

This talk was originally presented on 4 December 2015 as the keynote address at Rencontres du troisième type [👁](#), a symposium on typography for specialist scholarship in Paris, jointly organised by the Atelier national de recherche typographique (Nancy) and the Bibliothèque nationale de France. My thanks to the organisers for this opportunity, especially Florence Codine, Alice Savoie, and Thomas Huot-Marchand, and to Joel Kalvesmaki at Dumbarton Oaks and Pim Rietbroek at Brill for their assistance in preparing this presentation.

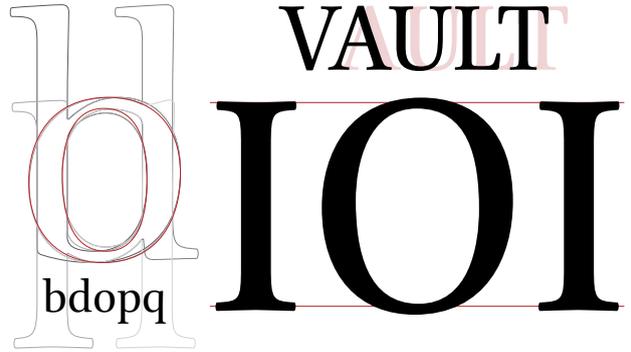
When I heard that the title of this symposium was to be *Encounters of the Third Type* — a play on the French title of Steven Spielberg's famous science fiction film —, I immediately wondered, 'What are the first and second types?' At the time, I didn't know what the organisers had in mind in this regard, but as I began to think about these ordinal categories of type, I realised that I could consider my own work as a type designer in terms of three kinds of things that I need to know or to learn, which correspond to different kinds of typefaces for different kinds of users.



types of knowing

John Hudson, Tiro Typeworks
Bibliothèque nationale de France
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HHHOHOOO nnonooo million



The first things are those that all type designers must know: the way in which shapes relate to one another; how their relative proportions and spacing contribute to the visual rhythm of text; how their weight, height and stroke modulation need to vary so that, optically, they appear balanced and aligned. It really doesn't matter for what writing system one is designing, or for what specific publications or communities of users: this knowledge of shape and proportion needs to be ingrained. It must become knowledge in the deep sense: not a theory, or a body of information, but *knowing* that is indistinguishable from movement of hand or judgement of eye.

Some measure of this first type of knowing is obtained by everyone who learns to read. As we mature into experienced and fluent readers, we internalise expectations around conventions of textual presentation. Those expectations are easily frustrated by poorly designed type and even more easily by poorly set type — by bad spacing, by inappropriate choices of size and weight, etc. —, even if the typical reader isn't able to articulate precisely what is wrong. The type designer or typographer, then, is simply a special kind of reader, just as the scribe, engraver, or stonemason was.

These things, along with some history, are what I need to know in order to design typefaces and make fonts for my own native writing system, and it also translates quite easily to related scripts such as Greek and Cyrillic, even though each has its distinctive traditions of stylistic idiom and cultural association. This is not to say that knowing how to design a Latin typeface automatically qualifies one to design a Greek or Cyrillic: there are new things to be learned for each, but they are the same kind of things.

For the type designer at least, this is general knowledge, and its application is also general: most typefaces are made without any knowledge at all of how they will be used or who will use them. The font is a little machine for making text, and the person who builds the machine usually doesn't know what the text will be.

If Pamphilus' method of collation and philological goals remain obscure,
the flavour and texture of his everyday practices as a scholar emerge clearly

Τὸν μὲν πρῶτον λόγον ἐποιησάμην περὶ πάντων, ὦ Θεόφιλε, ὧν ἤρξατο ὁ Ἰησοῦς
ποιεῖν τε καὶ διδάσκειν ἄχρι ἡς ἡμέρας ἐντειλάμενος τοῖς ἀποστόλοις διὰ πνεύματος

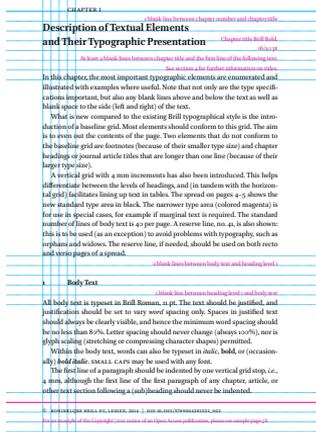
Первые типографские шрифты как в России, так и в других славянских
странах Европы создавались на основе рукописных. Это обязывает нас



α β γ δ ε

This is true even in the case of fonts commissioned by a single customer, such as the Brill types, which I made — with assistance from Alice Savoie — for the venerable Dutch academic publisher. The types were commissioned in 2008, to address problems arising from the mismatched and incomplete fonts that Brill had been using since adopting digital workflows, and to establish, for the first time in 330 years of publishing, a coordinated typographic house-style.

Working on the design, I was, of course, familiar with some of the kinds of books that Brill would be publishing, and had access to numerous previous publications, manuscripts in preparation, and — a real luxury — the opportunity to test the new fonts on the paper stocks and presses used for the books. But Brill publishes many titles every year, most of which I never see, and I have to trust that the general knowledge I have applied to the design — all that ingrained knowing about proportion and weight and spacing — will fulfill the reader's expectations, regardless of the nature, content, and complexity of the text.



lə trəmʊnˈtənə j əl səl əz ɔ̃spuˈtəβən |
 sus̃təˈniŋ ˈkɑd̥ u k eˈl ɛrə l mɛs fɔr | kwan
 dəˈsoptə | ˈbɛwəm ʊn biəˈdʒe kəs əˈkɔstə
 mbʊliˈkɑt ən ʊnə ˈɣrɑŋ ˈkɑpə

ō man wahman bē-mad ∴ pərəsəʦtçä . mä
 ciš . ahi . kahiiä . ahi ∴ pʊrs̃id-iz-iš
 əz man kü kē hē ud əz kēän hē ∴ kəβā
 aiiärä . daxšärä . fərasiiäi . ∴

jeuː jɛtʰ tʃiːt | pɛkʰ l fɔŋʰ tʰɔuːl tʰaiːt jɛŋʰ
 heiːt touːl auːl kɛnʰ piːnʰ kɔːl lɛkʰ tiːl | kʰɔyːl
 teiː amʰ amʰ tʰeiːt touːl jeuːl kɔːl jɛnʰ heiːt

41 ˈt̪ ɔʊx ɛɣɛvŋθ̃mɛv B D* .² | ɔʊ ɣɛvɛvŋmɛ-
 θα ʋ⁶⁶ N W 0250 f¹³ 565 al | tɛt ʋ⁷³ N² C
 D¹ Ө ʋ¹ 33 ʋ¹³ ʋ¹³ (N* L 070: ɔʊx ɛɣ–); Or · 42
 ˈt̪ɔʊs n̩ D 4 070 f¹³ 700. 892. 1424 ʋ¹³ aur f vɣ
 sa^{mss} | ɔʋ⁶⁶ B pɛ | ɛx ɣ. tou θ ɛzɛzɛɣlɥθα ʋ⁶⁶
 | ˈt̪ɔʊ ʋ⁶⁶ D Ө (579) pɛ it | ɛː_ɔtɔɣɛvŋ ʋ⁶⁶

What do I need to know in order to be able to create types for these writing systems and for this kind of publishing programme? Obviously, the things I have already discussed regarding proportion, weight, and visual rhythm still apply, albeit in different ways. But now I must also know something about how the writing systems work *as systems*, how they encode language, and also a lot of specific technical information about how to get fonts to correctly display the varieties of forms and dynamically changing relationships that occur within these systems. I could happily spend the rest of the afternoon talking about this technical know-how, but I'm going to limit myself to some brief comments about the writing systems and about the needs of the Murty Library, which constitute a kind of midway point between the applied general knowledge of the Brill types, and the more specialised typography — *le troisième type* — to which the remainder of this talk and symposium will be dedicated.

क्रियासिद्धिः सत्त्वे भवति महतां नोपकरणे kriyāsiddhiḥ sattve bhavati mahatām nopakaraṇe

0915 094D 0930 093F 092F 093E 0938 093F 0926 094D 0927 093F 0903
 0938 0924 094D 0924 094D 0935 0947
 092D 0935 0924 093F
 092E 0939 0924 093E 0902
 0928 094B 092A 0915 0930 0923 0947

Input: phonetic, character based

dSignI [dKRa] dYa dSignAa dSignI.2 dSa dSignI.2 [dDDha] dVisarga
 dSa [dTTVa] dSignE
 dBha bVa dSignI dTa
 dMa dHa dTa dSignAa dAnusvara
 dNa dSign0 dPa dKa dRa dNna dSignE

Output: visual, glyph based
 (reordering, ligatures,
 variant forms, anchored
 mark attachment)

The South and Southeast Asian writing systems that derive from the ancient Brahmi script are alphasyllaberies, combining concepts of letters and syllables as graphical units. Consonant letters carry a presumed short *a* vowel [ə], which can be replaced by means of a dependent vowel sign, or suppressed by means of a vowel-killer sign. When consonants with killed vowels are written in sequence, they form conjuncts, whose ligated forms may vary considerably from the independent forms of the letters involved.

This illustration shows an example of a double-consonant conjunct plus dependent vowel sign, in a number of different Indian scripts. The consonants are red and the vowel is blue; the vowel-killer sign is green, and in most of these examples disappears when the conjunct is formed. As you can see, there is considerable variety, in both modification of shapes and the ordering of elements within the graphical syllables. In several of the scripts, the vowel is represented by multiple elements arranged around and interacting with the consonants.

These features of the writing systems have two implications for the type designer. Firstly, they result in much larger fonts, with many more glyphs, than European languages typically require. Secondly, each script demands particular knowledge about its own rules, as well as orthographic conventions for the application of that script to individual languages, which may also vary historically and geographically.

Devanagari	ज + ् + ज + ी	जो
Bengali	জ + ্ + জ + ী	জো
Tamil	ஜ + ி + ஜ + ீ	ஜோ
Kannada	ಜ + ೆ + ಜ + ೀ	ಜೋ
Telugu	జ + ి + జ + ీ	జో

This illustration shows phonetically identical consonants and conjunct ligatures displayed in differing forms with the Murty Hindi and Murty Sanskrit fonts. Some of these differences derive originally from regional preferences observable in Sanskrit manuscripts, broadly divided into eastern and western categories. Interestingly, modern Hindi typography has inherited the western form of vowel letters and the eastern form of consonant letters, as well as favouring more horizontal ligature arrangements.

At this point, the epigraphists, numismatists, and sigillographers in the audience may begin to feel a sense of the familiar in this phenomenon of variation in form associated with time and place and particular orthography, the study of which is so important in the cataloguing and understanding of historical textual objects.

The Murty Classical Library books are literary editions, though, not studies of particular manuscripts and their palaeographic characteristics. So what I need to know in order to design these typefaces is not what historical forms might have been used in the manuscript tradition, in this or that time and place, but the expectations of modern readers of these scripts and languages encountering these texts in the Murty editions. This differs somewhat, though, from the approach in the Brill types, in which applied general typographic knowledge is expected to anticipate the needs of arbitrary texts. In the case of the Murty Library we are dealing, each year, with a specific five books, and are able to analyse these texts to identify the occurrence and frequency of consonant conjuncts and combinations with particular dependent vowel signs. This has been particularly valuable in the case of Sanskrit, where rules about elision or modification of sounds at morpheme boundaries can produce consonant combinations whose presence and frequency is particular to an individual text. It is incredibly helpful to know for what texts the little machine of the font will be used, so that the behaviour of the font can be proofed against those texts, and updated accordingly.

	HINDI	SANSKRIT		HINDI	SANSKRIT
<i>la</i>	ल	ल	<i>cca</i>	च	च
<i>śa</i>	श	श	<i>pta</i>	प	प
<i>śr</i>	शृ	शृ	<i>ptya</i>	प्य	प्य
<i>kta</i>	क्त	क्त	<i>lra</i>	ल	ल
<i>ktya</i>	क्त्य	क्त्य	<i>lla</i>	ल्ल	ल्ल
<i>ktra</i>	क्त्र	क्त्र	<i>llya</i>	ल्ल्य	ल्ल्य
<i>ktva</i>	क्त्व	क्त्व	<i>vla</i>	व	व
<i>kla</i>	क्ल	क्ल	<i>śka</i>	शक	शक
<i>kvya</i>	क्व्य	क्व्य	<i>śla</i>	शल	शल
<i>gja</i>	गज	ग	<i>śśa</i>	शश	शश

We are now at the permeable border between the first & second types and the third type that is the focus of this symposium. Two things should be obvious from the discussion so far. The first is that the kinds of knowledge involved are accumulative: knowledge of how complex writing systems work subsumes rather than replaces knowledge about proportion and rhythm that is germane, in various ways, to all writing systems. The second is that there is a progression from the general to the particular, and a corresponding increase in what the type designer needs to know about specific texts, or kinds of texts, and how these are read, studied, and published.

In 2010, I was commissioned by the Dumbarton Oaks research library in Washington DC to design a new typeface for Byzantine sigillography and numismatics. In the next session, Joel Kalvasmaki will talk about that project in more detail, and how it builds on previous work by Nicolas Oikonomides and others. The Athena Ruby type is intended to represent the appearance of text — the ‘diplomatic’ transcription — that forms part of the standard description of seals and coins. The diplomatic transcription presents — as far as can be accurately determined from the sometimes worn or damaged object — the letters and paratextual symbols that are visible on the seal or coin, *and their form*. This is accompanied by a normalised transcription, in a typical Greek or Latin text type, in which abbreviations are expanded, ligatures decomposed, and damaged or missing elements conjectured.

Sergios II, patriarch of Constantinople (1001–19)

BZS.1958.106.2207 (formerly DO 58.106.2207)

Diameter 44 mm | Weight 49.94 g | Condition Corroded.

Obv. The Mother of God standing, holding Christ on her left arm.

At left and right, sigla M R ΘV : *Mij(τj)ρ Θ(εσ)ῶ*. Faint traces of a circular inscription. No visible border.

... ΗΘΕΙ-ΤΩ ...

[Θ(εσ)ῶκε βε]ρήθει τῷ [σῷ δοῦλῳ]

Rev. Inscription of six lines preceded by decoration. No visible border.

—ϕ—
 СЕРΓΙΩ
 ΑΡΧΙΕΠΙ
 .Κ.ΚΩΝΣΤΑΝ
 .ΙΝΟΥΠΟΛ
 ΝΕΑCPΩ
 —M—

← Diplomatic transcription

Normalised transcription

Σεργίω ἀρχιεπί[σ]χ[ό]πι[τ]ω Κωνσταν[τ]ινουπόλ[εως] Νέας Ρώμης[ης].



That understanding needs, of course, to be incorporated with what I already know, about shapes and their relationships, so that all these variants can be freely combined to compose not just letter-by-letter transcriptions but graphically coherent texts. This seems to me important, although scholars have often made do with a kind of Frankenstein approach, cobbling together representative shapes without much regard to their relative proportions or spacing. It seems to me, though, — eccentricities of form and orthography notwithstanding — that Byzantine seals and coins were made by people who knew something about working with text. Their medium was small, so they favoured closely spaced letters, and from this developed a fine feel for massed characters within a small area, taking advantage of all the opportunities of ligation and abbreviation that were available to them within the conventions of their art. The objects of study display a coherent text aesthetic, discernable through centuries of wear and damage, frequently striking and sometimes beautiful. The typography of the studies should be too, even as it stands at an interpretative remove from those objects and from the hands and minds that made them.



ΜΡ ΘΥ Η ΛΦΗΟΣΩΡΗΤΗΣΔ | ΘΕΟΔΩΡΟΣΔΕΣΠΟ
ΙΩΔΕΣΠΟ ΘΔΗΜΗΤ ΘΔ ΙΩΔ ΕΥΠ
ΒΡΟΤΩΝ|ΡΟΗΧΤΑΪΣ|ΤΑΤΡΑΞΕΙΣΚΥΡΞ
ΑΪΩΣΙΗΑΚΡΟΪΣ|ΤΗΣΡΟΗΑΪ|ΧΑΚΟΡΗ
+ΘΚΕΡ,Θ,|ΤΩΣΩΔΗΛ,|ΘΕΟΔΩΡΩΑ
ΑΕΔΡΩΚΑΙ|ΚΟΙΑΙΓΩΡΙ|ΤΩΣΜΥΡΝ,| -Ω-
ΘΕΥΣΑΘΙΥ[ΖΑΡΟ]ΜΑΝΙΣ ΘΝΗΡΑΚΛΙ ΥΣΡΕΡΑΒΙ
DNERACΛ ΙΡΡΑΥΣ[]ΥΣΡΡΑΥΣ
μανδραεεποτ ολσιοςαιμιτρωος

ΣΤΕΦΑΝΟΣΠΙΣΟΣ ΘΚΩΝΣΤΑΝΤΙΝΟΣ | ΘΕΟΔΩΡΟΣ ΔΞ ΤΧ
ΚΕΡΟΗΘΗΤΩΣΩΔΗΛ,|ΙΩΑΝ·|.ΣΠΑΥΘΑ.|ΣΑΡΧΟΝΡ|ΕΔΕΣΤΟ
ΣΦΡΑΓ,|ΤΗΣΝΕΑΣ|ΜΟΝΗΣΤΗ|ΆΚΟΣΜΑΤΗ|ΤΣΙΥΤΣΙ|ΛΗΚΙΥ
SUM SPECULUM VITE ΙΟΗΑΝΝΕΣ ΖΗΩΙΝΙΕΡ ΕΣ ΡΙΖΕ

It is the nature of fonts for specialist scholarship that they are also ongoing negotiations with technology, technology that is most often developed around the needs of general modern language users and standardised orthographies. Unicode, the world's most widely used text encoding standard, makes a sensible and mostly consistent distinction between characters — the abstracted semantic units of text encoded in the computer — and glyphs — the particular graphical presentation of those units to the reader. As we've already seen in the examples of complex Indian writing systems, the relationship of characters to glyphs is not always one-to-one or even simply sequential. Such complex script processing is, however, driven by well-defined and standardised algorithms, and widely and fairly consistently supported in software.

Selection and reliable display of arbitrary glyph variants of individual characters, as needed in the case of a diplomatic transcription of a seal, is by contrast not standardisable within the context of Unicode itself, and is only partially and inconsistently supported in today's software. This slide illustrates the promise of Unicode text encoding and OpenType glyph processing: despite the variety of letterforms and ligatures employed, each line is encoded as exactly the same underlying sequence of character codes. This encoding — what we would call a clean or standard Unicode encoding, one that involves no non-standard or 'Private Use Area' codes — means that the computer is storing something that is, in effect, something between the diplomatic and normalised transcription, addressable in search operations for normal Greek words or conventional abbreviations, independent of the glyphs presented.

That's the promise. The current reality is that support for the Character Variant layout feature needed to reliably present a cleanly encoded text in such arbitrary variety of form is frustratingly rare. Scholars wanting to work with fonts such as Athena Ruby will tend to fall back on the non-standard, Private Use Area encodings also provided in the font, as a more robust means of accessing variants

ΒΑΣΙΛΕΥC ΒΑΣΙΛΕΩΝ ΒΑΣΙΛΕΥΩΝ ΒΑΣΙΛΕΥΟΝΤΩΝ
ΒΒΑΣΙΛΕΥC ΒΑΣΙΛΕΩΝ ΒΑΣΙΛΕΥΩΝ ΒΑΣΙΛΕΥΟΝΤΩΝ
ΡΑΣΙΛΕC ΡΑΣΙΛΕΩΝ ΡΑΣΙΛΕΩΝ ΡΑΣΙΛΕΟΝΤΩΝ
ΒΑΣΙΛΕΥC ΒΑΣΙΛΕΥΟΙ ΒΑΣΙΛΕΥΟΙ ΒΑΣΙΛΕΥΟΝΤΟΙ
ΒΑΣΙΛΕC ΒΑΣΙΛΕΩΗ ΒΑΣΙΛΕΩΗ ΒΑΣΙΛΕΟΝΤΩΗ

Βασιλευc Βασιλεων Βασιλευων Βασιλεοντων

ΒΒΑΣΙΛΕΥC ΒΒΑΣΙΛΕΩΝ ΒΒΑΣΙΛΕΥΩΝ ΒΒΑΣΙΛΕΥΟΝΤΩΝ
ΒΑΣΙΛΕΥC ΒΑΣΙΛΕΩΝ ΒΑΣΙΛΕΥΩΝ ΒΑΣΙΛΕΥΟΝΤΩΝ
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ΒΒΑΣΙΛΕC ΒΒΑΣΙΛΕΩ ΒΒΑΣΙΛΕΩ ΒΒΑΣΙΛΕΟΝΤΩ

and ligatures for diplomatic transcription. So developing fonts for 'the third type' requires knowing about the limitations of current technology and what these mean for scholars' workflows, so that the font may hopefully be part of the solution and not just another layer of problem.

I'll conclude with some observations regarding a new project. This image shows a set of Greek acrophonic numbers, with variants in red, which are included in the Brill fonts. I'm now working with Pim Rietbroek at Brill to extend this into a separate typeface for archaic and classical Greek epigraphy. This project is still at the proposal stage, so I don't have any design work to show today, but I want to talk about what's involved in the planning of such a project.

Obviously, the problems to be solved in an epigraphic font are similar to those Joel and I encountered when planning Athena Ruby, and many of the solutions will be same. Very probably we'll provide both OpenType Layout feature and Private Use Area options for accessing variants, and Brill's editorial and production teams will need to establish best practices in their workflows for both print and electronic media.

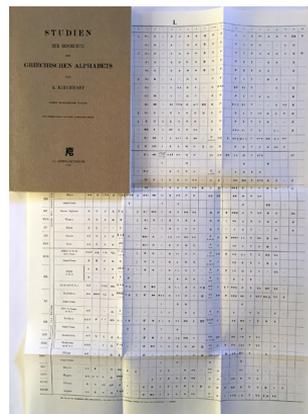


The first step, of course, is to define the set of glyphs to be included in the font, and to determine how these will be encoded. Pim and I have begun this process by comparing and merging the sets of variant letterforms catalogued in two seminal works on Greek epigraphic scripts: Adolf Kirchhoff's classic study of the history of Greek alphabets, and L.H. Jeffery's *The local scripts of Archaic Greece*. Using these sources, I've so far compiled a spreadsheet of 270 forms that would be the basis of the new Brill Epigraphic.

A few issues immediately arise from this process. The first is that Kirchhoff and Jeffery's labels don't agree, and the same forms are differently catalogued in each source. This isn't a direct problem for me, because the organisation of the font isn't going to depend on those labels — I'm not trying to classify or group glyphs based on period or location — but this kind of disagreement in my sources makes me nervous. There is also a discrepancy in letter identification: Jeffery distinguishes *eta* and *heta*, while Kirchhoff does not. This presents a quandary for how best to encode what might be variants of either letter.

The second issue is the age of these two sources: Kirchhoff's work was first published in 1887, and Jeffery's in 1961. I'm sure significant work has been done in the past half century, so I doubt very much if the forms I've garnered from these two works will be sufficient for everyone's needs.

The third issue is, of course, that any secondary source is also a filter. Before I begin to make my own typographic interpretation of these epigraphic letters, and my own decisions about what constitutes a significant distinction between two similar forms — the angle of a sloped crossbar, for example, or the width of a letter — Kirchhoff and Jeffery have already made their own interpretations and decisions, and each have used different criteria when deciding what shapes to conflate or separate. Should I accept those determinations and, more to the point, should the users of the new Brill Epigraphic font?



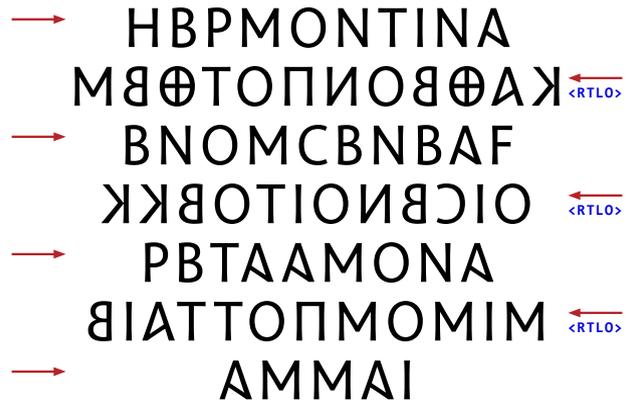
Index	Unicode	DynName	SourceForm
E1	0x0391	Alpha	Kirchhoff : I I: Haikonnosos
E2		Alpha.1	Kirchhoff : I I: Prokonessos 2
E3		Alpha.2	Kirchhoff : I I: Samos, Ältere Formen 2
E4		Alpha.3	Kirchhoff : I X: Teos, Koophon, Rhodos 1
E5		Alpha.4	Kirchhoff : I XI: Melos(1)
E6		Alpha.5	Kirchhoff : I XVII: Athenes, Ältere Formen 1
E7		Alpha.6	Kirchhoff : I XX: Korkyra 3
E8		Alpha.7	Kirchhoff : I XXV: Megara 2
E9		Alpha.8	Kirchhoff : II III: Boeotien 3
E10		Alpha.9	Kirchhoff : III III: Boeotien 4
E11		Alpha.10	Kirchhoff : II V: Phokis, Jüngere Inschriften 1
E12		Alpha.11	Kirchhoff : II V: Phokis, Jüngere Inschriften 2
E13		Alpha.12	Kirchhoff : III VI: b Doolische Lokrer 1
E14		Alpha.13	Kirchhoff : III VI: c Doolische Lokrer
E15		Alpha.14	Kirchhoff : III VIII: Thasosien
E16		Alpha.15	Kirchhoff : III X: Taras und Herakles, M Inschriften 2
E17		Alpha.16	Kirchhoff : III XIV: Achaische Kolonien 2
E18		Alpha.17	Kirchhoff : III XIV: Achaische Kolonien 3
E19		Alpha.18	Kirchhoff : III XV: Kephallenia
E20		Alpha.19	Jeffery: Boeota
E21		Alpha.20	Jeffery: Achaea and colonies 2
E22	0x0392	Beta	Kirchhoff : II: Haikonnosos
E23		Beta.1	Kirchhoff : I XI: Melos(2)
E24		Beta.2	Kirchhoff : I XII: Paros, Sigmas
E25		Beta.3	Kirchhoff : I XVII: Athenes, Ältere Formen 2
E26		Beta.4	Kirchhoff : I XX: Korinthos 1
E27		Beta.5	Kirchhoff : I XX: Korinthos 2
E28		Beta.6	Kirchhoff : I XX: Korinthos 3
E29		Beta.7	Kirchhoff : I XX: Korkyra
E30		Beta.8	Kirchhoff : I XXVI: Megara 1
E31		Beta.9	Kirchhoff : I XXVI: Megara 2
E32		Beta.10	Kirchhoff : I XXVI: Sellus
E33		Beta.11	Jeffery: Korinth, Korkyra
E34		Beta.12	Jeffery: Phliwas, Kinokhi, Tiryns
E35		Beta.13	Jeffery: Argos, Mykenae
E36		Beta.14	Jeffery: Gortia 2
E37		Beta.15	Jeffery: Thera, Kyrene

No discussion of Greek epigraphy, however brief, would be complete without consideration of *boustrophédon*: that peculiarity of Archaic Greek text layout in which alternating lines run in different directions, with letters correspondingly flipped. This is a level of complexity on top of what we've considered so far. Not only are we dealing with regional or other variant letterforms, but also with the possibility that they might need to be presented flipped, in text running from right-to-left.

Once again, the promise of Unicode and OpenType is that it should be possible to present text in this way and still have it be cleanly encoded, searchable, and indexable. A few years ago, I was involved in a process to specify OpenType Layout features and shaping engine behaviours for right-to-left and left-to-right mirroring forms and alternates. This work was originally driven by the need to resolve conflicts arising between character- and glyph-level mirroring applied to some elements in bidirectional layout of Arabic and Hebrew, but as a result of it I should, in theory, be able to build a Greek font that would enable automatic substitution of flipped glyphs as determined by line direction. The line direction itself should be able to be set by the user inserting a right-to-left override control character at the beginning of alternating lines. I say 'in theory' because I've not yet tried it, and I've learned not to get enthusiastic about the chances of obscure behaviours being well supported in software, not matter how well specified.

During a small symposium at Dumbarton Oaks in 2010, I asked Joel Kalvasmaki how many users he thought there would be for the Athena Ruby font, and how we would go about gathering feedback from them. He looked about at the sixteen or so people in the room, and said 'Oh, most of them are here'.

Such small numbers of users are at once the source of the biggest challenge in making type for specialist scholarship and, potentially, the greatest opportunity. It is challenging because the needs of such



user communities are unlikely ever to rank high in the priorities of major software developers. We're sometimes fortunate — we get in touch with the right people in the right companies at the right moment — and good things happen like the support of Character Variant layout features in CSS, but often years go by without appreciable improvements in key authoring and publishing software.

The opportunity is, I hope, obvious from the thrust of this presentation. It lies in the direct engagement between the specialist scholars who use these typefaces and the specialist type designers and font engineers who make them. This is work that requires a layering of knowledge of different kinds, and the third kind of knowledge, that which contributes most specifically to the distinctive character of scholarly typefaces, has to come from dialogue.

I am going to end here, because I am as excited as anyone present to hear what the other speakers have to say, and to spend time over these two days talking with the other attendees. I would like to thank the organisers, the *Bibliothèque nationale*, and ANRT for making this event possible. This symposium is exactly the kind of close encounter from which scholarly typography will richly benefit

Thank you.

WTCIPAXYE

