O quo ulque tandem abutere: Latilina: patiētia nostra? Æ, diu etiam furore ille tuus nos eluere? quem ad finē
sec essē effrētāta iactabit audacia?
Nihilne te noctēnum plēbium
Salati: nihil ubiūs vigiliae:
nihil timor populi: nihil con-
curē longum omnium: nihil
hic múricissimō habēdi senatus
locus: nihil ὅτι ora voluisti;
moveunt? Patere tua sēllia
non sentis; strīctam iam ὅτι
omnia scientia teneri pius-
itionem tua non vides? Quid
prīa: Æ lupīo per noctem egeris;
ubi fuesis; ὃs convocaveris;
quid consiliē ceperis: quem
noster ignōzare arbitrāris?
Quo usque tandem abutere, Catilina, patientia nostra? quam diu etiam furor iste tuus nos eludet? quem ad finem sese effrenata iactabit audacia? Nihilne te nocturnum praesidium Palati, nihil urbis vigiliae, nihil timor populi, nihil concursus bonorum omnium, nihil hic mun-tissimus habendi senatus locus, nihil horum ora voltusque moverunt? Patere tua consilia non sentis, constrictam iam horum omnium scientia teneri coniurationem tuam non vides? Quid proxima, quid superiore nocte egeris, ubi fueris, quos convocaveris, quid consilii ceperis, quem nostrum ignorare arbitraris?

C. D. Yonge [19] translated the paragraph as:

When, O Catiline, do you mean to cease abusing our patience? How long is that madness of yours still to mock us? When is there to be an end of that unbridled audacity of yours, swaggering about as it does now? Do not the nightly guards placed on the Palatine Hill—do not the watches posted throughout the city—does not the alarm of the people, and the union of all good men—does not the precaution taken of assembling the senate in this most defensible place—do not the looks and countenances of this venerable body here present, have any effect upon you? Do you not feel that your plans are detected? Do you not see that your conspiracy is already arrested and rendered powerless by the knowledge which every one here possesses of it? What is there that you did last night, what the night before—where is it that you were—who was there that you summoned to meet you—what design was there which was adopted by you, with which you think that any one of us is unacquainted?
The Short Version of Important Stuff

- Missaali is a free OpenType/CFF font with two application areas:
  1. as a Gothic display font; and
  2. for emulating late-medieval manuscripts.
- It should be used in a large size (18+ points).
- It is licensed under Open Font License (see the end of the document for details).
- It is a 15th century typeface. It contains a large number of symbols (see pages 24–25, 31, and 61–67) that are no longer in common use but it lacks many symbols (like Arabic numbers) that are essential for setting longer modern texts.
- It has a large number of OpenType features that control its behavior. See pages 11 and 39–44 for details.
- It is designed to be used with XeLaTeX. See pages 44–58 for details.
- Missaali works in recentish programs. Some old font renderers will mess up the spacing between letters. This happens at least in some old versions of MS Word. Newer programs shouldn’t have problems. However, some care is necessary when using abbreviation symbols with XeLaTeX, see page 45 for details.
What’s new in Missaali 2.0?

- An improved syntax for abbreviations:

  su[per]  ⇒  super
  [qui][bus]  ⇒  qui[bus]
  ìt  ⇒  ìt
  [prop]t  ⇒  propít

  The abbreviation syntax is detailed on pages 32–34.

- Added missing two-line initials by Ghotan. While most were added as character variants, three of them replace letters that I designed for the first version of the font, and I also redrew Å and Ö initials to match Swedish manuscripts better.

  \[\text{X} \text{U} \text{E} \text{A} \text{O}\]

  The old initials for them are available by turning on the font feature ornament in addition to title.

- Changed the form of Y. The old Y is available with font feature ornament. The new form is basically a slightly enlarged lower case y.

- Added Ghotan’s one line initials. They were taken mostly from Psaltarium Upsalensis that has an almost full set.

- Added some more ligatures and abbreviated characters.

- Added LaTeX package option ManuscriptSpacing that disables justification of columns and special punctuation space handling.

- Added better support for different colors in the LaTeX package.
1 Introduction

Missaali is a free unicode OpenType font that has two main purposes: it is a blackletter display font that can also be used to emulate late-Medieval formal manuscripts.

The letterforms are based on Missale Aboense [6] that Bartholomew Ghotan printed in Lübeck in 1488. It was the first book printed for Finland and was commissioned by Konrad Bitz who was at the time the bishop of Turku diocese. His aim was to harmonize the church services of the parishes of the diocese and the missal contains texts and instructions for all masses that are held over a year. The version 2.0 of the font adds also characters taken from other books printed by Ghotan, Psalterium Upsalense [7] and Revelationes Sancti Birgitte [2].

Ghotan followed the standard practice of the time and set the missal using textura, a type based on textualis formata that was the prevalent late-Medieval script in Germany for the most valuable manuscripts. Thirty years earlier Gutenberg had used the same script for his famous Bibles.
Figure 1: The basic alphabet. Capital letters W, Y, and Z do not occur in *Missale Aboense* so they have been made from scratch.

*Missaali* also has a number of large initials that are mostly set in the Lombardic style. This font includes the initials that were printed using leaden slugs among its symbols, but leaves out the large woodcuts as well as most of the hand-written ones.

Old printing inks spread more and more randomly than the modern ones. This means that two impressions created by the same slug are not identical. In the design I aimed for a look that is somewhat spread. Most corners are rounded and there are few sharp edges.

The set of symbols in the 15th century textura is very different from what we use nowadays. It retained many of the abbreviations that were in common use during middle ages while many modern symbols are missing. Most notably Ghotan didn’t use number symbols preferring instead to either spell the numbers out or write them using Roman numberals. While I designed a few missing glyphs for the font, I decided against including numbers.\(^1\) This means that Missaali is even less suitable for setting body texts of ordinary documents than blackletter in general. However, the limitation is not serious for the intended uses of the font.

Most of the symbols in the font cannot be found from modern keyboard layout charts. They can be accessed in several ways. The primary way for version 2.0 of Missaali is to use ligature substitutions (see pages 32–34) but the other way is to turn on a suitable combination of OpenType features that are present in the font. They may also be entered directly if the program used supports inputting arbitrary unicode code points. All symbols in the font have code points assigned to them, and those that are not present in the unicode standard are put into the private use area.\(^2\) Where possible, I have put the symbols to the same places as *MUFI character recommendation 3.0*.\(^3\) However, Missaali contains only a small part of the full recommendation and it has many symbols that are not present in it.

---

1. Largely because of lack of suitable samples for 15th century textura numbers.
2. Some symbols have duplicates that are not assigned code points to make searching resulting text files easier. See page 61 for details.
3. MUFI is the Medieval Unicode Font Initiative ([http://www.mufi.info](http://www.mufi.info)) whose purpose is to bring Medieval scribal symbols into unicode.
Figure 2: Two-line Lombardic initials. Several letters have alternate forms. These are taken from works printed by Bartholomew Ghotan except for W that I have not been able to find. The books are Missale Aboense (1488) and Revelationes Sancti Birgitte (1492). Note how Ghotan turned letters upside down to get another initials (for example, C ⇒ D, N ⇒ V). The variant form for I is based on a hand-written initial from Missale Aboense and it needs to be used in a very large size.
OpenType

OpenType is a technology that combines two different approaches of creating fonts under one package: Microsoft’s true type (OpenType/TT) and Adobe’s type 1 (OpenType/PS or OpenType/CFF) fonts. The PS technology is older and it originated in the 80s for defining digital fonts for printing. The true type fonts were designed primarily for high-quality screen fonts for Windows.

Missaali is a PS font that has been designed explicitly for printing and it is not very usable a screen font. The lack of numbers is one obstacle, but more seriously it is difficult to distinguish between strings of m, n and u letters in small size. It works best in a large size.

OpenType features  OpenType fonts may contain a number of features that alter their behavior. The most common ones that are used with European languages are ligature substitutions where two individual characters are replaced by a glyph that contains both of them. For example, in textura the letters ‘d’ and ‘o’ are fused together when they occur as a pair:

\[ \text{d} + \text{o} = \text{do} \]

Different programs use different conventions for selecting features. For example, in Photoshop the features are specified in a well-hidden menu that’s shown in figure 4.

Unfortunately many programs offer only a limited support for features.\(^4\) In particular, they often allow the user to choose them from a predefined set of feature identifiers (called tags) and different programs have different sets of allowed tags.

\(^4\)I myself use XeLaTeX that supports arbitrary combinations of features and Photoshop that doesn’t.
Figure 4: Photoshop OpenType menu
Figure 5: MS Word 2010 font feature dialog where selecting 'Historical and Discretionary' option for ligatures turns on abbreviation for que. For proper working of the font you should always leave the 'use contextual alternates' mark selected.

For this reason Missaali implements most of the features with two different tags: as a stylistic set that can be used with MS Word and as a randomly selected unrelated tag that Photoshop recognizes. Figure 5 shows the advanced tab of Word 2010 that can be used to change the set of features in use.\(^5\) Table 1 has a summary of all available features and they will be described in detail later.

**Open Font License v.1.1**

Missaali may be used and distributed under the conditions of the Open Font License v.1.1. The full text of the license is at the end of this document. It and answers to frequently asked questions about it are available at [http://scripts.sil.org/OFL](http://scripts.sil.org/OFL). The most important features of OFL are:

\(^5\)I have very little experience in using Word and I haven’t debugged Missaali with it except to note that it doesn’t work in the legacy document modes. So, if you have problems with Word start by ensuring that the document mode is at least Word 2010 and that the "use contextual alternates" checkbox is marked. Other than that I can’t help.
<table>
<thead>
<tr>
<th>Feature</th>
<th>All?</th>
<th>Tag</th>
<th>Alt.</th>
<th>Photoshop menu</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long s and rotunda r</td>
<td>×</td>
<td>calt</td>
<td>calt</td>
<td>Contextual alternates</td>
</tr>
<tr>
<td>Textura ligatures</td>
<td>×</td>
<td>liga</td>
<td>liga</td>
<td>Standard ligatures</td>
</tr>
<tr>
<td>Old æ and œ</td>
<td>×</td>
<td>hist</td>
<td>swsh</td>
<td>Swash</td>
</tr>
<tr>
<td>Ghotan’s abbreviations</td>
<td></td>
<td>dlig</td>
<td>dlig</td>
<td>Discretionary ligatures</td>
</tr>
<tr>
<td>Scandinavian ligatures</td>
<td>×</td>
<td>ss01</td>
<td>subs</td>
<td>Subscript</td>
</tr>
<tr>
<td>Additional abbreviations</td>
<td></td>
<td>ss02</td>
<td>ornm</td>
<td>Ornaments</td>
</tr>
<tr>
<td>Alternate abbreviations</td>
<td></td>
<td>ss03</td>
<td>frac</td>
<td>Fractions</td>
</tr>
<tr>
<td>Abbreviation marks</td>
<td></td>
<td>ss04</td>
<td>salt</td>
<td>Stylistic alternates</td>
</tr>
<tr>
<td>Add tilde</td>
<td></td>
<td>ss05</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>Add dieresis</td>
<td></td>
<td>ss06</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>Add r-abbreviation</td>
<td></td>
<td>ss07</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>Add shorter tilde</td>
<td></td>
<td>ss08</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>Add a-abbreviation</td>
<td></td>
<td>ss09</td>
<td>onum</td>
<td>Oldstyle</td>
</tr>
<tr>
<td>Add ring</td>
<td></td>
<td>ss10</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>Add diagonal slash</td>
<td></td>
<td>ss11</td>
<td>sups</td>
<td>Superscript</td>
</tr>
<tr>
<td>Add ur-abbreviation</td>
<td></td>
<td>ss12</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>Add horizontal strike</td>
<td></td>
<td>ss13</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>Add loop</td>
<td></td>
<td>ss14</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>Use liturgical symbols</td>
<td></td>
<td>ss15</td>
<td>smcp</td>
<td>Small caps</td>
</tr>
<tr>
<td>Old Finnish ortography</td>
<td>×</td>
<td>ss16</td>
<td>ordn</td>
<td>Ordinals</td>
</tr>
<tr>
<td>Alternate punctuation</td>
<td></td>
<td>ss17</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>Use po-ligature</td>
<td>×</td>
<td>ss18</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>Alternate form for z</td>
<td>×</td>
<td>ss19</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>Initial capitals</td>
<td></td>
<td>ss20</td>
<td>titl</td>
<td>Titling alternates</td>
</tr>
<tr>
<td>Add dot accent</td>
<td></td>
<td>ss21</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>Alternate form for G</td>
<td>×</td>
<td>ss22</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>Alternate initials</td>
<td></td>
<td>ss23</td>
<td>—</td>
<td></td>
</tr>
</tbody>
</table>

Table 1: OpenType features. Those marked with × may be enabled for the whole document, the others should be turned on only for affected characters.
1. You may freely use the font in your documents, including embedding it in it.

2. You may freely give the font to whoever you want, but you should give the whole package (including the documentation files). You may also sell it as long as you comply with the few restrictions that are enumerated in the text of the license.

3. You may freely modify the font, but if you distribute the modified font you should give it a different name and release it under OFL.

**Latex Project Public License version 1.3c**

The documentation files and the LaTeX style file are distributed under the Latex Project Public License (LPPL version 1.3c). The exact conditions of the license are defined in the file `lppl.txt` that should been included in the font package but is also available at [http://www.latex-project.org/lppl.txt](http://www.latex-project.org/lppl.txt).

The terms of LPPL are similar to those of the OFL. The short and incomplete version is:

1. You may freely use the files however you want.

2. You may freely distribute the package in its original form.

3. If you modify the files, you may distribute them but you must document what changes you have made in the files, make it clear that the changed version is not the original, and distribute either the original version or information on how it can be obtained with it.
2 Missale Aboense

Historical background  About 1000 years ago the area of modern Finland was essentially a sparsely-populated forest between Sweden and Novgorod. The inhabitants belonged to three tribes: Suomalaiset (Finns), Hämäläiset (Tavasts) and Karjalaiset (Karelians) that each had several subgroups. At the time the name ‘Finland’ meant only the South West part where Finns lived, and it took hundreds of years before the word acquired its modern sense and the term Finn came to encompass all people living in the area.

It is impossible to know exactly when Christianity first arrived in the area as there are no reliable written sources. The first surviving accounts about the history of Church in Finland seem to have been composed in the late 13th century and their historical value is not great. According to them and later medieval and early modern texts, King Eric IX of Sweden conducted a crusade to the land of Finns sometime around 1150 to baptize them and that he was accompanied by bishop Henry of Uppsala. The modern view is that Eric may have conducted a campaign in Finland—it is not certain, but the aim was more to obtain tribute than to spread Christianity.

Archaeological evidence suggests that first Christians were baptized in the 6th century and that by Eric’s time most people in South West Finland were already Christian while the people living inlands were still pagan. There were influences from both Western and Eastern Churches, but Finland wasn’t integrated with either, yet.

What happened in the mid 12th century was that the Swedish crown extended its rule over the Finns and during the next century also over the Tavasts. The area of Karelians was divided between Sweden and Novgorod with Novgorod getting the larger share.

The Legend of Saint Henry  The legend of Saint Henry dates from the late 13th century. According to it, Henry was an English clergyman who had moved to Sweden and became the bishop of Uppsala. He urged King Eric to go on to the crusade and joined the venture himself, baptizing the first Finns and then staying behind in Finland to organize the church when the king returned to Sweden.

The legend further tells that he was killed the next winter. The killer was a murderer who was enraged at Henry because he had imposed ‘church discipline’ on him in addition to the penalty that the law decreed from murder. The text doesn’t detail the exact natures of either punishment, but at the time killers typically paid wergild to the family of the victim. The legend tells that the killer got a divine punishment for his deed: he put the bishop’s cap on his head, and when he removed it, his whole scalp came off with it. This was considered to be the first miracle attributed with St Henry.
Figure 6: Hand-colored woodcut from the preface of Missale Aboense (reduced size). In the middle is Saint Henry treading on his killer Lalli. He is surrounded by bishop Konrad Bitz and dean Magnus Nicolai Särkilahti. Back left is the printer Bartholomew Ghotan. The identity of the priest back right is not certain, but he might be the proofreader, Daniel de Egher. The text starts: Reverendus in cristo pater et dominus, dominus Conradus Bystz dei et apostolice sedis gratia praesul ecclesie Aboense. — Reverend Father in Christ and Lord, Lord Konrad Bitz of the Apostolic See, bishop of the Turku diocese.
Later sources add details to the short legend. They make the mass baptism to happen at the spring of Kupittaa that nowadays lies inside the borders of the city of Turku, and also give the name of the killer and the place of the murder. The murder happened on the ice of Lake Köyliö and the killer was called Lalli.\textsuperscript{6} They also give two alternate explanations for the motive: he either didn’t want to pay tithes to the church or he got angry when Henry requested food from his farm. The divine retribution against Lalli was also extended, and the stories tell that he was eaten alive by mice on an island of Hiirijärvi lake.

Almost nothing is known about the historical bishop Henry. Even his whole existence is uncertain as it has proven impossible to identify him from contemporary sources. Whether he was a historical person or a completely invented saint is an open question. If he was real, it is very unlikely that he was a bishop at Uppsala because in that case he should have left a written trace of himself.

There is an alternative explanation for his origins. The English cardinal Nicolaus Albanus\textsuperscript{7} was a papal legate in Scandinavia in early 1150s. His mission was to integrate the Scandinavian episcopal sees tighter with the Catholic church. It is possible that Henry was one of his assistants who stayed behind when Nicolaus returned to Rome. It is plausible but far from certain that he left Henry behind to organize the churches in Finland.

What is certain is that St. Henry’s cult existed in the latter half of the 13th century and in 1300 or shortly before bones that were believed to belong to him were moved from the village of Nousiainen to the new Turku cathedral. Even though he was venerated as a saint in Finland and Sweden, he was never officially canonized by the Vatican.

Henry’s skeleton vanished during the Great Northern War of 1700–21. It had been moved to a side chamber of the cathedral after the reformation, and Czar Peter I gave an order to send the bones to St. Petersburg. After that their whereabouts are unknown. Today only a small piece of tibia can certainly be attributed to him. It survived by being buried with Blessed Bishop Hemmingus (c.1290–1366). Hemmingus would probably have been canonized as a saint but the reformation stopped the process.

There is also a skull that was dated to the 12th century using radiocarbon dating that was found hidden inside the cathedral. It is possible that the person who hid it believed that it was Henry’s skull. The skull is over 100 years older than the cathedral so it cannot belong to anyone whose first burial was inside it.

\textsuperscript{6}It is interesting to note that Lalli is a form of Laurentius so it is a Christian name, which speaks against those versions of the story that describe him as a pagan.

\textsuperscript{7}Known also by his English name Nicholas Breakspear. He later became Pope Adrianus IV.
Turku diocese  It is not known for certain when the Turku diocese was really established, but it existed at the beginning of the 13th century. During the middle ages the diocese was a part of the archdiocese of Uppsala but it did not follow the same liturgical tradition. Instead, Turku diocese was heavily influenced by the Dominican tradition starting from the time of bishop Thomas (c.1220–45) who belonged to the order. The influence was strengthened by the Dominican convent that was built in Turku in 1249.

Finland was far from the learned centers of Europe. While several dozens of Finnish clergymen studied in the continental universities over the years, most priests were trained at the Turku cathedral school and their education was not very deep and the church could not root out all old pagan traditions. There was a scriptorium that produced many illuminated manuscripts, but they couldn’t write enough for all parishes in the diocese and imported books were excessively expensive.

In the 1480s bishop Konrad Bitz\(^8\) and dean Magnus Nicolai Särkilahti\(^9\) started a project to improve the literary situation of the parishes in the diocese. They started by organizing a group order for *Psalterium cum Canticis* that was printed by Bartholomew Ghotan, and next started to plan for a missal.

**Bartholomäus Ghotan**  Ghotan was the foremost authority on printing liturgical texts at the time. He had previously worked as a priest at Magdeburg where he learned about book printing and decided to start a new career. His clerical training made him an expert on the subject of liturgical books and he printed the very first missal, *Missale Praemonstratense* there in 1479.

Ghotan moved to Lübeck that had become the center of bookprinting in Northern Europe and continued to make liturgical books. In 1486 he was invited to Stockholm where he printed several books for Swedish dioceses, including *Missale Strengnense*. In 1487 he had a disagreement with the government led by regent Sten Sture and returned to Lübeck where he printed *Missale Aboense* the next year.

Bartholomew Ghotan continued printing books in Lübeck for several years before deciding to open a printing shop at Novgorod in 1493. His timing proved to be unfortunate as a short while later the conflict between the Hanseatic League and Czar Ivan the Great intensified and culminated in the destrucion of the Hansa office Peterhof. Ghotan vanishes from historical records and he probably died in Novgorod in 1494. Some suspect that he was killed in the disturbances but the real cause of death is unknowable.

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\(^{8}\)A bishop between 1460–89.  
\(^{9}\)A dean in 1465–1489, then bishop 1489–1500.
Printing Missale Aboense  It seems likely that the project for Turku missal was started during Ghotan’s time in Stockholm. Even though Bitz was the official head of the project, the practical side was handled mostly by Magnus Nicolai. From the beginning Ghotan intended to print a multi-purpose book. The liturgy of Turku was close enough to the standard Dominican tradition that it would be possible to sell the book also to the order.

A manuscript for the book was prepared in Turku and it was sent to Daniel de Egher for review and corrections. He was a Dominican and the Professor of Holy Theology at the University of Paris. In his proofing he used as a source a Dominican missal printed in Venice in 1484, which explains how the feast days of several Hungarian saints ended up in a Finnish calendar. Though the text was checked, the quotations from the Bible have some small differences from the text of official version of the Latin Vulgate Bible.

The printing started in 1488. Ghotan apparently first printed the general Dominican missal and then he customized it for Turku by adding a prologue, a different calendar, and a section of texts specific to the diocese. The prologue was dated on August 17, 1488.

Copies were printed on both parchment and paper. The total size of the printing is not known but was probably in the range of 120–200. Twenty copies still exist and most are incomplete. Only one parchment copy is still in the original bindings. It is the copy of the Halikko parish that was stolen by Danes in 1509 and it is now at the Kongelige Bibliotek in Copenhagen. Three complete parchment copies have been reconstructed from separated pages that had been torn out and used as covers for archival documents in the late 16th century. The rest sixteen books are incomplete copies printed on paper.

The book was printed in large folio size with large letters. There are four different text sizes in use:

- The main body of text that is approximately 26 points in modern terms;
- Smaller main body text approximately 22 points in size. This was set with the same line height as the main font;
- Small text in a simpler typeface (textus preacissus) of about 14 points; and
- Large text for the initial part of the mass (Te igitur) approximately 48 points in size.

The main text was printed with black ink with red captions, instructions, and initials. Ghotan used four different types of initials:

- Large woodcuts of initials;
Figure 7: Sample from *Missale Aboense* containing text in normal and small sizes, several abbreviations, and four initials. The red ones are two sizes of printed Lombardian initials while the two blue ones are drawn by hand. Note how the other initials are inside the text block but the flourished initial *I* in *In* is drawn completely in the gutter between the columns. Also note now the abbreviated rubric *Oratio* ([Ora]tio) is set at the right end of the first line of the section.
Figure 8: The smallest Missale Aboense font that is based on textus preacissus instead of textus quadrata.

Figure 9: A large woodcut initial and the start of the Te igitur in large font size. The initial is not colored in the facsimile reprint of Missale but it probably was hand-colored in many copies.
• Two lines high printed Lombardic initials;
• One line high printed Lombardic initials;
• Leaving a two or three-line square empty space for hand-drawn initials.

Many of the surviving copies have blue hand-drawn initials that are very close in style with each other, so it is likely that there was a workshop — probably in Lübeck — that initialed some of the copies before they were sent to their recipients.

The woodcut initials as well as the few woodcut illustrations were colored by hand, and some copies had also a bit of burnished gold added to illustrations.

3 Textura

In late medieval times different types of texts were written using different scripts. The most refined hand that was used for the most valuable — and usually religious — German manuscripts was textualis formata in its textus quadrata form. I will be calling it textura in this document. Since it was considered the highest form of writing, it was natural that Johannes Gutenberg modeled his Bible typefaces on it and Bartholomew Ghotan followed his example for his liturgical books.

Textura is a very angular script that has high contrast between parts of the letter. There are wide usually vertical strikes and thin usually diagonal hairlines. The letters are spaced closely together and while the word spaces are not very wide, they are wide enough to clearly distinguish the words.

Quick red fox jumped et cetera.

One of the distinguishing features of textura is that the letter f does not have a descender like it has in cursive Gothic scripts. Another feature is that the vertical strikes of lowercase letters have small quadrangles at their feet. This is most notable in the letter m.

Text body Textura was set in justified rectangular blocks. The text was set in continuous lines and there was no line break between paragraphs. A new paragraph was marked by either a colored initial or by the paragraph symbol. The last line was also justified if at all possible. Justification was done by a combination of increasing word spaces and by using abbreviations. When a word was split at the end of the line, the hyphen was often left out. For example, in figure 7 leticia has a hyphen but hereditate in the following row doesn’t. When used, a hyphen is two short diagonal strokes.
**Fusions**  When writing textura two adjacent bowls of letters were fused together into one stroke. Ghotan fused together the following combinations:

$$
\begin{array}{cccccc}
\text{be} & \text{bo} & \text{de} & \text{do} & \text{pe} & \text{ve} \\
\end{array}
$$

The surprising thing is that Ghotan didn’t use the po fusion systematically. It is used in some places of the text, but usually they are kept separate. He also fused together double p:

$$pp$$

**Letter variant forms**  Like all Gothic scripts, textura has two forms of the lower case letter s: ‘short’ s and ‘long’ l. It also has two forms of r: the ‘straight’ r and the ‘round’ ñ that is usually called r-rotunda.

$$\begin{array}{cccc}
\text{Short s} & \text{Long s} & \text{Straight r} & \text{Rotunda r} \\
\end{array}$$

The rules for the use of long and short s became quite complex over centuries, but Ghotan followed the simple medieval rules: short s is used only if it is the last letter of the word and the long s is used in all other places.\(^\text{10}\) For example, the Latin word sanctus was written as:

**sanctus**

The round r was used after letters whose right edge had a bowl except when the r was at the end of the word. In textura those letters were traditionally b, d, h, o, p, v, and y,\(^\text{11}\) but Ghotan used a straight r after h and Missaali follows that convention. He also used rotunda r at the end of the word if the next to the last letter was not u or v:

**soror quodra igitur**

Ghotan wasn’t completely consistent in his usage and you occasionally find a rotunda r in a place where you would expect a straight r or vice versa.

\(^{10}\)Missaali uses the opentype feature **calt** to automatically insert long s and r-rotunda in places where Ghotan would have used them. If you want to follow a later convention, you need to turn the feature off.

\(^{11}\)Other Gothic scripts used different set of letters for r-rotunda selection.
The case of \textit{u and i}  Textura had two other letters with variant forms. At the time \textit{v} and \textit{u} were considered to be the same letter and similarly for \textit{i} and \textit{j}. Ghotan used \textit{u} and \textit{v} interchangeably and there is no clear rule for which letter he selected except that \textit{U} was used almost always for the capital letter. The capital \textit{V} is quite rare in the text and it doesn’t fit the other capitals so well.

\begin{tabular}{cccc}
\text{U} & \text{u} & \text{V} & \text{v} \\
\end{tabular}

Symbols \textit{i} and \textit{j} were also considered to be forms of the same letter but their use was more consistent. Ghotan used \textit{j} for the last letter in a sequence of \textit{i}s. This occurred most often in Roman numerals:\textsuperscript{12}

\begin{tabular}{cccc}
\text{i} & \text{ii} & \text{iii} & \text{iiii} \\
\end{tabular}

For an added complexity, some scribes used \textit{\ddot{y}} in place of \textit{ij}. However, Ghotan didn’t do that.

\textbf{Punctuation}  There were no strict rules for applying punctuation in the middle ages. Texts were usually read out loud and punctuation was used to mark out pauses of different lengths. In the body of text Ghotan used three different lengths of pauses and a question mark:

\begin{tabular}{cccc}
\text{;} & \text{.} & \text{.} & \text{?} \\
\end{tabular}

Ghotan used a colon for a shortish pause and centered dot for where we would normally write an ordinary period. Both colon and dot were usually placed so that there was as much space on both sides of it. He used an ordinary period usually at the end of paragraphs. In several places he used also the virgule / or a vertical bar | for punctuation.

The font has also few other medieval punctuation symbols that were in common use. They are placed in the positions of different-length dashes:

\begin{tabular}{cccc}
\text{-} & \text{–} & \text{—} & \text{—} \\
\end{tabular}

\textsuperscript{12}During medieval times both 'iv' and 'iiii' were used for number four. Likewise, nine was represented with both 'ix' and 'viii'.
4 Latin Abbreviations

Medieval scribes used many abbreviation symbols and there were different abbreviation systems in different places and for different scripts. They were particularly prominent in monastic and academic texts, but also liturgical works had them. They fell slowly out of use with the increase of literacy when the writers could not rely on their non-specialist audience to understand them and also because many of the symbols were specifically tailored for Latin and did not have much use in vernacular texts. Early printed books used old abbreviations but they fell out of use in the 16th century. Some holdouts survived longer: using tilde to mark missing nasal consonants was relatively common even in the 17th century in some areas and the ampersand is still in use.

Missale contains a large set of abbreviations that can be accessed in the font using two ways. In the original font release they were accessed through OpenType features, but release 2.0 added an option of entering them as ligature substitutions.

Bartholomew Ghotan used two different systems of abbreviations in Missale Aboense: one for the main body of text and another for the small 14 pt font. There is not much text in the small font and it isn’t possible to reconstruct his full system from it, but the system for the larger font is quite complete. Some of the symbols that he used were used in a different sense in different abbreviation systems. I will first describe the system that he used and then add to that some commonly-used symbols that are not found in Missale.

There are two basic ways to mark abbreviations: either by adding small marks over the letters to signify places where things are left out or to add new symbols to the running text.

Abbreviation marks

Ghotan used at least five semantically different abbreviation marks that were written over letters and a few of the symbols have also variant forms that are used over some specific letters. The basic marks are:

\[
\begin{array}{cccc}
\text{\~} & \hat{\text{a}} & \acute{\text{e}} & \grave{\text{o}} \\
\text{a-abbr.} & \text{r-abbr.} & \text{ur-abbr.} & \text{o-abbr.}
\end{array}
\]

Tilde  The tilde is used in three different senses:

1. to denote that a nasal consonant (m or n) is left out;
2. over p and q it denotes syllables prae and quae; and

\[^{13}\text{However, the full system can be reconstructed from his Revelationes Sancti Birgitte that he printed in 1492.}\]
<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
<th>Feature</th>
<th>Entering</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>bis</td>
<td>dlig</td>
<td>bis</td>
<td>occasionally general</td>
<td></td>
</tr>
<tr>
<td>con</td>
<td>dlig</td>
<td>con</td>
<td></td>
<td></td>
</tr>
<tr>
<td>et</td>
<td>dlig</td>
<td>et</td>
<td></td>
<td></td>
</tr>
<tr>
<td>etc</td>
<td>dlig</td>
<td>etc</td>
<td>et cetera</td>
<td></td>
</tr>
<tr>
<td>hoc</td>
<td>dlig</td>
<td>hoc</td>
<td>also general</td>
<td></td>
</tr>
<tr>
<td>m</td>
<td>dlig</td>
<td>m</td>
<td>occasional final form</td>
<td></td>
</tr>
<tr>
<td>mur</td>
<td>dlig</td>
<td>mur</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Per</td>
<td>dlig</td>
<td>Per</td>
<td></td>
<td></td>
</tr>
<tr>
<td>per</td>
<td>dlig</td>
<td>per</td>
<td>occasionally <em>por</em></td>
<td></td>
</tr>
<tr>
<td>præ</td>
<td>dlig</td>
<td>præ</td>
<td>entered with æ-ligature</td>
<td></td>
</tr>
<tr>
<td>pro</td>
<td>dlig</td>
<td>pro</td>
<td></td>
<td></td>
</tr>
<tr>
<td>quae</td>
<td>dlig</td>
<td>quae</td>
<td></td>
<td></td>
</tr>
<tr>
<td>quam</td>
<td>dlig</td>
<td>quam</td>
<td></td>
<td></td>
</tr>
<tr>
<td>que</td>
<td>dlig</td>
<td>que</td>
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<td></td>
</tr>
<tr>
<td>qui</td>
<td>dlig</td>
<td>qui</td>
<td></td>
<td></td>
</tr>
<tr>
<td>quid</td>
<td>dlig</td>
<td>quid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>quia</td>
<td>dlig</td>
<td>quia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>quo</td>
<td>dlig</td>
<td>quo</td>
<td></td>
<td></td>
</tr>
<tr>
<td>qvo</td>
<td>dlig</td>
<td>qvo</td>
<td></td>
<td></td>
</tr>
<tr>
<td>quod</td>
<td>dlig</td>
<td>quod</td>
<td></td>
<td></td>
</tr>
<tr>
<td>qvod</td>
<td>dlig</td>
<td>qvod</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quod</td>
<td>dlig</td>
<td>Quod</td>
<td></td>
<td></td>
</tr>
<tr>
<td>quoque</td>
<td>dlig</td>
<td>quoque</td>
<td></td>
<td></td>
</tr>
<tr>
<td>rum</td>
<td>dlig</td>
<td>rum</td>
<td></td>
<td></td>
</tr>
<tr>
<td>se</td>
<td>dlig</td>
<td>se</td>
<td></td>
<td></td>
</tr>
<tr>
<td>sed</td>
<td>dlig</td>
<td>sed</td>
<td>also other syllables with <em>se</em>.</td>
<td></td>
</tr>
<tr>
<td>tur</td>
<td>dlig</td>
<td>tur</td>
<td></td>
<td></td>
</tr>
<tr>
<td>us</td>
<td>dlig</td>
<td>us</td>
<td></td>
<td></td>
</tr>
<tr>
<td>us</td>
<td>dlig</td>
<td>vs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ver</td>
<td>dlig</td>
<td>ver</td>
<td>occasionally <em>vir</em></td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Bartholomew Ghotan’s specific abbreviations in *Missaali*. 
### General abbreviations

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Example</th>
<th>Meaning</th>
<th>Feat</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tilde</td>
<td>ā</td>
<td>General</td>
<td>ss04</td>
<td>usually m or n</td>
</tr>
<tr>
<td>Dieresis</td>
<td>ē</td>
<td>General</td>
<td>ss06</td>
<td>general abbreviation, an alternative to tilde</td>
</tr>
<tr>
<td>Dot</td>
<td>ḫ</td>
<td>General</td>
<td>ss21</td>
<td>general abbreviation, an alternative to tilde</td>
</tr>
<tr>
<td>Loop</td>
<td>Ḩ</td>
<td>General</td>
<td>ss14</td>
<td>general abbreviation, an alternative to tilde. The looped l (l) is available also as dlig ligature lum.</td>
</tr>
<tr>
<td>Squashed a</td>
<td>ĝ</td>
<td>A-abbr</td>
<td>ss09</td>
<td>Something with a</td>
</tr>
<tr>
<td>Tailed dot</td>
<td>ē</td>
<td>R-abbr</td>
<td>ss07</td>
<td>Something with r</td>
</tr>
<tr>
<td>Ring</td>
<td>ḳ</td>
<td>O-abbr</td>
<td>ss10</td>
<td>Something with o</td>
</tr>
</tbody>
</table>

Table 3: Bartholomew Ghotan’s general abbreviations in Ḷaillaali.

3. as a general abbreviation mark that is used when the abbreviation doesn’t have a specific notation.

\[
\text{omnes} \Rightarrow \text{ōmes} \\
\text{praesul} \Rightarrow \text{ślul} \\
\text{dominus} \Rightarrow \text{ōns}
\]

Here the tilde is used in the first sense in \text{omnes}, the second in \text{praesul} and in the third in \text{dominus}. The mark has a different form over some letters such as \text{d} and \text{r}. Letters with ascenders use different conventions to represent the general abbreviation. In \text{h} and \text{b} it is replaced by a dot placed on the right side of the letter, in \text{l} it forms a loop at the right top, and in \text{S} it is a diagonal stroke:

\[
\text{ā ē ḫ Ḩ Ḩ}
\]

**A-abbreviation** The symbol for \(a\)-abbreviation is very close to the tilde but it has two strokes. It represents an \(a\) that is left open and squashed flat. It is used to signify that the abbreviated portion contains an \(a\) somewhere in it. For example,

\[
\text{magna} \Rightarrow \text{māa} \\
\text{psalmis} \Rightarrow \text{pś}
\]
**Alternate set of abbreviations**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
<th>Feat</th>
<th>Entering</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ὺ bis</td>
<td>ss03</td>
<td>bis</td>
<td>occasionally general</td>
<td></td>
</tr>
<tr>
<td>Ῠ con</td>
<td>ss03</td>
<td>con</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ῡ et</td>
<td>ss03</td>
<td>et</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ῡ et</td>
<td>ss03</td>
<td>Xet</td>
<td>in middle of a word</td>
<td></td>
</tr>
<tr>
<td>Ὺ hoc</td>
<td>ss03</td>
<td>hoc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ῥ lum</td>
<td>ss03</td>
<td>lum</td>
<td></td>
<td></td>
</tr>
<tr>
<td>῱ mur</td>
<td>ss03</td>
<td>mur</td>
<td></td>
<td></td>
</tr>
<tr>
<td>῱ par</td>
<td>ss03</td>
<td>par</td>
<td></td>
<td></td>
</tr>
<tr>
<td>῱ Per</td>
<td>ss03</td>
<td>Per</td>
<td></td>
<td></td>
</tr>
<tr>
<td>῱ per</td>
<td>ss03</td>
<td>per</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ῳ prae</td>
<td>ss03</td>
<td>prae</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ῳ Pro</td>
<td>ss03</td>
<td>Pro</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ῳ pro</td>
<td>ss03</td>
<td>pro</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ῳ prop</td>
<td>ss03</td>
<td>prop</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ῳ qua</td>
<td>ss03</td>
<td>quaa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ῳ quae</td>
<td>ss03</td>
<td>quae</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ῳ quam</td>
<td>ss03</td>
<td>quam</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ῳ que</td>
<td>ss03</td>
<td>que</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ῳ qui</td>
<td>ss03</td>
<td>qui</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ῳ quo</td>
<td>ss03</td>
<td>quo</td>
<td></td>
<td></td>
</tr>
<tr>
<td>` ris</td>
<td>ss03</td>
<td>ris</td>
<td></td>
<td></td>
</tr>
<tr>
<td>` rum</td>
<td>ss03</td>
<td>rum</td>
<td></td>
<td></td>
</tr>
<tr>
<td>` sec</td>
<td>ss03</td>
<td>sec</td>
<td>also sed</td>
<td></td>
</tr>
<tr>
<td>` sed</td>
<td>ss03</td>
<td>sed</td>
<td>also sec</td>
<td></td>
</tr>
<tr>
<td>῰ ter</td>
<td>ss03</td>
<td>ter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>῰ tur</td>
<td>ss03</td>
<td>tur</td>
<td></td>
<td></td>
</tr>
<tr>
<td>῰ uer</td>
<td>ss03</td>
<td>uer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>῰ us</td>
<td>ss03</td>
<td>us</td>
<td></td>
<td></td>
</tr>
<tr>
<td>῰ ver</td>
<td>ss03</td>
<td>ver</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4: Alternate set of abbreviations.
**R-abbreviation**  A dot that ends in a short diagonal tail is used to signify that the abbreviated part contains a letter $r$. Ghotan used it most often for denoting the *er*-syllable. For example, *propter* could be use the $r$-abbreviation in two different ways:

\[
\begin{align*}
\text{*propter} &\rightarrow \text{propt} \\
\text{*propter} &\rightarrow \text{proptē}
\end{align*}
\]

The dot has a different form over $u$ and $v$ where it looks like a squished and turned tilde and in both cases it denotes the syllable *ver*:

\[
\text{universitas} \Rightarrow \text{uniōsitās}
\]

In the instructions for mass *ver* set in red denotes a versicle that the officiant sings and that is answered by the choir in response.

**Ur-abbreviation**  Ghotan used a sideways hook over $t$ and $m$ to denote the syllables *tur* and *mur*:

\[
\text{nocturnus} \Rightarrow \text{nocēnus}
\]

**O-abbreviation**  The least used abbreviation mark in *Missale Aboense*\(^{14}\) is a small ring that usually marks that something with an $o$ has been left out. Ghotan used it in two different $q$-related abbreviations:

\[
\begin{align*}
\checkmark & \quad \checkmark \\
\text{quo} & \quad \text{quoque}
\end{align*}
\]

**Abbreviation glyphs**

Ghotan had about a dozen special symbols for abbreviations that he then combined with abbreviation marks and ligatures to create a large amount of abbreviations for the text. By far the largest group is the symbols for Latin syllables starting with a *q* with the next largest being symbols for *p*. I will now go through his abbreviations in alphabetical order by the base symbol.

**C**  The syllable for *con* is abbreviated with a turned $c$ with a cedilla:

\[
\text{contra} \Rightarrow \text{pra}
\]

This occurs almost exclusively in the first syllable.

\(^{14}\)That I have noticed.
Missale uses the Tironian \textit{et} symbol in place of an ampersand. The symbol was named so after its inventor Marcus Tullius Tiro who was Cicero’s scribe.

\textit{et}

Ghotan used the symbol only for the word \textit{et} and it does not occur as a part of longer words even though many scribes used it that way. Also, it was relatively common that scribes used the \textit{et} symbol as a shorthand for \textit{and} also when writing in languages other than Latin.

There are no special symbols for abbreviating syllables containing \textit{m} but Ghotan occasionally set \textit{z} in place of \textit{m}, mimicking the custom of scribes to write the \textit{m} sideways if it didn’t otherwise fit. This form is used only at the end of the word and it is quite rare. For example, in one place \textit{alligatam} is written as:

\textit{alligataz}

In manuscripts this form was used almost exclusively at the end of a line, but Ghotan used it also in the middle of line in places where the word was followed by punctuation.

Three symbols based on \textit{p} occur in Missale. Two of them are very common and they correspond with syllables \textit{per} and \textit{pro} while the ’squirrel tailed’ \textit{prae} is uncommon as the syllable is usually represented by \textit{p} tilde. Two of the symbols have capital letter versions:

\[ \text{Per/}{\text{Por}} \quad \text{per/}{\text{por}} \quad \text{Pro} \quad \text{pro} \quad \text{prae} \]

There’s a ligature for \textit{pro} and \textit{p}. For example, the word \textit{prophete} is often abbreviated as:

\[ \textit{prophete} \Rightarrow \textit{prohe} \]

There are three different abbreviation symbols based on the letter \textit{q} and they are combined with abbreviation marks to create more. In addition to the three that Ghotan used, I added a fourth symbol as a ligature even though Ghotan set it with two separate slugs of type.\footnote{Handling ligatures in OpenType features is a bit simpler than handling separate glyphs.} The \textit{q}-based symbols are:

\[ \textit{que} \quad \textit{quod} \quad \textit{quo} \quad \textit{quia} \]

\footnote{Handling ligatures in OpenType features is a bit simpler than handling separate glyphs.}
Here *quia* is my addition and Ghotan used ordinary *q* and *r* rotunda to set it. The composed *q*-based abbreviations are:

\[ \hat{q} \hat{q} \hat{q} \hat{q} \hat{q} \hat{q} \hat{q} \]

\[ \text{quae quod qua qui quoque quam quid} \]

It is very easy to confuse *quae* with *qua* and *quam* with *quid* as in both cases the only difference is the shape of the tilde.

Ghotan had two different ways to abbreviate *quo* and *quod* and it is not clear to me how he chose which form to use:

\[ \text{quo } \Rightarrow \text{ g/q} \]
\[ \text{quod } \Rightarrow \text{ q/q} \]

Finally, Ghotan had an additional *q*-abbreviation that he did not use in *Missale Aboense* but that occurs in *Psaltarium Upsalense*:

\[ \text{Quod} \]

**R** There are two *r*-based abbreviations but one of them occurs almost exclusively in the instructions for the mass:

\[ \text{rum } \Rightarrow \text{ rum response} \]

Both of them are essentially the same symbol that denotes the suffix *rum*, but one of them is based on the straight *r* and the other in small caps rotunda. A red response symbol is very common in the instructions, but it occurs in the text set in black in a handful of places where it means *respondit*. Ghotan did not use lower case *rum* rotunda and instead set the straight *rum* after all letters.

The straight *rum* was used also in some other abbreviations. For example, the Easter litany of saints uses it to ask each saint to pray for us:

\[ \text{ora pro nobis } \Rightarrow \text{ Orum} \]

**S** The word *sed* is denoted by the eszet *ß* ligature:

\[ \text{sed } \Rightarrow \text{ ß} \]

In some places the same symbol is used also for other syllables starting with *se*-.. It is notable that Ghotan did not use it to represent double *s* in any place.

He had also an *se* ligature that he occasionally used that I have decided to interpret as an abbreviation symbol as it is not used consistently:

\[ \text{se } \Rightarrow \text{ ß} \]
There are two different symbols for the syllable -us that are used for different grammatical endings:

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>ʒ</td>
<td>Dative us</td>
</tr>
<tr>
<td>ǝ</td>
<td>Other us</td>
</tr>
</tbody>
</table>

The dative suffix ʒ occurs also in words that end in -bus even if they are in a different case.

<table>
<thead>
<tr>
<th>Word</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>deus</td>
<td>= deš</td>
</tr>
<tr>
<td>omnibus</td>
<td>= omnibš</td>
</tr>
<tr>
<td>tribus</td>
<td>= tribš</td>
</tr>
</tbody>
</table>

The only specific symbol based on V is used only to denote versicle and it is set in red in all places:

\[ \text{℣} \]

versicle

Other abbreviation symbols

Missale has several abbreviation symbols that don’t occur in Missale Aboense but that were in use when it was printed. These abbreviations are enabled using other OpenType features and are shown in table 5. Most of them represent the suffix -um that is denoted by adding a diagonal stroke to a base letter.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>ԁ</td>
<td>dum</td>
</tr>
<tr>
<td>ｍ</td>
<td>mum</td>
</tr>
<tr>
<td>ｎ</td>
<td>num</td>
</tr>
</tbody>
</table>

The syllable dum at the end of a word was occasionally abbreviated by adding a diagonal stroke to d:

\[ \text{ԁ} \]

dum

The syllable mum was abbreviated in the same way by adding a diagonal stroke:

\[ \text{ｍ} \]

mum

The syllable num was abbreviated in the same way by adding a diagonal stroke:

\[ \text{ｎ} \]

num
### Abbreviations with specific meanings

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
<th>Feat</th>
<th>Entering</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>☛</td>
<td>dum</td>
<td>ss02</td>
<td>dum</td>
<td></td>
</tr>
<tr>
<td>☞</td>
<td>is</td>
<td>ss02</td>
<td>is</td>
<td></td>
</tr>
<tr>
<td>☜</td>
<td>mum</td>
<td>ss02</td>
<td>mum</td>
<td></td>
</tr>
<tr>
<td>▪️</td>
<td>num</td>
<td>ss02</td>
<td>num</td>
<td></td>
</tr>
<tr>
<td>❌️</td>
<td>par</td>
<td>ss02</td>
<td>par</td>
<td></td>
</tr>
<tr>
<td>❌️️</td>
<td>que</td>
<td>ss02</td>
<td>que</td>
<td></td>
</tr>
<tr>
<td>❌️️️</td>
<td>que</td>
<td>ss02</td>
<td>qve</td>
<td></td>
</tr>
<tr>
<td>❌️️️️</td>
<td>rum</td>
<td>ss02</td>
<td>rum</td>
<td>rum rotunda</td>
</tr>
<tr>
<td>❌️️️️️</td>
<td>sunt</td>
<td>ss02</td>
<td>sunt</td>
<td></td>
</tr>
<tr>
<td>❌️️️️️️</td>
<td>sm</td>
<td>ss02</td>
<td>sm</td>
<td></td>
</tr>
</tbody>
</table>

Table 5: Other abbreviation symbols

**P**  Adding a dieresis on top of *p* was a common way to represent *par*. It is a bit surprising that it does not occur in *Missale Aboense*.

\[ \ddot{p} \]

\[ par \]

**Q**  The syllable *que* could be abbreviated in many different ways. *Missaali* contains two additional ways in addition to Ghotan’s convention shown on page 28. Simpler gothic scripts as well as early books printed in the roman type often used a semicolon after *q* for the syllable, and some abbreviation conventions (including Ghotan’s one for small size script) used a diariesis over *q*:

\[ q; \]

\[ \ddot{q} \]

\[ que \]

\[ que \]

**R**  Ghotan didn’t use rotunda version of *rum* except for the response\(^{16}\) but it was in a common use at the time.

\[ \ddot{z} \]

\[ rum \]

\(^{16}\)See page 29.
There are three additional symbols based on the long s. The syllable *is* adds a loop to it, *sm* a high horizontal stroke, and *sunt* a diagonal stroke:

\[
\begin{array}{ccc}
is & sm & sunt \\
\end{array}
\]

5 Ligature syntax for special characters

The version 2.0 of *Missaali* adds a way of accessing special characters as a ligature substitutions.

Alternate character selection  Alternative variants of characters are accessed by adding a colon after them. Most of the variants are in the two-line initials and will be explained in the next section. A few of them are for normal characters:

\[
\begin{align*}
\text{H} & \Rightarrow \text{G} & \text{m} & \Rightarrow \text{z} & \text{r} & \Rightarrow \text{z} & \text{z} & \Rightarrow \text{z} \\
\text{G} & \Rightarrow \text{G:} & \text{m} & \Rightarrow \text{m:} & \text{r} & \Rightarrow \text{r:} & \text{z} & \Rightarrow \text{z:} \\
\text{ä} & \Rightarrow \text{ä:} & \text{æ} & \Rightarrow \text{æ:} & \text{ö} & \Rightarrow \text{ö:} & \text{œ} & \Rightarrow \text{œ:}
\end{align*}
\]

Lombardic initials  The Lombardic initials are written by surrounding them with a plus sign. The two line initials are written with capital letters and one line initials with lower case ones. Alternate letter forms are written with one or more colons after the letter. For example:

\[
\begin{array}{ccc}
+S+ & +S:+ & +s+
\end{array}
\]

The full set of initials is shown in figure 10.

Abbreviation symbols  The abbreviation symbols are written inside brackets. In case there is more than one way to abbreviate a given string, that marked by adding one or more colons to the abbreviated string. In a few cases one symbol has more than one way to enter it:

\[
\begin{array}{ccc}
[par] & [par:] & [per]
\end{array}
\]

The *us* suffix abbreviation can also have a period added to it:
## Two-line initials

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>D+</th>
<th>E+</th>
</tr>
</thead>
<tbody>
<tr>
<td>+A+</td>
<td>+A+</td>
<td>+B+</td>
<td>+C+</td>
<td>+D+</td>
<td>+D:+</td>
</tr>
<tr>
<td>E</td>
<td>G</td>
<td>H</td>
<td>I</td>
<td>I+</td>
<td>J+</td>
</tr>
<tr>
<td>+E+</td>
<td>+F+</td>
<td>+G+</td>
<td>+H+</td>
<td>+I+</td>
<td>+I:+</td>
</tr>
<tr>
<td>L</td>
<td>O</td>
<td>O</td>
<td>N</td>
<td>O</td>
<td>D</td>
</tr>
<tr>
<td>+L+</td>
<td>+M+</td>
<td>+M:+</td>
<td>+M::+</td>
<td>+N+</td>
<td>+N:+</td>
</tr>
<tr>
<td>O</td>
<td>O</td>
<td>O</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>+Q+</td>
<td>+Q:+</td>
<td>+Q::+</td>
<td>+R+</td>
<td>+S+</td>
<td>+S:+</td>
</tr>
<tr>
<td>T</td>
<td>U</td>
<td>U</td>
<td>U</td>
<td>V</td>
<td>V:</td>
</tr>
<tr>
<td>+T+</td>
<td>+U+</td>
<td>+U:</td>
<td>+V+</td>
<td>+V:+</td>
<td>+W+</td>
</tr>
<tr>
<td>Z</td>
<td>Å</td>
<td>Å</td>
<td>Å</td>
<td>A</td>
<td>A+</td>
</tr>
<tr>
<td>+Y+</td>
<td>+Z+</td>
<td>+Å+</td>
<td>+Ä+</td>
<td>+Ö+</td>
<td>+R:+</td>
</tr>
</tbody>
</table>

## One-line initials

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>D+</th>
<th>E+</th>
</tr>
</thead>
<tbody>
<tr>
<td>+a+</td>
<td>+b+</td>
<td>+c+</td>
<td>+d+</td>
<td>+d:+</td>
<td>+e+</td>
</tr>
<tr>
<td>h</td>
<td>I</td>
<td>E</td>
<td>L</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>+h+</td>
<td>+i+</td>
<td>+j+</td>
<td>+k+</td>
<td>+l+</td>
<td>+m+</td>
</tr>
<tr>
<td>O</td>
<td>O</td>
<td>S</td>
<td>U</td>
<td>U</td>
<td>O</td>
</tr>
<tr>
<td>+p+</td>
<td>+q+</td>
<td>+r+</td>
<td>+s+s</td>
<td>+t+</td>
<td>+u+</td>
</tr>
<tr>
<td>x</td>
<td>z</td>
<td>Å</td>
<td>Å</td>
<td>Å</td>
<td>Å</td>
</tr>
<tr>
<td>+x+</td>
<td>+y+</td>
<td>+z+</td>
<td>+â+</td>
<td>+ä+</td>
<td>+ö+</td>
</tr>
</tbody>
</table>

Figure 10: Ligature substitutions for initials
The basic abbreviation ligatures are shown in figure 6.

Abbreviation marks

The abbreviation marks are handled by writing an accent mark before the character. In theory, this should work automatically with unicode combining characters and no special handling from font is necessary, but in practice I have had trouble getting them to work with LaTeX\textsuperscript{17} so I added the explicit ligature substitutions. This also allowed me to use some letters that are not technically accents for the substitutions. The different abbreviation marks map to accents (and other characters) as follows:

\begin{verbatim}
~ ´ ^ ` '
~ ´ ^ ' '
asciitilde acute asciicircumflex grave quotesingle
`` ° ; /
” ° ; /
quotedouble degree semicolon slash
\end{verbatim}

For example:

\begin{verbatim}
oMes propT noB aplce
\end{verbatim}

Some characters have a wider tilde available for them. That is accessed by using two tildes as a the prefix:

\begin{verbatim}
~w ~w
\end{verbatim}

Abbreviation marks can be combined with abbreviation symbols by entering the mark as the first character inside the brackets. For example:

\begin{verbatim}
[~per] [´prae] [¨que]
\end{verbatim}

\textsuperscript{17}And I use LaTeX almost exclusively.
### Abbreviation ligature substitutions

| [bis] ⇒ ḷ | [por] ⇒ ṭ | [quod] ⇒ ṕ  |
| [con] ⇒ ḱ | [prae] ⇒ ṭ | [quod:] ⇒ ṕ  |
| [con:] ⇒ ḱ | [prae:] ⇒ ṕ | [quoque] ⇒ ṕ  |
| [et:] ⇒ ṭ | [prop] ⇒ ṭ | [r:um] ⇒ ṭ  |
| [etc] ⇒ ṭ | [qua] ⇒ ṭ | [se] ⇒ ṭ   |
| [hic] ⇒ ṭ | [qua:] ⇒ ṭ | [sec] ⇒ ṭ  |
| [is] ⇒ ṭ | [quam] ⇒ ṭ | [sm] ⇒ ṭ  |
| [lum] ⇒ ṭ | [que] ⇒ ṭ | [sunt] ⇒ ṭ  |
| [num] ⇒ ṭ | [que:] ⇒ ṭ | [ter] ⇒ ṭ  |
| [mur] ⇒ ṭ | [qui] ⇒ ṭ | [tur] ⇒ ṭ  |
| [par:] ⇒ ṭ | [quo] ⇒ ṭ | [us:] ⇒ ṭ  |
| [per] ⇒ ṭ | [quo:] ⇒ ṭ | [ver] ⇒ ṭ  |
| [Per] ⇒ ṭ |

Table 6: Abbreviations as ligature substitutions
Table 7: Abbreviation marks added to abbreviation symbols

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Mark 1</th>
<th>Mark 2</th>
<th>Mark 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>con</td>
<td>[´con]</td>
<td>[con]</td>
<td>[°con]</td>
</tr>
<tr>
<td>per</td>
<td>[´per]</td>
<td>[per]</td>
<td>[°per]</td>
</tr>
<tr>
<td>prae</td>
<td>[´prae]</td>
<td>[prae]</td>
<td>[°prae]</td>
</tr>
<tr>
<td>pro</td>
<td>[´pro]</td>
<td>[pro]</td>
<td>[°pro]</td>
</tr>
<tr>
<td>prop</td>
<td>[´prop]</td>
<td>[prop]</td>
<td>[°prop]</td>
</tr>
<tr>
<td>que</td>
<td>[´que]</td>
<td>[que]</td>
<td>[°que]</td>
</tr>
<tr>
<td>quo</td>
<td>[´quo]</td>
<td>[quo]</td>
<td>[°quo]</td>
</tr>
<tr>
<td>quod</td>
<td>[´quod]</td>
<td>[quod]</td>
<td>[°quod]</td>
</tr>
<tr>
<td>rum</td>
<td>[´rum]</td>
<td>[rum]</td>
<td>[°rum]</td>
</tr>
</tbody>
</table>
6 Old Finnish Ortography

Missaali has support for typesetting Finnish using late 17th century ortographical conventions. It is anachronistic as textura was no longer in use at the time as it had been replaced by swabacher and fraktur during the 16th century.

Finnish was not a written language when Missale Aboense was printed. Latin was the educated language, and everyday matters were written in Swedish or German. Surviving Finnish texts are few and almost all are translations of prayers.

The first long texts in Finnish were written by Mikael Agricola in the 16th century. He was the reformer of Finland and he translated the New Testament and large parts of the Old to Finnish. His texts are very difficult to read nowadays, as he based his ortography on Latin, Swedish, and German, all languages very different from Finnish. Over time it became evident that the written language should be systematized. This happened with the 1642 Bible translation, Se Coco Pyhä Ramatu. This translation fixed the way Finnish was written for 150 years, and there were only small changes until the early 19th century.

Missaali has an OpenType feature (ss16, ordn) that implements a number of contextual substitutions for cases where the 1642 Bible systematically used characters that are different from modern Finnish.

\textbf{K} The most complex phoneme in 1642 was K. Mikael Agricola had eight different ways to represent it in different contexts, and the translators cut it down to five. The rules for its use were:

1. In most cases it is written with \textit{c}: tanfa, catco;
2. Before a front vowel (e, i, y, ä, ö) it is \textit{k}: hapy, hijce;
3. Double \textit{k} is written \textit{ck}: tacho, tachi;
4. Combination \textit{ks} is written with \textit{x}: yksi, wesi;
5. After letters \textit{n} and \textit{l} it is replaced by \textit{g}: langa, jalga;

There were a few combinations where these rules were not always followed. If a word started with \textit{Sk}, it was occasionally written with \textit{k} even if the next letter was a back vowel: Skáne, Skoulu. Some writers continued the medieval tradition of using \textit{g} in front of the diphong \textit{ui}: quin, quinga.

\footnote{Later in his career he was helped by other reformers, most notably Paavali Juusten, and it is often difficult to determine who translated which part of the text.}
The short s was used according to the word-final convention, so it was short only at the end of the word or at the end of the first part of a compound word. This is the default behavior of Missaali but it differs from the 19th century black letter conventions.

Marking the double s was inconsistent and a text might use different ways to the same word in different parts of the text. The three options were:

1. using the eszet ligature: kișa;
2. using the long f for both: kílla; or
3. using only one long f: kíla.

The combination ts was usually written using the tz ligature. Missaali does not have it in its set of characters, but the feature still replaces ts with tz: catze, Ruotsi.

Ä and Ö The letters å and ö were written with æ and œ ligatures, except that the e was written over the original letter: å, ö. The modern convention of using two dots gained prevalence in the early decades of the 19th century.

Consonant softening It was mentioned above that k was replaced with g in combinations nk and lk. The letters t and p were similarly softened in some contexts:

1. Combinations lt and nt were written as ld and nd: culba, linbu; and
2. The combination mp was written mb: ombi.

V and W The letter v is never used when setting Finnish in black letter and a w is always used in its place, even in names: caswi, Maaja, Olawi. However, if the name is in a different language, it is written as in the original language: Ñerbu, Riviera.

Comma A virgule was used instead of a comma: t.

Sound length In principle the sound length was marked the same way as in modern Finnish, that is, a long sound is written with a doubled letter, but its use was inconsistent. Missaali does not try to alter the sound lengths, but if you want to emulate the 17th century conventions by hand, you can follow the following three rules:
1. if the sound length changes the meaning of the word, then it is marked. For example, tuli and tuuli are always written with the correct vowel length;

2. a long vowel that occurs in the first syllable is always marked: päällä.

3. otherwise, if there is no possibility of confusion, the sound is often written with only one letter. For example, vitsaaks instead of viisaaks and phtaks instead of phtaaaks.19

7 OpenType Features

This section describes the OpenType features of Missaali. Many of the features have secondary names and these names do not usually correspond with the standard behavior of those features. This is because this font is intended for special uses and there are no standard tags for describing its behaviors. Abusing the existing standard tags is the only way to get the features to work in programs that do not support arbitrary tags.

Most of the features mentioned here are not necessary anymore with the ligature syntax introduced in Missaali 2.0 but they are left in the font so that documents written using earlier versions of the font still work. See section 5.

The features implementing abbreviation marks have two additional names defined for them. This is because of how the current version of the fontspec package of XeLaTeX works. The problem is that turning features on and off blocks the contexts of contextual substitutions, which means that the rules for r-rotunda do not work correctly. I had to split the abbreviation mark features into two because of this, one feature that adds the symbols to everything except r and another that adds it just to r. See page 45 for details.

**aalt — All alternatives** This tag maps all letters to all variant forms and abbreviations that make use of the symbol. This is a special feature that is supported by many programs.

**calt — Contextual alternatives** The calt tag defines the substitution rules for long s and rotunda r. The tag implements the rules in the form that Bartholomew Ghotan used them that differ from the standard rules of later typography. This feature should be turned on unless you specifically want to follow more modern conventions.

---

19The final i is missing from both words as the most writers used the Turku dialect and the dialect has lost it from the transitive suffix.
There is a duplicate version of the short s glyph in the font that you can use if you want to insert one in the middle of a word without turning calt off. It is at the position U+F509, and similarly there is a straight r at U+F4EB.

Some old versions of MS Word provide only partial support for calt: they substitute the characters but do not change the spacing within the word, so a long s is shown with the spacing of a short s.

dlig — Ghotan’s abbreviations Most of Bartholomew Ghotan’s abbreviations for Latin are enabled with dlig. The table 2 on page 24 contains a list of them.

que, hoc, urbis, qu, h, urb
-dlig +dlig

hist, swsh — Historical forms This form changes the æ, æ, õ, and ð characters to medieval forms where e is set over the top of a or o.

ä, æ, õ, æ å, å, ö, ö
-hist +hist

liga — Standard ligatures The feature liga implements the standard ligature substitution. This implements the fusion of bowls of adjacent letters as well as several substitutions for f and long s. This should usually be turned on for the whole document. The abbreviation ligature syntax is also handled with liga.

deus, dēus
-liga +liga

ss01, subs — Scandinavian vowel ligatures Nordic texts often used fused vowels to denote either long vowels or diphtongs. These fusions are not present in Missale Aboense, but I added them to the font:

aa, æo, m, ø
-ss01 +ss01
ss02, ornm — Additional abbreviations  This feature enables some abbreviations that are not in Missale Aboense. The details are shown in table 5.

mum, fim, que m. t. q;
-ss02 +ss02

This feature also converts some letters that were changed in font version 2.0 back to the forms that they had in version 1.0.

ss03, frac — Alternate abbreviations  This set works like dlig but it uses a different abbreviations for some letter combinations.

que, con, habet q, s, habz
-ss03 +ss03

ss04, salt, lt04, lr04 — Generic abbreviations  This feature adds a generic abbreviation symbol on the top of a letter or ligature. For most of the letters it uses a tilde, but some letters use something different.

a. h. l. w. c. d ã, h. l. w. ç, ç
-ss04 +ss04

ss05, lt05, lr05 — Tilde  Adds a tilde on top of most letters.

a. n. q. r ã, ñ, q, ç
-ss05 +ss05

ss06, lt06, lr06 — Dieresis  Adds a dieresis on top of most letters.

a. ë. r. Ç ã, ë, ç, ç
-ss06 +ss06

ss07, lt07, lr07 — R-abbreviation  Adds an r-abbreviation over most letters. Note that in this font the acute accent is used to mark the r-abbreviation tailed dot.

a. ç. t ã, ë. ë
-ss07 +ss07
**ss08, lt08, lr08 — Shorter tilde** Adds a shorter tilde over most letters. Ghotan used this occasionally in places where a normal tilde would have not fit well, most often over i. In this font this is implemented as a grave accent:

\[ \varepsilon, i, u \varepsilon, i, \acute{u} \]

Note that in case of letters where the normal tilde is already short, it uses the same symbol as **ss05**

**ss09, onum, lt09, lr09 — A-abbreviation** Adds a squashed open a that looks like a two-part tilde over most letters. This marks that something containing an a has been abbreviated out:

\[ g, s, q \bar{g}, \bar{s}, \bar{q} \]

This mark is implemented as the circumflex accent.

**ss10, lt10, lr10 — O-abbreviation** Adds a ring over most letters. This denotes that something containing an o is abbreviated out. This is implemented as the ring accent.

\[ q, u \acute{q}, \acute{u} \]

**ss11, sups — Um-abbreviation** This feature adds a diagonal slash to some letters that is in most contexts used for abbreviating um. The only one of these that occurs in *Missale Aboense* is straight *rum*.

\[ k, d, r, K \bar{k}, \bar{d}, \bar{r}, \bar{z} \]

As you can see from the example, this feature turns capital R into *rum* rotunda.

**ss12, lt10, lr10 — Ur-abbreviation** Adds a hook that denotes ur over most letters. This is implemented as the caron accent.

\[ m, r \check{m}, \check{r} \]
ss13 — **Horizontal strike**  Adds a horizontal stroke to some letters.

\[ \text{k, p, q} \quad \text{k, p, q} \]

-ss13 +ss13

ss14 — **Loop**  Adds a loop to some letters.

\[ \text{s l o f o} \]

-ss14 +ss14

ss15, smcp — **Liturgical symbols**  Changes some of the letters into liturgical symbols used in *Missale Aboense*.

\[ . \text{r v d x r b u} \]

-ss15 +ss15

ss16, ordn, ofin — **Old Finnish orthography**  This changes text to correspond to syntactic conventions that were in use in late 17th century Finnish texts (the so-called 1642 Bible Translation orthography).

**Input**  
Kuinka pitkälle aijot sinä, Catilina, käyttää väärin meidän kärsvällisyyttämme? Kuinka kauvan luulet sinä vielä voivasi hurjuulessasi pitää meitä pilkkana? Mihin määrään saakka kohoo sinun rajaton röyhkeytesi?

**Luinga**  
Kuinka pitkälle aijot sinä, Catilina, käyttää väärin meidän kärsvällisyyttämme? Kuinka kauvan luulet sinä vielä voivasi hurjuulessasi pitää meitä pilkkana? Mihin määrään saakka kohoo sinun rajaton röyhkeytesi?

+ss16

ss17 — **Alternate punctuation**  Replaces comma by colon, period by centered period and the exclamation sign by period.

\[ , \cdot \quad : \cdot \]

-ss17 +ss17

---

20 The Finnish translation of *In Catalinam* in the following example is by K. Laurila [14].
\texttt{ss18} — \textit{Fuse po} Enables the \textit{po} fusion.

\begin{align*}
\textit{po} & \quad \textit{p} \\
\texttt{-ss18} & \quad \texttt{+ss18}
\end{align*}

\texttt{ss19} — \textit{Alternative z} Use alternative form for \textit{z}.

\begin{align*}
\textit{z} & \quad \textit{z} \\
\texttt{-ss19} & \quad \texttt{+ss19}
\end{align*}

\texttt{ss20, titl} — \textit{Initials} Turn capital letters into Lombardic initials

\begin{align*}
\textbf{A} & \quad \textbf{L} & \quad \textbf{B} & \quad \textbf{C} \\
\texttt{-ss20} & \quad \texttt{+ss20}
\end{align*}

\texttt{ss21, lt21, lr21} — \textit{Dotaccent} Adds a dot to most letters.

\begin{align*}
\textit{b} & \quad \textit{v} & \quad \textit{b\text{\text{\text{"o}}}v} \\
\texttt{-ss21} & \quad \texttt{+ss21}
\end{align*}

\texttt{ss22} — \textit{Alternate G} Use alternative form for \textit{G}.

\begin{align*}
\textit{H} & \quad \textit{G} \\
\texttt{-ss22} & \quad \texttt{+ss22}
\end{align*}

\texttt{ss23} — \textit{Alternate initials} Changes some of the Lombardic initials into their alternate forms:

\begin{align*}
\textit{A} & \quad \textit{D} & \quad \textit{S} \\
\texttt{-ss23} & \quad \texttt{+ss23}
\end{align*}

8 \textit{LaTeX} interface

The file \texttt{missaali.sty} defines the package \texttt{missaali} that contains a number of convenience environments and macros for using the font together with XeLaTeX. All features of the font are available with the system, but accessing some of them is a bit cumbersome. This is partly because of how \texttt{fontspec} works and partly because the TeX typesetting algorithms are intended for modern typesetting conventions.
<table>
<thead>
<tr>
<th>Problem</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short $s$ in place of $f$</td>
<td>Move $s$ inside the macro:</td>
</tr>
<tr>
<td>\textit{concurs}$^9$ concurs\texttt{msabbr{us}}</td>
<td>\textit{concur}$^9$ concur\texttt{msabbr{sus}}</td>
</tr>
<tr>
<td>Straight $r$ after initial</td>
<td>Use \texttt{\textbackslash rotundar{}$}$</td>
</tr>
<tr>
<td>\textit{Pro} \texttt{msparinitial{P}ro}</td>
<td>\textit{Pro} \texttt{msparinitial{P}\textbackslash rotundar{}o}</td>
</tr>
<tr>
<td>Straight $r$ after abbreviation</td>
<td>Move $r$ inside macro</td>
</tr>
<tr>
<td>\textit{perry cúru} \texttt{msabbr{per}ry c\texttt{mstdr{u}ru}</td>
<td>\textit{perry cúru} \texttt{msabbr{perr}y c\texttt{mstdr{ur}u}</td>
</tr>
<tr>
<td>Missing mark over $r$</td>
<td>Use the $r$ versions of macros</td>
</tr>
<tr>
<td>\textit{mëis cors} \texttt{m\texttt{\textbackslash mstd{r}is co\texttt{mstd{r}s}}</td>
<td>\textit{mëis co\texttt{s}} \texttt{m\texttt{\textbackslash rstd{r}is c\texttt{rstd{or}s}}</td>
</tr>
</tbody>
</table>

Figure 11: Solving the LaTeX fontspec problems.

**The problem with fontspec contexts**  
Note! Most of these problems can be avoided by using ligature substitutions for abbreviations. However, they can still crop up, for example, when using different colors for letters.

Missaili has contextual substitutions where different forms of letters are substituted based on where in the word they occur. The most important of these are the rotunda $r$ and the long $s$. The current version of fontspec\textsuperscript{21} has the problem that the feature boundaries break the substitution contexts. This happens with abbreviation symbols as well as when using colored initials. For example, here are three different ways to write \textit{usque}:\textsuperscript{22}

\begin{verbatim}
usque
usq$\$ us\texttt{msabbr\{que\}}
uls$\$ u\texttt{msabbr\{sque\}}
\end{verbatim}

Here the middle line has short $s$ because fontspec broke the context at the point where the abbreviation starts so it thinks that the $s$ is occurring at the end of the word. The last line has the correct long $s$ because it is moved inside the \texttt{\textbackslash msabbr{\}} command so it belongs to the same context. Since $s$ does not have any

\textsuperscript{21}Version 2.7i in TeXlive 2021
\textsuperscript{22}Command \texttt{\textbackslash msabbr{\}} is a macro that enables the abbreviation ligatures defined by \texttt{dlig}. 
abbreviation marks defined for it and *sed* is the only abbreviation ligature starting with it, moving it inside the macros don’t cause any problems.

However, doing the same for *r* does cause problems because it has abbreviation marks. Moving *r* to the same context will force both symbols to have the same mark. The solution that Missaali uses is to define two additional features for each abbreviation mark feature, one that abbreviates only *r* and another for all other letters:

- **ssXX** — the base feature that adds abbreviation symbol to all letters;
- **ltXX** — adds abbreviation to all letters except *r*
- **lrXX** — adds abbreviation only to *r*.

For example, the behavior of the standard abbreviation macros is:

```
Normal  ss04  lt04  lr04
```

The package has two versions of for all abbreviation marks, one using the **ltXX** feature and another using **lrXX**.

### Typesetting Textura Blocks

Textura was usually set using two justified columns with only 24–26 characters per line, though late 15th century saw rise of using only wide column especially in secular books. Automatic typesetting algorithms, including the one used by TeX, work very poorly with justified short lines. It is necessary to help the algorithm by selecting suitable line break points and hyphenating words by hand. Using abbreviations makes setting the lines a bit easier, but the cost is that the modern audience will not understand them.

The style file defines three environments: **mstextura**, **mstexturablocks**, and **mstexturablock** for setting the text. The first sets complete two-column pages in Missaali, the second sets two-column Missaali that is intended to fit inside one page that may contain also modern typography, and the last sets one column of text that is intended to fit inside one page.

The environments make the following changes to the ordinary TeX layout:

1. they turn on the \texttt{\obeylines} so that LaTeX will force a line break at newlines of the text;

2. they add infinitely stretchable glue to the word space to force justification; and
3. they add space also to the left side of punctuation symbols.

4. they change ~ and ^ to be ordinary characters so that they can be used for ligature substitutions.

When \obeylines is in effect, LaTeX doesn’t hyphenate any words automatically so all hyphenations have to be added by hand.

When setting text with Missaali, I’ve used the following approach:

1. Set the font and textura block sizes.

2. Set the beginning of the text by placing possible rubrics in red at the start as well as the two first lines that contain the initial.

3. Go down through the text block adding line breaks to good places if XeLaTeX puts them in ugly places.

4. Further adjust the text by adding hyphenation points manually as well as abbreviation symbols.

5. If the text ends with a partial line, go back few lines altering them so that the last line is also full.

Using the manuscript spacing While printed textura was almost universally justified, manuscripts were not. Version 2.0 adds option \ManuscriptSpacing that prevents the automatic justification from happening.

Defining Font and Block Sizes

There are four parameters that alter the layout of textura blocks.

- font size (default 18 pt);
- text block width (default 6.4 cm);
- text block height (default 34 lines); and
- width of the gutter between columns (default 1 cm).

The first two affect all three textura environments, the third only \mstextura and the last affects environments with two columns. Each parameter has a macro for defining its value, and there is a combined macro for setting the first three at one time. See figure 12 for examples.
Nihilne te noctūnum prae sidium Palati, nihil urbis vigiliae, nihil timor populi, nihil concursus bonorum omnium, nihil

\mssetfontsize{22}
\mssetblockwidth{7.70cm}
\begin{mstexturablock}
  Nihilne te noc\msabbr{tur}num \msabbr{prae}sidium
  Palati, nihil urbis vigiliae,
  nihil timor populi, nihil con-
  cur\msabbr{sus} bonorum omnium, nihil
\end{mstexturablock}

Nihilne te noctūnum prae sidium Palati, nihil urbis vigiliae, nihil timor populi, nihil concursus bonorum omnium, nihil

\mssetfontsize{18}
\mssetblockwidth{6.40cm}
\begin{mstexturablock}
  Nihilne te noc\msabbr{tur}num \msabbr{prae}sidium
  Palati, nihil urbis vigiliae,
  nihil timor populi, nihil con-
  cur\msabbr{sus} bonorum omnium, nihil
\end{mstexturablock}

Figure 12: Examples of text size macros
This sets the font size. This is implemented as an independent variable because it is used for calculating the height of the text block.

This sets the width of the textura block to a given dimension.

This sets how many lines of text there are on each page of the \textmstextura environment. The height of the text block is calculated by multiplying the number of lines with the font size.

This sets the gutter width between the columns to its argument.

This sets the font size, text block width, and the number of lines on a page in one call.

Initials

The style file contains macros for setting the two size of intials in different colors as well as for creating two-line chapter beginnings.

There are three predefined colors:

\begin{itemize}
\item Red: 55e47
\item Green: 62876e
\item Blue: 455f9b
\end{itemize}

The red and blue correspond to the inks used in Missale Aboense while the green matches the ink used in Codex Aboensis that is a 1430s manuscript.\textsuperscript{23}

The two-line initials are created with four commands that have the same forms. They all set the initials hanging down so if you use them directly, you need to ensure that there is enough space underneath.

Sets a red two-line chapter initial. For letters that have alternate forms, you can add colons to access them.

\textsuperscript{23}In the sRGB color space
\texttt{\textbackslash mschapterinitial\{M\}} \texttt{\textbackslash mschapterinitial\{M:\}} \texttt{\textbackslash mschapterinitial\{M::\}}

\texttt{\textbackslash mschapterinitial\{}{blue\{initial\}}

Sets a blue two-line chapter initial.

\texttt{\textbackslash mschapterinitial\{}{green\{initial\}}

Sets a green two-line chapter initial.

\texttt{\textbackslash mschapterinitial\{}{withcolor\{initial\}\{}{color\}}

Sets a two-line chapter initial with a specified color.

\texttt{\textbackslash mschapterinitial\{}{withcolor\{A\}\}{ff00ff}}

\texttt{\textbackslash msparinitial\{initial\}}

Sets a one line high red Lombardic initial.

\texttt{\textbackslash msparinitial\{}{blue\{initial\}}

Sets a one line high blue Lombardic initial.

\texttt{\textbackslash msparinitial\{}{green\{initial\}}

Sets a one line high green Lombardic initial.

\texttt{\textbackslash msparinitial\{}{withcolor\{initial\}\}{color\}}

Sets a one line high green Lombardic initial in a specified color:

\texttt{\textbackslash msparinitial\{}{withcolor\{M\}\}{ff00ff}}

50
\textit{Vo usque tandem abutere: Catilina: patrietia nostra? Quamdiu etiam furor iste}

(a)

\textit{Vo usque tandem abutere: Catilina: patrietia nostra? Quamdiu etiam furor iste}

(b)

\textit{Egnante illus- Lectio trissimo rege sancto Erico in Svecia: venerabilis}

(c)

\textit{De vita sancto henrici episcopi}

\textit{Egnante illus- Lectio trissimo rege sancto Erico in Svecia: venerabilis}

(d)

Figure 13: Examples for chapter start macros
This sets a two-line initial in red, and then the contents of the first line and the second line to its right indented by the proper abount. This is shown in figure 13a.

This sets a two-line initial in blue, and then the contents of the first line and the second line to its right indented by the proper abount. This is shown in figure 13b.

This sets a two-line initial in green, and then the contents of the first line and the second line to its right indented by the proper abount.

Sets a two-line chapter start like the previous macros but with a specific initial color.

This sets a two-line initial in red, and the contents of the first line and at its end the rubric in red. The second line is set as in the previous commands. See figure 13c.

As previous, but sets the initial in blue and rubric in red.

This sets a two-line initial in green, and the contents of the first line and at its end the rubric in red. The second line is set as in the previous commands. See figure 13d. That figure also shows how to add a rubric in red in front above the chapter start using the command \texttt{msrubric}.
\msstartchapterwithrubricandcolors{r}{i}{f}{s}{color1}{color2}

This sets a chapter start with a partial line rubric in two colors: color1 is the color of the initial and the rubric is in color2.

Alternate initial I  The macro \initialI sets the tall version of initial I in blue into the margin or gutter using a very large size. As the letter is not in the text block, the next line doesn’t have to indented. If the line has a partial rubric on it, then the text has to be entered with macros \mspartialrubric and \mspartialline. For example, the blue initial on page 69 is created with:

\mspartialrubric{Incognit\msabbr{\msrubric{us}}}
\mspartialline{\initialI{N} taberna qu\mstdacc{a}{an}do } sumus: non curam{us} {quid} sit

The \mspartialrubric and \mspartialline have to be always used as a pair where rubric is first and the line is next.

Abbreviations

**NOTE!** With Missaali 2.0 it is better to use ligature substitutions to handle abbreviations! The old way of using them is still in the font, but you shouldn’t use it for new texts.

There are two different ways how abbreviations are handled in missaali.sty. The abbreviations with specific meanings are handled as ligatures while abbreviation marks are simple letter substitutions. There are three different commands for ligature substitutions and each abbreviation mark has four different commands defined for it.

Different commands for the abbreviation marks are needed because otherwise r-rotunda would not work correctly. Thus, there is a command that puts the mark over all letters except for r, and one that puts it only on r. This makes it possible to put r inside the abbreviation context to get a correct form for it. There are also two variants on whether an additional unabbreviated text is added also to the pdf using the actual text mechanism. This makes it easier to search text on advanced pdf viewers. The commands for abbreviation marks are shown in table 8.

The commands are named systematically so that if the base name of the macro is X, then the commands have the form:

1. \X: adds the mark to all other letters except for r, does not add the actual text to the pdf.
2. \rX: adds the mark only to r, does not add the actual text to the pdf.
<table>
<thead>
<tr>
<th>Command</th>
<th>Marks r</th>
<th>Actual text</th>
<th>Sample</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Generic abbreviation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>\mstd</td>
<td></td>
<td>ōr</td>
<td>\mstd{or}</td>
<td></td>
</tr>
<tr>
<td>\mstdacc</td>
<td></td>
<td>×</td>
<td></td>
<td></td>
</tr>
<tr>
<td>\rmstd</td>
<td></td>
<td>ōr</td>
<td>\rmstd{or}</td>
<td></td>
</tr>
<tr>
<td>\rmstdacc</td>
<td></td>
<td>×</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>A-abbreviation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>\mstda</td>
<td></td>
<td>ōr</td>
<td>\mstda{or}</td>
<td></td>
</tr>
<tr>
<td>\mstdaacc</td>
<td></td>
<td>×</td>
<td></td>
<td></td>
</tr>
<tr>
<td>\rmstda</td>
<td></td>
<td>ōr</td>
<td>\rmstda{or}</td>
<td></td>
</tr>
<tr>
<td>\rmstdaacc</td>
<td></td>
<td>×</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>R-abbreviation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>\mstr</td>
<td>ōr</td>
<td>\mstr{or}</td>
<td></td>
<td></td>
</tr>
<tr>
<td>\mstracc</td>
<td></td>
<td>×</td>
<td></td>
<td></td>
</tr>
<tr>
<td>\rmstr</td>
<td>ōr</td>
<td>\rmstr{or}</td>
<td></td>
<td></td>
</tr>
<tr>
<td>\rmstracc</td>
<td></td>
<td>×</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>O-abbreviation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>\msto</td>
<td>ōr</td>
<td>\msto{or}</td>
<td></td>
<td></td>
</tr>
<tr>
<td>\mstoacc</td>
<td></td>
<td>×</td>
<td></td>
<td></td>
</tr>
<tr>
<td>\rmsto</td>
<td>ōr</td>
<td>\rmsto{or}</td>
<td></td>
<td></td>
</tr>
<tr>
<td>\rmstoacc</td>
<td></td>
<td>×</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Specifically tilde</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>\mstdt</td>
<td></td>
<td>ōr</td>
<td>\mstdt{or}</td>
<td></td>
</tr>
<tr>
<td>\mstdtacc</td>
<td></td>
<td>×</td>
<td></td>
<td></td>
</tr>
<tr>
<td>\rmstdt</td>
<td></td>
<td>ōr</td>
<td>\rmstdt{or}</td>
<td></td>
</tr>
<tr>
<td>\rmstdtacc</td>
<td></td>
<td>×</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Short tilde accent</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>\mstdst</td>
<td></td>
<td>ōr</td>
<td>\mstdst{or}</td>
<td></td>
</tr>
<tr>
<td>\mstdstacc</td>
<td></td>
<td>×</td>
<td></td>
<td></td>
</tr>
<tr>
<td>\rmstdst</td>
<td></td>
<td>ōr</td>
<td>\rmstdst{or}</td>
<td></td>
</tr>
<tr>
<td>\rmstdstacc</td>
<td></td>
<td>×</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Specifically dieresis</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>\mstdd</td>
<td></td>
<td>ōr</td>
<td>\mstdd{or}</td>
<td></td>
</tr>
<tr>
<td>\mstddacc</td>
<td></td>
<td>×</td>
<td></td>
<td></td>
</tr>
<tr>
<td>\rmstdd</td>
<td></td>
<td>ōr</td>
<td>\rmstdd{or}</td>
<td></td>
</tr>
<tr>
<td>\rmstddacc</td>
<td></td>
<td>×</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Diagonal stroke</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>\mstddg</td>
<td>ōr</td>
<td>\mstddg{Sr}</td>
<td></td>
<td></td>
</tr>
<tr>
<td>\mstddgacc</td>
<td></td>
<td>×</td>
<td></td>
<td></td>
</tr>
<tr>
<td>\rmstddg</td>
<td>ōr</td>
<td>\rmstddg{Sr}</td>
<td></td>
<td></td>
</tr>
<tr>
<td>\rmstddgacc</td>
<td></td>
<td>×</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 8: LaTeX commands for abbreviation marks
3. \Xacc: adds the mark to all other letters except for \textit{r}, adds the second argument as the actual text to the pdf; and

4. \Xacc: adds the mark only to \textit{r}, adds the second argument as the actual text to the pdf.

**Other macros**

There are several additional macros for accessing other symbols of the font.

\texttt{\textbackslash msmanualequation}

Turns on the manually-adjusted spacing for text. See page 46.

\texttt{\textbackslash msalphategumentation}

Switches to use alternate punctuation marks.

\texttt{\textbackslash msinit\textit{\{letter\}}}

Inserts a Lombardic initial using the current size and color.

\texttt{\textbackslash msinita\textit{\{letter\}}}

Inserts an alternate form of a Lombardic initial using the current size and color.

\texttt{\textbackslash msrubric\textit{\{text\}}}

Inserts text in red.

\texttt{\textbackslash msrubricblue\textit{\{text\}}}

Inserts text in blue.

\texttt{\textbackslash msrubricgreen\textit{\{text\}}}

Inserts text in green.
\texttt{\textbackslash mspara}

Inserts a red paragraph symbol.

\texttt{\textbackslash mstdl\{character\}}

Turns on the liturgical variants of the symbols. Namely, it turns $r$ to the response symbol, $v$ and $V$ to two different versicle symbols, and the period to the cross.

\texttt{\textbackslash rotundar}

Inserts a forced $r$-rotunda to a place where ordinary contextual substitution rules would place a straight $r$.

\texttt{\textbackslash straighr}

Inserts a forced straight $r$ in a place where the contextual substitution rules would place a $r$-rotunda.

\texttt{\textbackslash shorts}

Inserts a forced short $s$ in a place where the contextual substitution rules would place a long $s$.

\texttt{\textbackslash longs}

Inserts a forced long $s$ in a place where the contextual substitution rules would place a short $s$.

\texttt{\textbackslash msnoliga\{text\}}

Turns off the standard ligature substitution for its argument.

\texttt{\textbackslash mspartialrubric\{text\}}

Sets \texttt{text} at the right end of the current line in red. This has to be used together with \texttt{\textbackslash mspartialline} and in the correct order with rubric coming before the line.

It is usually simpler to use \texttt{\textbackslash msrubric} directly to make a line with rubrics at the end. The use case for \texttt{\textbackslash mspartialrubric} and \texttt{\textbackslash mspartialline} commands is
when you want to make text that has some deliberate issues with spacing between the texts of different colors.

\texttt{\textbackslash mspartialrubricblue\{text\}}

As above but in blue.

\texttt{\textbackslash mspartialrubricgreen\{text\}}

As above but in green.

\texttt{\textbackslash mspartialrubricwithcolor\{text\}\{color\}}

Sets a partial rubric in given color.

\texttt{\textbackslash mspartialalline\{text\}}

Sets a partial line of text with a rubric after it. The rubric needs to be set with one of the \texttt{\textbackslash mspartialrubric} commands just before it.

Package options

When \texttt{missaali.sty} is included in the document, there are some package-level options available:

\texttt{OldAE}  Use old variant forms for ä and ö where there is a small e letter in place of dieresis (hist).

\texttt{ManuscriptSpacing}  Do not force column justification and instead typeset ragged lines.

\texttt{AltG}  Use variant form of $G$ (ss22).

\texttt{AltZ}  Use variant form of $Z$ (ss19).

\texttt{FusePo}  Use fused po-ligature.
OldFinnish  Use 1642 Finnish orthographic conventions (ss16).

After setting the options, you can change to Missaali using the command \mstexturafamily. This command also changes the \emph command to use red color for emphasis instead of italics and sets paragraph indentation to zero.

**Style Definition Macros**

There are several style definition options for enabling some features. This should be placed before the \fontspec command or the macro or environment that calls it.

\MsNormalStyle  Revert back to the standard style, cancels the effect of other style definition macros.

\MsAltAEStyle  Changes the æ and œ ligatures to the form where the e is set above the letter instead of being fused into it. This also converts á and ô to the same form.

\MsAltPunctuationStyle  Changes the comma, the period, and the explanation mark to symbols that Ghotan used in Missale Aboense for similar purposes. His punctuation conventions don’t match the modern usage so this only a convenient approximation.

\MsAltZStyle  Changes the shape of the lower case z to a slightly different form.

\MsAltGStyle  Changes the shape of the upper case G to a different form.

\MsOldFinnishStyle  Turns on the emulation for late 17th century Finnish orthography.

\MsPoFusionStyle  Enables the ð fusion ligature for po.

**9  How This Font Was Made**

I started the work by looking through the reproduction of Missale Aboense searching for good examples for all different symbols that were used there. Next, I scanned the symbols in and created a separate 1000x1000 pixel image for each, making sure to not alter their relative sizes.
At this point I also consulted Derolez [5], Cappelli [3], and various internet sources trying to identify the various abbreviation symbols. A very successful strategy was to search the internet for words next to the abbreviated part as in most cases the results would contain a page with the full text of the section. I ended on many different pages and didn’t keep track on what I used.

The first phase of making the actual font was to draw the glyphs based on the scanned images. I did the tracing by hand as my experiences with automatic tracing haven’t been very encouraging. I used Glyphs for making the font as it has a good support for OpenType features and it is much easier to use than FontForge. The version that I used (1.4.2 (554)) had an annoying bug where it occasionally deleted the undo history, but on the whole it is the best of all font editors that I’ve tried.\footnote{The version 2.0 of the font was made with Glyphs (3.0.2).}

After making the basic alphabet and the basic ligatures, I turned to creating the missing letters \textit{W}, \textit{Y}, and \textit{Z}. The \textit{Z} is essentially an enlarged \textit{z} while the other two letters are based on \textit{U}.\footnote{For version 2.0 of the font I replaced \textit{Y} by an enlarged \textit{y} because Ghotan didn’t use specific capital \textit{Y} in any of the books that he printed}

The next step was to run the \texttt{checkOutlines} script of the \textit{Adobe FDK} took suite to check that the glyphs were valid. Most weren’t and had to be fixed. At this point I also created the BlueValues and stem width arrays that are used for hinting the letters. However, I didn’t pay very much attention for them as textura shouldn’t be used at font sizes where hinting is needed.

Creating glyphs with abbreviation marks was a large task, but Glyphs has a good support for them so it wasn’t as overwhelming as it would have been with TypeTool that I have used for my previous fonts.

Because there isn’t any existing font with exactly the same initials that Ghotan used, I decided to add them to the font also. Again, some of them were missing and had to be created from scratch. The initial \textit{X} is enlarged from a half-size initial, \textit{Y} is based on \textit{U}, \textit{Z} is a mirrored alternate form of \textit{S}, and \textit{W} is a rotated \textit{M}. Rotated initials were relatively common in incunabulas. Ghotan himself used a rotated \textit{C} in place of a \textit{D} in several places, and I’ve seen a text where the typesetter used a rotated \textit{Q} for a \textit{D}.

I created the features using a combination of copy-pasting and a few auxiliary scripts. I found out the \texttt{fontspec} problem with contextual substitutions by accident and the result was that I had to almost triple the number of features so that all would work correctly with XeLaTeX.

The anachronistic Old Finnish feature was originally made for the font Fraktuura that is based on late 19th century newspaper fraktur fonts. That font is still unpublished as it needs one more editing pass before it is ready for wider audience.
The last major change for the font was a complete renaming of most of the glyphs. I didn’t follow the recommended conventions for glyph names from the start as I wasn’t aware of how important they really are for pdf usability. At this point I also created a large number of duplicate glyphs so that one copy has no code point assigned to it and the other has. This makes it possible to use the one without the point in software that supports the relevant features and so get searchable pdfs, while making the symbol available also in software with no support for that feature, though, with the cost that the typeset file might not be searchable.

The very final step was to run the autohint tool of the Adobe FDK to create the font hints. The tool gave a number of suggestions how the glyphs could be changed for better hinting. I followed some but not all of the suggestions as hinting is not so important for a large-size font as it is for body text fonts.

The version 2.0 of the font was a drawn out process where I first occasionally added a new symbol that I missed when using the font. Then I found out that Kungliga biblioteket had digitized copies of Ghotan’s other books available for download, so I started to hunt for missing letters from there. I managed to find quite a few initials that I added to font. There are still a couple initial variants that I didn’t add because they were small modifications of M and Q and there were already a lot of those.

When I was making the font Aboensis that is based on a 15th century Swedish cursive book hand, I realized that using font features to access abbreviation symbols did not work for it because there were far too many issues with context breaks within words. I came up with the idea of using ligature substitutions for accessing abbreviations. This worked so well in practice, that I ported the same functionality to Missaali.

10 Symbols in Missaali

There is a dilemma in creating OpenType fonts that have symbols that are not included in Unicode: whether to assign code points from the private use area to them or not and rely completely on OpenType features to access them. The advantage of assigning code points is that then the symbols can be used in programs that don’t support the features by entering them via Character Map or some similar utility program.

The disadvantage is that using the private use area breaks the search functionality of most if not all pdf viewers. If the fusion is placed into the private use area, then searching for door does not work because the viewer doesn’t recognize the fusion as the letters d and o.

\footnote{Aboensis is still unreleased but I hope to get it out in 2021.}
I resolved this dilemma by making two identical copies of a number of symbols: one that has a code point and thus can be entered with Character Map and one that hasn’t that can be searched. The \textit{do}-fusion that is automatically created as a ligature substitution can be found with search but the one entered with Character Map cannot.

I added duplicates for symbols that are substituted into text using features \texttt{calt}, \texttt{liga}, \texttt{dlig}, and \texttt{ss01}. The long \textit{s} and rotunda \textit{r} are there even though they have actual unicode code points because not all viewers can recognize that they are variants of the respective letters.
11 Examples

This section has two longish examples of how medieval Latin text can be set using Missaali. The first example is a page containing one poem and parts of two others, and the second is the first half of the Legend of St. Henry.

The complete poem is Quintus Horatius Flaccus’s *Integer vitae* [17], from his first book of Odes. The text has divided opinions on whether it is Horace intended it to be taken as a serious exultation of honest life or a satire of such poems. The text has been a popular students’ song since Friedrich Flemming composed a melody for it in the early 19th century.

The first partial poem are three verses from *Estuans intrinsecus* by The Arch-poet. He was a poet who was active around the mid-12th century and was somehow associated with Rainald of Dassel, Archbishop of Cologne. *Estuans intrinsecus* was very popular during the middle ages and it survives on over 30 manuscripts, including the famous *Carmina Burana* [18]. The verses in this sample belong to the *Meum est propositum* segment of the poem.

The final partial poem is a snippet from *In taberna* that is also from *Carmina Burana*.

The second example contains first five of the nine lections of the legend of Saint Henry. They contain the *vita* or the biography of the saint as well as the first of the miracles attributed to him. The text follows the critical edition by Tuomas Heikkilä [8] that is based on a large number of surviving manuscripts.
Horatius A carmina post Poculae vitae celeberrimae
levisque purissimae aetatis impressae in orbis aestuorae
plenitatis gravida lagittis: Fulce: pharetta: se dixis
iter aetuolae sive facturum per in hospitalem caudalem el 
loca fabulose lambit hydraulces. Nam des me silva lupus
in labina: dum meam canto lalagen et ultra terminum curis
vagor expeditis: fugit in eremem: quae portentum negunt
militaris daunias latis altis: aequulisque Juba e telli generat:
leum arida nutrix. Pone me pigris ubi nulla
campis argo aestiva recret atua: quod latus mundi nebulae
malulque Joviter urget: pone sub curu nimium
propinquus solis in terra domibz negata: dulce ridentem
lalagen amabo: dulce loquentem Archipoeta
Eum est propositum
in taberna mozi: ubi vina pro
xima mozentis ozi: tunc can-
tabunt leius angelus chozi:
sit deus pitius isti potentiae:
Poculis accenditur animi
lucerna: coe imbutum nectare
re volat ad supera: mihi
lapit dulcis vinum et taberna:
quam quod aqua miscuit
paelulis picolora: Tales verb
us facio: quale vinum bibo:
nichil postum facete nisi sump
to cibo: nichil valent eius:
que ieiunus scribo: Nalonem
post calices carmine praevo:
A taberna quando Incognitum:
nonis: non curamus quid sit
humus: sed ad ludum qvem
mus: cui semper insulamus:
mus: quid agatur in taberna:
ubi nummus est pincerna:
hoc est opus: ut queratur:
se quid loquar audiatur:
Quidam ludunt: quidam
bibit: quidam indiscrcte vivunt:
se in ludo qui mozantur:
ex his quidam tenudantur:
quidam ibi vestiuntur:
quidam laccis induuntur: ibi
nullus timet moztem: sed
pro Baccho mittunt loztem.
Incipit vita S. Henrici episcopi.

Lectio

Egnante illustrissimo rege sancto 
Erico in Suecia; venerabilis pontifex 
beatus Henricus; in 
Anglia oridum; 
episcopus vitae 
sanctitatis et morum 
honestatis
Upsalensi regem 
regat ecclesiam. 

Quibus quasi 

duobus magnis luminariis 
populus terre ilius; ad veri 
de noticiam et cultum magis 

dominas illustrabat inuitum 
ac ~informabat. 

Sanctus 
antem regem pontificem; vita, 

moribus et ecclesiasticis 
dignitatis culmine 

prepollentem; intimis amoris 
complectebat affectu et 
specialis familiaritatis 

plurimum honorabat. 
Felix 
patria, quam divina maiestas 
concessit talium actantorum 
rectorum. 

Nonerat tunc 
formidini, ut regnum in 
divisum demiserat; dum 

ad gloriem Dei et iustae 
tranquillitatem regiun subditarum 
capita populum tam 

concordit et convenerunt.

Discipulatur illo.

Lectio

in tepore ecclesia 
celsam in timore Dei; rectis 

bantur leges; quas simples 
antigetas vel minus recte 

considerat et obliqua et 

versitas malignorum. 

Studebat 
pacem et iusticie subditum; 
lupi rapaces dentes venenatos 
in infantes acuerunt non 
audebant; cum rex sedens in 

solio intuitum suo omine malum 
disparet et bonus pastore 

viritate vigilaret super culto 
dieis; Lumi vero plebs 

Finlandiae; tunc cecae et cru 

telis gentilis; habitantibus 
in Suecia gravia damna 
frequentem inferret; sanctus 

rex Eriicus; assumpto leco 

ab ecclesia Upsalensi beato 

Henrico collecto exercitu, 

contra nominis Christi et 
populi sui inimicos expedicion 

dirigit. 

Quibus potenter sibi 

Christi et suo subiugatis 

dominio; baptizatis pluribus 

et fundatis in partibus 

ecclesiis; ad Sueiam cum 
gloriola victoria remeavit. 

Eius autem Hen. Leo 

Eriicus vince domini cul 
torem et custodem se divinitatis 

constitutum considerans; ad 
irrigandum nubem celestis
doctrinæ novellas neophitorum plantulas et ad corrodian
dum dei cultum in partibus illis audacter remansit: non metuens le quibusque adversis exponere: ut posset gloriari
dei dilatarse. Q quantus fidei fervor: quantus acto divini amoris altare atque cordis devotissimis pòtissimum accende
rat: q: postspiritus opulencia rerum et amicorum solaciis et Upsalensis prefulatus esse sublimi: pro paucarum et pauperum oviun salvacione multis le moribus priculis exponerat. Illus imitatione pastoris: q relictis nonamita novem ovidus in delerto uni
cam errantem sollice reac
vit et inventa ad ovile precis
imposita hucris reportavit.

Omní enim edificaciódi lecto
et confirmacióni Finlandensis ecclesiæ prudentior fideliter indulgaret: accidit: ut homicidiam quidam ob ipsam facinoris insanitatem ecclesiasticæ disciplina vellet co
crigere: ne faciliter nimia
tenientur offendiciary pester: q salutis remedium infelix vir item luguinum contempsit et in lue tertit

Dampnacionis augmentum: odio habens le latubritur arguentem: In ministrum itap: iusticie in lue salutis
zelatoem funestus insiluit: ipsius crueltate trucidavit
Sic sacratus domini: accepibilis hostia divinis ob
lata conspectibus: occument
p iusticia: templum superne Jerusalem cu gis palma
triunphi feliciter introivit.

Postmodum ille Lectio
(cellest? occiso: tollens te capite sancti pòtificis bic
retum: q gestare plueverat: impolui tuo capiti: et re
gressus domum: de comissi
flagício le iactans q uolum prostrasset: q hoc significans
occisionem sancti viri: letabatur cum male fictilet: et exultabat in rebus pessimis.
Dum autem bicretum: quod in tuo poluerat capite: amoere temptaret: cutis et caro bicreto coheurent: et illa insinul a testa capitatis amoebat: congrua profecto divine ulcionis vindicta: ut tali pena miserabiliter toz
queretur: q non est veritus
christum domini cruculenter impecere et occisum spoliare.
References


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