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SyrCOM-95
Proceedings of the First International Forum on Syriac Computing

(in association with Syriac Symposium II)

June 8, 1995
The Catholic University of America
Washington, D.C.

Edited by
GEORGE ANTON KIRAZ

University of Cambridge
(St. John's College)

Published by the Syriac Computing Institute

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Anyone who asks for this volume, to read, collate, or copy from it, and who appropriates it to himself or herself, or cuts anything out of it, should realize that (s)he will have to give answer before God's awesome tribunal as if (s)he had robbed a sanctuary. Let such a person be held anathema and receive no forgiveness until the book is returned. So be it, Amen! And anyone who removes these anathemas, digitally or otherwise, shall himself receive them in double.

ܟܢܘܫܝܐ ܩܕܡܝܐ ܥܠ ܚܘܫ̈ܒܢܝܬܐ ܣܘܪ̈ܝܝܬܐ

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Preface

This volume contains the papers and demonstration abstracts prepared for the First International Forum on Syriac Computing, held on 8 June 1995 at The Catholic University of America, Washington D.C., in association with Syriac Symposium II.

Organised by the Syriac Computing Institute, the Forum aims at giving academics working on computational projects related to Syriac studies an opportunity to meet and share their work and experience, and to provide scholars and computer users with presentations and talks which may be of help in practical matters such as word-processing, fonts and other user-related applications.

The papers are divided into six parts: Part I, *Typesetting, Word Processing and Fonts*, contains four papers on various desktop publishing systems for the PC and Macintosh. Part II, *Manuscript Cataloguing and Bibliographies* describes two projects related to on-line cataloguing and bibliographies. Part III, *Hypertexts*, presents two projects which aim at providing Syriac hypertexts on the Word Wide Web (WWW): the first describes preparing editions of Syriac texts on the WWW, and the second describes an electronic encyclopaedia on Syriac studies. Part IV, *Lexicography*, describes the Arabic-Syriac/Syriac-Arabic Dictionary project of the Syriac Computing Institute. Part V, *Coding*, presents proposals for coding Syriac texts. Finally, Part VI, *Graphics*, gives an account of various methods for producing Syriac graphics.

This Forum would not have been possible without the generosity of the organising committee of the Syriac Symposium II. To them, especially Prof. Sidney Griffith of The Catholic University of America, I give my utmost appreciation.

I also would like to thank Mary Jac M. Reed, director of the Academic Computing Services at The Catholic University of America, for helping organise all the equipment required for presentations. Thanks is also due to those who accepted to chair the sessions.

The proceedings were prepared for publication by Daniel Ponsford, secretary of the Syriac Computing Institute. His voluntary help in various projects is highly appreciated.

8 June 1995

George Anton Kiraz
Conference Chair

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Part I

Typesetting, Word Processing and Fonts

ܣܒܪܐ (Sabra), a Syriac TEX system

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Abstract

In this paper we present "Sabra", a typesetting system for the Syriac script, based on TEX and METAFONT. We cover Serto, Estrangello, as well as East Syriac, both for the Syriac language as for Garshuni. Ligatures as well as stretching connections (keshideh) are automatically performed. Straight or curved isolated Serto *olaph* are chosen according to a set of rules described in the paper. This work is part of the ScholarTEX project.

ܚܘܝܢ ܡܐܡܪܐ ܗܢܐ ܠܡܐܢܐ ܕ «ܣܒܪܐ» ܕܐܝܬܘܗܝ ܡܐܢܐ ܕܛܘܦܣܐ ܟܠܗ ܐܬܘܬܐ ܠܟܬܒܐ ܣܘܪܝܝܐ
ܠܓܘ ܡܐܢܐ ܕ «TEX» ܘܗܘ ܕ «METAFONT». ܡܐܢܐ ܕܥܠ ܦܠܚܐ ܟܠ ܐܝܟ ܐܬܘܬܐ ܣܘܪܝܝܬܐ.
ܐܣܛܪܢܓܠܐ؛ ܐܦ ܐܝܟ؛ ܡܕܢܚܝܐ ܘܐܬܘܬܐ ܓܪܫܘܢܝܬܐ ܘܟܠܗ ܕܐܠܦ̈ܝ ܥܠ ܟܬܒܐ.

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1 Introduction: Difficulties of Syriac Typesetting

1.1 Scripts, and their Names

Like Greek and Hebrew, Syriac is a living language and a language of scholarly interest. But unlike Greek and Hebrew, Syriac has not been written in a unique way. Moreover, political or religious communities have used script variants as a distinguishing feature. The result is that —at least

*The author would like to thank George Kiraz (Cambridge), Johannes de Moor (Kampen), Murielle Debré (Paris) and f. Hazaïl Soumi (Louvain-La-Neuve) for their friendly support and guidance.

in older scholar texts[1]— the different Syriac scripts are often called by names of Christian sects, which have used them in the past:

- *Nestorian*, which we call "East Syriac";
- *Jacobite* (Syrian Monophysites), which we call "Serto" (ܣܶܪܛܳܐ);
- *Melchitic*, a variant of Estrangello, not covered by this paper.

These names will not be used in this paper (native Syriac language speakers find them offensive).

Other scripts, with less problematic names, are "Estrangello" (ܐܣܛܪܢܓܠܐ), *Peshito* (a variant of Serto) and *Mandean* (a very quadratic variant of Estrangello, close to Arabic Kufic) the later two not covered by this paper.

1.2 Technicalities

Syriac presents the same typesetting problems as Arabic[2]: right-to-left writing direction, contextual analysis, multitude of vowels and diacritics. It should be noted that Syriac needs almost the double amount of vowels/diacritics than Arabic: in fact, Syriac uses many vowel systems, sometimes mixed, and Garshuni Syriac (Arabic written in Syriac script) uses all Arabic vowels and diacritics.

1.3 Solutions: TeX, Ω

The ܣܰܒܪܳܐ (*Sabra* = "hope", in Syriac) system is build upon TeX and hence heritates all of TeX's power and flexibility. Nevertheless, the many problems involved in Syriac typesetting make the use of supplementary tools unavoidable: a pre-processor is used for 'input encoding → font encoding' translation, and contextual analysis; a multiple font loading mechanism is used to access all the signs, and TeX--XeT is necessary for switching writing directions.

This rather cumbersome way of adapting TeX to Syriac will be obsolete once the Ω extension of TeX[3] is fully operational. Ω allows the use of 16-bit fonts (up to 65,536 characters) which is more than enough for Syriac; the contextual analysis and remapping of codes is handled by internal Lex-like filters and TeX--XeT is integrated by default.

With respect to the forthcoming availability of this new TeX system, we will not enter too much into TeX- and METAFONT-specific techniques which become obsolete under Ω.

1.4 The Serto isolated *olaph*

The Serto letter *olaph*, when in isolated contextual form, can take two different shapes: "straight" ܐ and "curved" ܐ. Here are the rules for choosing between straight and curved form:

1. At word begin, the **curved** form is used;
2. Inside the word, or at word end, the **straight** form is used, except in the following cases:
3. When the letter *olaph* is preceeded by
   (a) a *dolath* ܕ, or
   (b) a *waw* ܘ, or
   (c) a *waw* followed by a *dolath* ܘܕ, or

[1] And even in more recent texts, like [8] (1980), still using only the terms 'Jacobite' and 'Nestorian'.

[2] See [6] for a detailed discussion on the problems of Arabic typesetting.

[3] See [7] for a detailed discussion of Ω's features, and follow the Ω project pointer in the `http://www.ens.fr` homepage to find out about the latest status of this very ambitious project.

(d) a double *dolath*[4] ܕܕ.

Here are some exceptions to these rules, found in [3]:

- the word ܐܐܪ (ἀὴρ = air), and it's plural form ܐܐܪ̈ܐ, contradict rule 2: the curved form of *olaph* is used inside the word;
- the words ܕܐܒܐ (wolf), ܕܐܪܐ (combat) contradict rule 3-a: although *olaph* is preceeded by a *dolath* it is typeset in straight form;
- the word ܘܐܘ (letter *waw*) contradicts rule 3-b: although *olaph* is preceeded by a *waw* it is typeset in straight form.

It seems that all Syriac authors/typesetters do not follow the same rules: [2] uses only the curved form of *olaph*; the text given as example in [9, p. 181] uses a curved *olaph* at word begin and a straight one otherwise, EVEN when preceeded by a *waw* or a *dolath*. In another document [5], also printed at the Imprimerie Nationale in Paris, one finds only straight *olaphs*, even at word begin...

According to f. H. Soumi[5], the rules are by far more complicated than those given above, and a good knowledge of Syriac language is necessary to determine the form of *olaph* to be used. The author would be grateful for any supplementary information.

The input methods for the different forms of *olaph* are described in section 2.4, p. 5.

1.5 The Serto initial *olaph-lomad* ligature

A similar phenomenon as for the isolated *olaph* letter, occurs for the initial *olaph-lomad* ligature: the use of this ligature obeys to the same rules as the typesetting of curved *olaph* letter: this ligature is used:

1. At word begin, except in the following cases:
2. When the letters *olaph-lomad* are preceeded by
   (a) a *dolath* ܕ, or
   (b) a *waw* ܘ, or
   (c) a *waw-dolath* pair ܘܕ, or
   (d) a double *dolath*[6] ܕܕ.
3. When the letters *olaph-lomad* are followed by *olaph*: in that case the first *olaph* is isolated curved and the letters *lomad-olaph* form a ligature. Example: ܐܠܐ (to bewail).

This rule seems to be even less followed as the one for the form of letter *olaph*; here are some exceptions, found in [3]: ܐܠܦ (letter *olaph*), ܐܠܦ (thousand) with the variant form ܐܠܦܐ.

The input methods for the different forms of *olaph* are described in section 2.4, p. 5.

---

[4] In a private communication, G. Kiraz mentions only the three first rules. The fourth one has been detected by the author in [4, p. 273].

[5] Personal communication.

[6] In the same private communication, G. Kiraz mentions only the three first rules. The fourth one has been introduced in analogy with the case of the isolated *olaph* letter.

2 Using Sabra

2.1 Requirements

To typeset in Syriac using ܨܒܪܐ, one needs a decent TEX system (in this context, this would be a TEX implementation featuring Peter Breitenlohner's TEX--XET and an operational METAFONT implementation), a relatively powerful machine (being able to run BigTEX) and the ܨܒܪܐ (Sabra) package[7], consisting of a preprocessor (`sabra`), fonts written in METAFONT, and TEX macros. The preprocessor is written entirely in GNU Flex, without using any system-dependent subroutines; hence it can be compiled in a straightforward manner on any platform having a GNU Flex executable and an ANSI C compiler.

Once ܨܒܪܐ installed, typesetting is done in two steps: an input file is prepared using the syntax we will describe below; the preprocessor then reads this file, and produces a LATEX 2_ε (or plain TEX) file which then can be run through TEX, in the usual way. Once Ω will be operational, there will be no pre-processor needed anymore.

2.2 Preparing the input file

If you wish to write your file in LATEX 2_ε, you have to include the line

```
\usepackage{sabra}
```

in the preamble.

A ܨܒܪܐ input file contains text, TEX/LATEX macros, and *preprocessor directives*. The latter concern only Syriac script. To type Syriac text you need to enter *Syriac mode*; this is done by the preprocessor directives `<E>` (Estrangello), `<S>` (Serto) or `<C>` (East Syriac). To leave one of these modes, one enters `</E>` or `</S>` or `</C>`.[8]

Once you are inside Syriac mode, you type Syriac text in Latin transcription, from left-to-right. No special indication needs to be given to TEX about font or writing direction switching, this is done automatically by TEX.[9] Section 2.4 describe the transcription you have to use as well as all other features of the preprocessor.[10]

2.3 A text in a text in a text: nesting modes

Often one needs Latin, Greek, or other left→right insertions inside Syriac text; these insertions may again contain Syriac insertions, and so forth. If it weren't for the writing direction, it would be equivalent of switching from one script to the other. Unfortunately, the situation is more complicated: every writing direction is an environment, and paragraph breaking into lines depends on the rules of this environment. The only way to deal properly with such environment is to *nest* them: if you want to switch from Syriac to Latin, you have to decide:

1. if you are finished with Syriac and you are "returning" to Latin, in which case you leave Syriac mode by typing `</E>` (Estrangello), `</S>` (Serto) or `</C>` (East Syriac);

2. if you are going to type a Latin insertion: in that case you enter (nested) Latin mode by typing `<L>`. To leave this mode, use `</L>`; this will bring you back to the script you were using before (Serto, Estrangello or East Syriac).

---

[7] ܨܒܪܐ it is part of the long awaited version 1 of the ScholarTEX package, together with *new* Greek, Arabic, Hebrew, Coptic and Akkadian cuneiform systems.

[8] A few other similar directives concern other languages of scholarly interest: `<A>` for Arabic Naskhi, `<H>` for Biblical Hebrew, `<K>` for Akkadian cuneiform. Other writing systems provided by ScholarTEX do not require a preprocessor.

[9] Nevertheless, when your text takes more than one paragraphs, you have to write the commands `\hfill\phantom{.}` at the end of the first paragraph, and `\beginR` at the begin of the next one; this is an unfortunate shortcoming of TEX--XET, which will be fixed in forthcoming versions of Ω.

[10] Nevertheless, the document preparation syntax will remain the same so that documents prepared for the current version of ܨܒܪܐ will still be processable by Ω and produce exactly the same results.

Inside nested Latin mode the preprocessor is totally inactive: nothing is changed, up to the next </L>, <S>, <E>, or <C>. Similarly, when you are in (nested) Latin mode and enter into a (doubly nested) Syriac mode, everything is as in usual Syriac mode, with the only difference that when you leave it you are back in (nested) Latin mode, and so on...[11]

The figure below illustrates the nesting property of nesting modes:[12]

```
                    ...
          <E>  ...  </E>
     <L>  ...  ...  ...  </L>
<S>  ...  ...  ...  ...  ...  </S>
```

2.4 Transcription of Syriac consonants and long vowels

The Syriac transcription of letters (consonants and long vowels) is given in tables 1 (Serto), 2 (Estrangello) and 3 (East Syriac), pages 9–10 of the appendix.

Here is a simple example of code producing non-vowelized Syriac text:
`<S>tuub qTygwRys d'rysTTlys pylsuup'</S>` will produce

— ܛܘܒ ܩܛܝܓܘܪܝܣ ܕܐܪܝܣܛܛܠܝܣ ܦܝܠܣܘܦܐ, in Serto;

— ܛܘܒ ܩܛܝܓܘܪܝܣ ܕܐܪܝܣܛܛܠܝܣ ܦܝܠܣܘܦܐ, in Estrangello (<E> and </E> instead of <S> and </S>);

— ܛܘܒ ܩܛܝܓܘܪܝܣ ܕܐܪܝܣܛܛܠܝܣ ܦܝܠܣܘܦܐ, in East Syriac (<C> and </C> instead of <S> and </S>).

Some notes concerning the transcription of letters of tables 1–3:

There is no distinction between isolated, initial, medial and final forms; these are automatically applied by TEX.

Some letters have multiple transcriptions: `'` or `aa` for *olaph*, `w` or `uu` for *waw*, `h` or `ee` for *he*, `y` or `ii` for *yud*. These produce exactly the same results: choosing between them can make transcribed input more readable, especially when the text is not vowelized (for example, when used as *mater lectionis*, long vowels are more readable when transcribed as vowels, etc.).

In section 1.4, p. 2 we mentioned the two forms of Serto isolated *olaph*. If the rules described in that section are to be followed, then no extra precaution need to be taken: the transcription `'` will produce a straight or a curved *olaph* depending on the context. To disobey the rules, two extra transcriptions are given: `'|` will produce a straight isolated *olaph*, and `'@` a curved one, under ALL circumstances. So, for example, the exceptions seen in 1.4, p. 2 ܐܳܐܰܪ and ܕܺܐܒܳܠ are input as `<S>'@A'@ar</S>` and `<S>di'|bAl</S>` respectively.

In section 1.5, p. 3 we gaved rules about the typesetting of the *olaph-lomad* ligature. Once again, these rules are automatically applied by ܣܕܪܐ. To transgress them, one can use the same transcriptions as in the previous paragraph: `'@` for a curved *olaph* (the logical choice, since we are necessarily at word begin) or `'|` for a straight one. Here are some example: `<S>'alAhA'</S>` to obtain ܐܰܠܳܗܳܐ (god), `<S>'elA'</S>` for ܐܶܠܳܐ (to bewail) but `<S>'@Alep</S>` for ܐܳܠܶܦ (thousand).

Transcription `s|` stands for the two-form *semkath*. This letter will be typeset in isolated or final forms only, while usual `s` will have all four forms (isolated, initial, medial and final). The transcription `s+` is used for the (two-form) letter *semkath* with tail.

2.5 Transcription of Syriac vowels and diacritics

There are many systems of Syriac vowelization, and often more than one of them are used simultaneously. ܣܕܪܐ provides four types of vowels:

[11] The number of times you can enter a mode inside a mode, is given by the preprocessor internal variable `MAX_STATE_STACK_SIZE` which by default is set to 16. Besides switching from Syriac to Latin and back, you can also switch to Garshuni Syriac (see 2.6, p. 6) or from one Syriac script to another.

[12] For people with LATEX experience, it may be enough to say that every ܣܕܪܐ mode corresponds to a LATEX environment.

1. Greek vowels (see table 4, p. 11);
2. Vowel points (see table 5, p. 11);
3. East Syriac vowels (see table 6, p. 11);
4. Jacob of Edessa vowels (these are not diacritics but real letters) (see table 7, p. 12).

These vowels can be used in the same context: a word can very well contain for example Greek and East Syriac vowels: ܫܡܥܘ ܡ̈ܠܐ ܕܡܠܟܗܘܢ (listen the words of their king).

In two cases (inverted Greek vowels and Jacob of Edessa vowels), there are alternate input methods. If one has to typeset texts which have more inverted Greek vowels than regular ones, or more Jacob of Edessa vowels than Greek ones, one can enter into "inverted vowel" (or "Jacob of Edessa vowel") mode. This is done by typing `<INVVOW>` (resp. `<JACVOW>`). Once entered in one of these modes, the transcription of vowels changes, as indicated in the table. This behaviour of the pre-processor continues until the user exits the mode (by typing `</INVVOW>` or `</JACVOW>` respectively).

2.6 Transcription of Garshuni letters and diacritics

Garshuni is Arabic written in the Syriac script. Since the Arabic language has a few more sounds than Syriac, new letters had to be introduced: these are pre-existing Syriac letters with additional dots or strokes[13]. The Garshuni transcription used in ܦܫܝܛܐ is exactly the same as in the الأمل (*Al-amal* = "hope", in Arabic) system, the Arabic part of ScholarTEX system.

This means that the transcription used to typeset Arabic *language* in Syriac script, is DIFFERENT from that used to typeset Syriac *language*, although the letters themselves are mostly the same. The transcription used for Garshuni is described in tables 11, p. 14 (Serto), 12, p. 15 (Estrangello) and 13, p. 16 (East Syriac), for the consonants and long vowels and in table 10, p. 13 for the Arabic vowels and diacritics.

This transcription is only valid in "Garshuni mode": to enter Garshuni mode, one has to do the following steps: (a) entering into Syriac mode (by typing `<S>` for Serto, `<E>` for Estrangello or `<C>` for East Syriac), and (b) enter into Garshuni mode, by typing `<G>`. So, for example, the famous Arabic "welcome"

أَهلاً و سَهلاً

is transcribed `<A>'aahlAaN wa sahlAaN</A>` in الأمل; to typeset it in Syriac Serto script we just have to write `<S><G>'aahlAaN wa sahlAaN</G></S>`. Here is the result:

ܐܗܠܐ ܘ ܣܗܠܐ

The reader must realize that these "modes" have to be *nested*: if one enters Syriac mode and then Garshuni mode, then one must *first* leave the later and *then* the former.[14]

[13] There seem to be many ways of adapting Syriac script to the Arabic language; the author has chosen to follow the one suggested by G. Kiraz. Have there been Persian or Turkish texts written in Syriac script? The author would be grateful on any information related to this question.

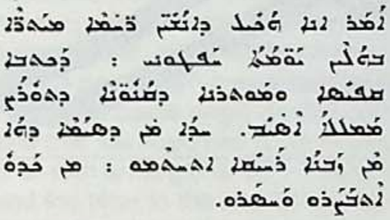
[14] This is not the case for the "inverted vowel" mode and the "Jacob of Edessa vowel" mode: these can be entered and exited at any time, without nesting with Syriac mode. To be more precise we should call these "pseudo-modes", or "global flags".

2.7 Stretching letter connections (کشده)

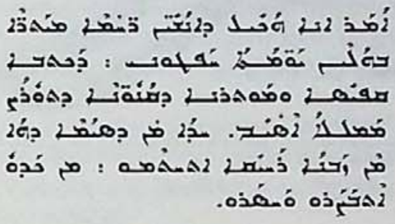
As in Arabic, Syriac words are never hyphenated. To balance white space on each line, one stretches connections between initial and medial, or medial and final forms of letters. This stretching is called کشده "keshideh" (a Persian word, derived from the verb کشدن, "to stretch", see [1, p. 171]).

In ܣܦܪܐ, stretching of letter connections is not activated by default. To activate it, one uses the preprocessor directive `<KESHIDEH>` (and `</KESHIDEH>` to desactivate it). This is not a "mode" in the sense of `<G>` (Garshuni mode) or `<L>` (Latin mode) and hence doesn't need to be nested with respect to Syriac mode.

Here is an example of the use of letter connection stretching:



Without letter connection stretching



With letter connection stretching

3 Notes on the design of the fonts

The Serto, Estrangello, and East Syriac fonts have been designed in the METAFONT language. Characters are described by mathematical equations (1st and 3rd degree polynomials, known as Bézier curves), using *parameters*. These parameters define the weight, scaling, optical correction and style of each character and of the entire font. The author has tried to follow traditional Syriac types as much as possible: inspirative sources have been kindly provided by G. Kiraz.

Syriac scripts carry so much beauty and offer so many challenges to the designer that giving even a half-complete description of the designing process of these fonts would be too long for this paper. The author only retained a specific phenomenon of the Serto script, which he believes will be of interest to type designers even unfamiliar with the Syriac language and script:

3.1 Anti-symmetry of Serto letters *lomad* and *'e*

One of the most interesting challenges in type design is the art of making symmetric letters look different. It is a known fact that older types (such as the Elzevirs or Venitian ones) are more readable than modern sans-serif ones; this is in part a consequence of small distinguishing features between letters which otherwise "would look too much alike". In the Helvetica type, letters 'b', 'd', 'p' and 'q' are just reflections and rotations one of each other; in Garamond, their shapes are significantly different, so that a reflected 'p' is not identical to a 'q', and so forth.

In Serto, a similar problem arises with letters *lomad* and *'e*: as can be seen in the following table, in principle *'e* can be seen as a *shortened lomad*:

Form	Isolated	Initial	Medial	Final
lomad	ܠ	ܠ	ܠ	ܠ
'e	ܥ	ܥ	ܥ	ܥ

How did Serto type designers make it easier for the eye to distinguish between these letters? By giving them **different angles.** We are talking about the angle of the main stem of these letters (or of the two parallel stems, in the case of the isolated and final forms). The following table gives the angle of these stems, when tracing them downwards and from left to right:

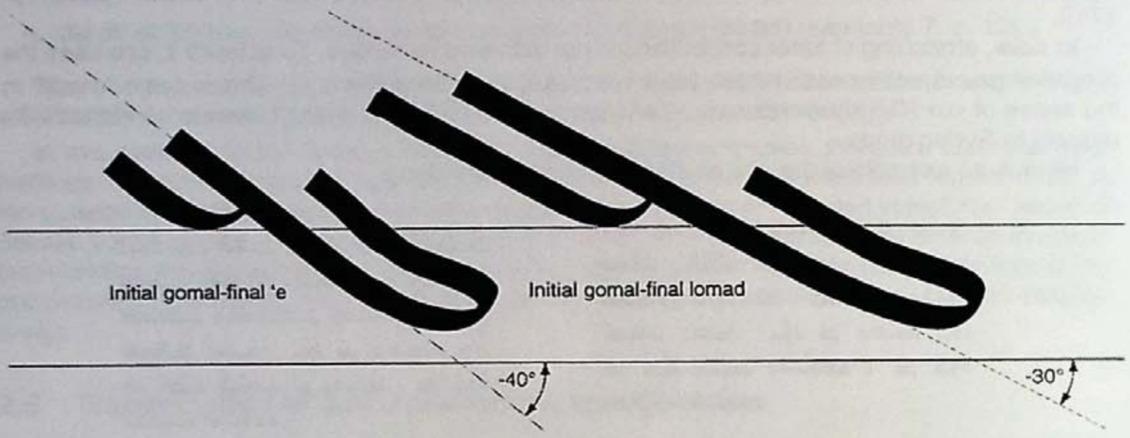


Figure 1: The Serto isolated *gomal-lomad* and *gomal-'e* ligatures

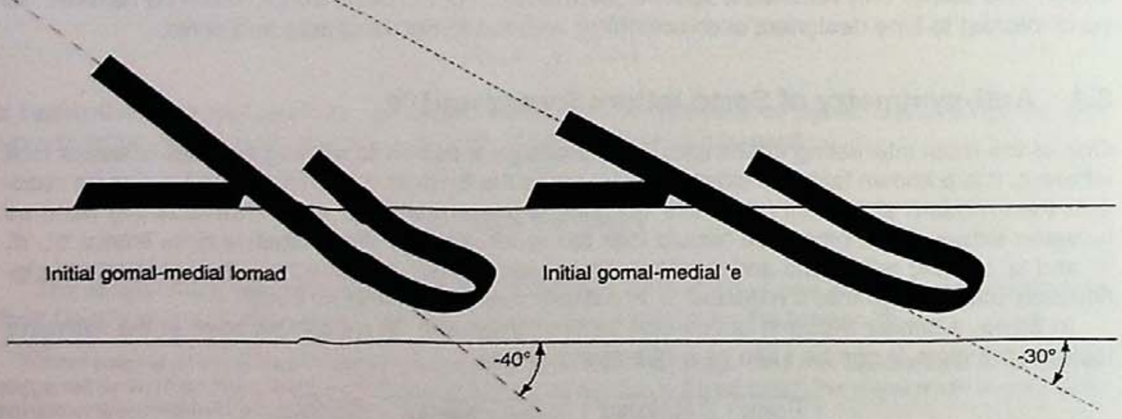


Figure 2: The Serto initial *gomal-lomad* and *gomal-'e* ligatures

Form	Isolated	Initial	Medial	Final
lomad	-30°	-40°	-40°	-30°
'e	-40°	-30°	-30°	-40°

This is what we call "anti-symmetry" of these two letters: whenever one of them has an angle of -30°, the other one (in the same contextual form) has an angle of -40°. Here is what it gives when these letters are close to each other:

ܠܥܠ ܥܠܥ

The story doesn't ends here. One of the most beautiful Serto letter combinations is the *gomal-lomad* one, because that long straight *lomad* stroke is drawn as a continuation of the equally long *gomal* stroke: ܓܠ (to bubble). This means that the *gomal* stroke must have exactly the same angle as the *lomad* one, and that these two letters should be specially drawn to fit together.

What happens now when *gomal* is followed by an *'e* rather than by a *lomad*? Once again the *gomal* must have the same angle as this letter.

This means that we need two *gomals*: one for the (final) *lomad*, with an angle of 30°, and one for the (final) *'e*, with an angle of 40°. The amusing part is that the former will fit also exactly to the (medial) *'e* and the later to the (medial) *lomad*. These ligatures are illustrated on figures 1 (*gomal* followed by final letters) and 2 (*gomal* followed by medial letters).

Of course ܡܥܒܕܪ chooses automatically the right form of letter *gomal*.

4 Tables

4.1 Syriac consonants and long vowels

ܐ	ܒ	ܓ	ܕ	ܕ	ܗ	ܘ	ܙ	ܚ
'	b	g	d	D	h, ee	w, uu	z	x
ܛ	ܝ	ܟ	ܠ	ܡ	ܢ	ܣ	ܣ	ܥ
T	y	k	l	m	n	s	s+	`
ܦ	ܝ	ܩ	ܪ	ܪ̈	ܫ	ܬ	ܐ	ܐ
p	Y	q	r	R	S	t	'|	'@

Table 1: Syriac Serto letters and their input codes

ܐ	ܒ	ܓ	ܕ	ܖ	ܗ	ܘ	ܙ	ܚ
'	b	g	d	D	h, ee	w, uu	z	x
ܛ	ܝ	ܟ	ܠ	ܡ	ܢ	ܣ	ܤ	ܥ
T	y	k	l	m	n	s	s+	‘
ܦ	ܨ	ܩ	ܪ	ܪ̈	ܫ	ܬ	ܐ	ܐ
p	Y	q	r	R	S	t	'|	'@

Table 2: Syriac Estrangello letters and their input codes

ܐ	ܒ	ܓ	ܕ	ܖ	ܗ	ܘ	ܙ	ܚ
'	b	g	d	D	h, ee	w, uu	z	x
ܛ	ܝ	ܟ	ܠ	ܡ	ܢ	ܣ	ܤ	ܥ
T	y	k	l	m	n	s	s+	‘
ܦ	ܨ	ܩ	ܪ	ܪ̈	ܫ	ܬ	ܐ	ܐ
p	Y	q	r	R	S	t	'|	'@

Table 3: East Syriac letters and their input codes

In normal mode:	a	A	e	i	u
In inverted mode:	<INV>a	<INV>A	<INV>e	<INV>i	<INV>u

In normal mode:	<INV>a	<INV>A	<INV>e	<INV>i	<INV>u
In inverted mode:	a	A	e	i	u

Table 4: Greek vowels and their input codes (type <INVVOW> to enter "inverted mode", </INVVOW> to exit)

<.>, .a, .o	<_.>, .e, .i

Table 5: Vowel points and their input codes

/a	/A	//A	/E

//E	le, /e	/o	/u

Table 6: East Syriac vowels and their input codes

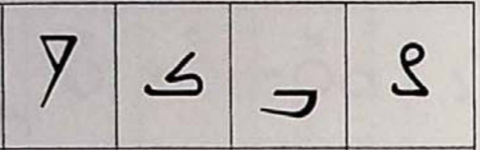
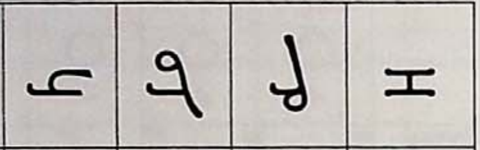
				
In default mode:	<JAC>a	<JAC>E	<JAC>e	<JAC>I
In Jacob of Edessa mode:	a	E	e	I
				
In default mode:	<JAC>i	<JAC>U	<JAC>u	<JAC>u/
In Jacob of Edessa mode:	i	U	u	u/

Table 7: Jacob of Edessa vowels and their input codes (type <JACVOW> to enter "Jacob of Edessa vowels mode", </JACVOW> to exit)

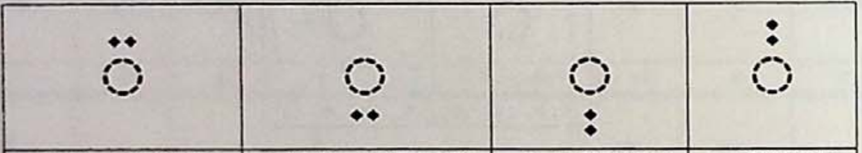
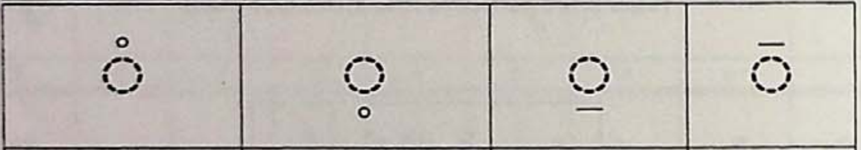
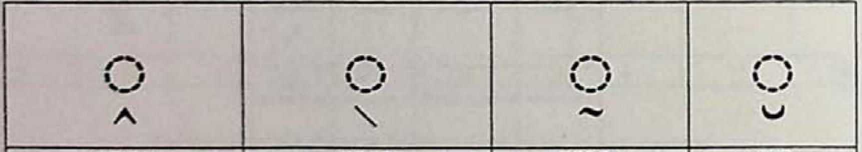
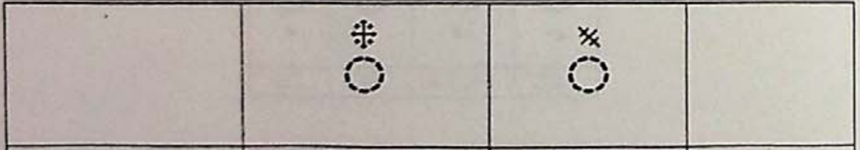
			
<PLU>, <SEYAME>	<_PLU>, <_SEYAME>	_", <_SHWAYA>	", <SHWAYA>
			
<QUS>, <QUSHOYO>	<RUK>, <RUKAKHA>	<_LIN>	<^LIN>
			
<MEGA>	<KILO>	<TILDA>	<CUP>
			
	<BAREKH>	<QSO>	

Table 8: Miscellaneous Syriac diacritics

;	,	+:	\:	/:
:, |: [15]	.	::	<<	>>

Table 9: Syriac punctuation

4.2 Arabic written in Syriac script (Garshuni)

a	"a	i	u	:	*	aN	iN
uN	*a	*"a	*i	*u	*aN	*iN	*uN

Table 10: Garshuni vowels and their input codes (type <G> to enter "Garshuni mode", </G> to exit)

[15] The transcription |: for : becomes necessary in Garshuni mode, because of a conflict with one of the *sukun* diacritic (see table 10).

ء (ء)	ܐ (ا)	ܐ̄ (آ)	ܐ̈ (ٱ)	ܐ̇ (أ)
||	A	'A	"A	'a
ܐ̣ (إ)	ܘ̇ (ؤ)	ܝ̇ (ئ)	ܒ (ب)	ܗ̈ (ة)
'i	'u	'y	b	"t, "h
ܬ (ت)	ܬ̣ (ث)	ܓ̰ (ج)	ܚ (ح)	ܟ݂ (خ)
t	t_	g	H	h_
ܕ (د)	ܕ̤ (ذ)	ܪ (ر)	ܙ (ز)	ܣ (س)
d	d_	r	z	s
ܫ (ش)	ܨ (ص)	ܨ̇ (ض)	ܛ (ط)	ܛ̇ (ظ)
S	Y	D	T	Z
ܥ (ع)	ܥ̇ (غ)	ܦ (ف)	ܩ (ق)	ܟ (ك)
'	G	p, f	q	k
ܠ (ل)	ܡ (م)	ܢ (ن)	ܗ (ه)	ܘ (و)
l	m	n	h	w, U
		ܝ (ي)		
		I, y		

Table 11: Garshuni Serto letters and their input codes (type <G> to enter "Garshuni mode", </G> to exit)

ء (ء)	ܐ (ا)	ܐ (آ)	ܐ (آ)	ܐ (أ)
||	A	'A	"A	'a
ܐ (إ)	ܘ (ؤ)	ܝ (ئ)	ܒ (ب)	ܗ (ة)
'i	'u	'y	b	"t, "h
ܬ (ت)	ܬ (ث)	ܓ (ج)	ܚ (ح)	ܟ (خ)
t	t_	g	H	h_
ܕ (د)	ܕ (ذ)	ܪ (ر)	ܙ (ز)	ܣ (س)
d	d_	r	z	s
ܫ (ش)	ܨ (ص)	ܨ (ض)	ܛ (ط)	ܛ (ظ)
S	Y	D	T	Z
ܥ (ع)	ܓ (غ)	ܦ (ف)	ܩ (ق)	ܟ (ك)
‘	G	p, f	q	k
ܠ (ل)	ܡ (م)	ܢ (ن)	ܗ (ه)	ܘ (و)
l	m	n	h	w, U
		ܝ (ي)		
		I, y		

Table 12: Garshuni Estrangello letters and their input codes (type <G> to enter "Garshuni mode", </G> to exit)

ء (ء)	ܐ (ا)	ܐ̄ (آ)	ܐ (ٱ)	ܐ (أ)
||	A	'A	"A	'a
ܐ (إ)	ܘ (ؤ)	ܝ (ئ)	ܒ (ب)	ܗ̈ (ة)
'i	'u	'y	b	"t, "h
ܬ (ت)	ܬ (ث)	ܓ (ج)	ܚ (ح)	ܟ (خ)
t	t_	g	H	h_
ܕ (د)	ܕ (ذ)	ܪ (ر)	ܙ (ز)	ܣ (س)
d	d_	r	z	s
ܫ (ش)	ܨ (ص)	ܨ (ض)	ܛ (ط)	ܛ (ظ)
S	Y	D	T	Z
ܥ (ع)	ܓ (غ)	ܦ (ف)	ܩ (ق)	ܟ (ك)
‘	G	p, f	q	k
ܠ (ل)	ܡ (م)	ܢ (ن)	ܗ (ه)	ܘ (و)
l	m	n	h	w, U
		ܝ (ي)		
		I, y		

Table 13: Garshuni East Syriac letters and their input codes (type <G> to enter “Garshuni mode”, </G> to exit)

5 Examples

5.1 Serto script, Syriac language

ܒܘܪܐ

ܡܫܝܚܐ ܒܗܘ ܕܒܟܬܒܐ ܣܘܪܝܝܐ ܒܣܘܦܘ ܩܕܡܝܐ ܐܢܫ ܘܦܪܘܩܢ.
ܘܡܠܟܘܬܗ ܡܫܝܚܐ ܠܡܫܝܚܘܬܗ ܠܒܢܝܢܐ ܫܘܪܝܐ ܐܚܝܕܐ
ܘܐܬܚܬܡ. ܘܐܢܘܢ ܚܝܐ ܘܡܟܬܒܐ ܕܡܘܬܐ ܘܕܝܢܐ ܠܟܠܗܘܢ ܥܡܡܐ
ܐܘܪܚܐ ܫܡܗ ܘܟܬܒܗ. ܘܡܠܟܐ ܚܝܐ ܕܐܝܬܘܗܝ ܦܪܘܩܐ ܗܘ ܗܘ
ܗܘ ܦܩܕ ܘܐܬܓܠܝ
ܐܡܪ: ܐܢܐ ܗܘ ܕܚܠܝܢ ܘܐܚܪܝܢ ܕܢܚܬܐ ܡܢܗܘܢ ܒܗܘܢ ܡܘܬܐ
ܡܫܝܚ: ܕܡܠܐ ܡܫܝܚܐ ܘܡܠܐܟܐ ܕܡܠܟܐ ܘܐܘܪܚ ܡܫܟܚܐ ܐܢܫ.
ܚܕܐ ܡܢ ܕܚܕܐ ܕܗܝ ܡܢ ܐܚܝܐ ܕܚܝܐ ܐܠܗܐ: ܡܢ ܒܪܗ ܐܬܓܠܝ
ܡܫܝܚܗ. ܕܐܬܐ ܕܝܢ ܕܡܠܟܐ ܠܐ ܢܬܒܥܘܢ ܟܠ ܚܕܐ ܕܚܕܐ
ܕܒܫܡܝܐ ܐܬܓܠܝ. ܡܢܟܘܢ ܐܢܫ ܕܒܡܫܝܚ ܕܐܬܒܥܘܢ. ܘܒܟܠܗ
ܡܠܟܘܬܗ: ܠܟܠܗܘܢ ܕܐܬܐ ܘܡܫܝܚܐ ܗܘܢܐ ܕܚܝܐ
ܕܒܟܬܒܐ ܡܫܝܚܐ ܡܢ ܡܟܬܒܢ ܢܘܗܪܐ ܕܒܪܫܝܬܐ ܕܩܕܝܫܐ
ܡܫܝܚܐ. ܘܒܟܠܗܘܢ ܐܬܐ ܕܗܘܐ ܕܡܠܐ «ܕܒܪܫܝܬܐ ܩܕܝܫܐ» ܒܫܡܐ
ܘܠܫܡܝܐ. ܟܠ ܚܕ ܚܕ ܕܝܢ ܡܢ ܦܘܩܕܢܐ: ܕܢܘܗܪܐ ܩܕܝܫ ܐܘܫܥܐ
ܐܡܪ ܕܢܘܗܪܐ ܘܕܚܠܬܐ ܕܗܘܐ ܟܠܗ ܡܫܝܚܐ ܠܟܠ ܢܒܝܐ.
ܘܟܬܒܐ ܕܡܫܝܚܐ ܘܐܘܪܚܐ ܢܬܒܥܘܢ ܘܢܗܘܘܢ

5.2 Serto script, Arabic language (Garshuni)

ܐܠܡܠܟ ܐܠܒܪܟܗ

ܘܡܢ ܩܐܠ ܐܠܟܬܒ ܒܝܢ ܐܠܟܬܒ، ܘܐܠܡܟܬܘܒ ܒܝܢ ܐܠܡܟܬܘܒ، ܘܒܝܢ
ܢܘܪ ܐܠܐܝܡܐܢ ܐܠܡܩܕܣ ܒܝܢܗ، ܘܡܩܕܣܐ ܐܠܐܝܡܐܢܗ ܐܠܡܣܝܚܝܗ
ܡܢܙܠܗ ܡܣܝܚܝܗ ܐܠܟܢܝܣܗ ܒܟܠ ܐܓܡܥܗܐ. ܘܡܢܗܐ ܐܠܡܣܝܚܝܗ
ܦܝ ܐܠܟܢܐܝܣ ܢܬܒܥ ܡܣܝܚܝܗ ܒܝܢ ܓܐܡܥܗܐ ܒܡܠܟ ܟܠܗܐ ܘܟܠ

ܘܗܘ ܟܬܐܒ ܐܘ ܡܟܬܘܒ
ܘܐܚܝܪܐ ܐܠܐ ܢܩܘܠ ܐܢܗ ܠܝܣ ܦܝܗ ܐܠܟܬܐܒ ܐܣܗܠ ܐܠܟܬܒ ܐܠܐܫܥܐܪ،
ܦܪܐܣܗ ܐܘ ܝܠܐ ܐܚܕ ܡܢ ܡܠܐܐ، ܐܘ ܗܡܠ ܦܝ ܟܠܡ ܥܪܝ ܡܢ ܟܬܒ
ܥܡ. ܝܟܘܢ ܐܢ ܐܘܗܕ ܦܝ ܐܠܟܬܐܒ ܠܐܟܬܡܘܡܠ.
ܒܢܘܥ ܐܠܐܡܪܐ ܐܠܡܟܬܘܒܬ ܒܡܟܬܒ ܟܡܟܬܘܒ، ܘܡܠܪܐ ܦܝ
ܐܠܟܪܝܡ ܐܠܡܫܠܪ ܦܝܗ ܐܓܐܘܐ ܡܢ ܡܟܠ، ܣܠܐ ܘܪܟܒ ܐܠܐ
ܐܠܟܬܒ ܐܠܬܝ ܡܠܐܡ ܦܝܗ ܐܠܬܟܠ ܐܠܪܐܟܣ، ܦܪܐܐܗ ܟܠܟܠ
ܐܡܠܡܗ ܦܡܠܟܬܗ ܡܬܝ ܐܠܟܬܐܒ، ܐܘܠܗ ܐܠܐܘܟܝܗ ܟܟܗ
ܐܠܟܪܝܡ ܐܠܬܝ ܡܘܪܟܠ ܐܠܐ ܐܠܣܝܡܩܬ ܐܠܡܫܡܘܪܬ.

5.3 Serto script, Jacob of Edessa vowels

ܟܬܒ (ܐܡܝ)، ܐܥܣܝ (ܐܝܣܝ)، ܚܠܠܣܦ (ܚܒܝܣܘ)، ܐܠܦܪܘܐܝ
(ܐܘܦܘܝ)، ܠܬܚܠܐܐ (ܠܚܬܡܠܐ)، ܗܦܩܠ (ܗܦܘܠ)، ܐܦܩܠ
(ܠܦܘܠ)، ܙܚܠܠܐ (ܙܟܘܠܐ)، ܘܚܠܠܐ (ܘܟܘܠܐ)، ܚܝܟܠܐ (ܚܝܘܠܐ)،
ܙܚܠܐ (ܙܟܘܠܐ)

5.4 Estrangello script, Syriac language

ܡܘܬܪܐ

ܥܘܗܕܢܐ ܠܗܘ ܕܠܒܢܝܐ ܗܘܢܝܐ ܒܡܘܬܗ ܦܪܝܫܐ ܢܦܫ ܘܡܕܪܡ.
ܘܡܠܦܢܘܬܗ، ܡܚܝܢܐ ܠܥܠܝܬܗܘܢ، ܠܡܕܢܚܐ ܗܘܢܝܐܝܬ ܐܝܟ ܕܐܦ ܘܐܡܠܡ.
ܐܬܚܙܝܬ ܒܝܫܪܐ ܘܡܠܦܢܐ ܡܗܝܪܐ ܕܒܬܗ ܠܡܬܚܫܢܘ ܥܩܪܐ
ܐܪܡܝܐܝܬ ܗܘܐ ܘܠܫܡܗ. ܘܠܟܠܗ ܫܢܬܐ ܕܪܘܘܬܗ ܦܪܘܣܬܐ ܟܗ
ܟܕ ܟܗ ܦܝܡܐ ܘܬܪܒܝܗ
ܐܟܪ ܐܝܟ ܗܟܢܐ ܕܐܢܫܝܢ ܪܢܫܐ ܡܢܬܪܐ ܒܗܠܝܢ ܢܘܟܪܝܐ
ܫܘܠܡܐ : ܕܟܠܒܐ ܡܦܫܩܐ ܘܡܬܪܓܡܢܐ ܕܡܠܬܐ ܕܬܘܪܝ ܡܡܠܠܐ
ܐܦܢܝܢ. ܫܪܐ ܡܢ ܕܗܟܢܐ ܕܗܘܐ ܡܢ ܐܝܟܢܐ ܐܢܫܐ ܐܬܚܫܒܘ :
ܡܢ ܟܕܘ ܐܬܟܪܙܘ ܘܫܦܪܘ. ܕܐܬܪܬܝܢ ܐܢܝ ܕܥܩܪܐ ܠܟ ܢܗܘܘܢ ܟܠ

ܩܢܘܢܐ ܕܒܠܘܟܐ ܕܟܦܠܘܬܐ ܕܫܘܬܦܘ. ܡܢܠܗ̇؛ ܕܐܣܝ ܕܠܡܬܠܐ
ܕܒܬܘܗܝ. ܘܠܗܘܢ ܕܐܬܠܬܘܗܝ : ܠܕܡܟܬܒܢ ܕܟܬܒܐ ܘܫܒܝܚܬܐ
ܗܢܘܢܐ ܕܚܝܕܐ ܠܚܠܦܘܢܐ ܫܘܡܗܐ ܡܢ، ܘܠܡܚܣܘ ܢܘܗܪ ܕܕܪܡܫܘܘ
ܕܗܡܝܢܘܢܐ ܦܘܩܕܢ. ܘܠܗܘܢܘܢ ܬܐܣܝܐ ܒܗܘܢܐ ܒܠܘܟܐ «ܕܕܪܡܘܫܐ
ܥܪܘܟܐ» ܚܢܝܢ ܘܠܡܘܫܐ. ܟܠ ܣܢ ܣܢ ܕܝܢ ܡܢ ܦܘܫܩܐ : ܕܕܘܪܝܐ
ܡܕܡ ܐܝܘܦܩܢ ܐܚܪܢ ܕܪܘܫܒܐܝܬ ܘܕܠܠܐܝܬ ܠܗܘܢܐ ܠܥܢܢܐ ܥܒܝܕܐ
ܛܠܢܐ ܢܐܠܦܘܢ. ܘܠܡܫܡܫܐ ܕܘܫܢܐ ܘܐܪܙܐ ܢܥܡܘܢ ܘܢܪܦܘܢ

5.5 Estrangello script, Arabic language (Garshuni)

ܐܠܦܨܠ ܐܠܬܐܣܥ

ܘܩܕ ܦܐܬ ܐܠܝܘܡ ܒܥܕ ܐܠܝܘܡ، ܘܐܠܐܣܒܘܥ ܒܥܕ ܐܠܐܣܒܘܥ.
ܘܠܡ ܢܓܕ ܐܠܐܡܝܢ ܐܠܐܚܒܐܪ ܬܕܠܢܝ، ܘܟܬܪܬ ܐܠܐܡܝܢܗ
ܐܠܡܣܝܚܝܗ ܡܢ ܦܪܢܣܗ ܡܬܓܘܠܗ ܐܠܟܬܐܒ ܥܠܝ ܐܓܘܒܗܐ. ܘܟܠܡܐ
ܐܣܬܡܥܬ ܦܝ ܐܠܟܢܐܝܣ ܬܟܬܪ ܡܣܪܚܗ ܒܠ ܓܐܡܥܗܐ ܠܡܐ،
ܠܢܗܐ ܡܠ ܗܘ ܟܐܢ ܐܘ ܡܟܬܘܒ
ܘܐܓܪܐ ܐܡܬ، ܢܥܡ ܐܪܣܠ ܦܝܗ ܐܠܓܐܡܥ ܐܫܥܪ ܐܠܠܗ
ܬܒܐܪܟ، ܦܟܐܢܬ ܐܡܗ ܐ ܐܓܪ، ܡܢ ܟܐܬܐ، ܐܘ ܗܡܟܐ ܦܝ
ܓܠܣ ܥܪܝ ܡܢ ܓܡܝܥ ܫܝ. ܒܥܕ ܐ ܐܡܪܟ ܦܝ ܐܠܟܢܐܝܣ
ܠܐܠܫܥܘܒܐ.
ܓܪܚܬ ܐܠܐܚܒܐܪ ܐܠܡܬܓܘܗܗ ܒܡܟܬܒ ܟܬܒܗܐ. ܘܟܐܢܬ ܦܝ
ܐܠܛܪܝܩ ܐܠܢܫܐܪ ܦܝܗ ܐܓܪܐܗܐ ܡܢ ܩܒܠ، ܫܝ، ܘܢܠܬ ܒܠ
ܐܠܟܠܡ ܐܠܬܝ، ܢܥܡ ܦܝܗ ܐܠܬܟܠ ܐܠܡܐܠܝ. ܦܐܢܬ ܟܐܠܫܗܐ
ܐܟܐܟܗ ܦܫܐܠܬܗ ܗܢܝ، ܐܠܟܢܝ. ܐܢܗ ܐܢܬܠܝ ܥܠܝ ܐܠܛܪܝܩ
ܐܠܬܝ، ܢܬܪܟ ܒܠ ܐܠܡܣܝܚܝܗ ܐܠܟܬܘܒܝܗ.

5.6 Estrangello script, Jacob of Edessa vowels

ܟܬܒ̈ (ܐܡܬ̈). ܫܡܥܘܢ (ܫܡܥܘܢ). ܒܠܫܢ (ܒܠܫܢ). ܐܠܦܗܐ،

(ܐܘܪܗܝ). ܠܒܝܬܐܪܡܝܐ (ܟ̈ܬܒܬܐ). ܣܦܝܪܐ (ܣܦܘܪܐ). ܛܪܝܨܐ
(ܛܘܪܟܐ). ܝܠܕܬܐ (ܝܠܕܘܬܐ). ܕܗܡܠܬܐ (ܕܗܘܬܐ). ܒܪܫܬܐ
(ܒܪܘܬܐ). ܝܠܫܬܐ (ܝܠܘܬܐ)

5.7 East Syriac script, Syriac language

ܬܘܕܝܬܐ

ܫܘܒܚܐ ܠܗܘ ܕܠܠܥܠ ܗܘܕܥܐ ܒܫܘܩܝܘ ܡܕܝܢܬܐ ܬܝܢ ܘܪܡܙܬ.
ܘܡܠܦܢܘܗܝ. ܡܫܬܐ ܠܥܠܡܘܗܝ. ܠܗܘܬܐ ܗܘܕܥܐ ܐܠܗܐ ܘܐܬܠܒ.
ܘܐܬܪܘܬ ܒܫܪܐ ܘܡܠܦܢܐ ܡܗܝܪܐ ܕܝܠܦܘܗܝ ܠܬܠܡܝܕܐ ܫܦܝܪܐ ܐܬܪܐܝܬ
ܗܘܘ ܘܠܫܡܗ. ܘܠܥܠܡ ܚܝܐ ܕܒܪܘܚܘܗܝ ܦܪܘܩܐ ܕܗ ܟܠ ܕܗ
ܦܬܚܘ ܘܐܬܪܚܡܘ
ܐܡܪ ܐܢܐ ܗܘܝܬ ܕܐܬܝܢ ܕܫܡܐ ܡܗܝܪܐ ܒܗܠܝܢ ܢܘܟܪܝܐ ܣܦܪܘܗܝ :
ܕܟܬܒܐ ܡܦܫܩܐ ܘܡܬܡܠܝܢ ܕܡܢܘܬܐ ܕܗܘܝܢ ܡܠܟܐ ܐܦܢ. ܣܓܝ ܡܢ
ܕܫܡܥܐ ܕܗܘܐ ܡܢ ܐܒܘܗܝ ܕܫܡܝܐ ܐܬܚܙܝܘ : ܡܢ ܟܬܒܐ ܐܬܟܬܒܘ
ܘܫܡܥܘ. ܕܐܬܪܘܗܝ ܕܝܢ ܕܝܠܦܘܢܐ ܠܐ ܢܗܘܘܢ ܥܠ ܡܕܝܢܬܐ ܕܟܬܒܐ
ܕܟܦܝܢܐ ܐܬܗܦܟܘ. ܡܢܠܗܘܢ ܐܝܟ ܕܠܡܫܠܡ ܕܠܗܘܢ. ܘܠܦܘܢ
ܬܠܡܝܕܘܗܝ : ܠܐܬܪܘܬܐ ܕܒܝܬ ܘܦܠܚܝܢ ܒܝܬܐ ܕܝܫܘܥ ܠܡܠܦܢܐ
ܗܘܝܢܐ ܡܕܝ ܡܠܦܢܐ ܢܘܗܪܐ ܕܒܪܘܚܐ ܕܩܘܕܫܐ ܫܦܝܪܐ.
ܘܠܝܘܬܢܐ ܗܕܝܪܐ ܒܗܘܢܐ ܟܠܗܝܢ «ܕܒܪܘܚܐ ܩܕܝܫܬܐ» ܟܬܒܐ
ܘܐܬܟܬܒ. ܥܠ ܚܕ ܚܕ ܕܝܢ ܡܢ ܦܘܩܕܢܐ : ܕܘܟܪܢܐ ܡܕܡ ܐܘܦܟ
ܐܝܟܢ ܕܐܬܩܛܠ ܘܕܠܠܗܘܢ ܠܗܘܢ ܠܟܠܢܐ ܥܒܕܝܢ ܬܠܡܝܕܐ ܬܠܡܘܗܝ.
ܘܠܗܘܢ ܕܗܘܐ ܘܐܬܦܬܚ ܢܚܡܘܗܝ ܘܢܕܥܘܗܝ

5.8 East Syriac script, Arabic language (Garshuni)

ܐܠܡܘܠܕ ܐܠܡܓܝܕ

ܘܠܕ ܦܝܗ ܐܠܢܒܝ ܟܢܬ ܐܠܢܒܝ، ܘܐܠܡܣܝܚ ܟܢܬ ܐܠܡܣܝܚ، ܘܟܠ
ܢܘܪ ܐܠܡܓܕ ܐܠܡܥܒܕ ܟܒܝܪ، ܘܡܥܗ ܐܠܡܠܐܝܟܗ ܐܠܣܡܐܘܝܗ

ܡܢ ܡܕܝܢܬܐ ܡܫܒܚܬܐ ܕܐܘܪܗܝ ܗܢܐ ܐܦܪܝܡ܂ ܘܟܠܗ ܕܐܘܪܗܝܐ ܒ
ܕܠܡܕܪܫ ܢܦܩܘ ܡܠܦܢܐ ܐܝܟ ܦܪܘܫܐ ܠܗܕܐ ܠܥܠܡ ܗܘ ܗܘ ܟܕܪܘܡ
ܐܘ ܡܢܗܘܢ

ܘܐܦܪܝܡ ܐܦ ܗܘ ܐܣܬܪ ܒܗ ܕܐܦܪܝܡ ܐܦܪܝ ܕܠܠܗ ܗܝܡܢܐ،
ܦܪܝܫ ܐܢ ܐܝܟ ܐܦܪܝ ܡܢ ܡܠܐ، ܐܘ ܗܘܐ ܒ ܦܠܓ ܥܕܢ ܡܢ ܦܠܓ
ܥܡ. ܐܝܟ ܐܢ ܐܘܪܗܝ ܒ ܕܠܫܢ ܠܐܠܫܡܫܐ.

ܒܕܪܗ ܕܐܬܪܢܐ ܕܠܡܕܝܢܬܐ ܒܪܥܢ ܡܟܢܫܐ، ܘܡܢܢܗ ܒ ܕܠܡܕܪܫ
ܕܠܡܫܢܐ ܒܗ ܐܦܪܝܐ ܡܢ ܡܠܟ، ܗܢܐ ܘܡܠܟܗ ܐܝܟ ܕܠܟܘܢ ܕܠܒܝ
ܡܢܗ ܒܗ ܕܠܡܠܟ ܕܠܫܢܐ، ܦܪܢܗ ܐܠܗܐ ܐܝܩܪܗ ܦܪܢܣܗ
ܗܢܝ ܕܠܟܘܢ، ܕܪܟܗ ܕܢܗܪܬ ܥܠ ܕܠܡܕܪܫ ܕܠܒܝ ܢܘܪܐ ܐܝܟ
ܕܠܫܪܫܐ ܕܠܡܫܡܫܢܘܬܐ.

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Title: Syriac Wordprocessing on the PC: MLS, UniType and UniVerse
By: Linda Brandt, Gamma Productions Inc.
Demonstration by: Chip Coakley, Harvard University

INTRODUCTION:

Gamma Productions first introduced Syriac fonts for its Multi-Lingual Scholar version 3.0 in 1986. The Syriac language module was designed by Alaph Beth Computer Systems, and it was a major breakthrough for Syriac writing on the IBM PC because it not only supported automatic contextual character shapes but it also had full right to left and bi-directional editing capability. This was a first in the PC marketplace.

Gamma went on to improve Multi-Lingual Scholar for Syriac with release 3.2 which included the significant typographic addition of the *keshida,* which is the automatic "stretching" of the connecting points between characters to fill a block justified line without leaving gaping wholes as word spaces. The *keshida* enabled the computer output to emulate fine hand writing.

Multi-Lingual Scholar 4.0 was released with larger point sizes, "what you see is what you get" editing, style sheets, columns and several additional features that were useful for academic writing.

By 1993, Microsoft Windows began gaining in popularity as the operating system of choice for IBM PC compatibles, and Gamma turned it's development work to Windows applications.

Our first Windows product was Gamma UniVerse, which, like Multi-Lingual Scholar for DOS is a multilingual word processor. Unlike Multi-Lingual Scholar, however, Gamma has not added several features much needed by the academic writers, particularly columns and footnotes. Therefore, this product has not been popularly used by this audience.

Gamma has put most of its Windows development work into a utility for adding language support to existing applications, called Gamma UniType. Over the years of producing dedicated word processing applications, Gamma often received criticisms from customers that what they really wanted was something to use *with* Word or WordPerfect, not instead of Word or WordPerfect. UniType is such a product. UniType is a utility that facilitates typing foreign languages – even those with complex character sets such as Syriac – directly into standard Windows applications.

OVERVIEW OF GAMMA UNITYPE:

UniType allows you to switch among multiple languages in any Windows application. For Syriac and other right to left languages, UniType provides the automatic contextual character forms, correct diacritic positioning and right to left typing. As you type the Syriac text, UniType sends it directly to the active application such as Word, PageMaker, CorelDraw etc. It is not limited to word processing but can be used with any type of application such as graphics, course authoring, and database programs.

Once the Syriac text is sent to the application, the application does not know that it is Syriac, only that it is a series of character codes using a specific (Syriac) font. The user then has the full use

of all the features of the main application – style sheets, graphics, tables, footnotes, columns etc. Having use of the full range of features of the major applications is a major benefit of using an add-on utility versus a self contained word processing application. Although the right to left and bi-directional editing and also the multi-lingual ease of use will not be as smoothly integrated when using an add-on as when using a dedicated application, the issue is that to date, the dedicated multilingual applications have been developed by smaller companies whose applications cannot compete feature-wise with those from the top companies such as Microsoft, Novell/WordPerfect or Lotus.

Until recently right to left text was a limiting feature of add-ons. However, with release 1.7 of Gamma UniType, it is now considerably easier to write paragraph-oriented right to left text. Because the popular word processing applications don't automatically support right to left word wrap in their left to right versions, this information must somehow be provided to the application after-the-fact. Gamma's solution is to type the right to left text (for which UniType automatically provides the correct direction) with a carriage return at the end of each line, and then run a macro on the paragraph which reformats it with the correct line breaks. A second macro is provided to enable you to edit an existing paragraph and change the font size or margins, and again reform the text with the correct line breaks. Although this is a two-step process compared to the automatic word wrap in a self-contained word processor that supports bi-direction (such as Multi-Lingual Scholar), the benefit of the two-step process is to have access to all the features of a top of the line word processor which does not have integral bi-directional support.

Gamma UniType supports TrueType and Postscript fonts. For Syriac (Western, Eastern and Estrangelo), Gamma provides TrueType fonts. Characters can be edited or new fonts can be made by anyone using an off-the-shelf TrueType or Postscript font editor as long as the character codes for the new font match the character codes in Gamma's fonts. Using the TrueType fonts provided by Gamma, the Syriac text will print from any Windows application to any Windows supported printer, including high resolution Postscript Typesetters.

In addition to being an end user product for typing foreign languages, Gamma UniType is a developer's tool for adding foreign language support to other applications. An Application Programming Interface (API) is provided for developers to talk directly to UniType from their application. Let's say that someone is writing a Syriac grammar program with a course authoring tool that includes a programming or macro language. The developer could use the programming language to talk directly to UniType to provide the Syriac language support to the tutorial program. Bundling licenses are available for redistribution of Gamma's software.

As a useful real-life example of writing to the UniType API, Gamma includes macros for Word and WordPerfect to 1) integrate UniType into the word processor such that a single hot key will select the language, change the keyboard layout and change the font; and 2) facilitate right to left word wrap. Just as Gamma has used the Word and WordPerfect macro language to talk to UniType, so can the developer integrate UniType into a custom application.

Gamma UniType is a 32 bit application using Unicode technology. Because it is 32 bit, it is designed to run on Windows NT and Windows '95 as well as Windows 3.1.

A word about Unicode: Unicode is a specification of how to code and implement all of the world's languages in one double-byte character set. Unicode solves the problem of supporting multiple language fonts in a single application, whereas in the past one character set would need to be

replaced by another in order to support multiple languages. Because Unicode supports over 65,000 characters in one code page, it eliminates many problems caused by 256 character single byte font limitations.

The Unicode specification was developed by a consortium of major computer industry companies such as Apple, Microsoft, IBM, Xerox, Lotus, Novell, Sun and many more. Although you will not find it in many end user applications yet (Gamma has the first full Unicode multilingual retail products in the marketplace), Unicode is the native coding scheme of Windows NT and Novell operating systems, and Unicode is being specified now by many government agencies and corporations who are making their future purchasing decisions with multilingual interests in mind.

OVERVIEW OF GAMMA UNIVERSE:

Gamma UniVerse is a simple editor. Although it is limited in features, it's language features are excellent and seamlessly integrated. Features such as bi-directional word wrap, *keshida,* editing existing multilingual text, and saving files as Unicode files distinguish it from UniType. However, because it is a simple editor, it is not usually satisfactory for academic writing.

Gamma UniVerse is currently being revised for increased performance but it will remain a simple editor. It will not be developed into a full featured word processor, as the feedback from existing and potential users shows a strong preference for an add-on solution such as UniType vs. a self-contained application.

OVERVIEW OF MULTI-LINGUAL SCHOLAR:

Multi-Lingual Scholar 4.1 (MLS) offers the three styles of Syriac as a DOS solution. Although not as full featured as a program such as WordPerfect, MLS is feature full and many camera ready manuscripts have been produced with it. It supports columns (side by side or newspaper), footnotes, style sheets, page numbering and many other features.

MLS uses bit-map fonts and not TrueType or Postscript outline fonts. The negative of this is that although the fonts can be scaled, the quality of the scaled fonts is less than perfect. Therefore, for publication quality, a bit map font needs to be made and optimized for each desired point size.

For this purpose, Gamma includes the Font Scholar in the MLS package. Font Scholar is a bit-map font editor that allows you to modify the character shapes, add additional characters to an existing font, or create entirely new font designs. Font Scholar includes many features to make font editing simple, such as importing scanned images, "borrowing" shapes from existing characters and then modifying them, and cutting and pasting "pieces" of characters. Any additions to the fonts can be added to the available keyboards with the keyboard map editor.

FUTURE DEVELOPMENT:

Most of Gamma's future development revolves around the Unicode technology on top of which Gamma UniType is built, which we call International Language Interface (ILI).

Gamma has licensed ILI to other developers including developers of electronic dictionaries and also an SGML editor. As additional products using Gamma's Unicode technology come into the marketplace, end users will be able to share resources for use with all compatible applications. For example, the Syriac fonts, complete with "smart" keyboard entry and right to left support will be able to be used in these products that support ILI.

UniType will continue to be improved with more plug-in features such as word and phrase translation. Just as now you can spell check (in the available languages) text as you are typing with UniType loaded, the translation module will let you get translations for words and phrases as you are typing your text.

In addition, Gamma plans to publish a specification for adding new spell checking engines, for making new language data files (for supporting currently unsupported languages or code pages), and for making new keyboard layouts.

CONCLUSION:

For Windows users doing most types of scholarly writing, Gamma UniType provides a useful solution in facilitating the Syriac and other language text entry into existing Windows applications. Although by its nature as an add-on, there are still some shortcomings in the handling of bi-directional text in comparison to dedicated word processing applications with integrated bi-directional support, there are the many advantages of having full access to the complete range of features of the major applications. In addition, the learning curve is very small because the user need not learn a whole new application.

Gamma UniType also offers the flexibility of an API for users who wish to integrate language support into another application. Integration is via a DDE interface and, for a Windows programmer experienced with DDE, the work involved usually only takes a few days.

For DOS, Multi-Lingual Scholar offers a flexible solution using high quality bit map fonts. Because DOS is no longer a growing area for developers, MLS is currently a supported product although it is no longer continuing to be developed. However, for users looking for a dedicated word processing application that fully supports right to left and bi-directional editing and has sufficient features to produce most kinds of camera ready manuscripts, MLS is certainly an excellent option.

Nisus Writer, an Amazing Word Processor for Syriac

by Wonmo Suh

A word processor handling Syriac for IBM compatible computers was introduced into scholarly world as early as 1988. In his article at the fifth Syriac Symposium in Louvain, Kiraz mentioned that the usefulness of a Syriac word processor should be measured in its capability of contextual analysis (one letter per key, the shape of characters changes automatically according to their position) as well as that of handling bi-directional editing, vowels, and diacritical marks.[1] Here Kiraz introduced a word processor called Multi-Lingual Scholar (MLS) as a very satisfactory and sophisticated program handling Syriac. Considering such early development of Syriac computing on the IBM compatible computers, Syriac computing on the Macintosh computers which started around

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[1]George Anton Kiraz, "Computers: Innovation and New Feature to Syriac Studies", in Réne Lavanant, S.J. ed., V Symposium Syriacum 1988, Orientalia Christiana Analecta 236 (Roma: Pont. Institutum Studiorum Orientalium, 1990), 451-458.

two years ago seems to be far behind. However, it is my pleasure as a Macphile to suggest that the Macintosh environment has made great strides to close this gap. Here I want to introduce a multilingual word processor handling Syriac for the Macintosh computers, called Nisus Writer.

Nisus as a Word Processor

A software called Nisus which is developed by Paragon Concepts Inc. has been unknown to most of Mac users until recently in U.S.A. However, this is not true for other countries. There are Hebrew, Arabic, and Korean versions of Nisus that have been in existence for many years. And in these countries Nisus has gained fame as a sophisticated word-processor. Because of Nisus's recent revision (Nisus 4.0), it is now emerging in the U.S. as a new popular word processor on the Macintosh in par with Microsoft Word and WordPerfect.

Nisus Writer, of course, has all the basic features of writing and formatting tools: footers and headers, footnotes and endnotes, and spelling checks and thesaurus, electronic bookmarks and cross-references, easy-to-edit and automatically expanding glossaries, indexes and table of contents. It also has a small built-in drawing program. Furthermore, there are several powerful features for which no other word processor can match: "undo/ redo" an unlimited number of times, noncontagious selection and rectangular selection, a powerful macro language, and a ten-compartment clipboard. It can also read aloud English, French, Spanish, German, or Italian text.

In addition to these, there are two other important features of Nisus Writer, in particular, designed for scholars and students: (1) Find and Replace (2) Gloss. Nisus Writer provides three levels of find and replace functions. It can find almost everything (e.g. paragraph rulers, graphics, character formats). It can also search across multiple documents even when they are not active, or resident in memory. The Gloss function is originally developed in Nisus for the Japanese language. Nonetheless, it can be utilized within any language to attach notes on selections of text (e.g., grammatical notes, correct forms or meanings etc.).

Of course, there are a few down sides to Nisus Writer. In comparison with Microsoft Word and WordPerfect, Nisus cannot match their table editor feature. In that, Nisus's tables cannot exceed one page length. Also the features of Nisus's table editor are not fully integrated with the main program of Nisus Writer. Critics regard its mail merge function as too complicated.[2] However, I think such weakness does not matter to scholars and students. I would boldly say that Nisus Writer can be your favorite English word-processor. Foremost, as far as I know, Nisus Writer is the best word-processor on the Mac which can handle multilingual texts.

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[2]For evaluation of Nisus Writer in comparison with other popular wordprocessors such as Microsoft Word and WordPerfect, see MacUser (April, 1995) and Mac World (March, 1995).

Nisus as a Multi-lingual Word Processor

From the inception, Nisus was designed as a multilingual processor. It now fully supports Hebrew, Arabic, Farsi, Russian, as well as many Eastern European languages.[3] One can easily add Korean, Japanese and Chinese to its multilingual features with the help of Apple Language Kits.

Furthermore, Nisus can now fully support Syriac. There are now two Syriac fonts available for the Macintosh computers: one from Ecological Linguistics and the other from Linguist Software called Laser Syriac. Ecological Linguistics develops both Syriac and Estrangelo. Its fonts work with the Arabic system and have full diacritical marks and vowels and allow to enter one letter for one key (the shape of characters automatically changes according to their positions). Laser Syriac font, developed by Linguist Software, uses the Hebrew system and it has only Estrangelo. Although it does not have the feature of one letter for one key, in terms of sorting and searching, Laser Syriac font works with Nisus as perfectly as the Syriac fonts from Ecological Linguistics.

Nisus Writer's multilingual features are excellent. It is the only word processor which takes full advantage of Apple's Word Script technology, faithfully following guidelines set by Apple. This means that Nisus Writer can add to its system any script system which will be developed and released by

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[3]For these languages, you should buy Nisus's Language kit which includes all of them in one package.

Apple or by other companies which follow its guidelines. It also means that Nisus embodies full facilities of multilingual computing, not only writing directions and keyboard systems but also sorting and searching. It can be rightly assumed that all the word processing features (Glossary, Macro, Find and Replace, Gloss, Editing, Headers, Footers, Footnotes etc.) are fully available in multilingual computing in Nisus. Here I want to highlight some of Nisus's multilingual features with special focus on Syriac.

With Syriac fonts made by Linguist Software and Ecological Linguistics, you can:

1) write from right to left. Changing fonts from English to Syriac automatically sets the writing direction. By one click, you are fully ready for entering Syriac texts. The change from English to Syriac is the same. If you want, you can choose other keyboard systems by one click (for example, Arabic, Hebrew, or Persian keyboard systems).

2) With Nisus you can correctly sort Syriac texts. I think this is one of great strength of Apple's World Script technology and Nisus. It doesn't matter whether the text has diacritical marks and vowels or not. With one click, Nisus can perfectly sort the text. If you have a text with various languages, Nisus sorts according to the first character in a paragraph in the following order: Romanic, Japanese, Chinese, Korean, Arabic, Hebrew, Cyrillic, Thai, and Eastern European. Hence, making indexes and table of contents from a document of mixed languages in Nisus is very simple and convenient. Furthermore, Nisus has the Word List macro by which it creates the list of all the words in a document. You can edit

this world list and make indexes in an automated way by means of this list. However, at present, this feature does not operate with Hebrew, Arabic, Syriac, or Farsi language. Nisus will hopefully implement this feature in a future version.

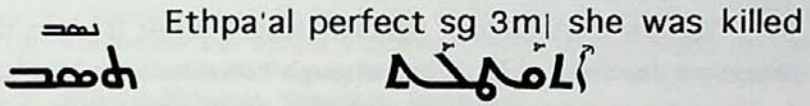
3) As previously mentioned, Nisus has a very powerful search feature. This is also true in multilingual computing. Unlike other word-processors, you can enter the Syriac in the Find and Replace boxes and paste Syriac texts into them. With Nisus, you can search, ignoring diacritical marks and vowels. Nisus considers the final forms of the letters of Kaph, Mim, Nun as the equivalent of their medial forms. You can find Syriac (Arabic or Hebrew) words according to their tri-literal roots. Furthermore, in documents with mixed scripts, Nisus performs script sensitive search. For example, in a document containing English and Syriac, Nisus can search through either Syriac or English text. You can also select the portion of a multilingual text written in a specific language at once.

4) Word processing in Syriac is just as easy as in English. You can edit your Syriac text (e.g., cutting, pasting, and copying) as easily as an English text. You can also make footnotes in Syriac with great ease. With Nisus, you can mix all languages on the same line with no trouble. When the cursor moves into a region of text of another language, the font and direction are automatically changed. However, if you want to insert text at the boundary between texts of different directions, you should be careful, for an invisible border exists between text of different directions.

5) Gloss function is another significant feature of Nisus for studying foreign languages. With this function, you

can place text notes above a selection. Nisus centers a gloss above the text, and the gloss can include spaces and characters in any language. When you want to gloss in Syriac, you cannot see Syriac characters in the Gloss box, but they appear in the main text. I found this function very useful for learning Syriac. If you use Find and Replace function, you can add glosses over the same words in the text automatically. However, there is one limitation. Within the same gloss, you can have only one font, size and style.

[Examples of Gloss function]



Compatibility

Nisus Writer is readable by most other word processors, but only as unformatted text. Nisus Writer can read the documents written by Microsoft Word without any conversion, but one need an ASCII conversion to read in Nisus a document made by the word-processors other than Microsoft Word. You can open your Syriac text written by Nisus in other word processors. Laser Syriac font performs such conversion smoothly. But as for a mixed document (such as English and Syriac), conversion is not easy without a special utility program.

Since IBM compatible computers first started Syriac

computing, and since electronic data so far have been stored by those computers, it will be great that Mac users have an access to those data. What is nice for Nisus Writer is that it has a very powerful Macro language, so that Nisus will be the first to allow such conversion if it is possible. Here I want to assert that Syriac computing for Mac already has begun and that the Syriac computing project in the future should take it into consideration. In this, TLG (Thesaurus Linguae Graecae) CD ROM project is a good model.

Conclusion

Unlike Multi-Lingual Scholar, Nisus Writer is a word-processor for the public. It has enough conveniences and full features for word-processing and desk-top publishing that it can be used as one's favorite word processor, far and above Microsoft Word or WordPerfect. I think this is a great strength of Nisus Writer, for my experience shows that it takes a while to get accustomed to new software. Therefore, to have all the word processing features and multilingual capabilities in one program is a great advantage. Furthermore, as in other popular word-processors, upgrading to a newer version is very convenient (companies provide reasonable discount price). Hence, as far as Nisus keeps multilingual features, -- I am sure it will -- you may do your Syriac computing in par with the development of the computer technology. What is best, the company offers academic price. I am sure that Nisus, with its own powerful features and advanced multilingual capabilities, will make your Syriac computing work a joyous experience.

Syriac and related alphabets on the Macintosh

L. Anderson
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May 2, 1995

Abstract

There are many advantages of the Macintosh Worldscript operating environment for Syriac and related alphabets. These include:

a) compatibility with any application which is worldscript compatible. The capability to use Syriac for example is not restricted to a single application.

b) Ease of keyboarding: no need to choose initial medial and final forms or special ligatures

c) Sorting

d) Searching

e) Interoperation of a wide range of scripts in the same documents, using the same operating system supports

f) Automatic switching between left-to-right and right-to-left for those scripts which do this, merely by font shift

g) Illustrations in this paper focus on Syriac (Serto and Estrangelo are structured for nearly automatic conversion merely by font shift), working in both Arabic and Hebrew worldscript systems; illustrations will include a number of other scripts related to Syriac, even Mandaic, Parsig, Parthian, Middle Persian, Psalter, Pahlavi varieties, Sogdian varieties, Avestan, Kharosthi, probably Nabatean, Samaritan, and more.

Part II

Manuscript Cataloguing and Bibliographies

Syriac manuscripts at Harvard:
an on-line catalogue

J. F. Coakley

Houghton Library at Harvard University houses a collection of 181 Syriac manuscripts. This communication describes a project to make catalogue information on these manuscripts accessible through the University Library's on-line public access catalogue.

The collection

An account of the collection of Syriac manuscripts at Harvard may be found in the catalogue by Moshe H. Goshen-Gottstein published in 1978.[1] It is, however, a rather personal account, following the author's own part in helping to organize the collection; and because at one or two points it can be improved upon, I will give an analysis of the collection again here by way of introduction.

Syriac manuscripts came to Harvard from the following sources.

1. Two manuscripts (the present mss. 1, 136) came to the Harvard College Library as donations, in 1863 and 1923 respectively. (They are the only manuscripts in the collection which actually belong to the Library, the rest being deposited.) They will have been moved to Houghton in 1942 along with the rest of the books and manuscripts from the Treasure Room in Widener Library.

2. Fourteen manuscripts (mss. 2-13, 175, 181) are deposited by the United Church Board for World Ministries, the body which is the successor to the American Board of Commissioners for Foreign Missions. They are part of the great collection of A.B.C.F.M. archives which came to Houghton in 1942. Six of the manuscripts (mss. 2-5, 12, 13) are old church books brought back to the U.S.A. by early missionaries to the Church of the East in the 1840s and 1850s. These, it seems, had for long lain unattended (since the turn of the century, in a locked chest of drawers known only to be 'full of old stuff') in the Board's offices in Boston. The other eight manuscripts, of which five are in Modern Syriac, were written during the days of the mission itself. They were probably among the archives which had previously been kept at the Andover-Harvard Library.[2] Ms. 181 was only turned up among uncatalogued A.B.C.F.M. material and identified in 1994.[3]

3. The rest of the collection (165 items) is the property of the Harvard Semitic Museum. The Museum began to remove its collection of manuscripts to Houghton perhaps when

Houghton was first opened, but the bulk were not moved until 1959, and one final transfer (ms. 180) was made in 1994. The earlier history of this group of manuscripts can be pursued in the archives of the Museum,[4] from which the following sequence emerges.

a. Among the very first accessions of the Museum, in March 1890, were six Syriac manuscripts, bought from J. H. Shedd, a missionary in Urmia, Persia. These were East Syrian manuscripts (mss. 141, 156, 158, 159, 162, 165), five being charms.

b. Two other East Syrian manuscripts came as gifts in the Museum's first year (mss. 142, 177), the former a beautiful *Gazza*.

c. Six manuscripts were bought in 1893, two (mss. 137, 138) by Prof. George Foot Moore from a dealer, and four (150, 155, 157, 174) directly from a certain Rabi Baba who had some sort of association with the Urmia mission and had come to America to get himself supported while writing a Syriac dictionary.

d. In 1900 there was a larger acquisition consisting of 21 manuscripts bought from the estate of Isaac H. Hall. The collecting activities of Hall extended to books and manuscripts, many acquired from the Middle East, and it is a pity that his collection is not documented anywhere.[5] The manuscripts (mss. 143-9, 151-4, 160-1, 163-4, 166-70, 178) are with one exception East Syrian, and probably all derive, again, from the mission at Urmia.

e. Also in 1900 the Museum bought two old West Syrian volumes (mss. 139, 140) through the A.B.C.F.M. They had been sold by the priest of the village of Basabrina to the missionary A. N. Andrus. One of the manuscripts has a large crater caused by fire damage, and was said to have been rescued from a burning church during the Armenian troubles of 1895.

f. The largest collection of manuscripts to come to the Museum (mss. 14-135, 176, 179, 180: a total of 125 items, still making up the majority of the present Houghton collection), was acquired from the British scholar and collector J. Rendel Harris. Most of these came in one lot in 1905. To explain why he wanted to sell his collection, Harris told Moore, with whom he was corresponding, that 'I am beginning to see the end & wind up' – a comment made again, however, eight years later when he sold a further lot of manuscripts to the John Rylands Library, Manchester.[6] The Syriac volumes on offer to Harvard had the numbers 1-134, missing however a few numbers corresponding to books (as he put it) 'sacrificed some years since to a rich private collection, when I was at a low ebb financially'. At first some Armenian manuscripts were included in the offer, but then (since the Semitic Museum would not in the

nature of the case take the same interest in these) he set a price for the Syriac only at £1350. Moore and David Lyon the curator successfully applied to Jacob Schiff, the Museum's chief benefactor, for the money, although there seems to have been some trouble and in the delay they almost lost the manuscripts to Yale. Harris retained several manuscripts to work on them and only sent them to Harvard in 1915. At some point he also sent an album of photographs of the former Harris Syr. 1, one of the volumes previously 'sacrificed'.[7] This album (now ms. 180) remained at the Museum until 1994 when it came to Houghton.

g. Finally, in 1922, after it had virtually ceased its acquisitions, three more manuscripts came to the Museum (mss. 171-3, two Melikite and one West Syrian) from a Dr. F. Grote.

Three generations of catalogues

Harris had written to Moore that he hoped some American scholar would work on his collection, but the first scholar to do so was British. Lewis H. Titterton, a graduate of Cambridge (St. John's College, 1923) with a First in oriental studies, was awarded the Choate Memorial Fellowship in 1924 and came to Harvard to prepare a catalogue of the Syriac manuscripts as a doctoral thesis. Unfortunately he never submitted the thesis. His fellowship was not renewed after the first year, and although he stayed a second year it was evidently not quite long enough for him to finish. However, the typescript which he left behind him is a practically complete catalogue covering all the Syriac manuscripts then in the Semitic Museum. Titterton aimed at the level of detail to be found in Wright's British Museum catalogue, and his descriptions are generally both full and accurate. Morale may have been low at the Semitic Museum where Titterton was working, but it is still a mystery why his important catalogue should have been left in this state, unpublished and unnoticed. Where Titterton went from Harvard I do not know. He does not seem to have done any further scholarly work. The typescript itself was lost and only reunited with the collection in Houghton in 1963.

A generation or more after Titterton, in 1960, Moshe Goshen-Gottstein began to work on the Syriac manuscripts at Harvard. The story of his involvement with the collection is told by himself and need not be repeated here. Attention may simply be called to his disclaimers of expert competence in the field of Syriac studies, and to his comment (p. 10) that when Titterton's catalogue was rediscovered he should have given up his own project. He did not give it up, however, and his catalogue of the Houghton collection (and some other collections in an appendix) was published in 1978. This catalogue now furnishes a better starting-point for anyone using the collection than Titterton's typescript. It is published and generally available; it includes the whole collection, not just the Semitic Museum items; it is keyed to the present call numbers of the manuscripts rather than the old Harris and Semitic Museum numbers; and its references to secondary literature are naturally more timely. It is also interesting for the

various quotable *obiter dicta* of its author which it contains. Its chief inadequacy lies in its summary descriptions which give only very short indications, under the rubric 'details', of the contents of composite volumes.

The present writer joined the manuscript department at Houghton in 1993 with some idea of compiling a new catalogue that would subsume and improve on the two existing ones. What form such a catalogue would take, and whether, if it had to be an entirely new publication, it would repay the rather great trouble of producing it, were, however, questions which had to be considered first. In the event it was a short apprenticeship in cataloguing in the MARC (*MAchine Readable Cataloguing*) format, and a new acquaintance with Harvard's on-line public catalogue HOLLIS, which led to the realization that my questions had been overtaken by developments in library technology.[8] A new 'catalogue' which would consist of bibliographic records in HOLLIS would have a number of advantages over a published book. One of these advantages was that it would be a practicable and realistic project, over against a hard-copy catalogue which, however useful to have, would never be urgent and might probably never be finished. The other advantages may be summarized as follows.

1. *Accessibility*. As it is realized that bibliographical questions which used to require leg-work can now often be answered without leaving one's desk, the activity of searching remote library catalogues on line has become familiar to more and more scholars. Since HOLLIS is accessible to anyone who is connected to the Internet, it follows that the bibliographic records for the manuscripts would actually be more easily available there than in a published book. This point was doubted by some colleagues in Syriac studies to whom I mentioned the project a year or more ago, but I think it will be increasingly obvious as electronic communications of all kinds become more generally familiar.

2. *Searchability*. The ability of records to be indexed and turned up quickly by various kinds of searches is one of the chief advantages and attractive features of MARC cataloguing. I shall mention this point again with an example below.

3. *Improvability*. Records on computer databases are by their nature alterable. In the case of HOLLIS records, the alterations may be made by anyone with the appropriate password, anonymously, and without leaving any trace of the previous form of the record. (This is one reason why library catalogue records are not considered the intellectual property of the cataloguer, even when the cataloguing may have required considerable research.) A disadvantage of this state of affairs is perhaps that it makes it difficult for a catalogue record to be the object of a scholarly citation. On the other hand, it makes it possible for errors in attributions and mistaken readings to be corrected, for extra precisions to be introduced, and even – should the trouble be taken – for references to secondary literature to be updated.

Against these advantages of an on-line 'catalogue' of manuscripts, there were some considerations in the opposite direction. In the first place, although HOLLIS had many records for manuscripts, almost all of these were for archives and modern personal papers, and there was little collective experience in the Harvard library system (nor, as a matter of fact, was there much in any other institution) of making records for older codices. This was an incidental difficulty, but there were others of a more fundamental kind.

1. *Transliteration of Syriac.* Although the MARC format is in principle able to deal with non-Roman alphabets, few systems have this capability in practice and HOLLIS is not among them. Even if future plans call for supporting other alphabets, it is hardly to be expected that the turn of Syriac will come very soon. Any Syriac in a catalogue record must therefore be in transliteration. This would be seriously tiresome to the reader if the record needed to contain a lot of Syriac text, but for other reasons (which I shall return to mention in a moment) that is usually excluded anyway. A more immediate problem with transliteration is that the Library of Congress has no special system for transliterating Syriac,[9] and proposals from Oxford and Harvard over the last year or more have so far not elicted any positive response. (In the examples at the end of this article I use the proposed, but so far not officially authorized, system.)

2. *General features of the on-line catalogue.* Catalogue records appear on a computer monitor, and have to be scrolled through or viewed one screen at a time. It is a maxim among cataloguers that no record will be read past the third screen; and even if our manuscripts should be exceptional, it is still true that the whole array of data about a manuscript cannot be shown to the eye all at once as it can on a page. The lack of typographical variation (no proportional spacing, italics, or small type, at least in the present system) also compares unfavourably with what is possible in print. All this constitutes a disincentive to including a lot of detail in one's catalogue record (e.g., a quotation of a colophon in full in Syriac and in translation).

3. *Particular limitations of the MARC format.* Since the design of the MARC format is by and large the product of printed-book cataloguing, some features of manuscripts are not well catered for in it. Chief of these is compositeness. A manuscript consisting of many bibliographically distinct items can have a printed description broken into paragraphs each including the necessary titles, incipit, references to publications, etc., for the item in question. In a MARC record where the 'fields' have a prescribed order and (in general) have to refer to the whole manuscript, such a presentation is not possible. In the examples to follow some of the resulting infelicities may be noticed. For a more comprehensive discussion, reference should be made to a recent and authoritative article by Hope Mayo

entitled 'MARC Cataloguing for Medieval Manuscripts: An Evaluation'. One of her conclusions may be quoted: 'MARC format cataloguing under the restrictions I have assumed will not accommodate all the fine points of information and detailed discussion of evidence that one expects to find in the best traditional manuscript descriptions.'[10] It is true that these 'best' descriptions are for western medieval manuscripts, and are more detailed than is the rule for Syriac; but the verdict still applies.

If no finding aid to the Harvard Syriac manuscripts already existed, it would be a legitimate question, in view of all these considerations, whether producing MARC records or a detailed catalogue of a traditional kind should have the priority. However, in the Syriac case the way forward clearly lay in the direction of the MARC cataloguing, and that is the project which is now under way.

Examples of MARC records for two manuscripts

The first example, MS Syriac 123, is a modern literary manuscript containing just two main works. For this item I reproduce here the record in the form in which the cataloguer creates it (using HOLLIS in 'technical services mode') and the same record as it is displayed to the user ('public mode'). The former shows the whole apparatus of the MARC format, and is included for the possible interest of other library cataloguers. Such specialists will know that the form of the record is dictated in a complex way by a combination of the format itself, the system which implements it, the cataloguing rules in use, and some decisions taken by the cataloguer.[11] (None of this needs to be discussed here.)

```
                                              LI812--HOLLIS CATALOGING  HC4E
 HU FMT: U ENCL: a C/DT: 04/05/95 U/DT: 04/28/95 STAT: n LGD: bm DCF: a CHK: 3
 LCMRC: ˇ LCCLAS:    0000 VENDOR:      PDTYP: s PDT1: 1903 PDT2:      CNTRY: mau
 LANG: syr REPROD:   MODREC: ˇ CATSRC: d

 100:0 : ¦a Jacob, ¦c of Edessa, ¦d ca. 640-708.
 245:10: ¦a Scholia on the Old Testament : ¦k manuscript, ¦f 1903.
 300/1:  : ¦a 119 leaves, bound : ¦b paper ; ¦c 25 cm.
 505/1:0 : ¦a Table of contents (incomplete; f. 3v) -- 1. Scholia by Jacob of
Edessa on Genesis (4v-26r) -- Exodus (26r-39v) -- Leviticus (39v-51v) --
Numbers (48r-51v including a lacuna indicated by white space, ff. 49-50) --
Deuternomony (51v-57r) -- Job (57r-61r) -- Joshua (61r-62v) -- Judges (62v-63v)
-- 2. Brief commentary on the Old Testament from the teaching of Ephrem and
Jacob of Edessa (64r-115v) -- colophon (115v).
 546/2:  : ¦a In Syriac.
 500/3:  : ¦a Acquired by the Harvard Semitic Museum from J. Rendel Harris,
1905 (accession no. 4055).  Deposited in Houghton Library, 1959.
 500/4:  : ¦a Written by the deacon Mattai the Syrian in Mosul in February 1903:
 copied from a manuscript written by one Yo.hanan in 1624/5, who could not find
a volume to copy for the end of the book, and died with the work unfinished.
 500/5:  : ¦a Serto hand with occasional vowels, rubricated, 24 lines per page.
 500/6:  : ¦a Page size 24 x 17 cm.; text area 20 x 12 cm.

 500/7:  : ¦a Western binding.
 524/8:  : ¦a MS Syriac 123.  Houghton Library, Harvard University.
 555/9:0 : ¦a Typescript description by L.H. Titterton available in the Library
(call no. B3674.150F*).
 510/10:4 : ¦a Baumstark, ¦c pp. 250-1
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510/11:4 : |a Goshen-Gottstein, |c pp.87-8.
655/1: 7: |a Manuscripts, Syriac. |2 lcsh
655/2: 7: |a Codices. |2 aat
630/3:00: |a Bible. |p O.T. |x Commentaries.
740/1:0 : |a Short commentary on the Old Testament from the teaching of Jacob
of Edessa.
740/2:02: |a Short commentary on the Old Testament from the teaching of Ephrem
and Jacob of Edessa.
700/3:0 : |a Ephraem, |c Syrus, Saint, |d 303-373. |t Short commentary on the
Old Testament from the teaching of Ephrem and Jacob of Edessa.
740/4:02: |a Pu˘saqa d-dyatiqi 'atiqta ayk d-baz'uryata men malpanuta d-
qadi˘sa Mary Ya'qob apisqopa d-Urhay.
740/5:02: |a Pu˘saqa d-dyatiqi 'atiqta ayk d-baz'uryata men malpanuta d-
qadi˘sa Mary Aprim wa-d-Mar Ya'qob apisqopa d-Urhay.
LOC/1:9p: |i hou |b MS Syriac 123 |x Semitic Museum deposit, 1959.
```

The following is the same record as it appears in the public mode of HOLLIS:

```
HU LONG DISPLAY                        Item 1 of 1 retrieved by your search:
FIND HN BBE7922
------------------------------------------------------HU HOLLIS# BBE7922 /mss
       AUTHOR: Jacob, of Edessa, ca. 640-708.
        TITLE: Scholia on the Old Testament : manuscript, 1903.
  DESCRIPTION: 119 leaves, bound : paper ; 25 cm.
     CONTENTS: Table of contents (incomplete; f. 3v) -- 1. Scholia by Jacob of
                 Edessa on Genesis (4v-26r) -- Exodus (26r-39v) -- Leviticus
                 (39v-51v) -- Numbers (48r-51v including a lacuna indicated by
                 white space, ff. 49-50) --Deuternomony (51v-57r) -- Job (57r
                 -61r) -- Joshua (61r-62v) -- Judges (62v-63v) -- 2. Brief
                 commentary on the Old Testament from the teaching of Ephrem
                 and Jacob of Edessa (64r-115v) -- colophon (115v).
        NOTES: Language note: In Syriac.
               Acquired by the Harvard Semitic Museum from J. Rendel Harris,
                 1905 (accession no. 4055).  Deposited in Houghton Library,
                 1959.
               Written by the deacon Mattai the Syrian in Mosul in February
                 1903; copied from a manuscript written by one Yo.hanan in
                 1624/5, who could not find a volume to copy for the end of the
                 book, and died with the work unfinished.
               Serto hand with occasional vowels, rubricated, 24 lines per
                 page.
               Page size 24 x 17 cm.; text area 20 x 12 cm.
               Western binding.
               Cite as: MS Syriac 123.  Houghton Library, Harvard University.
      INDEXES: Finding aids: Typescript description by L.H. Titterton available
                 in the Library (call no. B3674.150F*).
               References: Baumstark, pp. 250-1 Goshen-Gottstein, pp.87-8.
   FORM/GENRE: Manuscripts, Syriac.
               Codices.
     SUBJECTS: *S1 Bible. O.T.--Commentaries.
      AUTHORS: *A1 Jacob, of Edessa, ca. 640-708.
               *A2 Ephraem, Syrus, Saint, 303-373. Short commentary on the Old
                 Testament from the teaching of Ephrem and Jacob of Edessa.
 OTHER TITLES: Short commentary on the Old Testament from the teaching of Jacob
                 of Edessa.
               Short commentary on the Old Testament from the teaching of
                 Ephrem and Jacob of Edessa.
               Pu˘saqa d-dyatiqi 'atiqta ayk d-baz'uryata men malpanuta d
                 -qadi˘sa Mary Ya'qob apisqopa d-Urhay.
               Pu˘saqa d-dyatiqi 'atiqta ayk d-baz'uryata men malpanuta d
                 -qadi˘sa Mary Aprim wa-d-Mar Ya'qob apisqopa d-Urhay.

     LOCATION: Houghton: MS Syriac 123
```

It will be seen that HOLLIS takes the raw coding and re-formats it under headings AUTHOR, TITLE, DESCRIPTION, etc. for the display in the public mode. Most of this display should be self-explanatory. The level of detail which I have aimed at in this record, which is just under three screens long when looked at on a monitor, will also be evident. I decided not to reproduce the colophon, even in translation, though I have summarized the facts in it. One of the texts in the manuscript is edited (the scholia of Jacob of Edessa), but the record is not encumbered with the reference; the reader will be expected to find it by way of Baumstark. The other part of the manuscript (the combined commentary of Ephrem and Jacob) is not edited, and since there might be a question about the identity of the two texts I have given the titles in Syriac. They appear rather crudely as OTHER TITLES at the end of the record. This placement might be confusing if there were a number of such titles not linked to their corresponding entries in the Contents, but that is a limitation of the format as already mentioned above.

The second record is for an older and somewhat more interesting manuscript.

```
------------------------------------------------------HU HOLLIS# BBM0138 /mss
         TITLE: Stories of saints : manuscript, 1760 [1448 or 1449].
   DESCRIPTION: 154 leaves, bound : paper ; 18 cm.
      CONTENTS: 1. Story of Mar Shali.ta (ff. 83r-111v; beginning in the middle
                  of chapter 4) -- 2. The triumph, that is a small part of the
                  story of Mar Aksenaya who is Mar Philoxenus (111v-121v) -- 3.
                  Story of the chosen apostle Mar Thoma who evangelized India
                  (122r-174r) -- 4. Triumph of Mar Yo.hanan Daylamaya whose
                  monastery is in Persia near the city of Re'gan (175r-186v) --
                  5. Story of Mar Eulogius of the lion ('aryaya) from the
                  company of Mar Awgen (187r-236v) -- 6. Story of Mar Yo.hanan
                  of Kpane which is above the town of Za'z (236v; breaking off
                  after this leaf).
         NOTES: Language note: In Syriac and Arabic (some in Karshuni).
                Written by the deacon Addai son of the priest Malke in the year
                  1760 of the Greeks (f. 111v).
                Page size 18 x 13 cm.; text area 14 x 9 cm.
                Clear bold serto hand, 12-15 lines per page; rubricated.
                Colored geometric designs on ff. 111v, 121v, 174r, 175r.
                Marginal notes by later hands, some in Arabic, on ff. 107v,
                  108r, 110v, 111r, 153v, 154r, etc.
                In quires of 8 leaves, signed.  Only quires 5-23 and one other
                  pair of leaves are preserved.  Leaves are wanting after ff.
                  130, 137, 234, 236.  Ff. 131, 138 are blanks supplied by the
                  binder.
                Bound with Religious stories, [14--?].
                The Acts of Thomas is a shorter recension than the texts
                  published by Wright and Bedjan.
                Microfilm available in the Library (reel 116 no. 3).  Readers
                  are asked to consult this first.
                Acquired by the Semitic Museum from J. Rendel Harris, 1905
                  (accession no. 3964).  Depostied in Houghton Library, 1959.
                Cite as: MS Syriac 38. Houghton Library, Harvard University.
       INDEXES: Finding aids: Typescript description by L. H. Titterton
                  available in the Library (call no. B3674.150F*).
                References: Goshen-Gottstein, pp. 51-52.  No. 2: Expositor, 8th
                  series, 19 (1920):149-160.  No. 3: BHO 1186-1204.
    FORM/GENRE: Manuscripts, Syriac.
                Codices.

      SUBJECTS: *S1 Christian saints--Iran--Biography.
       AUTHORS: *A1 Addai, Deacon, son of Malke, scribe.
  OTHER TITLES: Acts of Thomas. Syriac.
      LOCATION: Houghton: MS Syriac 38
```

This item is in fact only part of a manuscript, since MS Syriac 38 is a volume bound together from two manuscripts, both of which lacked beginning and ending leaves and which happened to be of the same size and similar contents. The record shown here applies to the second half of the volume. It has no named author, and the title has had to be made up by the cataloguer. (In fact, the same was the case for the Jacob of Edessa volume, but it was less obvious.). The date is given in the somewhat cumbersome form prescribed by the cataloguing rules. The individual stories of saints are, with one exception, obscure texts. I have tried to get as much identifying information into the 'Contents' field as possible, mainly by translating the rubrics almost completely. The reference to the published form of text no. 2, and the comment which seemed called for about the Acts of Thomas, could only be recorded among the 'Notes' later in the record. The note beginning 'Bound with' gives the title of the text which is the first half of ms. 38. In that record there is a note about the binding of the volume.

The two records already shown can be retrieved from various indexes which are listed on the second screen when one begins a HOLLIS session. One example must suffice here. Searching for 'Ephrem' in the author index would (after a cross-reference to 'Ephraem Syrus, Saint, 303-373', the authorized form of the name) result in a list of 116 items, the end of which is:

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                                          LI330--HOLLIS INDEX SEARCH HC4E
  AU INDEX -- 116 ENTRIES FOUND, 102 - 116 DISPLAYED

EPHRAEM SYRUS SAINT 303 373
 102 selections 1981/ 1981  bks
 103 sermo alius in patres defunctos 1918 /saint ephrem le syrien son/ 1918  bks
 104 sermones/ 1481  bks
 105 sermones de fide/ 1961  bks
 106 sermones de fide german /reden uber den glauben ausgewahlte nisi/ 1984  bks
 107 sermones in hebdomadam sanctam/ 1979  bks
 108 sermones secundum traductionem ambrosii camaldulensis/ 1481  bks
 109 sermons latin selections /libri sancti effrem/ 1491  bks
 110 sermons selections latin 1505 /sermones ingeniosissimi ac sctiss/ 1505  bks
 111 short commentary on the old testament from /scholia on the old t/ 1903  mss
 112 symeon the new theol /selections turkish karamanlidi 1815/ 1815  bks
 113 tou osiou patros ephraim tou syros pros ten hellada metablethent/ 1709  bks
 114 tvoreniia sviatago ottsa nashego efrema sirina/ 1983  bks
 115 vies georgiennes de s symeon stylite lancien et de s ephrem/ 1957  bks
 116 works russian 1983 /tvoreniia sviatago ottsa nashego efrema siri/ 1983  bks
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This displays (item 111) in among the printed books our manuscript containing the combined commentary of Jacob and Ephrem – and shows, by the way, some of the other rich holdings of Harvard.

At the time of writing the project described in this article has just begun, but I hope it will be able to proceed along the lines set out here, and in the end produce a useful tool for Syriac scholars.

NOTES

1. Moshe H. Goshen-Gottstein, *Syriac Manuscripts in the Harvard College Library: A Catalogue* (Harvard Semitic Studies, 23; Scholars Press, 1978).

2. On the A.B.C.F.M. archives see 'Transferring the Archives', unpublished typescript by Enoch F. Bell, dated February 1945 (a copy in the manuscript department, Houghton Library). Some of the Syriac manuscripts were among the items in dispute between Andover Newton Seminary and Harvard, but the share-out agreed in 1941-3 seems to have allocated them all to Harvard. Admittedly, not everything is clear from the documents quoted by Bell. There are references to *three* Syriac Bible manuscripts on vellum, and presently only two (Syriac 2, 4) meet this description.

3. The manuscript consists of part of the Gospel of John in Turoyo.

4. I should like to thank Dr. Joseph A. Greene for locating the relevant files and allowing me to read them. Besides what is recorded here, these files have interesting information about manuscripts on the market which were offered to the Museum but not purchased.

5. Many of Hall's books went to the Andover Seminary and are now at Andover-Harvard Library. Of special interest are a number of Syriac books printed by the American missionaries in Urmia.

6. See *The Harp* (Kottayam) 6 (1993), 26.

7. This manuscript, containing the minor catholic epistles of the New Testament, was as far as I know last heard of in the possession of Lord Peckover in 1909 (see J. Gwynn, *Remnants of the Later Syriac Versions of the Bible*, London 1909, pp. l-li).

8. It is right to say that I owe this 'realization' to the Curator of Manuscripts at Houghton, Leslie Morris.

9. In the *ALA-LC Romanization Tables* (Library of Congress, 1991), the Hebrew and Yiddish table is said to be 'applicable to all Hebraic languages'. Informal guidance from the Library indicates that Syriac is supposed to be included – but apart from any other objection to calling Syriac a 'Hebraic' language, the Hebrew table is very unsuitable for it.

10. Hope Mayo, 'MARC Cataloguing for Medieval Manuscripts: An Evaluation', in Wesley M. Stevans, ed., *Bibliographic Access to Medieval and Renaissance Manuscripts: A Survey of Computerized Data Bases and Information Services* (Haworth Press, 1992), 93-139; quotation p. 115.

11. For the format: *USMARC Format for Bibliographic Data Including Guidelines for Content Designation* (Library of Congress, 1994); for the cataloguing rules: *Anglo-American Cataloging Rules* (2nd edition revised; American Library Association, 1988) and S. L. Henson, *Archives, Personal Papers and Manuscripts* (2nd edition, Society of American Archivists, 1989). Supplementary guidelines for the present Syriac collection are enshrined in a document in the manuscript department, Houghton Library.