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Complex Graphemes in Proto-Elamite

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§1. *Introduction*

§1.1. The proto-Elamite material offers a unique opportunity to survey the early development of a pristine, or at least only partially derivative writing system. Albeit unquestionably inspired by the slightly earlier writing system of southern Mesopotamia conventionally called proto-cuneiform, proto-Elamite exhibits a high degree of independent development of both sign repertoire and text structure.

§1.2. The present study explores how complex graphemes are formed in proto-Elamite. That information is subsequently used to isolate specialized vocabularies and text-groups. In the course of the article, the text *MDP* 17, 77+212+226, is discussed. Tablets that were not available for collation have only been included in this study when necessary to strengthen an argument, but due to the questionable quality of the majority of primary publications, no argument concerning proto-Elamite can be made without reference to the original tablets. Throughout this study, I have noted whether or not a tablet has been collated.

§1.3. For the values of proto-Elamite signs, a transliteration system based on the sign-list Meriggi 1974, volume 2, has been implemented. As has been noted earlier, Meriggi's sign-list is not without errors. It suffers from both technical errors (such as the systematic inversion of signs, presumably a typesetting error, indistinct drawings, etc.), as well as methodological problems (e.g., the grouping of signs based on graphic similarities rather than on semantic classification, the general direction of the drawings of the signs contrary to conventions, etc.). However, Meriggi's sign-list is, by far, the most sophisticated published list of proto-Elamite signs. Based on collation of available documents, it has been used here to produce a new signlist, in which the numbering system has nevertheless been retained (note that the alpha-numeric suffix of many signs does not indicate that signs are variants of the "main" type [without alpha-numeric suffix], unless this is stated. These suffixes have been retained solely to conform to the numbering in Meriggi 1974). Drawings of all signs discussed in this study are given in the accompanying tables.

§1.4. It is possible to isolate two distinct categories of complex graphemes in proto-Elamite: those formed by adding a numerical notation with or without a non-numerical sign to another sign (N(+G)xG), and those formed by combining two distinct graphemes—by framing one grapheme with another, by inscribing one in the other, or by bundling them (G1+G2+G1, GxG, or G+G). The only well developed example of the first group is the sign M36. The latter group can be further subdivided according to the semantic classification of the combined grapheme. We shall call the first group *complex capacity signs*, abbreviated "CCS" and the other group *complex graphemes*, abbreviated "CG." CCSs always stand for counted objects such as pots, jars, and the like; CGs can represent such inanimate objects, but also persons, households, and more.

§1.5. Three types of CGs can be distinguished: those formed by surrounding one grapheme with multiples of another, those formed by inscribing one grapheme inside another, and those formed by placing two distinct graphemes adjacent to each other. The two signs forming a type three CG do not appear to form a ligature, but it can be established that they form a distinct semantic unit that can be replaced by a CG of the second type.

§1.6. We can schematize the three types of CGs according to figure 1. The first type (A+B+A) is exclu-

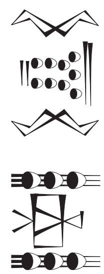
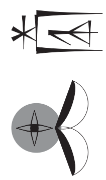
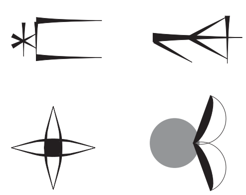
Type	Structure	Examples
1.	A+B+A	
2.	AxB	
3.	A+B or B+A	

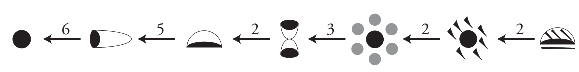
Fig. 1. Three types of complex signs in the proto-Elamite corpus.

sively used to write "names" of households. One exception is M370+SIGN+M370, which is here analyzed as a type two CG since it is probably a variant writing of M370b+SIGN (see below). There is a possible temporal divergence between types two and three; they seem to appear together only in what is perhaps an early stage of standard proto-Elamite. In late standard proto-Elamite, if such a distinction can be made at all, we find primarily type two (AxB).

§1.7. Type two CGs designate households, products, and humans, and may, in certain contexts, be syllabic signs. Type three CGs (A+B or B+A) has, so far, only been found to denote households. The household CGs, whether written with CGs of type two or three are by far the most numerous of all CGs.

§2. *Complex Capacity Signs*

§2.1. The most common CCS is, unquestionably, M36. No other graphemes with added numerical notation exhibit the same complexity as this sign. It can be inscribed with any numerical sign from the capacity system below the value of N_1 (for the relational values of the numerical signs used in the general grain capacity system, see the factor diagram below this paragraph). In the relatively few instances where M36 may be inscribed with the numerical sign N_{14}, it is apparently shorthand for N_{30d}, as suggested by the calculations in the involved texts. See for example *MDP* 6, 203 (collated), a text with too many unknowns to allow for a full identification of the listed containers; however, M36+1N_{14} must be a rather small container to conform with the total. With *MDP* 6, 355 (collated), we may infer by analogy that M36+1N_{14} is likely to be a scribal error for M36+1N_{30d} appearing twice earlier in the same text. The reverse is unfortunately completely missing, allowing no further calculations; and *MDP* 6, 375 (collated), whose calculations strongly suggest that M36+1N_{14} is indeed shorthand for M36+1N_{30d}. Where the copy of *MDP* 26, 125 (not collated) has a broken M260, we can expect M260+1N_{24} (see also §2.10 below). Likewise, where the copy has M36+1N_{14}, we may infer that M36+1N_{30d} was meant. The total has 3N_{39b}, 1N_{24} 1N_{30c}, presumably from the addition of a notation of 4N_1 M260(+1N_{24}) and 2N_{14} M36+1N_{30d} (both notations presumably in the bisexagesimal system); 20 x 1N_{30d} is exactly 1N_{39b} 1N_{24} 1N_{30c}, whereby we can assume a value of 1N_{24} for each M260. However, this tablet was not available for collation and this argumentation serves more to correct the copy than to investigate a possible notation M36+1N_{14}. The same tablet has a scribal design which has been identified on several other tablets, including *DAFI* 1, 58 12 (not collated), one of the few Susa tablets found in secure context (the other attestations are the two parallel texts *MDP* 6, 263 and 387 (both collated); *MDP* 6, 308; *MDP* 17, 5, 162 and 326 (all collated); *MDP* 26, 4 (not collated); and *MDP* 26S, 5016 (collated)).



§2.2. M36 always appears in a position in the sentence believed to be reserved for that of a counted object. It is usually thought to represent a smallish container of grain. When M36 is inscribed with a numerical sign, the resulting CCS presumably indicates a particular quantity of grain. Additionally, when M36 is inscribed with a specific grapheme, the resulting CG probably indicates that a specific quality of grain is meant. Adding a non-numerical sign to M36 inscribed with a numerical notation probably indicates both the quantity and the quality of the product recorded with the following numerical notation.

§2.3. Meriggi's sign-list included a number of variants of M36 (Meriggi 1974, volume 2, 9; see here figure 2). These were numbered M36 a, b, c, d, e, f, g, h, i, i', j, j', k, k', l, l', l'', m, m', n, o, o', p, q, r, s, s', s'', t, u, and v. Meriggi $M36_c$ corresponds to our M36+M10; $M36_d$ to our $M36{+}1N_{39c}$ (see *MDP* 17, 171 [collated]); $M36_e$ to our M36+M35 inverted; $M36_h$ to our $M36{+}M343_h$ inverted; i, i', j, and j' to our $M36{+}1N_{39b}$, $M36{+}1N_{39c}$, and $M36{+}1N_{30c}{+}1N_{39c}$, all inverted; k corresponds roughly to our $M36{+}1N_{14}$; signs M36 k' to l'' correspond to our $M36{+}1N_{30d}$; and n and o presumably to $M36{+}1N_{30c}$; o' is our $M36{+}1N_{30d}{+}M343_h$; s is $M36{+}1N_{24}$; s' is presumably also $M36{+}1N_{24}$ (see *MDP* 26, 2 [not collated]); s'' is $M36{+}1N_{30d}$ (see *MDP* 17, 152 [collated]); and t is our $M36{+}1N_{24}{+}M343_h$. The remaining variants in Meriggi's list are most likely based on faulty copies of the originals: $M36_a$ is attested only once on an oblong tablet (*MDP* 17, 24), presumably belonging to an early writing stage since it is only a graphical variant of M36. We have thus reduced the number of variants of M36 by more than 50%.

§2.4. Three, or possibly four non-numerical graphemes can be inscribed in M36. Of these, $M343_h$ is used in the most complex way (see also below, §3.4). The CGs M36+M10 and M36+M35 both presumably indicate containers holding a particular kind of grain. M10 is believed to be a sign for a particular quality of grain, as can be inferred from the numerous attestations of the sign alone followed by a grain notation in the capacity system (see, e.g., *MDP* 6,

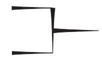
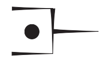
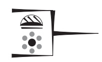
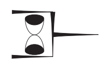
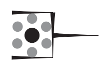
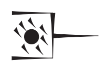
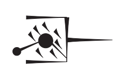
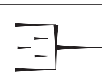
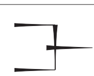
Image	Name	Reference(s)
	M36	
	$M36{+}1N_{14}$	See, e.g., MDP 6, 203 (collated) Perhaps short-hand for $M36{+}1N_{30D}$
	$M36{+}1N_{39B}$	See, e.g., MDP 17, 77+212+226 (collated)
	$M36{+}1N_{30C}{+}1N_{39C}$	MDP 26, 386 (not collated)
	$M36{+}1N_{24}$	See, e.g., MDP 17, 77+212+226 (collated)
	$M36{+}1N_{30C}$	See, e.g., MDP 17, 77+212+226 (collated)
	$M36{+}1N_{30D}$	See, e.g., MDP 6, 355 (collated)
	$M36{+}1N_{39C}$	See, e.g., MDP 17, 48; 76; 77+212+226; 152; (all collated); MDP 26, 324 (not collated)
	$M36{+}M343_h$	MDP 17, 77+212+226 (collated)
	$M36{+}1N_{39B}{+}M343_h$	MDP 17, 77+212+226 (collated)
	$M36{+}1N_{24}{+}M343_h$	MDP 17, 77+212+226 (collated)
	$M36{+}1N_{30D}{+}M343_h$	MDP 17, 77+212+226 (collated)
	M36+M10	MDP 17, 081 (collated)
	$M36{+}M343_e^{?}$	MDP 17, 252 (collated)
	M36+M35	MDP 06, 4994 (collated)
	$M36_a$	MDP 17, 24 (collated)

Fig. 2. Variants of the sign M36.

334 l. 3; *MDP* 17, 26 l. 3; *MDP* 17, 81 ll. 10, 14, 18, 22, 25, and 30; note M36+M10 in the same text, l. 29 [all collated]). M35, however, never appears in a position that would suggest that it represents a product (see, e.g., *MDP* 6, 227, 240; and 355 [all collated]). Rather, M35 appears as part of sign strings that probably represent personal names, with the exception of one text, *MDP* 6, 4994 (collated). In that text it is found inscribed in M36 and appears as a counted object. I have no explanation for this.

§2.5. M36 (figure 3) can, with some reason, be compared with the Late Uruk sign NINDA$_2$, since both can be inscribed with a variety of numerical signs, and both seem to represent smallish containers for grain or perhaps even a measuring device (cf. Friberg 1978-9, 21, Damerow and Englund 1989, 25 fn 77, and Englund 2004a, 38 + fn 22). The Late Uruk sign SILA$_3$, on the other hand, is semantically different from our M36; although it can be inscribed with other graphemes, it is rarely inscribed with numerical signs.

§2.6. All other CCSs can be divided into two groups: those that can be classified as seemingly semantic variants of M36, and those formed by adding a numerical sign to M260. A few remaining complex graphemes with inscribed numerical sign must be treated as complex graphemes rather than complex capacity signs.

§2.7. Three variants of M39 (Meriggi's list of subforms of M39 should be disregarded) can be inscribed with N$_{30d}$. These variants are numbered M39+1N$_{30d}$ (*MDP* 26S, 5034 [not collated]), M39$_c$+1N$_{30d}$ (*MDP* 6, 356 [collated]; *MDP* 17, 376 [collated]; and *MDP* 26, 9 [not collated]), and M39$_{ca}$+1N$_{30d}$ (*MDP* 6, 356 [collated]). They are used in a way that closely resembles that of similar variants of M36. The text *MDP* 6, 356, conforms to the superstructure of other so-called "bread and beer" texts (see, e.g., *MDP* 6, 203, 251 [note that the reverse of *MDP* 6, 251 was published as *MDP* 6, 250], and 355 [all collated]). One is tempted to suggest that the variants of M39 in this text are mere graphic variants of M36. That, however, is unlikely to be the case, since an M36 (empty) appears in the same text, and because there is a clear graphical difference between the two variants of M39. Such a differentiation cannot be observed with regard to M36.

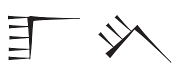
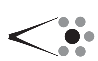
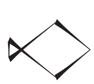
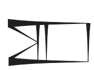
Vessel Grapheme	**Image**	**Inscribed Numerical Sign**	**Notes**
M36		1N$_{39b}$, 1N$_{30c}$+1N$_{39c}$, 1N$_{39c}$, 1N$_{39d}$, 1N$_{39c}$	See §2.3
M39$_a$ / M39$_c$		1N$_{39d}$	
M482		1N$_{39c}$	Non-numerical component cannot be isolated.
M354		1N$_{39d}$	No non-numerical component.
M260		1N$_{24}$, 1N$_{39c}$	Three graphical variants of M260 can be inscribed with N$_{24}$.
M288		1N$_1$, 1N$_{39b}$	

Fig. 3. Complex signs inscribed with numerical signs.

§2.8. In the text *MDP* 26S, 4765 (collated; see also photo on pl. 21 of *MDP* 6), we find a sign that is graphically distinct from both M36 and M39, but with striking semantic similarities to both. That sign has been named M482. It represents a small container counted in the bisexagesimal system. In the same text we find M36+1N_{30d}, counted in the bisexagesimal system B#; the totals of M482 and M36+1N_{30d} are not bundled. M482 appears in Meriggi's list as number 354_e, that is, it is grouped as a subform of number 354 (= 1N_{30d}), although it is formed by adding a "hat" to number 353 (= 1N_{30c}).

One primary, and two derived capacity systems are known. One derived system is formed by hatching each numerical sign, the other by framing the entire numerical notation. Likewise, one general and one derived bisexagesimal system are known; the derived system is formed by framing the entire notation. See Englund 2004b, 115-118 + fig. 5.4.

§2.9. In many texts, M354 appears alone in a position where we would expect M36+1N_{30d} (see, e.g., *MDP* 6, 203, 388 [both collated], and *MDP* 26, 27 [not collated]). M354 represents in all these cases a smallish container counted (when possible to ascertain) in the bisexagesimal system (see, in particular, *MDP* 26, 27 [not collated]; cf. Friberg 1978-79, 21). M353, or N_{30c}, is apparently never found in this capacity.

§2.10. The sign M260 can presumably be inscribed with N_{30c}, N_{14} and N_{24}, although only M260+1N_{24} is attested with a frequency that allows for any generalization. M260 inscribed with 1N_{30c} is found in only two texts (*MDP* 26, 3 [not collated]; and Yahya 8 [not collated]). In both cases, the CCS is a counted object. The unique attestation of M260+1N_{14} (see *MDP* 6, 211 [collated]) is questionable, and no explanation of it is attempted here. On the other hand, M260–or a graphic variant–inscribed with N_{24} is frequently attested in the material. M260 is occasionally used as a simplified graphic variant of M269, a sign that may represent a jar for milk, butter, or butter oil. This classification is based on the use of this sign in several texts relating to the herding of animals, and on the graphic particularities of the variants $M269_f$ through $M269_j$. Most proto-Elamite signs are quite abstract, and the horizontal strokes protruding from the lower part of the body of the variants $M269_f$ through $M269_j$ may not be a graphical rendering of any physical feature of a specific type of jar. It is to be anticipated that renewed archaeological research will assist in the classification of some proto-Elamite pictograms. The classification proposed here is contrary to Damerow and Englund (1989, 29 + fn. 96), who identified all variants of M260 (M260 through M270, presumably) as proto-Elamite equivalents of proto-cuneiform DUG, a sign for a beer vessel. Whereas it is certainly true that those variants of M260 inscribed with a numerical notation, as well as probably all signs numbered M260 through M268, and certain other comparable signs, are "beer-vessels," the variants of M269 mentioned above must represent a by-product of animal-herding. The most common signs for beer and dairy product vessels are listed in figure 4 (certain signs with a graphical resemblance to the signs listed there are, however, never attested as counted objects and will be dealt with in a later study).

§2.11. The absolute size of the grain measures of the proto-Elamite texts is difficult to ascertain, as Damerow and Englund (1989, 26-27), have demonstrated. According to their estimate, either proto-Elamite N_{30c} or N_{30d} corresponds to proto-cuneiform N_{30a}, which may correspond to a day-ration or the absolute measure of a "ninda-bowl" (beveled-rim bowl), on average holding between 0.6 and 0.8 liters of grain. M260 inscribed with N_{24}, therefore, likely denotes a jar of considerable size used in beer production, storage, or disbursement. The same holds true for $M264_a$+1N_{24} attested in one text only (*MDP* 17, 132 [not collated; on loan to New Delhi]), this attestation has therefore not been included in figure 4).

§2.12. The only other container sign that can be inscribed with a numerical notation is M288. In *MDP* 17, 414 (not collated), a "ration text" with eleven entries, each "person" is allotted one M288+1N_1. The total is counted in the capacity system, indicating that M288 was inscribed with N_1, perhaps to indicate that each M288 held a volume corresponding to 1N_1 of the product being distributed. We may suspect that the containers (M288+1N_1) were counted in the bisexagesimal system. In this type of texts (the so-called bread and beer texts), the total generally gives a measure in the general capacity system or a system derived from it, calculated by adding the "known" content of the vessels (of standardized size) listed in the body of the text. These containers are often counted in the bisexagesimal system, and only rarely do we find measures in the capacity system in this kind of texts (see the documents mentioned in §2.7 above, in particular *MDP* 6, 356, listing, on the obverse, 33 containers of varying size, totaled as 5N_1 2N_{39b} 1N_{24} 2N_{30c} of M297 on the reverse; the reverse face of this text was not copied by Scheil). In *MDP* 26S, 4755 (collated), we find one M288+1N_{39b}. This text is broken and no interpretation can be offered here.

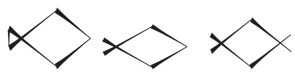
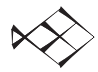
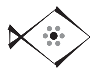
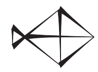
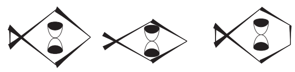
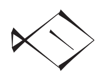
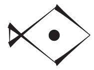
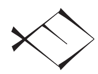
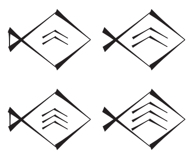
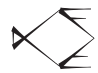
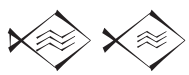
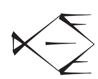
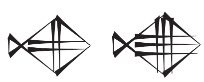
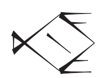
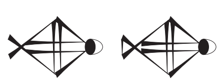
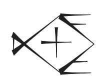
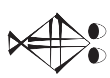
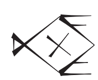
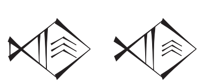
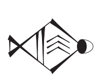
“Beer” vessels		“Dairy” vessels	
Image (main form + Variants)	*Name*	*Image (main form + Variants)*	*Name*
	M260		$M269_a$
	$M260+1N_{30c}$		$M269_b$
	$M260+1N_{24}$		$M269_c$
	$M260+1N_{14}$		$M269_d$
	$M261_a$		$M269_e$
			$M269_f$
	$M261_d$		$M269_g$
	$M263_a$		$M269_h$
	$M263_b$		$M269_i$
	$M263_e$		$M269_j$
	$M264_a$		
	$M264_b$		

Fig. 4. Common proto-Elamite signs representing containers for beer and dairy products

§2.13. The inscribed component of a CG can be a numerical sign without making the combined grapheme a CCS or a even a referent of a counted object. N_{30} (= M353) is found inscribed in M136, the so-called hairy triangle; it is also found alone on at least two seals (*MDP* 16, 102 and 122) and may represent some official or household. Note, however, that whereas N_{30c} is not a typical sign for a household, the common household sign $M136_g$ is also found on only two seals (*MDP* 16, 266 and 330). Two other CGs can be described as combining a numerical sign to a non-numerical sign: M351 inscribed with $3N_1$ and $M343_h$ with an added N_{30d} (=M354). $M351+3N_1$ is found in several texts and is believed to represent a household (see, for example, *MDP* 17, 8, 17 and 133 [all collated]); $M343_h$+M354 is found in only one text (*MDP* 6, 356 [collated]). It does not appear as a counted object. Numerical signs employed in the writing system as non-numerical signs will be discussed at a later date.

§3. *Excursus: “The Range of Conventionalization”*

§3.1. Consistent with theories concerning the early development of writing, many proto-Elamite signs are attested in only one or a few texts each (see in particular

Damerow 1999, 10). This lack of standardization, convincingly established for proto-cuneiform, and equally prevalent in proto-Elamite, apparently allowed the scribes who wrote the proto-Elamite tablets to generate signs in an *ad hoc* manner when needed, usually relying on a set of basic signs. Given the uneven excavation history for the majority of the proto-Elamite tablets, this information may be useful for the identification of ancient archives, otherwise forever lost to us.

§3.2. The short introduction to *MDP* 17 is among the few published records describing the circumstances of the discovery of the proto-Elamite tablets. Vincent Scheil gives the following account of the provenience of the tablets published by him in *MDP* 6 and 17:

> *A first group of texts published in MDP 6 (1905) came from two main lots discovered by J. de Morgan in 1901. One lot came from trench 24 (at a depth of 5 meters) deposited along the walls of a room; the other from trench 7 (at a depth of between 8 and 13 meters).*
>
> *A second group of texts was excavated after 1907, by Mr. R. de Mecquenem. It came partly from the same trench 7 (widened and deepened to 17 meters) and partly from the northwestern edge of the Acropolis (dug to a depth of 8 meters).*
>
> *From the same height of the ruin came the inscribed monuments of Manishtusu, Puzur-Shushinak, and the bricks of the kings of Ur and of various patesis. (MDP 17, i [translation of the author])*

§3.3. Unfortunately, nowhere in *MDP* 6 does Scheil provide any information as to which tablets were found in trench 24 and which in trench 7. To the best of my knowledge, no published drawings of the layout of the trenches of Morgan and Mecquenem exist. Fortunately, a few tablets were found during the later excavations on the Susa Acropolis, some of which can be directly linked to the material from Morgan and Mecquenem's excavations (see also below). In the following, we shall use the knowledge that some signs were used only in one or a few texts not to reconstruct ancient archives but to show that the same information can be used to join fragments.

§3.4. According to the signlist Meriggi 1972, volume 2, the signs M343$_{h}$ and M343$_{d}$ are mirror images (see figure 5). For obvious reasons, Meriggi's numbering has not been retained here. They can be found in only one text each: M343$_{d}$ in *MDP* 17, 117, and M343$_{h}$ in *MDP* 17, 342 (both collated). Meriggi lists two more references for these particular variants of M343: *MDP* 17, 383 (M343$_{h}$), and *MDP* 17, 402 (M343$_{d}$) (both collated; see Meriggi 1974, volume 2, 216). I am unable to support this claim. Note also that Meriggi fails to record the appearance of M343$_{h}$ in his edition of *MDP* 17, 383 (Meriggi 1974, volume 3, 167 [text R g 9]). The sign M343$_{e}$ is only attested in *MDP* 17, 252, where it is inscribed within the sign M36. It is believed to be a scribal error for M343$_{h}$.

§3.5. M36 inscribed with M343$_{h}$ appears in only two texts, *MDP* 17, 77 and 212. *MDP* 17, 77, is a damaged mid-sized tablet. *MDP* 17, 212, is a smallish fragment. It appears from the copies that the two fragments are not related, but in *MDP* 17, 77, we find two M36+M343$_{h}$ as well as one M36+1N$_{30d}$+M343$_{h}$, and in *MDP* 17, 212 we find one M36+1N$_{24}$ with an added M343$_{h}$ (M36+1N$_{24}$+M343$_{h}$), as well as a broken M36+1N$_{39b}$ with M343$_{h}$ clearly visible (M36+1N$_{39b}$+M343$_{h}$). *MDP* 17, 212, joins with *MDP* 17, 77 (a physical join was confirmed in the Louvre).

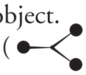
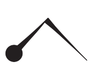
Image	**Name**	**Reference(s)**
	M343$_{d}$	*MDP* 17, 117 (collated); counted object. Perhaps a graphic variant of M376 ()
	M343$_{h}$	*MDP* 17, 342 (collated); counted object (capacity system C and C#). Note also the possible attestation of M343$_{h}$ in *MDP* 17, 415 (collated).
	M343$_{h}$+M354	*MDP* 6, 356 (collated); not a counted object.
	M343$_{e}$	Only attested as inscribed in M36, see *MDP* 17, 252 (collated), possible scribal error for M343$_{h}$

Fig. 5. M343 and variants.

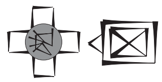
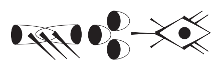
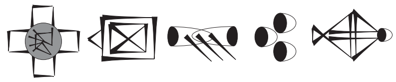
Text ID	Signs	Transliteration
MDP 17, 226		M327+M342 M180$_b$
MDP 17, 77		M387$_{ef}$ M381 M249$_h$
MDP 17, 92		M327+M342 M180$_b$ M387$_{ef}$ M381 M263$_{b1}$

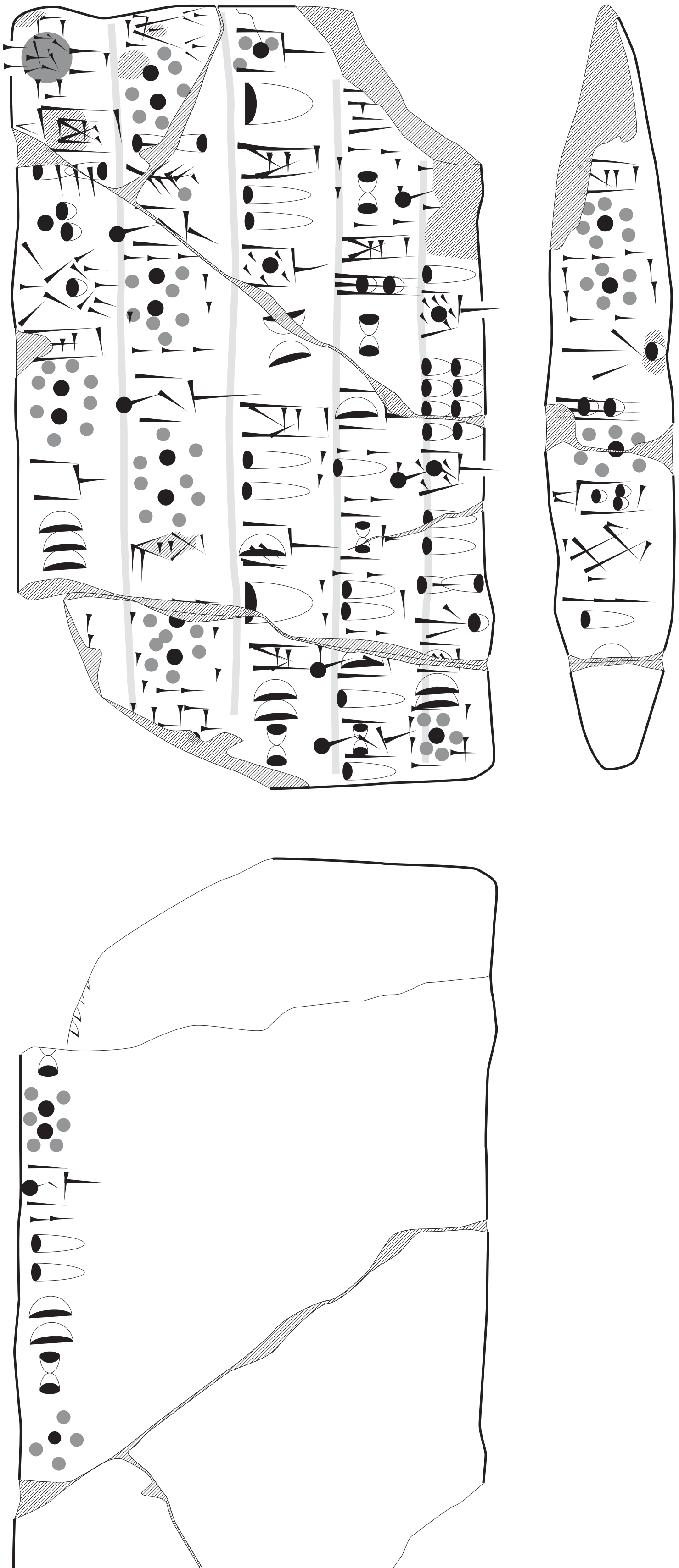
Fig. 6. A comparison of the texts MDP 17, nos. 17, 92 and 226.

§3.6. The header and the first sign of *MDP* 17, 77, are broken off, along with the first two signs of the second column. However, by analogy with the three remaining signs of the initial string of *MDP* 17, 77 (M387$_{ef}$ M381 M249$_h$), and with the header plus initial string of the related text *MDP* 17, 92 (M327+M342 M180$_b$ M387$_{ef}$ M381 M263$_{b1}$), we are able to suggest a reading of the header of *MDP* 17, 77 (M327+M342 M180$_b$; see figure 6). The only other text where this group of signs can be found is the small fragment *MDP* 17, 226. That fragment joins with *MDP* 17, 77 (a physical join has been confirmed in the Louvre). The archival relationship between *MDP* 17, 77 and 92, will be explored in another study.

§3.7. Other joins based on the distribution of signs and variants can be made in the proto-Elamite material. All of the following tablets have been collated, all joins have been confirmed in the Louvre, and all are physical joins. *MDP* 6, 366, has been joined with *MDP* 26S, 5025, based on the use of the sign M206$_j$. M206$_j$, perhaps a graphic variant of M206$_g$, a sign representing an animal by-product, is found only in *MDP* 26S, 5025, and *MDP* 6, 386. The two texts *MDP* 6, 366 and 386, are closely related; they are of almost identical size, and the break-pattern is almost identical. It is therefore highly likely that the two tablets were stored together in ancient Persia. The join *MDP* 6, 366+*MDP* 26S, 5025, is thus based on a reading of *MDP* 6, 366, which itself could only be obtained by realizing the relationship between this tablet and *MDP* 6, 386. *MDP* 17, 81, has been joined with number 347 based on the sign-group M294$_a$ M050$_k$ found only in this and two other texts, *MDP* 17, 36, a text with a similar scribal design (see further *MDP* 17, nos. 131, 156, 286 and 331, all with the same scribal design), and *MDP* 17, 189+336. The latter join is, in turn, based on a comparison with *MDP* 17, 81+347, and *MDP* 17, 36 (the two fragments *MDP* 17, 189 and 336 are too small to reveal the possible existence of the same scribal design found on the other texts from the same sign-group). And, finally, *MDP* 17, 250, has been joined with number 251, based partly on the fact that this is the only text in which the sign M4 can be shown, beyond doubt, to represent a counted object.

§3.8. The joined tablet *MDP* 17, 77+212+226 (figure 7), is more than 75% complete, measuring 115 × 69 × 21 mm. The surface is well preserved. The three fragments with the museum numbers Sb 22269 (*MDP* 17, 77), Sb 22380 (*MDP* 17, 212), and Sb 22393 (*MDP* 17, 226), are kept in the Louvre Museum. All three fragments were published for the first time in Scheil 1923. (I wish to thank Béatrice André-Salvini for her kind permission to study the full collection of proto-Elamite tablets in the Louvre).

§3.9. Proto-Elamite uses no word-dividers, and the entries are not arranged in boxes. In actuality, a proto-Elamite text is arranged sequentially and not in any visible order of hierarchies. This in-line representation of the entries is quite different from all other early writing-systems, and it may carry certain elements of language coding (cf. Damerow 1999, 7). The entries can cover all surfaces, and can run from one line to the next and from one surface onto the next. Each entry consists of a string of graphemes and a numerical notation. Most of the strings of signs in the proto-Elamite corpus are of modest length (2 - 6 signs), but some longer strings exist (see for, example *MDP* 31, 16, with 11 signs; *MDP* 6, 314, *MDP* 26S, 4758, and *MDP* 31, 37, with 10 [all collated]). The header and subscript are not followed by numerical notations. In conventioinal transliterations of proto-Elamite texts, each entry is given its own line-



Transliteration of *MDP* 17, 77+212+226

obverse

01. M327+M342 ,
02. M180b ⸢M387$_{ef}$⸣ M381 M249$_{h}$ M288 , 2N$_{30c}$
03. M36 , 3N$_{39b}$ X
04. [...] , [...]
05. [...] M61a , 2N$_{30c}$
06. ⸢M387$_{a}$⸣ X ⸢M36+M343$_{h}$⸣ , 2N$_{30c\#}$
07. M36+M343$_{h}$, 2N$_{30c}$
08. M266$_{b}$, 2N$_{30c\#}$
09. ⸢M328$_{b}$⸣ [...] M36+1N$_{30c}$, 1N$_{34}$
10. M288 , 2N$_{1}$
11. M36+1N$_{30d}$, 1N$_{54}$
12. M288 , 2N$_{1}$
13. M36+1N$_{39c}$, 1N$_{34}$
14. M288 , 2N$_{39b}$ 1N$_{24}$
15. [...] X , 1N$_{24\#}$
16. M288 M377$_{e}$, 1N$_{24}$
17. M36+1N$_{39b}$, 1N$_{1\#}$
18. M36+1N$_{24}$, 2N$_{1\#}$
19. M36+1N$_{39b}$+M343$_{h}$, 1N$_{1}$
20. M36+1N$_{24}$+M343$_{h}$, 1N$_{1}$
21. [...] , [...]
22. M36+1N$_{30d}$, 7N$_{1}$
23. M36+1N$_{30d}$+M343$_{h}$, 2N$_{1}$
24. M387$_{a}$ M81 ⸢M36+1N$_{30d}$⸣ , 2N$_{39b}$ 1N$_{30c\#}$
25. [...] , [...]
26. ⸢M288⸣ , 1N$_{30c}$ 1N$_{30c\#}$
27. M81 M377$_{e}$, 1N$_{30c}$
28. ⸢M175+M381⸣ M319 M2$_{b}$, 1N$_{1}$ 1N$_{39b}$

reverse

01. [...] , [...] ⸢4N$_{39b}$ 1N$_{24}$⸣ 2N$_{30c}$
02. M36+M343$_{h}$ M2$_{b}$, 2N$_{1}$ 2N$_{39b}$ 1N$_{24}$ 1N$_{30c}$

Fig. 7. MDP 17, 77+212+226 (115 × 69 × 21 mm)

number, and its two constituent parts are separated by a comma. As a rule the right edge is considered part of the obverse, and only the first entry to start on the reverse is numbered as belonging to the reverse. When the text of the obverse runs onto the reverse, that segment of the reverse is called column 1, the segment holding the total (if present) is called column 2. If there is no spill-over from the obverse the total (if present) is coded reverse, column 1. Normally, the tablet is rotated 180 degrees on its horizontal axis to write the total (devia-

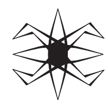
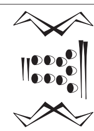
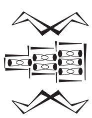
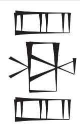
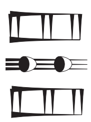
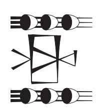
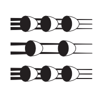
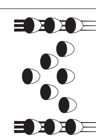
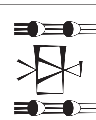
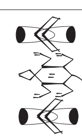
Encircling Grapheme	Complex Grapheme	Image	References
M54	M54+M365+$M54_i$		*MDP* 26, 71 (not collated); *MDP* 26S, 4804 (not collated)
M54	M54+$M384_i$+$M54_i$		*MDP* 6, 217 (collated)
M54	M54+$M393_f$+$M54_i$		*MDP* 17, 180 (collated); *MDP* 26, 158 (not collated)
M153	M153+M320+M153		*MDP* 26S, 4770 (collated)
M153	M153+$M377_e$+M153		*MDP* 31, 41 (collated)
M377	M377+M320+M377		*MDP* 17, 6; 18; 93; 135; 148; 214; 426; 433; 447; *MDP* 31, 29 (all collated); *MDP* 26, 101; 172; 173; *Couvent Saint-Etienne* 126 (not collated)
M377	M377+$M377_g$+M377		*MDP* 31, 37 (collated)
M377	M377+M383+M377		*MDP* 26, 98 (not collated)
$M377_e$	$M377_e$+M320+$M377_e$		*MDP* 17, 46 (collated)
$M387_{ca}$	$M387_{ca}$+M340+$M387_{ca}$		*MDP* 6, 232 (collated)

Fig. 8. Type one complex graphemes.

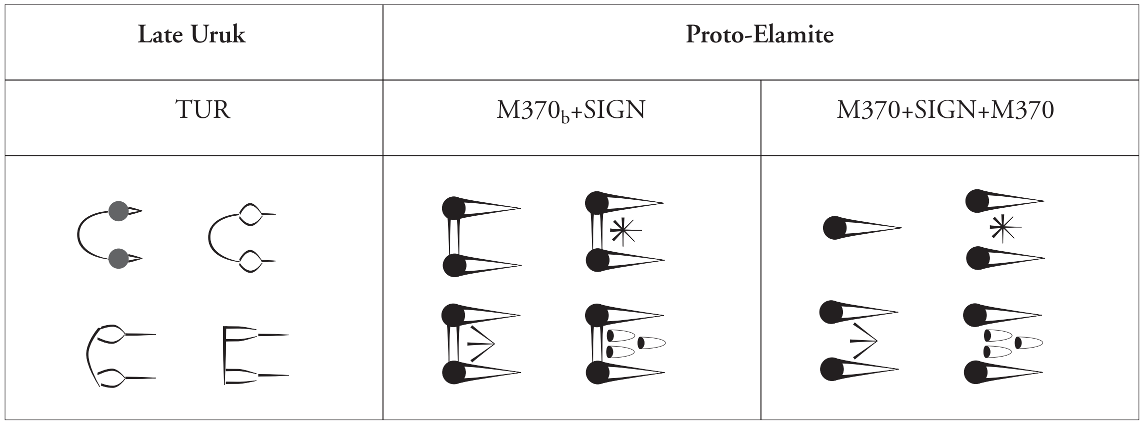


Fig. 9. Type two complex graphemes

tions occur), and 180 degrees around its vertical axis for a continuation of the text.

§3.10. Although the translation of a proto-Elamite text is at present impossible, I am able to present here an outline of the content of the text in figure 7. The account pertains to the household M327+M342, presumably dealing with the rations for different "staff" members. The staff is not, apparently, differentiated by "personal names." Rather, it appears to have been made up of a number of "individuals" qualified as either $M387_a$ or $M387_{ef}$. This exchange between $M387_a$ and $M387_{ef}$ resembles the pattern found in a specific group of texts, some identified by having the same scribal design on the reverse, others by having the same text header (see, e.g., *MDP* 17, nos. 36, 81+347 (physical join confirmed in the Louvre), 94, etc. [all collated]). The texts from this group will be dealt with at a later date. Each entry of our text consists of a broad range of grain products. There is no identifiable relationship between the entries. Note the entries in lines 9-10, 11-12, and 13-14, each counting a large number of containers of M36+$1N_{30c}$, M36+$1N_{30d}$, and M36+$1N_{39c}$, and computing the combined capacity measure of these containers.

§4. *Complex Graphemes*

§4.1. In the beginning of this study, I proposed to differentiate between three different types of complex graphemes on the basis of their construction. The first type was formed by encircling one grapheme with another. The second by inscribing one grapheme in another, comparable to the way complex capacity signs were formed. A third type was formed by placing two signs, known to form a type two complex grapheme, next to each other.

§4.2. Only four graphemes can be shown to have been used for the purpose of encircling another grapheme and forming a type one complex grapheme (A+B+A). The formation of type one CGs is described in figure 8. Of the encircling signs listed there, M54 holds a special position. It is the only asymmetric sign used in this type of CG. Its inverted form (called $M54_i$) is known throughout the corpus. It is uncertain whether the particular form of the sign contains specific semantic information. Due to its particular shape, the inverted form is used together with the regular form when encircling another grapheme.

§4.3. The most productive group of CGs is type two. Unfortunately, it is difficult to find any pattern regarding the formation of this type of CG. A restricted number of signs that can be used to form a type 2 CG seem to exist; a revised full sign-list currently in preparation will deal extensively with this issue. The majority of the type two CGs were used to write names of households, rarely to write counted objects. A semantically, but not structurally distinct group of complex graphemes can be isolated. These are CGs that appear within the sign strings believed to represent personal names. However, some of these CGs seem to appear as counted objects as well.

§4.4. The sign combination M370+SIGN+M370 (figure 9) mentioned in the beginning of this study can apparently be replaced with $M370_b$+SIGN. It is therefore included here as a type two CG. It is only found inscribed with one particular group of signs representing low-level workers, always in laborer lists. Damerow and Englund (1989) speculated that this sign was a sort of proto-Elamite equivalent to proto-cuneiform TUR due to its striking semantic and slight graphic resemblance. This seems confirmed by texts such as *MDP* 6, 246+332 (join confirmed in the Louvre, July 1988; see Damerow and Englund 1989, 57, fn 156, and perhaps add *MDP* 6, 302), in which M370$_b$+SIGN appears to denote a low-level worker listed after regular male and female workers (note that it is possible that M370 alone could function as shorthand for an empty M370$_b$).

§4.5. M343$_h$ (see figure 5 and §3.4 above) is attested alone only once in the corpus. In that text, *MDP* 17, 342, M343$_h$ follows M36; each appear to be independent signs (note that M36 is broken and could possibly have been inscribed with another sign). Based on an analogy with other complex graphemes, it may be argued that the meaning of M36 is the same if that sign is followed by, or inscribed with M343$_h$. In this regard, it is gratifying to observe that in both *MDP* 17, 77+212+226 and 342, the grapheme-group M36 M343$_h$ is followed by numerical notations in both the basic capacity system and the derived system C#. In the case of *MDP* 17, 77+212+226, this is recorded first as M36+M343$_h$ followed by a notation in the capacity system C# (2N$_{30c\#}$), and then once again M36+M343$_h$, now followed by a notation in the basic capacity system

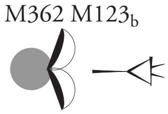
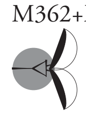
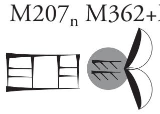
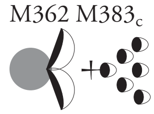
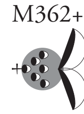
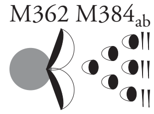
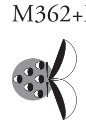
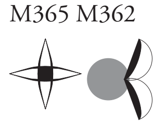
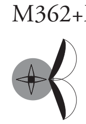
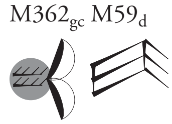
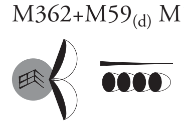
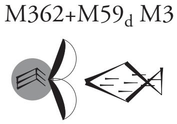
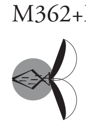
Sign-Cluster	Reference(s)	Corresponding Complex Grapheme	Reference(s)
M362 M123$_b$ 	*MDP* 26, 387 (not collated)	M362+M123$_b$ 	*MDP* 17, 85 (collated)
M207$_n$ M362+M41$_e$ 	*MDP* 17, 85 (collated); add perhaps the fragment *MDP* 17, 380 (collated)	[…] M362+M207$_n$ X 	*MDP* 17, 97 (not collated)
M362 M383$_c$ 	*MDP* 17, 85 (collated)	M362+M383$_c$ 	*MDP* 17, 85 (collated); *MDP* 17, 96+325 (collated); *MDP* 17, 97 (not collated); *MDP* 26, 217 (not collated: uncertain reference)
M362 M384$_{ab}$ 	*MDP* 17, 191 (collated)	M362+M384$_a$ 	*MDP* 17, 085 (collated); *MDP* 17, 96+325 (collated)
M365 M362 	*MDP* 26, 100 (not collated)	M362+M365 	*MDP* 26, 243 (not collated)
M362$_{gc}$ M59$_d$ 	*MDP* 17, 182 (collated)	M362+M59$_d$ 	*MDP* 17, 97 (not collated)
		M362+M59$_{(d)}$ M1+M379$_c$ 	*MDP* 17, 85 (collated); *MDP* 17, 96+325 (collated); *MDP* 17, 97 (not collated)
M362+M59$_d$ M312$_a$ 	*MDP* 17, 96+325 (collated)	M362+M312$_a$ 	*MDP* 17, 85 (collated)

Fig. 10. Complex Graphemes constructed with M362.

($2N_{30c}$), whereas M36 $M343_h$, in *MDP* 17, 342, is followed by one "mixed" notation ($1N_{14}$ $3N_1$ $1N_{14\#}$ ⌜$3N_{1\#}$⌝).

§4.6. Several proto-Elamite graphemes can be inscribed with other graphemes. However, it appears as if the inscribed grapheme could just as well appear next to the main grapheme, without altering the semantic qualities of the combined complex sign. Perhaps the most powerful argument in favor of this observation comes from the three accounts concerning Susa animal-herders *MDP* 17, nos. 85, 96+325 (discontinuous join confirmed in the Louvre), and 97 (compare to *MDP* 26, 100 [neither text collated]). Each of these three accounts, which will be dealt with extensively at a later date, lists the animals belonging to fourteen different "houses." Two of these texts seem to record the by-products obtained from this trade, and there is even evidence to suggest that a set of production norms similar to those attested for Mesopotamian animal-husbandry from the late 3rd millennium were in place in Susa. Each house is designated by the sign M362, generally believed to be a sign for a domesticated animal of some sort, inscribed or bundled with another sign (see figure 10). However, in at least one case the same inscribed sign is positioned outside M362 (M362 $M383_c$, see *MDP* 17, 97 obv. 11a), and inside in another (M362+$M383_c$, see *MDP* 17, 85, obv. 13a). Further, in *MDP* 17, 191 (collated), a comparable sign ($M384_{ab}$) is written in front of M362, and almost the same sign ($M384_a$) is found inscribed in M362 in both *MDP* 17, 85, and 96+325.

§4.7. *MDP* 17, 191, is, in fact, the primary document used to draw up the corresponding entry of *MDP* 17, 96+325 (see entry number 3): the archival relationship between "primary" documents (or receipts, as they are sometimes called) and accounts in proto-Elamite is only rudimentarily explored. The pair given here is the first such recorded. Note in this connection that *MDP* 17, 191, the primary document, is sealed, and *MDP* 17, 96+325, the account, is not. This is entirely uniform with late 3rd millennium Mesopotamian archival practice, but is poorly documented in contemporary documents from Late Uruk (Englund 1998, 194-195, and 2004a, 40, with fn. 23). $M384_a$ is only found in *MDP* 17, nos. 85 and 96+325, and is likely to be merely a graphic variant of the more frequently attested sign $M384_{ab}$. In *MDP* 26, 387 (not collated), we have M362 followed by $M123_b$, a sign-combination found in at least one of the herder texts mentioned above (see *MDP* 17, 85, obv. 14a), where $M123_b$ is inscribed in M362.

§4.8. There appears to be no temporal or spatial divergence in the distribution of the signs. Sign-clusters, as well as complex graphemes made of the same components and apparently with identical meaning, appear in closely related texts, most likely originating from the same archives. In addition, it seems supported by the structure of these texts that the "grapheme groups" presented above do relate to the same semantic units. This particular group of texts may belong to an early stage of "standard" proto-Elamite.

§4.9. Analyzing those signs that are inscribed in or bundled with M362 occurring in the Susa animal-herder texts, we see that they did not change the character of the sign M362, which continued to be counted in the decimal system, a numerical system reserved for counting discrete animate objects, in particular domesticated animals and human laborers. We can conclude that M362 alone is "animal"; M362 plus another sign "n," whether inscribed or bundled, is "animal of n." The hypothesis is that when inscribed in or bundled with M362, these signs assume the same meaning as the mark left by the branding iron of the cattle-owners; they assign the animals to a specific house, office, or perhaps person.

§5. *Conclusion*

§5.1. The complex graphemes mentioned in the beginning of this study, those formed by adding either a numerical or a non-numerical sign to a "container" sign (or both a numerical and a non-numerical sign), represent one relatively well understood group of complex graphemes. These CCSs were invented to describe (most adequately) a certain quantity or quality, or even a particular quantity of a particular quality of a product.

§5.2. The second group of complex graphemes–complex graphemes formed by adding one grapheme to another or by juxtaposing two graphemes otherwise known to form an inscribed complex grapheme–was analyzed in §4 of this paper. Their formation and application was discussed. Several questions remain, and parts of that section remain speculative (the existence of a proto-Elamite syllabar cannot at present be proven).

§5.3. The free formation of complex graphemes in proto-Elamite comports well with the following quote from P. Damerow (1999, 12) concerning proto-cuneiform:

> *This remarkable irregularity of sign usage suggests that proto-cuneiform writing was based on a core of standardized signs,*

which could however be flexibly complemented by modifications of existing signs or by the creation of new signs which were used only in specific contexts and never developed into the standardized signs of cuneiform writing.

Unfortunately, we know of no successor writing-system to proto-Elamite; the scant linear-Elamite material dating to some 500-700 years after the time of the proto-Elamite texts is of no use when trying to identify proto-Elamite signs.

§5.4. I. Gelb hypothesized that proto-Elamite, like proto-Indic (his name for the Indus writing from Harappa and Mohenjo Daro), represented a "fully developed system" with regard to phonetization (Gelb 1952: 218). Unfortunately, as Gelb himself stated, his assertion was based on a very brief look at the material (Gelb mixed both proto-Elamite and linear-Elamite texts in his analysis, as had been done to some extent by the publishers of the proto-Elamite material Scheil and de Mecquenem). However, it is worthwhile noting that since its discovery, proto-Elamite has often been viewed as an optimal candidate for decipherment.

§5.5. It is my working hypothesis, in agreement with the suggestions of Meriggi and others (see for example Meriggi 1969, 157, and 1975, 105; see also Vallat 1986, 338-339), that hidden in the extensive proto-Elamite repertoire of signs, mainly consisting of pictograms, is a small group of signs used only to write proper nouns—personal and professional designations, toponyms and so on. That list represented a true syllabary.

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