‘]	IAF
“ §13	wa/i-tà- [‘]	IAF
“ §13	pa-si- [‘]	IAF ²⁵
“ §14	wa/i-mu- [‘]	IAF
“ §16	pa-sa-za-[pa [?]]-wa/i-mu- [‘]	IAF
“ §19	wa/i-mu- [‘]	IAF ²⁶

24 Instead of Hawkins’ reading as plene (MALUS-*la/i-a-ti*).

25 This is a good example of how scribe can make final *a* fit if needed.

26 Another example of near horizontal *a*.

“ §19	pa-si-i- [‘]	IAF
“ §19	MALUS-wa/i-za- [‘]	IAF
“ §25	wa/i-mu- [‘]	IAF
“ §26	wa/i-mu-[[‘]]	IAF
“ §27	wa/i-tá- [‘]	IAF
“ §21	za-a-ti-i	plene
“ §25	za-a-sa	plene
“ §12	SUPER+ra/i-a	disambiguating
“ §14	SUPER+ra/i-a	disambiguating

35. BABYLON 1 (10th/9th c.)	signs	type
“ §10	a-tà-pa-wa/i-ta	initial <i>a</i> (ligature)
“ §11	a-tá-ti-li-i-sa	initial <i>a</i> (ligature) ²⁷
“ §3	*a-wa/i-tu	IAD
“ §3	*a-mi-i-na	IAD
“ §9	*a-wa/i-tu-tà	IAD
“ §15	*a-[pa]-t[i]-[p]a-wa/i	IAD
“ §2	wa/i-mu-ta- [‘]	IAF
“ §11	la/i-la/i/u-ni-sa- [‘]	IAF
“ §12	la/i-la/i/u-ni-sa- [‘]	IAF
“ §4	á-ma-za-pa-wa/i-a	plene/disambiguating
“ §9	pa+ra/i-na-a ²⁸	plene?
“ §13	“LOCUS”-lá/i-za-a	plene
“ §4	REL-a-za	disambiguating
“ §8	REL-a-za	disambiguating
“ §15	ara/i-a	disambiguating

36. TELL AHMAR 6 (10th/9th c.)	signs	type
“ §4	a-wa/i	initial <i>a</i>
“ §10	a-wa/i	initial <i>a</i>
“ §20	a-wa/i	initial <i>a</i>
“ §24	a-wa/i	initial <i>a</i>
“ §26	a-wa/i	initial <i>a</i>
“ §27	a-wa/i	initial <i>a</i>
“ §30	a+tá	initial <i>a</i> (ligature)
“ §32	a-wa/i	initial <i>a</i>
“ §4	*a-mi-i-sa	IAD
“ §5	*a-mu-pa-wa/i	IAD
“ §6	*a-mi-ya-ti	IAD
“ §8	*a-mi-i-sa	IAD
“ §18	*a-wa/i-ma-sa	IAD
“ §26	*a-pa-ti-i	IAD
“ §30	*a-MALUS-wa/i-za	IAD
“ §31	*a-pa-ti-pa-wa/i	IAD
“ §32	*a-pa-si-na	IAD

27 Ligature of *a-tá* reflects derivation of adjective from *anda*.

28 Hawkins reads this as related to Hitt. *peran*, hence initial *a* is unexpected. Plene *a* is also unexplained. He considers a phonetic rendering of *parna*- ‘house’ unlikely.

" §2	(*a)-wa/i-mu-(')	IAD/IAF
" §10	(*a)-mi-ya-za-(')	IAD/IAF
" §3	wa/i-mu- ^ε	IAF
" §4	sa-tá- ^ε	IAF
" §5	mi-zi- ^ε	IAF
" §5	la/i-ní-zi- ^ε	IAF
" §13	wa/i-ma-za-ta- ^ε	IAF
" §19	wa/i-ma-sa- ^ε	IAF
" §21	la/i-ni-zi-pa-wa/i-mi-i- ^ε	IAF
" §22	wa/i-mu- ^ε	IAF
" §33	wa/i-tú-ta- ^ε	IAF
" §6	za-a-sa	plene
" §17	za-a-sa-pa-wa/i-mu	plene
" §26	za-a-na	plene
" §28	za-a-ti-pa-wa/i	plene
" §34	NEG ₃ -sa-a-pa	plene
" §34	za-a-na	plene
" §10	NEG ₂ -a	disambiguating
" §11	SUPER-ra/i-a-ha-wa/i	disambiguating
" §24	REL-a-ti-i	disambiguating
" §30	NEG ₂ -a-pa-wa/i	disambiguating

APPENDIX 3

Frequency of A Movement Techniques by Period

Empire Period	initial <i>a</i>	init. <i>a</i> /IAD	IAD	IAF	deletion	<i>á</i> substitution
SÜDBURG	-	2	-	-	-	-
EMIRGAZI altars	1	-	25	1	3	-
EMIRGAZI blocks	1	-	6	-	-	-
YALBURT	16	3	2	-	-	-
KARAHÖYÜK ²⁹	10	-	3	-	1	-
Total	28	5	36	1	4	-
Percentage ³⁰	38%	7%	49%	<1%	5%	-

Early Trans. (11th-10th c.)	initial <i>a</i>	IAD	IAD/IAF	IAF	deletion	<i>á</i> substitution
GÜRÜN	-	2	1	1	-	-
KOTUKALE	-	2		-	-	-
IZGIN 1	-	3		2	1	-
IZGIN 2	1	5		1	-	-
ALEPPO 6	-	3		1	-	-
ALEPPO 7	-	2		3	-	-
MARAŞ 8	1	3		1	-	-
KARKAMIŞ A4b	-	4		-	-	-
KARKAMIŞ A18d	-	2		-	-	-
KARKAMIŞ A14b	-	1		-	-	-

29 KARAHÖYÜK (12th century BC) is grouped here because of its archaic features, including the preference for initial *a*.

30 Percentages may not add up to one-hundred due to rounding.

KARKAMIŠ A14a	-	3	1	1	-	-
KARKAMIŠ A1a	-	11	1	8	1	-
KARKAMIŠ A1b	-	2		1	-	-
KELEKLI	-	1		-	-	1
Total	2	44	3	19	2	1
Percentage	3%	62%	4%	27%	3%	1%

Late Trans. (10th-9th c.)	initial <i>a</i>	IAD	IAD/IAF	IAF	deletion	<i>á</i> substitution
KARKAMIŠ A11a	-	8	3	8	-	-
KARKAMIŠ A4d	-	-	1	-	-	-
KARKAMIŠ A11b+c	-	15	2	13	-	-
KARKAMIŠ A2+3	-	6	4	11	1	-
KARKAMIŠ A12	-	6	-	1	-	-
KARKAMIŠ A13d	-	-	-	1	-	-
KARKAMIŠ A23, A26a1+2	-	8	-	7	-	-
KARKAMIŠ A20a1	-	1	-	-	-	-
KARKAMIŠ A25a	-	3	-	1	-	-
TELL AHMAR 2	-	2	-	8	1	-
BOROWSKI 3	-	2	1	3	-	-
TELL AHMAR 5	-	3	-	3	-	-
ALEPPO 2	-	5	2	8	1	1
TELL AHMAR 1	-	9	1	15	-	-
BABYLON 1	-	4	-	3	-	-
TELL AHMAR 6	-	9	2	9	-	-
Total	-	81	16	91	3	1
Percentage	-	42%	8%	47%	2%	<1%

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