

Fonts for Neo-Assyrian Cuneiform

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This paper presents T_EX and PostScript fonts for typesetting cuneiform (Akkadian, Hittite, Old Persian, and Ugaritic) in a form similar to script of the Neo-Assyrian period. The fonts have been developed in the Type 1 font format; fonts for *Syllabary A* were also created in METAFONT.

Introduction

Cuneiform script was used to represent texts in several languages in the Ancient Near East from the end of the fourth millennium until the first millennium BC. The design of fonts presented in the article is based on the Neo-Assyrian sign form of the first millennium. This choice may be accounted for by the following facts. The library of the Assyrian king Ashurbanipal in Nineveh collected many tablets rewritten in Neo-Assyrian form from older cuneiform sources or other dialects or languages. And the native cuneiform syllabary, known as *Syllabary A*, referenced for example in the book “The World’s Writing Systems” (WWS) [1, pp. 47–51]; (where other sources are listed) was written in this period. Syllabaries completed in recent centuries by experts and scholars comprise about 600 signs (including variants).

Neo-Assyrian font form in this article means the typeface similar to cuneiform used in the Neo-Assyrian period. Assyriologists and ‘cuneiform experts’ write faithful copies of the original cuneiform texts (from tablets or inscriptions) by hand and they do not use any fonts in their papers and books for presenting the original sources. On the other hand I consider that using standardized fonts with ‘normalized’ sign shapes may be useful for typesetting syllabaries, textbooks for students and also for transliterating texts written originally in various cuneiform forms.

Fonts

METAFONT fonts cover *Syllabary A* (211 original plus a few additional signs). Their design modifies and extends original ideas of Joel M. Hoffman and Jo Grant (CTAN: [fonts/cun](#), 1990–1992).

PostScript Type 1 and Type 3 fonts [5, 6] have been developed independently of the METAFONT version. (The Type 3 fonts are not presented in this article.)

The present definition includes more than 450 signs or their variants. Script sources were taken from WWS 1996 [1], Labat 1959 [2], Thureau-Dangin 1926 [3].

Examples of wedge and sign forms are shown in Table 1.

Table 1

Sign number								
<i>Syllabary A</i> ¹	61	add.	77	63	135	41	add.	162
R. Labat [2]	1	480	532	381	411	449	545	554
PS encoding ²	a/1	b/224	c/20	b/125	b/155	b/193	c/33	c/42
Sign name	aš	diš	me	ud	u	igi	šú	sal
Name in PS	ash	dish	me	ud	u	igi	shuII	sal
Sign forms								
METAFONT								
‘Classic’								
‘Academic’								
‘Acad.B.F.’ ³								
Type 1								
‘Classic’								
‘Academic’								
‘Acad.B.F.’								

¹ *Syllabary A* sign number \equiv METAFONT encoding

² The sign code equals “*sign_number* mod 256” in font part a,b,c, respectively

³ Acad.B.F. denotes ‘Academic Bold Filled’

The idea of the three font forms—‘Classic’, ‘Academic’ and ‘Academic Bold Filled’—was also taken from J. Hoffman/J. Grant and all the fonts have been developed in ‘triplets’.

Sign names: Most signs have more than one phonetic and/or logographic value, and in transliteration may be denoted by several names. One of these names has been chosen for the character name in a font. The sign values supplied with accents and index numbers used according to modern scholarly conventions were (in ASCII) changed to Roman numerals, e. g. gu \rightarrow gu, gú (means gu₂) \rightarrow guII, ná (means na₂) \rightarrow naII, nà (means na₃) \rightarrow naIII, gu₄ \rightarrow guIII, etc. This allows sorting with required results.

Character encoding: METAFONT font character encoding corresponds to ‘native’ *Syllabary A* sign numbers (only 1–211). The encoding for Type 1 (= encoding for Type 3) generally corresponds to the numbering in the Akkadian syllabary [2] and equals $sign_number \bmod 256$ —for *part a* (1–255), *part b* (256–511), and *part c* (≥ 512); positions free in Akkadian are used for encoding of alternative signs (often there is more than one sign with the same number in the syllabary).

Type 1 font raw definitions have been written by hand without using any graphics tools. The cuneiform sign elements (wedges) and several wedge groups are defined by subroutines. The Type 1 font raw texts are then converted to “pfb” format by the `t1asm` program (CTAN:[fonts/utilities/t1utils](#)); the afm format is generated by `getafm` (CTAN:[support/psutils](#)) and finally, tfm is created by `afm2tfm` (CTAN:[dwiware/dvips](#)).

Integrating PostScript fonts (.pfb files) with \TeX & dvips can be made in the usual way—appending lines like

```
naakca NeoAssyrianClassicType1a <naakca.pfb
```

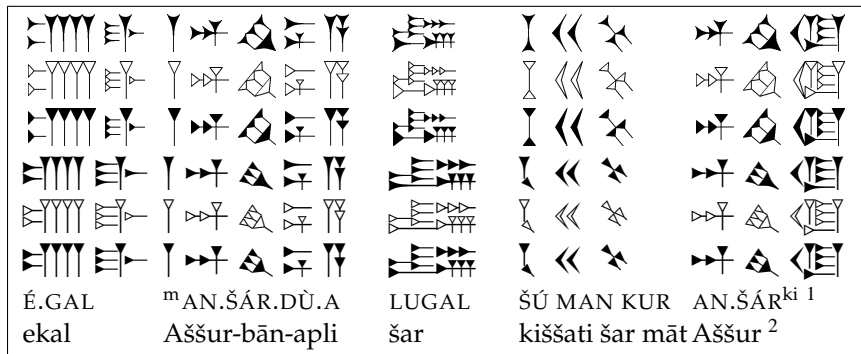
into the file `psfonts.map`. Unfortunately, I don’t know a standard and simple way to connect Type 3 fonts and at the moment the Type 3 fonts are not presented here. The Type 3 font sign shapes are very similar to the Type 1 and I assume that Type 3 fonts may be omitted in this article.

Samples

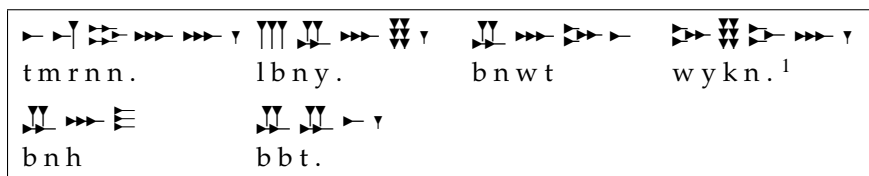
This section demonstrates a sample of Akkadian (taken from WWS [1, p. 56]) and also very short samples of modified fonts derived from the the Neo-Assyrian wedge set (for Ugaritic, Old Persian, and Hittite). The signs follow the wedge form of Neo-Assyrian but they contain wedge combinations not attested in the Neo-Assyrian sign repertoire.

SAMPLE OF AKKADIAN

(A text in six font forms—3 fonts in METAFONT and 3 fonts in PS—please compare with Table 1.)



SAMPLE OF UGARITIC (WWS, p. 102)



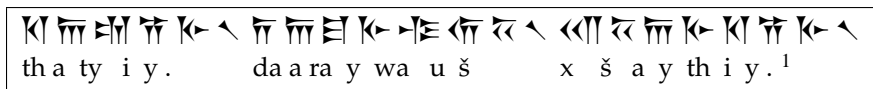
¹ Transliteration (in Roman script), ² Phonetic transcription (in IPA)

SAMPLE OF HITTITE

(This is a short part of the table from Friedrich 1960 [4, p. 7].)

A. ZEICHEN FÜR ANFÄNGER							
Einfache Silbenzeichen							
a) Vokale und Halbvokale							
a		e		i		u	
ú		ja		ua		ui	
b) Konsonant + Vokal							
ba		be		bi		bu	
da				di		du	

SAMPLE OF OLD PERSIAN (WWS, p. 136)



¹ *Transliteration* (in Roman script),

An overview of signs is presented in the Appendix. Appendix A contains the complete *Syllabary A* designed in METAFONT (presented only in the ‘Classic’ form). Appendix B shows a significant part of the Akkadian syllabary, with each of the three parts in a different font form—*part a* in ‘Academic form’, *part b* in ‘Classic’, and *part c* in ‘Academic Bold Filled form’.













































































































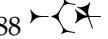

Conclusion

The first release of cuneiform fonts in METAFONT, Type 1 and Type 3 font format has been created. The fonts are not yet perfect and are still under development and improvement. Complete sign tables (including numbers and sign names) will be available on my WWW page.

References

- [1] “*The World’s Writing Systems*”, edited by P. T. Daniels and W. Bright, Oxford University Press, New York – Oxford, 1996.
- [2] R. Labat: “*Manuel d’épigraphie akkadienne*”, troisième édition, Imprimerie nationale, Paris, 1959. (The recent 6th edition was not available to the author of this paper.)
- [3] F. Thureau-Dangin: “*Le Syllabaire Accadien*”, Librairie Orientaliste Paul Geuthner, Paris, 1926.
- [4] J. Friedrich: “*Hethitisches Keilschrift-Leserbuch*”, Carl Winter – Universitätsverlag, Heidelberg, 1960.
- [5] Adobe Systems Inc.: “*PostScript Language Reference Manual, Second Edition*”, Addison-Wesley, 1990.
- [6] Adobe Systems Inc.: “*Adobe Type 1 Font Format*”, Addison-Wesley, 1990.

Appendix A – Cuneiform sign list – Syllabary A (METAFONT)

1		23		45		67		89	
2		24		46		68		90	
3		25		47		69		91	
4		26		48		70		92	
5		27		49		71		93	
6		28		50		72		94	
7		29		51		73		95	
8		30		52		74		96	
9		31		53		75		97	
10		32		54		76		98	
11		33		55		77		99	
12		34		56		78		100	
13		35		57		79		101	
14		36		58		80		102	
15		37		59		81		103	
16		38		60		82		104	
17		39		61		83		105	
18		40		62		84		106	
19		41		63		85		107	
20		42		64		86		108	
21		43		65		87		109	
22		44		66		88		110	

Syllabary A – METAFONT (cont.)

111		133		155		177		199	
112		134		156		178		200	
113		135		157		179		201	
114		136		158		180		202	
115		137		159		181		203	
116		138		160		182		204	
117		139		161		183		205	
118		140		162		184		206	
119		141		163		185		207	
120		142		164		186		208	
121		143		165		187		209	
122		144		166		188		210	
123		145		167		189		211	
124		146		168		190		56A	
125		147		169		191			
126		148		170		192			
127		149		171		193			
128		150		172		194			
129		151		173		195			
130		152		174		196			
131		153		175		197			
132		154		176		198			

Appendix B – Cuneiform sign list – Akkadian Syllabary

Type 1 part a “Academic form”

1		28'		60 ^x		82	
2		29		61		83	
3		30		62		84	
4		31		63		85	
5		32				86	
6		33		65		87	
7		34		66		87a	
8		35		67		87b	
9		36		68		88	
10		38		69		89	
11		40		70		90	
12		41		71		92	
13		43		72		92b	
15		44		73		93	
16		46		74		94	
17		49				95	
18		50		74 ^x		96	
18 ^x		52		75		97	
19		53		76		98	
20		54		77		99	
22 ^x		55		78 ^x		100	
23		56		79		101	
24		57		79 ^x		102	
24'		58				103	
26		59		80		103a	
27		60		81		103b	
28							

Akkadian Syllabary – Type 1 part a “Academic form” (cont.)

104		132		170		210	
105		133		171		211	
106		134		172		211a	
107		138		173		212	
108		139		176		214	
108 ^x		140		176'		215	
109		142		181		224	
110		142a		183		225	
111		143		185		226	
112		144				228	
113		145		187		229	
114		146				230	
115		147				231	
118		148				232	
119		149		190		233	
122		150		190h		237	
122a				191		244	
122b		151		192			
123		152		195		248	
124		152 ⁴		200		249	
		152 ⁸		201		252	
126		164		202		255	
128		165		203			
129		166		205			
129a		167		206			
130		168		207			
131		169		208			
131a				209			

Akkadian Syllabary – Type 1 part b “Classic form”

256		297		330		355	
261		298		331		356	
270		306		332		362	
271		307		333		363	
278		308		334		366	
280		309		335		367	
281		310		336		371	
281a		311		337		372	
283		312		338		373	
284		313		339		374	
286		314		342		375	
287		315		343		376	
289		317		344		376*	
291		318		345		377	
295		319		346		378	
295a		319a		347		381	
295b		320		348		383	
295c		321		349		384	
295d		322		350		390	
295e		323		351		392	
295f		323'		352		393	
295k		324		353		394	
295l		325		354		395	
295m		326		354b		396	
296		328				397	
		329				398	

Akkadian Syllabary – Type 1 part b “Classic form” (cont.)

399		431		464	
400		433		465	
401		435		467	
402		436		468	
403		437		469	
		438		470	
404		439		471	
405		440		472	
		441		473	
		444		475	
406		445		480	
		446		481	
411		449		482	
412		450		483	
415		451		484	
416		452		485	
417		454		487	
418		455		491	
419		456		493	
420		457		494	
421		458		500	
424		459		510	
425				511	
426		460			
427		461			
428		462			
429		463			
430					

Akkadian Syllabary – Type 1 part c (“Academic bold filled form”)

512		550		579	
513		551			
515		554			
		555			
517		556			
522		557			
525		558		580	
528		559		581	
529		560		583	
532		561		586	
533		562		589	
		563		591	
535		564		592	
536		565		593	
537		567			
538		569			
539		570		594	
540		571		595	
541		572		596	
542		573		597	
544		574		598a	
545		575		598b	
546		576		598c	
547		577		598d	
548		577'		598e	
549					

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