

A geometric diagram of a typecase, showing a rectangle with various construction lines. A vertical line divides the rectangle into two unequal parts. Diagonals are drawn from the corners. A horizontal line is drawn across the middle. A smaller rectangle is constructed in the upper right corner, with its top edge aligned with the top of the main rectangle and its right edge aligned with the right of the main rectangle. The title 'The Brill Types' is printed in a red, serif font in the lower right area of the diagram.

# The Brill Types

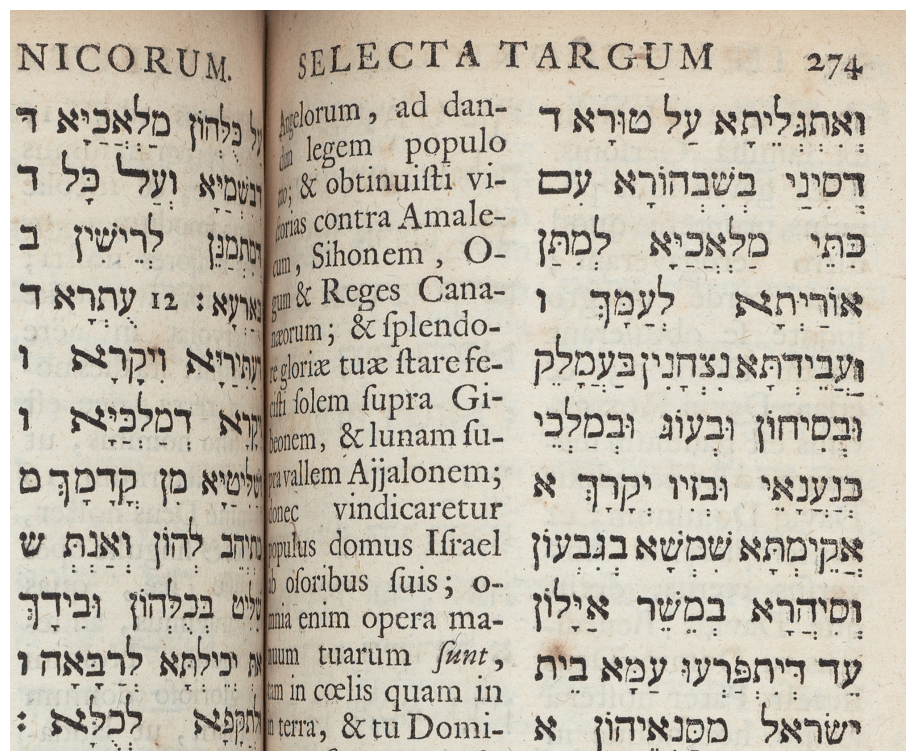
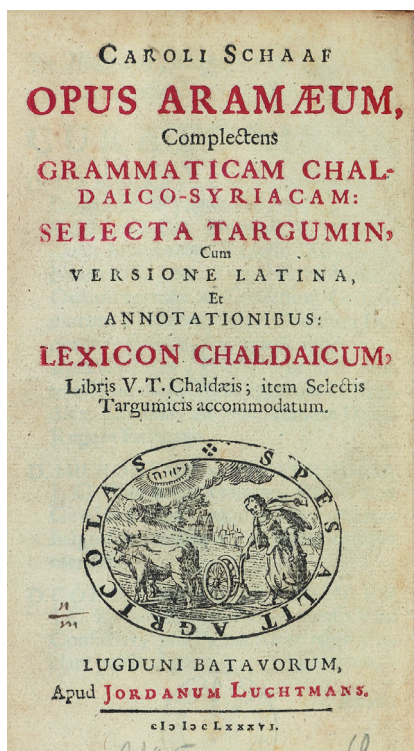
John Hudson, Tiro Typeworks, [john@tiro.ca](mailto:john@tiro.ca)

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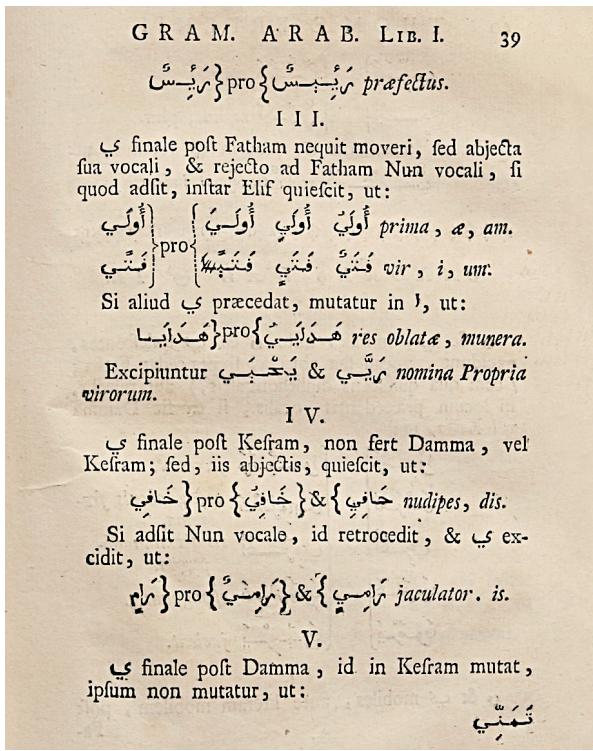
The company now known as Brill began publishing at Leiden in 1683. In late 2012, they initiated a celebration of 330 years of scholarly publishing with an exhibition at the Boerhaave science museum in Leiden, a symposium on the mutuality of typography and scholarship, and the official launch of the new Brill typefaces.

I had first been approached by Brill in 2006, and in this presentation I will give a necessarily condensed history of the development of the types over six years. To provide the background to that story, I need to begin with an even more condensed history of 330 years of typography at Brill.



This is one of the earliest Brill publications, from 1686: a grammar of Biblical Aramaic and Syriac by Charles Schaaf. Even at this early stage, the combination of different languages and writing systems was a feature of Brill typography, as it remains today.

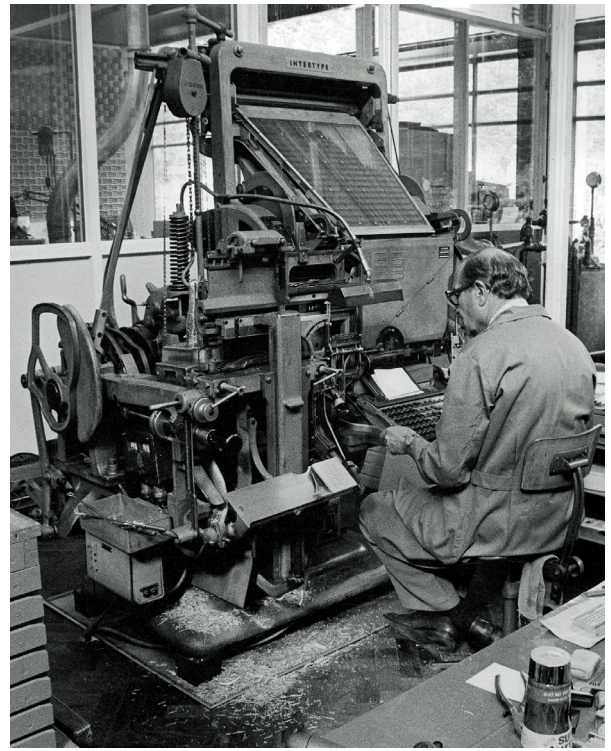




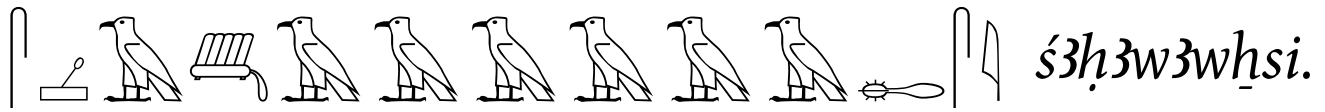
na	n	n-tsj	n-tsj	n-dsja	n-dsj	n-na	
अ	उ	अ	इ	अ	इ	अ	
280,78	471	287,81	472a	286,80	472b	282,79	
ta	ta	t-ma	t-m	t-ja			
ठ	ठ	अ	इ	अ			
384a,176	425a	330a,122	503	328,123			
tha	tha	th-ma	th-m	th-ja			
ठ	ठ	अ	इ	अ			
384b,177	426	329,124	504	330,125			
da	da	d-ga	d-ma	d-m	d-ja		
ड	ड	अ	इ	अ	अ		
354,147	414+424	236,37	216,20	440	21		
dha	dha	dh-ma	dh-m	dh-ja			
ढ	ढ	अ	इ	अ			
355,148	425b	217,22	441	218,23			
na	n	n-na					
ण	ण	अ					
196,1	432	283,72					
ta	ta	t	t-ta	t-t	t-t-ra	t-t-r	t-t-wa
त	त	त	त	त	त	त	त
320,114	406	495	324,118	500	326,119	501	327,121

Striding through the centuries, on the left is a 1747 edition of the Erpenius-Schultens *Grammatica Arabica*. The Arabic type is pretty crude, but the page is a good example of the textual complexity that remains common in Brill books. On the right is a Sanskrit manual compiled by Antonie Rutgers, published in 1851. This is interesting for a couple of reasons: it is a publication that was conceived not primarily as a scholarly work but as a manual for typesetters, but it also represents the early development of standardised Latin transcription of Sanskrit using special diacritics. While Brill often publish texts in original writing systems, they make very extensive use of transcription and transliteration—of ‘romanisation’—, requiring extensive diacritic sets as well as phonetic notation characters.





For much of the firm's history, Brill typeset books in-house and had them locally printed in The Netherlands. These photographs show the Brill composing room in 1951, and the use of an Intertype machine in the 1960s. With the advent of digital typesetting, authors and editors assumed greater responsibility for the preparation of texts for publication, and like most major publishers Brill now contract-out typesetting and printing overseas.



•PIE  $*b^h eH_2-$

**\*baH** ‘to shine’

•AVESTAN:  $(+ \text{ } ^*\bar{a}-)$

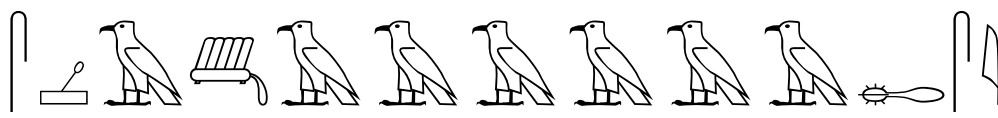
\*tebutimV ‘fist’ > HR tivtsim, IK tsi<sup>d</sup>zim, NH tsi<sup>d</sup>zifum, ŌG tivkim, TM tífutsim,.

*āver-/āver-*

which acts as the trigger. For example in the verb ‘breathe’ in the negative is *yuban* change is \*bu > v. The language of Ōgami evidence for the secondary nature of this

The transition to digital technology was not kind to Brill typography, though. The complex and specialised nature of the texts they were publishing often collided hard with the limitations of available fonts and software. This image shows some of the kinds of problems that Brill brought to me in 2006 ...




š3h3w3whsi.

•PIE \*b<sup>h</sup> eH<sub>2</sub>-

\*baH ‘to shine’

•AVESTAN: (+ \*ā-)

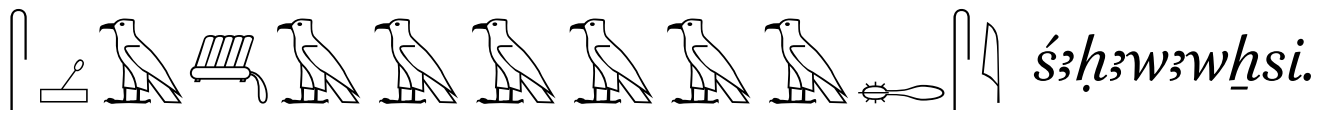
\*tebutimV ‘fist’ > HR tivtsim, IK tsi<sup>d</sup>zim, NH tsi<sup>d</sup>zifum, ŌG tivkīm, TM tifutsim,.

ā<sup>ˈ</sup>ver-/ā<sup>ˈ</sup>ver-

which acts as the trigger. For example in the verb ‘breathe’ in the negative is yubaŋ change is \*bu > γ. The language of Ōgami

Substitutions of glyphs from other fonts, often incompatible in weight, proportion and spacing; mechanically scaled smallcaps and superior letters; fake bold; lack of ligatures; poorly positioned diacritic marks; absence of kerning; collisions; and compromises in the choice of symbol characters. Ironically, the Egyptian hieroglyphs, which you might expect to be challenging, are the only part that comes out unblemished.

Over the years, Brill had come up with a variety of ad hoc solutions to some of the worst of these problems, but without any unified typographic style, relying on a variety of typefaces selected for their character set coverage rather than their design merit. The fonts involved used a variety of non-standard character encodings, also ad hoc, intended simply to get a glyph on the page without much thought or hope given to the digital life of the document beyond the print run. The task presented to me by Brill in 2006 was to help them get from that ...



•PIE:  $*b^heH_2-$        $*baH$  ‘to shine’  
 •AVESTAN: (+  $*ā-$ )

$*tebutimV$  ‘fist’ → HR  $tivtsim$ , IK  $tsi^dzim$ , NH  $tsi^dzifum$ , ŌG  $tivkim$ , TM  $ṭifutsim$ .

$\acute{a}ver-$ / $\check{a}ver-$

(r) which acts as the trigger. For example in of the verb ‘breathe’ in the negative is *yuban* is change is  $*bu \rightarrow v$ . The language of Ōgami er evidence for the secondary nature of this

... to this: a stylistically harmonised typography—a recognisable Brill house-style—with all the tools necessary to cleanly display even the most complex aspects of scholarly texts in a typographically sophisticated way, with proper smallcaps and superiors, accurate diacritic mark positioning, appropriate ligatures and kerning, and all of it built on top of standardised Unicode character encoding.

So, how did we get there? What was the process?





Jeremy Tankard, *Kingfisher* 2005

This is not the Brill type. This is the very nice Kingfisher type, designed by my friend Jeremy Tankard. I'm showing this for a couple of reasons. Firstly, it is a very handsome and interesting set of images. Secondly, it is a very good example of a type design process that begins with thinking about letter shapes, considers historical antecedents, and develops through drawing and exploring. And perhaps this is how you imagine the type design process, if you bother to imagine it at all.

By contrast, almost all my type design projects begin like this ...

192	0x00E0	agrave	à	LATIN SMALL LETTER A WITH GRAVE					ccmp	lccmp\NFD	a gravecmb -> agrave	2
193	0x00E1	aacute	á	LATIN SMALL LETTER A WITH ACUTE					ccmp	lccmp\NFD	a acutecmb -> aacute	2
194	0x00E2	acircumflex	â	LATIN SMALL LETTER A WITH CIRCUMFLEX					ccmp	lccmp\NFD	a circumflexcmb -> acircumflex	2
195	0x00E3	atilde	ã	LATIN SMALL LETTER A WITH TILDE					ccmp	lccmp\NFD	a tildecmb -> atilde	2
196		atilde_acutecmb	ã		ccmp	lccmp\NFC	atilde acutecmb -> atilde_acutecmb	2	ccmp	lccmp\NFD	a tildecmb acutecmb -> atilde_acutecmb	3
197	0x00E4	adieresis	ä	LATIN SMALL LETTER A WITH DIAERESIS					ccmp	lccmp\NFD	a dieresiscmb -> adieresis	2
198	0x0101	amacron	ā	LATIN SMALL LETTER A WITH MACRON					ccmp	lccmp\NFD	a macroncmb -> amacron	2
199		amacron_gravecmb	ā		ccmp	lccmp\NFC	amacron gravecmb -> amacron_gravecmb	2	ccmp	lccmp\NFD	a macroncmb gravecmb -> amacron_gravecmb	3
200		amacron_acutecmb	ā		ccmp	lccmp\NFC	amacron acutecmb -> amacron_acutecmb	2	ccmp	lccmp\NFD	a macroncmb acutecmb -> amacron_acutecmb	3
201		amacron_tildecmb	ā		ccmp	lccmp\NFC	amacron tildecmb -> amacron_tildecmb	2	ccmp	lccmp\NFD	a macroncmb tildecmb -> amacron_tildecmb	3
202		amacron_brevecmb	ā		ccmp	lccmp\NFC	amacron brevecmb -> amacron_brevecmb	2	ccmp	lccmp\NFD	a macroncmb brevecmb -> amacron_brevecmb	3
203	0x0103	abreve	ă	LATIN SMALL LETTER A WITH BREVE					ccmp	lccmp\NFD	a brevecmb -> abreve	2
204	0x00E5	aring	å	LATIN SMALL LETTER A WITH RING ABOVE					ccmp	lccmp\NFD	a ringcmb -> aring	2
205	0x00E6	ae	æ	LATIN SMALL LETTER AE								
206		b_dieresisbelowcmb	ḃ						ccmp	lccmp\NFD	b dieresisbelowcmb -> b_dieresisbelowcmb	2
207	0x010D	ccaron	č	LATIN SMALL LETTER C WITH CARON					ccmp	lccmp\NFD	c caroncmb -> ccaron	2
208	0x00E7	ccedilla	ç	LATIN SMALL LETTER C WITH CEDILLA								
209	0x1E0D	ddotbelow	ḍ	LATIN SMALL LETTER D WITH DOT BELOW					ccmp	lccmp\NFD	d ddotbelowcmb -> ddotbelow	2
210		d_dieresisbelowcmb	ḍ						ccmp	lccmp\NFD	d dieresisbelowcmb -> d_dieresisbelowcmb	2
211	0x1E0F	dlinebelow	ḏ	LATIN SMALL LETTER D WITH LINE BELOW					ccmp	lccmp\NFD	d macronbelowcmb -> dlinebelow	2
212	0x00E8	egrave	è	LATIN SMALL LETTER E WITH GRAVE					ccmp	lccmp\NFD	e gravecmb -> egrave	2
213	0x00E9	eacute	é	LATIN SMALL LETTER E WITH ACUTE					ccmp	lccmp\NFD	e acutecmb -> eacute	2
214	0x00EA	ecircumflex	ê	LATIN SMALL LETTER E WITH CIRCUMFLEX					ccmp	lccmp\NFD	e circumflexcmb -> ecircumflex	2
215	0x1EBD	etilde	ẽ	LATIN SMALL LETTER E WITH TILDE					ccmp	lccmp\NFD	e tildecmb -> etilde	2

... with a spreadsheet. This is how I start documenting the client's needs, planning how I will build the fonts, and as a project progresses the spreadsheet becomes the locus of glyph and layout information that I will leverage in various ways in my font manufacturing workflow. It is, in effect, the technical specification of the font.

In the case of the Brill project, it turned out that they were, for me, an ideal client, because the first thing they sent me when we started talking in 2006 was ...



À	Aeiodot	&#x0226;	0180 - 024F	Brill	Enc. Islam	No comment yet	Not to be mapped	02042	03103
à	aeiodot	&#x0227;	0180 - 024F	Brill	Enc. Islam	No comment yet	Not to be mapped	02097	03065
ā	aeiodoteiodoteidas	&#x01DF;	0180 - 024F	Brill	Enc. Islam	No comment yet	Not to be mapped	02167	03065
ā	aeioteiubareicom	&#x00E1;&#x0328;	0080 - 00FF; 0300 - 036F	Brill	Enc. Islam	No comment yet	Not to be mapped	02097	03065
ā	aeirbkt	&#x1E9A;	1E80 - 1EFF	Brill	Enc. Islam	No comment yet	Not to be mapped	02097	03065
ā	aeitildeeidash	&#x00E3;&#x0304;	0080 - 00FF; 0300 - 036F	Brill	Enc. Islam	No comment yet	Not to be mapped	02097	03065
ā	aeiubar	&#x00E1;&#x0332;	0000 - 007F; 0300 - 036F	Brill	Enc. Islam	No comment yet	Not to be mapped		
Ā	Ae iubareicomma	&#x0041;&#x0326;	0000 - 007F; 0300 - 036F	Brill	Enc. Islam	No comment yet	Not to be mapped	02043	03104
ā	ae iubareicomma	&#x0105;	0000 - 007F; 0300 - 036F	Brill	Enc. Islam	No comment yet	Not to be mapped	02172	03104
ā	ae iubareicommai	&#x0105;	0100 - 017F	Brill	Enc. Islam	No comment yet	Not to be mapped	02172	03104
ā	ae iubareilbkt	&#x00E1;&#x031C;	0000 - 007F; 0300 - 036F	Brill	Enc. Islam	No comment yet	Not to be mapped	02097	03065
Ā	Ae iubareiodot	&#x1EA0;	1E80 - 1EFF	Brill	Enc. Islam	No comment yet	Not to be mapped	02043	03104
ā	ae iubareiodot	&#x1EA1;	1E80 - 1EFF	Brill	Enc. Islam	No comment yet	Not to be mapped	02172	03104
ā	ae iubare iubar	&#x00E1;&#x0332;	0000 - 007F; 0300 - 036F	Brill	Enc. Islam	No comment yet	Not to be mapped	02097	03065
ā	ae iubar	&#x00E1;&#x032E;	0000 - 007F; 0300 - 036F	Brill	Enc. Islam	No comment yet	Not to be mapped	02097	03065
Æ	ÆLIG	&#x00C6;	007F - 00FF	Brill	All	AE	Aelig		
Æ	ÆLIG	&#x00C6;	007F - 00FF	Isolat1	All	No comment yet	Not to be mapped		
æ	ælig	&#x00E6;	007F - 00FF	Isolat1	All	No comment yet	Not to be mapped		
æ	aeringacute	&#x01FD;	0180 - 024F	Brill	All	LATIN SMALL LETTER AE WITH ACUTE			
Α	Agr	&#x0391;	0370 - 03FF	isogr1	All	GREEK CAPITAL LETTER ALPHA	Not to be mapped		
α	agr	&#x03B1;	0370 - 03FF	isogr1	All	GREEK SMALL LETTER ALPHA	Not to be mapped		
À	AGRAVE	&#x00C0;	007F - 00FF	Brill	Enc. Islam	No comment yet	Agrave		
À	Agrave	&#x00C0;	007F - 00FF	Isolat1	All	No comment yet	Not to be mapped		
à	agrade	&#x00E0;	007F - 00FF	Isolat1	All	No comment yet	Not to be mapped		
ē	ai	&#x0250;	0180 - 024F	Brill	Enc. Islam	No comment yet	Not to be mapped	02097	03065
‘	ain	&#x02BF;	n.a.	Brill	Kannengieser	No comment yet	Not to be mapped		
α	alpha	&#x03B1;	0370 - 03FF	isogr3	All	GREEK SMALL LETTER ALPHA	Not to be mapped		
Ā	Amacr	&#x0100;	0100 - 017F	Isolat2	All	No comment yet	Not to be mapped		
ā	amacr	&#x0101;	0100 - 017F	Isolat2	All	No comment yet	Not to be mapped		
ā	amacracute	&#x0101;&#x0301;	0100 - 017F; 0300 - 036F	Brill	All	LATIN SMALL LETTER A WITH MACRON with COMBINING ACUTE ACCENT			
ā	amacrgrave	&#x0101;&#x0300;	0100 - 017F; 0300 - 036F	Brill	All	LATIN SMALL LETTER A WITH MACRON with COMBINING GRAVE ACCENT			
ā	amacrvrtline	&#x0101;&#x030D;	0100 - 017F; 0300 - 036F	Brill	All	LATIN SMALL LETTER A WITH MACRON with COMBINING VERTICAL LINE ABOVE			

A really huge spreadsheet! Pim Rietbroek—who was my contact at Brill throughout the project—had worked with one of his colleagues to compile a huge list of what they referred to as ‘entities’; that is, discrete elements occurring in the text of Brill publications. To do this, they consulted not only the characters and glyphs in the various ad hoc fonts used in recent books and journals, but also scoured older volumes.

À	Aeiodot	&#x0226;	0180 - 024F	Brill	Enc. Islam	No comment yet	Not to be mapped	02042	03103
à	aeiodot	&#x0227;	0180 - 024F	Brill	Enc. Islam	No comment yet	Not to be mapped	02097	03065
ā	aeiodoteiodoteidas	&#x01DF;	0180 - 024F	Brill	Enc. Islam	No comment yet	Not to be mapped	02167	03065
ā	aeioteiubareicom	&#x00E1;&#x0328;	0080 - 00FF; 0300 - 036F	Brill	Enc. Islam	No comment yet	Not to be mapped	02097	03065
ā	aeirbkt	&#x1E9A;	1E80 - 1EFF	Brill	Enc. Islam	No comment yet	Not to be mapped	02097	03065
ā	aeitildeeidash	&#x00E3;&#x0304;	0080 - 00FF; 0300 - 036F	Brill	Enc. Islam	No comment yet	Not to be mapped	02097	03065
ā	aeiubar	&#x0061;&#x0332;	0000 - 007F; 0300 - 036F	Brill	Enc. Islam	No comment yet	Not to be mapped		
Ā	Aeiubareicomma	&#x0041;&#x0326;	0000 - 007F; 0300 - 036F	Brill	Enc. Islam	No comment yet	Not to be mapped	02043	03104
ā	aeiubareicomma	&#x0105;	0000 - 007F; 0300 - 036F	Brill	Enc. Islam	No comment yet	Not to be mapped	02172	03104
ā	aeiubareicommai	&#x0105;	0100 - 017F	Brill	Enc. Islam	No comment yet	Not to be mapped	02172	03104
ā	aeiubareilbkt	&#x0061;&#x031C;	0000 - 007F; 0300 - 036F	Brill	Enc. Islam	No comment yet	Not to be mapped	02097	03065
Ā	Aeiubareiodot	&#x1EA0;	1E80 - 1EFF	Brill	Enc. Islam	No comment yet	Not to be mapped	02043	03104
ā	aeiubareiodot	&#x1EA1;	1E80 - 1EFF	Brill	Enc. Islam	No comment yet	Not to be mapped	02172	03104
ā	aeiubareiuabar	&#x0061;&#x0332;					Not to be mapped	02097	03065
ā	aeiubaru	&#x0061;&#x032E;					Not to be mapped	02097	03065
Æ	AELIG	&#x00C6;					Aelig		
Æ	Ælig	&#x00C6;					Not to be mapped		
æ	ælig	&#x00E6;					Not to be mapped		
æ	æringacute	&#x01FD;							
Ä	Ägr	&#x0391;					Not to be mapped		
α	agr	&#x03B1;					Not to be mapped		
À	AGRAVE	&#x00C0;					Agrave		
À	Agrave	&#x00C0;					Not to be mapped		
à	aggrave	&#x00E0;					Not to be mapped		
ē	ai	&#x0250;	0180 - 024F	Brill	Enc. Islam	No comment yet	Not to be mapped	02097	03065
‘	ain	&#x02BF;	n.a.	Brill	Kannengieser	No comment yet	Not to be mapped		
α	alpha	&#x03B1;	0370 - 03FF	isogr3	All	GREEK SMALL LETTER ALPHA	Not to be mapped		
Ā	Amacr	&#x0100;	0100 - 017F	Isolat2	All	No comment yet	Not to be mapped		
ā	amacr	&#x0101;	0100 - 017F	Isolat2	All	No comment yet	Not to be mapped		
ā	amacracute	&#x0101;&#x0301;	0100 - 017F; 0300 - 036F	Brill	All	LATIN SMALL LETTER A WITH MACRON with COMBINING ACUTE ACCENT			
ā	amacrgrave	&#x0101;&#x0300;	0100 - 017F; 0300 - 036F	Brill	All	LATIN SMALL LETTER A WITH MACRON with COMBINING GRAVE ACCENT			
ā	amacrvrtline	&#x0101;&#x030D;	0100 - 017F; 0300 - 036F	Brill	All	LATIN SMALL LETTER A WITH MACRON with COMBINING VERTICAL LINE ABOVE			

They had, whenever possible, identified Unicode encodings for the ‘entities’, recorded where in the Brill libraries they had been found, and provided mappings to the glyphs in the ad hoc fonts.

The beginning of the brief for the new Brill types was, basically, ‘We need all these entities in a font’. To which my immediate response was ‘Do you really?’

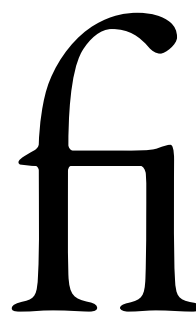




Image courtesy of Frank Blokland

Brill's notion of an 'entity' maps nicely to what I call a typeform. It isn't necessarily a single character, and it might not be a single glyph either.

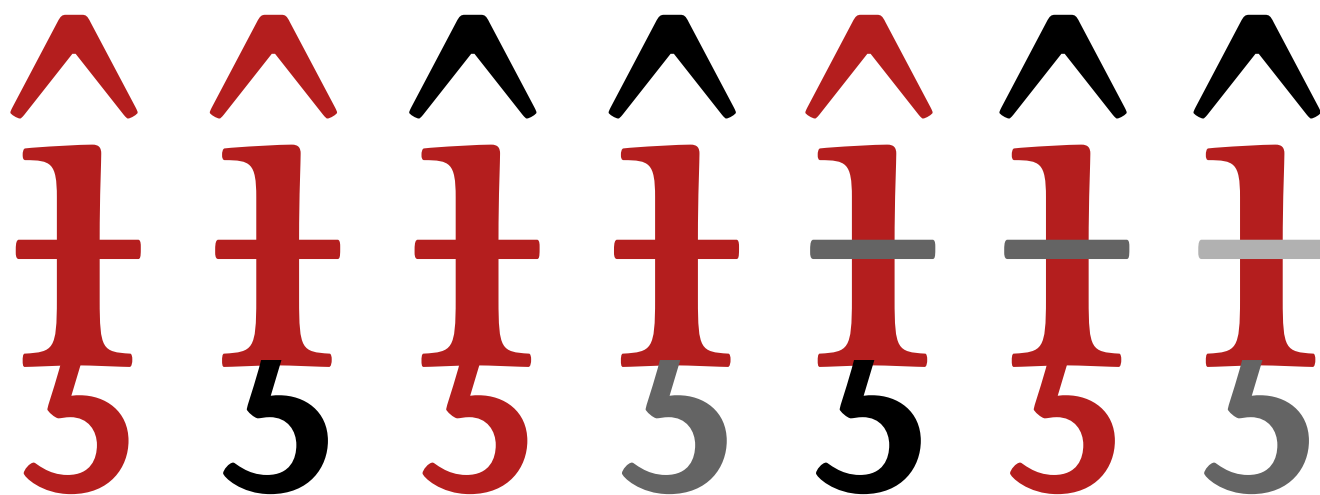
This is a good, solid, 16th Century example of a typeface: Hendrik van den Keere's *moyen canon* ...



... and this is its good, solid /fi/ ligature and, on the right, a ligature glyph from a digital revival of a similar style, Robert Slimbach's interpretation of Garamond's roman types. In the case of the van den Keere type, we know this is a ligature—a single metal sort representing two letters—because we have the piece of metal. In the case of the digital Garamond, you have to take my word for it that this is a ligature—a single glyph representing two encoded characters—unless you've cracked the font open to see how it is made, but even without my assurance it would be a pretty safe assumption.

^  
1  
t  
5

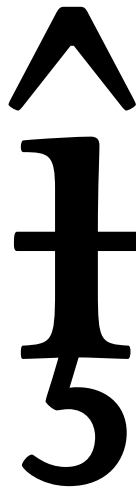
What about this though? If you encounter this orthographic unit of text on a printed page or displayed on screen in an eBook or web page, you really can have no idea how it came to be there, or even how many encoded characters it represents. And that's what a typeform is: a technologically agnostic text unit, the outcome of a process that you cannot determine by looking at the result.



0069+0335+0327+0302	0069+0302+0335+0327	0131+0327+0335+0302
0069+0335+0302+0327	0069+0302+0327+0335	0131+0327+0302+0335
0069+0327+0335+0302	0131+0335+0327+0302	0131+0302+0335+0327
0069+0327+0302+0335	0131+0335+0302+0327	0131+0302+0327+0335
0268+0327+0302		0268+0302+0327

In the case of this typeform—orthographically, a nasalised central vowel spoken with a rising-falling tone, as might be found in grammars for some African languages—there are seven ways it might reasonably be displayed: as a single glyph, as a diacritic base glyph with a combining cedilla, or with a combining circumflex, or both, and even in permutations with a combining crossbar. And even before you get to the display stage, Unicode permits of fourteen different ways this typeform might be encoded in text, all of which are canonically equivalent and will, if subject to normalisation, resolve to the same result.



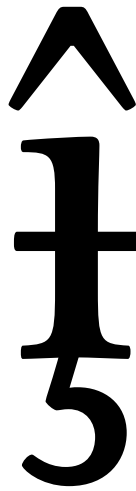


= / 1-4 glyphs /

= | 3 or 4 characters in unknown order |

= [ 1-4 keystrokes ]

So if you consider this single typeform, on page or on screen, you must reckon that you are probably looking at 1-to-4 glyphs, either three or four encoded characters in an unknown order and, if you consider how those characters might have got into the computer in the first place, probably between one and four keystrokes depending on the keyboard layout used.



= / 1–4 glyphs /

= | 3 or 4 characters in unknown order |

= [ 1–4 keystrokes ]

[x] : |y| : /z/

In fact, such uncertainty might be considered paradigmatic of digital text processing, in which the relationship of keystrokes to characters to glyphs is always that of independent variables: [x] to |y| to /z/. And that's roughly what I told Brill in 2006, before reassuring them that this realisation was a *good thing*, and that it meant that we could not only handle all their 'entities', but also a lot more that they hadn't yet encountered, and could do so with a smaller set of glyphs than their immense spreadsheet would suggest.

# dynamic diacritics

So I went through Brill's spreadsheet, and removed all the entries for typeforms involving Unicode combining mark characters, which I proposed to handle in the new Brill fonts using OpenType mark positioning anchors, which would allow for dynamic diacritics ...

dýňamīc dĩăcřĩťčš

... to be created ‘on-the-fly’ during typesetting. This is a flexible and productive mechanism, since more than one combining mark can be applied to a single base ...



ďŷñamīć đĩăcřĩćş

... and mark-to-mark anchor positioning allows for stacking. All this positioning is handled using data in the font GPOS table; it happens automatically (presuming software support, of course), with no intervention needed from the typesetter.

dynamīc̄ dīacrītīcs

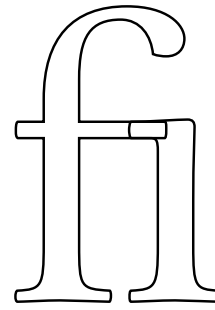
You can get quite carried away.



f

Having determined that much of the typeforms needed for Brill publications, now and in the future, could be displayed dynamically using multiple glyphs in controlled relationships, I began to consider how this approach might also be applied elsewhere in the type design.

Here's our 16th Century ligature again and, on the right, the Brill /fi/ ligature.



Except it isn't a ligature at all: it's two special forms of the letter f and i that, when placed next to each produce a typeform that looks like a ligature. Which is a useful reminder that a ligature—a single glyph representing more than one character—is a technical solution, inherited from obsolete technologies, not a design solution. It may sometimes be the appropriate solution, but we shouldn't presume that every font needs ligatures, even if we want to display ligated typeforms.



f f i → f f <sub>1</sub> → f f i

f j → f j → f j

f f l → f f l → f f l

f b → f b → f b

g i → g <sub>1</sub> → g i

fb ff fj  
Most efficient  
flying fish flee  
effluent fjords  
effectively.  
ff

Like the diacritic mark positioning, the dynamic ligating in the Brill types happens automatically. There are contextual rules in the font GSUB tables that substitute special forms of certain letters when they occur in sequence. One of the great benefits of this approach is that it is productive, so even though it means adding some variant letter glyphs to the font, the quantity of these is very much smaller than the number of ligated typeforms that can be made with them.

As you can see on the lower left, the same mechanism can be used to manage the visual relationship of hooked letters that don't ligate in the sense of having joining strokes. And on the right you can see how this mechanism interacts with some combinations of diacritic letters and combining marks, again contextually controlled.



0x0063	LATIN SMALL LETTER C
0x2184	LATIN SMALL LETTER REVERSED C
0x0254	LATIN SMALL LETTER OPEN O
0x0272	LATIN SMALL LETTER N WITH LEFT HOOK
0x0273	LATIN SMALL LETTER N WITH RETROFLEX HOOK
0x014B	LATIN LETTER SMALL CAPITAL B
0x0065	LATIN SMALL LETTER E
0x0258	LATIN SMALL LETTER REVERSED E
0x01D0	LATIN LETTER SMALL CAPITAL TURNED E
0x0255	LATIN SMALL LETTER OPEN E
0x0256	LATIN SMALL LETTER TURNED OPEN E
0x1D00	LATIN LETTER SMALL CAPITAL TURNED OPEN E
0x028A	LATIN SMALL LETTER ESH
0x028B	LATIN SMALL LETTER SQUAT REVERSED ESH
0x029A	LATIN SMALL LETTER CLOSED TURNED E
0x025E	LATIN SMALL LETTER CLOSED REVERSED O
0x027F	LATIN SMALL LETTER REVERSED R WITH FISHHOOK
0x027E	LATIN SMALL LETTER R WITH FISHHOOK
0x0280	LATIN LETTER SMALL CAPITAL R
0x1D19	LATIN LETTER SMALL CAPITAL REVERSED R
0x0436	CYRILLIC SMALL LETTER ZHE
0x0444	CYRILLIC SMALL LETTER EF

The image displays three large, stylized letters: a black 'e', a red 'ə', and a black 'e'. These letters are positioned in the foreground, partially obscuring a background table. The table lists various Latin characters and their descriptions, including 'LATIN SMALL LETTER E WITH RETROFLEX HOOK', 'LATIN SMALL LETTER E', 'LATIN SMALL LETTER RE', 'LATIN SMALL LETTER TU', 'LATIN SMALL LETTER OP', 'LATIN SMALL LETTER OPEN E', 'LATIN SMALL LETTER TURNED OPEN E', 'LATIN SMALL LETTER ESH', 'LATIN SMALL LETTER SQUAT REVERSED ESH', 'LATIN SMALL LETTER CLOSED OPEN E', 'LATIN SMALL LETTER CLOSED REVERSED OPEN E', 'LATIN SMALL LETTER REVERSED R WITH FISHHOOK', and 'LATIN SMALL LETTER WITH FISHHOOK'.

Of course, these reversed letters are not mechanically flipped—as in the red example here—: they’re drawn with optical compensations to ensure they harmonise with the rest of the design.

A a b c d e f g h i j k l m n o p q r s t u v w x y z.  
A B C D E F G H I J K L M N O P Q  
R S T U V W X Y Z.

*A a b c d e f g h i j k l m n o p q r s t u v w x y z. æ œ ~*  
*A B C D E F G H I J K L M N O P Q R*  
*R S T U V W X Y Z. Æ.*

These considerations steered me towards something in the line of a neo-classical or ‘English roman’ style, which also meant that the new types would not be a total departure from the Monotype Baskerville fonts that Brill had been using heavily for a couple of decades. I wasn’t interested in a revival of 18th Century types, per se, and the testing of the new types in Brill’s print production workflows and on target paper stocks favoured stronger hairlines than in the historical models. However, what I think of as the pre-history of the types of Baskerville, Bell etc.—the inventiveness of English writing masters in the first half of the 18th Century in developing an integrated text aesthetic that included a formal roman style—is a subject of immense interest to me, and suggested a novel departure for one aspect of the Brill design.

These are exemplars of written letters, not type, penned by Joseph Champion and engraved by George Bickham in 1741, a few years before John Baskerville first had similar forms cut as type. They’re part of the standard repertoire of an English writing master by this date, and they fulfill, in the scribal text culture, the role of the as-yet-missing neo-classical types, interpreting the normative shapes and proportions of typographic roman and italic established in the 15th Century with the dynamics of the characteristic writing and engraving tools of the 18th Century.

The typographic italic was, of course, derived from the standard secretarial cursive hand of the Italian renaissance, as a companion to the roman derived from the formal humanist book hand. By the 18th Century, very little scribal book production took place, and the formal roman plays only a small, supporting role in the writing masters’ work. In contrast, a huge amount of secretarial writing was produced at this time, in support of globalised trade, and I began to think about ways in which the Brill italic types might capture something of the flavour of this ...



A a b c d e f g h i j k l m n o p q r s t u v w x y z.  
A B C D E F G H I J K L M N O P Q  
R S T U V W X Y Z.

*a b b c d d e f o g h h i j k k l l m n n o p p q r s s t u v v x y z.*  
*A B C D E F G H I J K L M M N*  
*N O P Q R S T U V W X X Y Y Z.*

... —the common secretarial hand of the time—instead of the earlier renaissance models that continue to inform most text type. Of course, the italic needed to function in its common typographical roles, complementing the roman, and not to look like a ‘script’ type or handwriting font.

*abcdefghijklmn  
opqrstuvwxyz*

*abbcdddefoghhijjkkllmnnoppqrrsstuvvxyz.  
A B C D E F G H I J K L M N O P  
Q R S T U V W X Y Z.*

The most obvious novel feature borrowed from the 18th Century secretarial 'roundhand' is the absence of serifs on ascending letters. This might not seem like a radical departure, but its remarkable how seldom it occurs in more than 500 years of italic typeface design.

*It should now be clear that I have tried to eliminate the arbitrary nature of much of the previous work, as well as some current work, in distant lexical comparison by relying heavily on proven, widely-attested semantic shifts as found in the daughter languages, especially Indo-European, Semitic, and Dravidian, which, due to having written records of sufficient time depth to be able to follow how words have changed meaning over time, as well as due to having voluminous data with which to work, are particularly valuable. My approach is thus positivistic, that is, data-oriented, rather than impressionistic. To further ensure that my views are firmly grounded in the attested data and not derived from purely theoretical assumptions, I supply a large amount of cited forms from the daughter languages to illustrate the types of changes that have occurred, I give explanations where needed, I supply voluminous references to the standard etymological dictionaries and other relevant literature, I set rather narrow limits on the meanings of the*

This reduced presence of serifs contributes, along with the generous horizontal proportion of the letters, to the relative openness of the Brill italic in blocks of text.

---

The remainder of the presentation is by way of a kind of type specimen, illustrating some of things the Brill types can do, and something of the extent of their character set.



dābaieiti :: *kē ēd ī tō xrad padīš*  
*nē pad tis bē frēbīhēd* :: spəntəm . a  
 t . θβā . maṇhē . ahurā . hiiat .  
 mā . vohū . pairijasat . manāṇhā  
 :: *abzōnīg-im ēdōn tē menīd hē ohrmazd* :: *kā*  
*ō man wahman bē-mad* :: pərəsaṭcā . mā  
 ciš . ahī . kahiiā . ahī :: *pursīd-iz-iš*  
*az man kū kē hē ud az kēān hē* :: kaθā .  
 aiiārō . daxšārā . fərasiiāi . ::  
 [dīšā] :: *ciyōn ān ī rōz daxšag rōz ī frāz ham*  
*pursagīh nimūd estēd kū daxšag ciyōn kunom*  
 :: aibī . θβāhū . gaēθāhū . tanušəc  
 ā :: *ī abar ēd ī tō gēhān-tan rāy nimūd estēd*  
 :: at . hōi . aojī . zaraθuštrō . paouru  
 uīm :: *ēdōn-iš ō ōy guft kū zardušt hom*

This is a bilingual manuscript in the old Avestan and Pahlavī writing systems of Persia.  
 In the transcription on the right, roman type is used for Avestan and italic for Pahlavī.  
 The relatively broad and open italic enables it to function as the equal of the roman,  
 rather than indicating a subsidiary relationship.

mā . vohū . pairijasaṭ . manan̄hā  
*az man kū kē hē ud az kēān hē :: kaθā .*  
*pursagīh nimūd estēd kū daxšag ciyōn*  
:: aibī . θβāhū . gaēθāhū . tanuṣ̣əc

ABCDEFGHIJKLMNOPQRSTUVWXYZ  
ABCD abcdefghijklmnopqrstuvwxyz 0123

Here is a detail of that transcription, showing the extensive use of diacritic characters in such scholarship. Below it is a specimen of the basic roman alphabet design.

ABCDEFGHIJKLMNOPQRSTUVWXYZ

*EFGH abcdefghijklmnopqrstuvwxyz 4567*

**ABCDEFGHIJKLMNOPQRSTUVWXYZ**

**IJKL abcdefghijklmnopqrstuvwxyz 8901**

***ABCDEFGHIJKLMNOPQRSTUVWXYZ***

***MNOP abcdefghijklmnopqrstuvwxyz 2345***

And the basic alphabets for the italic, bold and bold italic designs. A lot of the work on the bold weights was done by my colleague Alice Savoie, who deserves a lot of the credit for how well these turned out.



Τὸν μὲν πρῶτον λόγον ἐποίησάμην περὶ πάντων, ὦ  
Θεόφιλε, ὣν ἤρξατο ὁ Ἰησοῦς ποιεῖν τε καὶ διδάσκειν  
ἄχρι ἥς ἡμέρας ἐντειλάμενος τοῖς ἀποστόλοις διὰ  
πνεύματος ἁγίου οὓς ἐξελέξατο ἀνελήμφθη· οἷς καὶ  
παρέστησεν ἑαυτὸν ζῶντα μετὰ τὸ παθεῖν αὐτὸν ἐν  
πολλοῖς τεκμηρίοις, δι' ἡμερῶν τεσσαράκοντα ὁπ-  
τανόμενος αὐτοῖς καὶ λέγων τὰ περὶ τῆς βασιλείας  
τοῦ θεοῦ. καὶ συναλιζόμενος παρήγγειλεν αὐτοῖς  
ἀπὸ Ἱεροσολύμων μὴ χωρίζεσθαι, ἀλλὰ περιμένειν  
τὴν ἐπαγγελίαν τοῦ πατρὸς ἣν ἠκούσατέ μου· ὅτι  
Ἰωάννης μὲν ἐβάπτισεν ὕδατι, ὑμεῖς δὲ ἐν πνεύματι  
βαπτισθήσεσθε ἁγίῳ οὐ μετὰ πολλὰς ταύτας ἡμέρας.  
Οἱ μὲν οὖν συνελθόντες ἡρώτων αὐτὸν λέγοντες,  
Κύριε, εἰ ἐν τῷ χρόνῳ τούτῳ ἀποκαθιστάνεις τὴν  
βασιλείαν τῷ Ἰσραήλ; εἶπεν δὲ πρὸς αὐτούς, Οὐχ  
ὑμῶν ἐστὶν γινῶναι χρόνους ἢ καιροὺς οὓς ὁ πατὴρ  
ἔθετο ἐν τῇ ἰδίᾳ ἐξουσίᾳ· ἀλλὰ λήμψεσθε δύναμιν  
ἐπελθόντος τοῦ ἁγίου πνεύματος ἐφ' ὑμᾶς, καὶ ἔσ-  
εσθέ μου μάρτυρες ἔν τε Ἱερουσαλὴμ καὶ ἐν πάσῃ

αβγδεζηθικλμνξοπρ  
ςςτυφχψωϜϞϙϠϡϢ  
ϣϤϥϦϧϨϩϩϩϩϩϩ  
ϩϩϩϩϩϩϩϩϩϩϩϩϩ  
αβγδεζηθικλμνξοπρς  
ςςτυφχψωϜϞϙϠϡϢ  
ϣϤϥϦϧϨϩϩϩϩϩϩ  
ϩϩϩϩϩϩϩϩϩϩϩϩϩ

In addition to the extensive Latin character coverage, the Brill types include a Greek companion, with full polytonic support as well as archaic letters and symbols. The design owes something the famous Didot Greek types, but with a more consistent stroke modulation pattern.

В одном из вагонов третьего класса, с рас-  
света, очутились друг против друга, у само-  
го окна, два пассажира,—оба люди молодые,  
оба почти налегке, оба не щегольски одетые,  
оба с довольно замечательными физионо-

There is a Cyrillic companion, currently limited to Slavic language support, which is Brill's main area of publication in the script. In future, this could be extended to cover the large number of central Asian languages using Cyrillic orthographies. The design doesn't reference any particular historical type, but employs the idiomatic conventions of Russian neo-classical typography. When I am designing Latin and Cyrillic side-by-side, the two will tend to influence each other, most obviously in the proportions of the common letters, which need to look well balanced in both scripts.

11<sup>a</sup> v 11 → ̳<sup>-WOLMss</sup> || <sup>b</sup> ̳ και ἦρεν cf ̳ et 20,33<sup>a</sup>  
 || 12<sup>a</sup> nonn Mss cit מפני || <sup>b-b</sup> → ̳<sup>-WOLMss</sup> || 14<sup>a</sup>  
 mlt Mss Seb בכל cf ̳<sup>93.94Mss</sup> || <sup>b</sup> mlt Mss Mss<sup>Q</sup>  
 בן- cf ̳<sup>̳Mss</sup> || 17<sup>a</sup> ̳<sup>-WOLMss</sup> om 17-19 || 18<sup>a</sup>  
 → ̳<sup>-WL</sup> || <sup>b</sup> pc Mss וּמ cf ̳ || 19<sup>a</sup> pc Mss לְעִירָא  
 cf ̳<sup>Mss</sup> || 20<sup>a</sup> → 2 Mss cf ̳<sup>-WOLMss</sup><sup>93.94Mss</sup>  
 || 21<sup>a-a</sup> → ̳<sup>-WOLMss</sup> || 22<sup>a</sup> mlt Mss Mss<sup>Q</sup> יד- cf  
 Vrs || <sup>b</sup> nonn Mss citt טא cf Jdc 4,21 || 23<sup>a</sup> ̳  
 הַנִּקְלָה || <sup>b</sup> nonn Mss citt ה' cf Vrs || <sup>c</sup> ̳ ה' - || 25<sup>a</sup>  
 nonn Mss Seb K<sup>Or</sup> citt א כ cf Vrs.

41 † ουκ εγεννηθημεν B D\* .2 | ου γεγενημεθα P<sup>66</sup>  
 N W 0250 f<sup>13</sup> 565 al | txt P<sup>73</sup> s<sup>2</sup> C D<sup>1</sup> Θ Ψ f<sup>1</sup> 33  
 M (s\* L 070: ουκ εγ-); Or • 42 † ουκ ε D Δ 070 f<sup>13</sup>  
 700. 892. 1424 M aur f vg sa<sup>mss</sup> | □ P<sup>66</sup> B pc | † εκ  
 γ. του θ εξεληλυθα P<sup>66</sup> | † ου P<sup>66</sup> D Θ (579) pc it  
 | †-σταλκεν P<sup>66</sup>

ΑΒΓΔΕΦΖΗΘΙΚΛΜ  
 ΝΟΠΡΟΣΤΑΒΧ  
 ΥΖαβγδεζηιθλμνοπρ  
 ρστυφωχζΑΒΓΔΕΦΖ  
 ΗΘΙΚΛΜΝΟΠΡΟΣ  
 ΤΑΒΧΥΖαβγδεζη  
 ιθλμνοπρστυφωχζ

There are even two weights of a fraktur style included in the Brill types, although not intended for standard text setting. These are encoded as symbols and used in the apparatus of critical editions of ancient texts, as shown on the left, where they are used to indicate particular manuscript sources. The fraktur was designed by Karsten Luecke. Like the Latin and Greek, it references 18th Century models, such as the Walbaum Fraktur, but the uppercase is less complex and more open, so that it harmonises well with the other parts of the Brill design. I think it's quite lovely, and hope to see it developed into functional fraktur fonts.

[The Hebrew type shown in the *apparatus critici* examples is my SBL Hebrew, which Brill use extensively in their publications.]

*Catalan* lə trəmun'tanə j əl səl əz ðispu'taβən  
| sustə'ninj 'kað u k eɫ 'erə l mes fər | kwan də  
'soptə | 'bewən um biə'dʒe kə s ə'kəstə mbuli'kat  
ən unə 'ɣrən 'kapə ||

v a v A æ b ħ h B β c d  
d δ g θ ə ə ɶ ε ʌ z ʒ ʒ ʒ ʒ  
e f g G γ Γ ς η ከ y u n  
h i ! u j j k x κ ♣ l L λ λ Λ  
᠓ ᡕ ᡗ ᡙ ᡛ ᡞ ᡟ ᡢ ᡤ ᡥ ᡦ ᡩ ᡪ ᡬ ᡭ ᡮ ᡯ ᡰ  
8 9 p p q r f r r l r s s s  
t t t e v w x x x y z z z z

I referred earlier to the key role of the International Phonetic Association alphabet in determining the characteristics of the design. Subsets of IPA are used in a wide range of transcription schema for non-Latin scripts, and as a basis for many orthographies for African and Amerindian languages. The full IPA system, which can capture virtually any level of human speech utterance, is very extensive, and I'm showing here only some of the letters and symbols involved in this and other phonetic notation systems supported in the Brill types.

si  <i>silk</i>	si  <i>time</i>
si  <i>to try</i>	si <sup>1</sup> <i>history</i>
si  <i>matter</i>	si <sup>1</sup> <i>city</i>

ГгГгГгГгГг  
УуУуУуУуУуУуУу  
ТтТтТтТтТтТтТт  
МмМмМмМмМмМмМм  
НнНнНнНнНнНнНн  
ВвВвВвВвВвВвВв  
ЗзЗзЗзЗзЗзЗзЗз  
ИиИиИиИиИиИиИи  
ЙйЙйЙйЙйЙйЙй

This is another aspect of the IPA system, used in the transcription of strongly tonal languages such as Mandarin, Cantonese, and other Chinese languages. These are tone bars, which indicate either single pitch or melodic contours of two or three pitches applied to a syllable or word. Unicode only encodes the five single tone bars, shown in red: high, high-mid, mid, low-mid, and low. The rest of the tone bar set is handled using automated ligature substitutions. Not all of these tone patterns occur in languages, but this is an instance where providing for the whole combinatorial set is easier than attempting to research the subset that occurs.

X ) C I T P Δ ▯ H H ▯ ▯  
 M ▯ T ▯ Δ ▯ H ▯ X ▯ Σ  
 ⋯ ▯ ▯ Δ Δ ▯ ▯ H H ▯ ▯  
 X X M M M M A P K > <  
 Γ E 7 E - · ▯ P :: ⋯ Z C E  
 ▯ ⊙ ⋯ X Λ ↑ ▯ ▯ ▯ ▯  
 TE HE TE P Π PE P M Y  
 ∇ Π M

I II III IV V VI Ç VII  
 VIII IX X XI XII L J C D  
 M O D O D O = - £  
 2 2 » X V HS H + > /  
 ∠ ∽ ω d L π < ∽ ≈ ∫ f f t  
 K s F ξ ÷ ˆ I P q °  
 ♀ ♀ ♂ ♂ 4 5 6 7 8 9 10 11  
 ∞ ∞ ∞ ∞ ∞ ∞ ∞ ∞

The Brill character set is rounded out with ancient Greek acrophonic numbers; classical Roman and Greek numbers, weights and measures; astrological symbols; as well a lot of other symbols of various kinds—not shown—, and typographic niceties such as arrows and pointing fists, lots of superior letters, and a several different styles of numerals.

It was a massive project—each of the four fonts contains more than five thousand glyphs—, and took six years to complete from the initial contact to the official launch at the Boerhaave Museum in 2012. It was a fascinating challenge, and a pleasure at every stage to work with Brill’s experts, and to have access to iterative press testing of the design-in-progress.



‘I had to stare at it quietly for a while to figure out what was included, because it’s all so pleasantly integrated. From the fraktur to the € to  $\frac{16}{32}$ , roman and italic, old and new, simple and complex, whatever a writer would need to publish a good book for reading, this font’s got it, and well done—my favourite.’ *David Berlow*

[\*www.brill.com/about/brill-fonts\*](http://www.brill.com/about/brill-fonts)

The Brill types were selected for recognition in the 2013 Type Directors Club competition, and I’ll leave you with the kind assessment of David Berlow, who picked them as his ‘judge’s choice’.

In addition to using the new types in their own publications, Brill have made them available for non-commercial use by individuals, and even granted licenses for some other publishers to use them. In this way, the Brill types contribute to that mutuality of scholarship and typography that began in Leiden more than 330 years ago.

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[With thanks to Pim Rietbroek, Jeremy Tankard and Frank Blokland for their contributions; to my colleagues Alice Savoie and Karsten Luecke for their excellent work on the typefaces; to Jürgen Siebert, Indra Kupferschmid, and to the staff at Typo Berlin; and to Dan Reynolds for first suggesting that I should speak at the conference.]