

# The selnolig package: Selective suppression of typographic ligatures<sup>\*</sup>

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## Abstract

The `selnolig` package suppresses typographic ligatures automatically based on predefined search patterns for English and German language documents. The search patterns focus on ligatures deemed inappropriate because they span morpheme boundaries within words. For example, the word `shelfful`, which is mentioned in the `TEXbook` as a word for which the “ff” ligature might be inappropriate, is automatically typeset as `shelfful` rather than as `shelfful`.

The `selnolig` package provides ligature suppression macros for the “common” typographic f-ligatures. These comprise not only the familiar `ff`, `fi`, `fl`, `ffi`, and `ffl` ligatures but also ligatures such as `ft` and `fft`, which are frequently provided by many fonts suitable for typesetting text.

For English language documents, the package also provides ligature suppression macros for a selection of “discretionary” and “historic” ligatures.

The `selnolig` package requires the use of the `Lua®TEX` format.

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<sup>\*</sup>Current version: 0.157. Features of this package are subject to change without prior notice. The main text fonts used in the present user guide are “Garamond Premier Pro” (for the most part) and “EB Garamond” (for the passages involving the `fb`, `fh`, `fk`, `ffb`, `ffh`, `ffk`, and `fk` ligatures). In this document, both “common” and “discretionary” ligatures are enabled for these two fonts. Sans-serif words and text fragments are typeset in “Helvetica Neue”, and “Consolas” is used as the monospaced font.

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# I Introduction

The ability of T<sub>E</sub>X and Friends to use typographic ligatures has long been cherished by its users. Indeed, the automated and transparent use of typographic ligatures by T<sub>E</sub>X and Friends is often held up by their users as one of the reasons for using these programs.

However, even though the automatic use of typographic ligatures is very useful in general, there are words for which the use of certain typographic ligatures may not be appropriate. The T<sub>E</sub>Xbook observes, on p. 19, that the word “shelfful” may look better if it is typeset as “shel<sup>ff</sup>ful”, i.e., *without* the ff-ligature. Some other English-language words that would generally be considered to be good candidates for non-use of ligatures are cufflink and offload, compare their appearance with that of cufflink and offload. Observe that all of these words are composite, with the first word component (or morpheme) ending in an “f” or “ff” and the second component (morpheme) beginning with either an “f” (in the case of shel<sup>ff</sup>ful) or an “l” (in the cases of cufflink and offload). A morpheme, briefly stated, is the smallest linguistic unit within a word that bears distinct meaning. Thus, the words shel<sup>ff</sup>ful and offload each contain two morphemes.

On the whole, though, the need to suppress typographic ligatures selectively for English language documents generally does not appear to be an enormously pressing concern, possibly because English doesn’t feature composite words that frequently. However, in some other languages, such as German, composite words are much more common, in such languages, there is naturally a much greater potential for composite words to feature f-f, f-l, f-i and other such character pairs (and triples) at morpheme boundaries. In German typography, the use of ligatures across morpheme boundaries is considered something to be avoided at (nearly) all cost, probably because ligatures that span morphemes have the potential to impair seriously the intelligibility of these words.<sup>1</sup> Words such as kopflos and elffach (containing fl- and ff-ligatures) simply look wrong to a German reader; they should be typeset as kopflos and elffach, respectively.

T<sub>E</sub>X and Friends offer several methods for suppressing ligatures on a case-by-case basis.<sup>2</sup> However, these methods must be applied separately to each and every occurrence of all words that contain undesirable ligatures. As such, these methods are both time-intensive and tedious, and there’s a residual risk that some words for which ligatures should be suppressed will be overlooked in the editing process.

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<sup>1</sup>For German texts, I believe that the *Duden* provides this sort of authoritative backing. For English texts, I’m actually not aware of a document issued by an official or quasi-official body that discourages the use of typographic ligatures across morpheme boundaries. If anybody can provide such a reference, I would be happy to list it.

<sup>2</sup>In L<sup>A</sup>T<sub>E</sub>X, there are three basic methods for suppressing ligature within a character pair: (i) insertion of an “empty atom”, { } between the characters, (ii) insertion of an explicit italic correction, \/, and (iii) insertion of an explicit “kern”, e.g., \kern0pt or \hspace{0pt}. The babel package, when used with the ngerman option, offers the “shortcut” macro “|” for this purpose. Note, though, that the first ligature suppression method, { }, does *not* work if the document is compiled with LuaL<sup>A</sup>T<sub>E</sub>X.

What has *not* been available so far is a L<sup>A</sup>T<sub>E</sub>X package that (i) specifies a list of word patterns and entire words for which ligatures should be suppressed and (ii) systematically discovers all instances of these words in a document and applies the non-ligation rules automatically. The `selnolig` package is meant to address this need. The package is currently set up to handle English and German language non-ligation issues by providing extensive lists of ligature suppression macros appropriate for the respective languages. Of course, no claim as to the completeness of either list is or can be made. The package does make it fairly easy, though, for users to provide additional ligature suppression rules to treat words not already covered by the package.<sup>3</sup>

For both English and German language documents, the `selnolig` package provides macros to suppress selectively the following f-ligatures: `ff`, `fi`, `fl`, `ffi`, and `ffl`—the “standard” f-ligatures that should be familiar to most users of Computer Modern fonts—as well as the `ft` (or `ft`) and `fft` ligatures. The latter two ligatures, while not provided by the Computer Modern font family, are available frequently in “oldstyle” or “Garalde” font families.

For English language documents, the package’s default setting is to suppress f-ligatures for only a fairly basic set of words. However, by providing the option `broad-f`, additional f-ligatures can be suppressed, e.g., for words that contain the `fb`, `fh`, `fj`, and `fk` character pairs. The package also recognizes an option called `hdlig` to suppress selectively historic and discretionary ligatures, such as those for the `ct`, `st`, `sp`, `sk`, `th`, `et`, and `as` character pairs.

For German language documents, all instances of `fb`, `fh`, `fj`, and `fk` ligatures are suppressed globally; see [Section 7.5](#). However, exceptions are provided in order *not* to suppress these ligatures for selected words of *non-German* origin—such as `fjord`, `fjell`, `Prokofjew`, and `Kafka`. At this time, no macros for the selective suppression of historic and/or discretionary ligatures are provided for German language documents.

The `selnolig` package also provides additional hyphenation exception lists for both English and German language words.

A remark on the classification of various forms of typographic ligatures: Among the ligature-rich OpenType fonts I’m familiar with that can be loaded via the commands of the `fontspec` package, there appears to a near-complete lack of terminological standardization as to which typographic ligatures—beyond the so-called “common” ligatures (mainly f-ligatures)—are labelled “historic” and which ones are labelled “discretionary”. For instance, Latin Modern Roman, Garamond Premier Pro, and Hoefler Text report having “only” discretionary ligatures, whereas Junice, Cardo, EB Garamond, and Palatino Linotype report featuring both historic and discretionary ligatures. (Interestingly, none of these fonts report having ligatures classified as either “contextual” or “required”.) The `selnolig` package provides the `hdlig` option to enable ligature suppression rules that apply to ligatures that may be classified as either “historic” or “discretionary”.

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<sup>3</sup>If you discover such words, please email them to me so that I can augment the package’s ligature suppression rules appropriately. A suggested template for reporting such cases is provided in [Appendix E](#).

## 2 I’m in a hurry! How do I start using this package?

### 2.1 How do I load the `selnolig` package?

- If your document is in English and you want to suppress f-ligatures for a “basic” set of words and word patterns, you should load the package as follows:

```
\usepackage[english]{selnolig}
```

Synonymous options for `english` are `UKenglish`, `british`, `USenglish`, `american`, `canadian`, `australian`, and `newzealand`.

- If you want to load a broader set of f-ligature suppression rules than the set that’s enabled by default, be sure to also specify the `broad-f` option; see [Section 6.2.1](#).
  - If the font you use for your document also provides “historic” and/or “discretionary” ligatures (e.g., `ct`, `st`, `sp`, *th*, *as*, *is*, *us*, etc.), you should also specify the `hdlig` option (in addition to the `english` option, of course) when loading the `selnolig` package.<sup>4</sup>
- If your document is written in German, load the package as follows:

```
\usepackage[ngerman]{selnolig}
```

Synonymous options are `german`, `austrian`, `naustrian`, `swissgerman`, and `swiss`.

- If you load the package *without* an explicit language option, i.e., as

```
\usepackage{selnolig}
```

but if one or more of the language options noted above are specified as options to the `\documentclass` instruction, L<sup>A</sup>T<sub>E</sub>X will pass these options on to the `selnolig` package.

- If no language options are set, either when the package is loaded or as options in the `\documentclass` instruction, loading the `selnolig` package will have no effect on the appearance of your document—unless you specify various `\nolig` macros on your own.

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<sup>4</sup>If the `selnolig` package is loaded *after* the `fontspec` package, a macro is run to inquire if historic and/or discretionary ligatures are enabled; if the answer is yes, the `hdlig` option is enabled automatically.

## 2.2 Any hints on how to get started with Lua<sup>A</sup>TeX?

The `selnolig` package requires Lua<sup>A</sup>TeX; it will *not* work with either pdf<sup>A</sup>TeX or X<sup>A</sup>TeX. This requirement will likely force you to make some changes to the preambles of your existing <sup>A</sup>TeX files in order to have them meet Lua<sup>A</sup>TeX's requirement. The main required changes are: (i) to remove any `\usepackage{inputenc}` instructions, and (ii) to insert the following instruction:

```
\usepackage{fontspec}
```

Of course, you'll also need to use a TeX distribution that includes a fairly recent version of Lua<sup>A</sup>TeX. TeXLive 2012, MacTeX 2012, and MiKTeX 2.9 all satisfy this requirement. If you use a command-line interface to compile your document named, say, `myfile.tex`, be sure to type

```
lualatex myfile
```

rather than either `latex myfile` or `pdflatex myfile`. If you use an editor with pull-down menus or buttons to invoke the required TeX compiler, be sure to select LuaLaTeX. The first time you run Lua<sup>A</sup>TeX on your document with a new set of fonts, the compilation speed will likely be quite slow because Lua<sup>A</sup>TeX has to build various cache files to store font-related information. Subsequent compilation runs should be much faster.

Depending on your TeX distribution, the default font family used by Lua<sup>A</sup>TeX will be either Computer Modern or Latin Modern. If you wish to use a different font family, further instructions will be required. How to specify fonts and font families and set up various font-related options in Lua<sup>A</sup>TeX are subjects that go far beyond the scope of this user guide. I urge you to become familiar with the [user guide](#) of the `fontspec` package to learn how to set a multitude of font-related options. The answers to the question [Frequently loaded packages: Differences between pdf<sup>A</sup>TeX and Lua<sup>A</sup>TeX?](#), posted on [tex.stackexchange.com](http://tex.stackexchange.com), also contain some very useful information. A great resource for people who would like to become more familiar with Lua<sup>A</sup>TeX is [A Guide to Lua<sup>A</sup>TeX](#) by Manuel Pégourié-Gonnard.

## 2.3 Anything else I need to do or know?

For multilingual support, Lua<sup>A</sup>TeX and the `selnolig` package work just fine with the [babel](#) package. If your document loads the `babel` package, be sure to load the `selnolig` package *after* the `babel` package so that the additional hyphenation patterns provided by the `selnolig` package aren't clobbered by any hyphenation settings provided by the `babel` package. The `selnolig` package is also compatible with the [hyphsubst](#) package (which, if used, should be loaded with a `\RequirePackage` statement *before* the `\documentclass` instruction).

Lua<sup>A</sup>TeX natively supports the so-called UTF-8 input encoding. The `selnolig` package assumes that users make full use of this feature. In particular, if your document is in German, it is assumed

that all vowels with diereses (Umlaute) are entered as ä, ö, and ü rather than as `\{"a}`, `\{"o}`, and `\{"u}` (or, if you tend to use the babel “shortcuts”, as “a”, “o”, and “u”). Likewise, it’s assumed that you enter the “Eszett” (“Scharfes s”) character as ß rather than as `{\ss}`.<sup>5</sup>

It is also assumed that you use the triple-f (modern) spelling form for words such as *Schiff-fahrt*, *Stofffarbe*, and *griffest*.

Finally, all babel-style “|” ligature-suppressing shortcut instructions should either be removed entirely or replaced with `\breaklig` instructions. On my Lua<sup>®</sup>TeX system (MacTeX 2012), whenever a “|” command is encountered, a bad crash occurs that requires a reboot of the computer.

### 3 Acknowledgments and license

I owe a huge intellectual and programming debt to Patrick Gundlach and Taco Hoekwater, who responded kindly and generously with detailed computer code to various queries I posted to [tex.stackexchange.com](http://tex.stackexchange.com).<sup>6</sup> Without their expertise in programming in Lua and interfacing the lua code with L<sup>A</sup>T<sub>E</sub>X, this package would not exist. They certainly deserve most of the credit for the lua code used by the `selnolig` package.

Felix Lehmann (a linguist and expert in morphology, i.e., the study of morphemes) and Steffen Hildebrandt (computer scientist extraordinaire) served as patient and careful testers of several *early beta* versions of this package, uncovering bugs, pointing out unclear passages in the user guide, and providing many excellent suggestions for important enhancements and other improvements. Steffen provided crucial modifications to the package’s lua code to make possible the `\keeplig` macro. Equally importantly, Felix and Steffen created software to systematically and comprehensively test the package’s German detection patterns for linguistic adequacy and (relative) completeness.

[Still to come: a brief summary of what Felix and Steffen have found, and a reference or two to their published work.] They wish to thank the Institut für Maschinelle Sprachverarbeitung at the Universität Stuttgart for granting them a license for the morphological analysis tool SMOR and, in particular, Helmut Schmid for his guidance, the Web-as-Corpus kool ynitiative (WaCky) for letting them use the SdeWaC corpus.<sup>7</sup> They also thank Rajesh Bhatt (University of Massachusetts–Amherst), Miriam Butt (Universität Konstanz), and Sabine Schulte im Walde (Universität Stuttgart) for helping them find the right resources for their project.

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<sup>5</sup>The use of the input characters with “built-in” diereses is actually required only for the operations of the package’s `\nolig` and `\keeplig` commands.

<sup>6</sup>See especially the questions <http://tex.stackexchange.com/q/48516/5001>, <http://tex.stackexchange.com/q/63005/5001>, and <http://tex.stackexchange.com/q/37443/5001>.

<sup>7</sup>M. Baroni, S. Bernardini, A. Ferraresi and E. Zanchetta, 2009, The WaCky Wide Web: A Collection of Very Large Linguistically Processed Web-Crawled Corpora. *Language Resources and Evaluation*, 43 (3): 209–226.



The `rmlligs` script lists hundreds of German language words for which various f-ligatures should be suppressed. I created many of the initial German language ligature suppression rules of the `selnolig` package to treat the words listed in the `rmlligs` package.<sup>8</sup>

Matthias Vogel very kindly informed me of a very useful and detailed set of macros, named `Ligatures-German`, which he wrote for the WinEdt programmer's editor, to suppress f-ligatures by inserting the babel `"|` shortcut macro in the appropriate spots. Matthias' regular-expression based macros have led me to refine and extend the scope of the `selnolig`'s `\nolig` commands.

Barbara Beeton provided careful and incisive comments on an early version of this user guide and the English-language ligature suppression macros. Other contributors to [tex.stackexchange.com](http://tex.stackexchange.com) and [comp.text.tex](http://comp.text.tex), too numerous to name individually, also helped guide and influence the genesis of this package. To all of you, I express my sincere thanks.

The website <http://www.morewords.com> provides very convenient methods for searching English language words that may contain cases of ligature collisions across morpheme boundaries. For German words, the site <http://corpora.informatik.uni-leipzig.de/?dict=de> provides a similar resource.

The entire `selnolig` package is placed under the terms of the L<sup>A</sup>T<sub>E</sub>X Project Public License, version 1.3 or later (<http://www.latex-project.org/lppl.txt>). It has the status “maintained”.

## 4 Structure of the package

### 4.1 Components of the package

The `selnolig` package has the following components:

- The main “driver” file is called `selnolig.sty`. It loads several other files and sets up the package's main user macros, `\nolig` and `\keeplig`. These macros are explained in more detail in [Section 4.2](#) below.
- The package's user macros rely on lua code given in the file `selnolig.lua`.
- Extensive lists of non-ligation rules for English and German language documents are provided in the files `selnolig-english-patterns.sty` and `selnolig-german-patterns.sty`.
- Supplemental hyphenation exception patterns, mostly for words that involve one or more ligatures that are to be suppressed, are contained in the files `selnolig-english-hypex.sty` and `selnolig-german-hypex.sty`.

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<sup>8</sup>All versions of `rmlligs` are archived at <http://www.j3e.de/ispell/igerman98/dict/>. A slightly modified version of the `rmlligs` package's test file, now called `rmlligs-testfile.tex`, is included among the ancillary files distributed with the `selnolig` package.



- A user guide (the document you’re reading right now); the source code of the user guide is available in the file `selnolig.tex`.
- Ancillary files: the files `selnolig-english-test.tex` and `selnolig-german-test.tex` load the `selnolig` package as well as either `selnolig-english-wordlist.tex` or `selnolig-german-wordlist.tex`. They serve to demonstrate the output of the `selnolig` package when run on lists of English or German words that are candidates for non-use of ligatures. The files `selnolig-english-test.pdf` and `selnolig-german-test.pdf` contain the results of compiling the test programs.<sup>9</sup>

## 4.2 Command syntax

The file `selnolig.sty` should be loaded in your document’s preamble with a `\usepackage` statement, usually with one or more options.<sup>10</sup>

After setting up several Boolean switches designed to structure the processing of options, the package loads the file `selnolig.lua`, which contains the package’s lua code.

Next, the package’s user macros are set up:

1. The main user macro is called `\nolig`. Each `\nolig` instruction takes two arguments: a “search string” and a string that indicates the “insertion point” for the non-ligation “whatsit”. For example, the macro

```
\nolig{lf|ful}{lf|ful}
```

serves to suppress automatically the `ff`-ligature in words such as “shelfful”, “bookshelfful”, and “selffulfilling”. Note the use of the `|` symbol in the command’s second argument to indicate which ligature should be suppressed.<sup>11</sup>

It is possible to use “wildcard” characters in the search string, as long as these characters occur after the non-ligation point. For example, the file `selnolig-german-patterns.sty` employs the instruction

```
\nolig{Auf1[aäeioöuü]}{Auf|1}
```

to search for words that start with `Auf1` followed by a vowel. This particular search string is used because the abbreviated word “Aufl.” does *not* get its `fl`-ligature suppressed. (The “.”

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<sup>9</sup>The two “test” files also load the package `showhyphens` to indicate automatically all instances where `LuaLATEX` might insert hyphenation points.

<sup>10</sup>If you load the `selnolig` package *after* the `fontspec` package (and any associated font and ligature-setting commands), the package can determine automatically if certain additional options should be set.

<sup>11</sup>In principle, more than one ligature suppression point may be provided in the second argument of a `\nolig` instruction. For instance, one *could* specify `\nolig{Auf1auflaufform}{Auf|1auf|form}` to suppress both the `fl` and the `ff` ligature in this word. As is mentioned in [Section 6.2.3](#), the `selnolig` package actually uses to separate `\nolig` commands to “treat” the word `Auflaufform`.

(dot, period) character is itself a Lua wildcard character that matches *any* character; it turns out to be easier to provide a choice of eight possible vowels in the search string rather than to try to negate the “.” character.) Note also that it is not absolutely necessary, in the second argument of the `\nolig` command, to provide any material *after* the vertical bar. However, the readability of the `\nolig` instructions may suffer if you suppress that material.

If you study the `\nolig` instructions provided in the files `selnolig-german-patterns.sty` and `selnolig-english-patterns.sty`, you’ll notice that there’s some redundancy built into the `\nolig` rules. E.g., the German verb “auffahren” is noticed both by `\nolig{auff}{auf|f}` and by `\nolig{ffahr}{f|fahr}`. This redundancy is there by design, because not all words that might fit the first pattern will also fit the second pattern, and vice versa.<sup>12</sup> Listing the *union* of all possible pairs of non-redundant rules would result in a rather large and unwieldy number of separate rules and slow down processing tremendously. Conversely, taking the *intersection* of the two rules—in the present case, just the character pair `ff`—would create ligature suppression rules that are far too broad. Building in some redundancy seems like a reasonable way to proceed in this field.

Observe also that the arguments of the `\nolig` command (as well as of the package’s other user commands) are case-sensitive.

## 2. The macro

```
\keeplig{<word-fragment>}
```

lets users specify words and word fragments for which typographic ligatures should *not* be suppressed anywhere in the document. It is permissible to use lua-type wildcard characters in the argument of `\keeplig`.

In a sense, `\keeplig` is the exact opposite command to `\nolig`. Having the `\keeplig` macro is very useful because it allows us to specify simpler, i.e., less restrictive, `\nolig` instructions: Any Type-II errors that may arise from having a slightly-too-broad `\nolig` macro can be addressed by providing judiciously chosen `\keeplig` macros.

To give an example: if the `ngerman` option is set, the package uses the macro

```
\nolig{flich}{f|lich}
```

to break up the `fl`-ligature in the words `brieflich`, `tariflich`, `trefflich`, `hilflich`, `verwerflich`, `beruflich`, `sträflich`, `höflich`, `glimpflich`, `unerschöpflich` and `begrifflich`—and probably quite a few more words too. However, this macro is too broad because it also operates on words such as `Pflicht` and `verpflichten`, for which the `fl`-ligature should *not* be suppressed. Rather

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<sup>12</sup>For instance, the second `\nolig` instruction also catches words such as `Golffahrten` and `Prüffahrten`.

than provide a plethora of slightly more restrictive `\nolig` macros just to avoid including the Pflicht-words, the package simply provides the commands

```
\keeplig{Pflicht}
\keeplig{pflicht}
```

to override the action of the `\nolig{flich}{f|lich}` instruction for words that contain these two word fragments. (Recall that the argument of `\keeplig` is case-sensitive; hence, two `\keeplig` instructions are needed.)

Just as it is possible to override the action of a `\nolig` command with a subsequent `\keeplig` command, it is also possible to override the action of a `\keeplig` macro with a more specific `\nolig` command. For instance, it turns out that the two `\keeplig` commands stated in the preceding paragraph are themselves a bit too broad because they also affect the typesetting of the composite word `Sumpflicht` (swamp light), for which the fl-ligature *should* be suppressed. To address this case, the file `selnolig-german-patterns.sty` provides the macro

```
\nolig{Sumpflicht}{Sumpf|licht}
```

Observe that we make use of the case sensitivity in the final `\nolig` instruction in order to avoid having it apply to words such as “Visumpflicht” (visa requirement).

3. The macro `\breaklig`, which doesn’t take an argument, is provided as a hopefully easy-to-remember version of the low-level  $\text{\LaTeX}$  command `\-\hspace{0pt}`. As its name suggests, you should insert this macro in places where you want to break up a ligature on an ad-hoc basis (and also wish to permit hyphenation to occur). For instance, to suppress the *sk* ligature in the word *groundskeeper* on a one-off basis, one might enter it as “`grounds\breaklig keeper`” to get *groundskeeper* rather than *groundskeeper*.<sup>13</sup>

Incidentally, the `selnolig` package does not provide a dedicated macro to disable the action of a `\nolig` macro on an ad hoc basis, i.e., to *force* the use of a typographic ligature. The  $\text{\LaTeX}$  command `\mbox{}` is available for just this purpose.

The final few steps in the package’s startup process depend on which language-related options are set:

- If *no* language-specific options are in effect, the loading process terminates. Users may still use the instructions `\nolig`, `\keeplig`, and `\breaklig`, but no lists of language-specific `\nolig` macros are loaded.

---

<sup>13</sup>To suppress the *sk* ligature globally for this word, as well as for words such as *greenskeeper* and *miskeep*, one could issue the directive `\nolig{skeep}{s|keep}`. The `selnolig` package does so.

- If the `english` option (or one of its synonymous options) is set, the files `selnolig-english-patterns.sty` and `selnolig-english-hyphex.sty` are loaded. The former file contains a long list of `\nolig` macros adapted to English language typographic usage, [Appendix C](#) provides a complete listing of these macros. The latter file contains a list of hyphenation exceptions, mainly for words that contain one or more potential non-ligation points and for which T<sub>E</sub>X’s hyphenation algorithm either misses valid hyphenation points or selects invalid hyphenation points; see [Section 6.2.2](#) below.
- If the `ngerman` option (or one of its synonymous options) is set, the files `selnolig-german-patterns.sty` and `selnolig-german-hyphex.sty` are loaded. The former file contains ligature-suppressing instructions appropriate for German typographic usage, [Appendix D](#) lists its contents. The latter file provides additional hyphenation rules for German-language words.
- If the user specifies both the `english` and `ngerman` options (or some of their synonymous options), *both* language-specific style files will be loaded. Under normal circumstances, a user will probably want to load only one or the other set of language-specific files, but not both sets.

## 5 The `selnolig` package’s approach to breaking up ligatures

The `\nolig` macros provided in the files `selnolig-english-patterns.sty` (see [Appendix C](#)) and `selnolig-german-patterns.sty` (see [Appendix D](#)) are primarily designed to break up ligatures—mainly f-ligatures, but potentially other ligatures as well—across *morpheme* boundaries.

Issues of ligating character pairs and triples across morpheme boundaries can occur

- if two independent or “main words” (Stammwörter) are joined together: rooftop/rooftop, newspaper/newspaper, Schilffeld/Schilffeld, Brieftaube/Brieftaube;
- between a prefix and main word: mißtruß/mistrust, dißplay/display, aufleben/aufleben, auftun/auftun; and
- between a main word and a suffix: shelfful/shelfful, dwarflike/dwarflike, kopflos/kopflos, and Zöpflein/Zöpflein.

For German words, the following exceptions and adjustments apply:<sup>14</sup>

- Should the combination of a main word and suffix give rise to an fi or ffi ligature, this ligature is *not* suppressed. Examples: streifig and affig. However, the fi and ffi ligatures *are* suppressed if two main words are joined together: Schilffinsel, Zupfinstrument, and Baustoffingenieur.

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<sup>14</sup>These adjustments are culled from the rules stated in the *Duden* and various websites that have taken an interest in this subject.

- For some borderline cases involving an fl ligature at the boundary of a main word (Stammwort) and suffix, preference is given to how the syllables are pronounced and how a word would be hyphenated. For instance, the words teuflisch (devilish) and schweflig (sulfurous) have their fl ligatures suppressed even though the f and l characters belong to the same underlying morphemes, viz., Teuf(e)l and Schwef(e)l. For these words, the suffixes are -isch and -ig, respectively, rather than -lisch and -lig. Nevertheless, usage seems to be in such cases to follow the words' pronunciation and hyphenation patterns, resulting in a suppression of the f-l ligature. This rule also applies to the typesetting of words such as knifflig (tricky) and mufflig (grouchy).
- If a word could terminate with an fl ligature even though the “l” technically belongs to a different morpheme (say, because of an abbreviation that's in effect), the fl ligature *is* used. E.g., one writes Aufl. and gefl. with an fl ligature. (But, when spelled out, the words should be typeset as Auflage and gefällig[st].)
- This rule also suggests that ft and fft ligatures are permitted in words such as geschärft, unbedarf, and erschafft, whereas they should be suppressed in words such as gestreifte, schlürfte, and raffte.
- Here's a case for which I have not yet found a clear rule on how to proceed. If a main word ends in “ft” (e.g., Luft and Saft) and is followed by a suffix that starts with an i, as in saftig and luftig, one could typeset them as saftig and luftig because the ft character pair belongs to a single morpheme, *or* one could give preference to the way the words are hyphenated and break up the ft-ligature to typeset them as saftig and luftig. For now, the selnolig package chooses the former option. I haven't found any clear references so far on how to treat this case. Expert help and guidance on this topic would be much appreciated.

## 6 Options that govern the package's behavior

### 6.1 Main language options

The selnolig package currently offers two main language-specific options:

- `english`; synonyms: `british`, `ukenglish`, `UKenglish`, `american`, `usenglish`, `USenglish`, `canadian`, `australian`, and `newzealand`.
- `ngerman`; synonyms: `german`, `austrian`, `naustrian`, `swiss`, and `swissgerman`.

These language options may be used either individually or jointly. Indeed, this package's user guide was compiled with both the `english` and `ngerman` options set.

See [Appendices C and D](#) for the complete listings of the package’s English and German language ligature suppression rules.

## 6.2 Other options

### 6.2.1 English language case: The `broad-f` and `hdlig` options

The ligature suppression patterns listed in [Appendix C](#) for English language words are grouped into four parts. The first two parts concern the suppression of various f-ligatures. Part 1 provides a fairly limited, or “basic”, set of patterns that will always be executed, and Part 2 contains a broader set of ligation suppression rules that will be executed if the `broad-f` option is specified.

For English-language documents, only a fairly small number of the f-ligature suppression rules is enabled by default, i.e., if the `broad-f` option is not enabled. Eliminating *all* f-ligatures that cross morpheme boundaries simply does not appear to be a major concern in English-language typography. Whereas many (maybe even most?) people would agree that it is advisable not to use the `ffi`-ligature in words such as *chaffinch* and *wolffish*, and not to use the `ffl`-ligature in words such as *scofflaw* and *offload*, there appears to be far less of a perceived need to suppress the `fi` (`ffi`) ligature in the far more commonly occurring words that end in `f` (`ff`) followed by the `-ing`, `-ish`, `-ier`, `-iest`, `-ily`, and `-iness` particles.<sup>15</sup> The same goes for the `fl` (`ffl`) ligature in words that end in `f` (`ff`) followed by `-ly`.<sup>16</sup> That is why only a few f-ligature suppression macros are enabled by default if the `english` option is set. To enable the broader set of f-ligature suppression rules, users must set the `broad-f` option explicitly.

My choices regarding which f-ligature suppression rules belong to the “basic-f” and “broad-f” groups are almost entirely pragmatic. They are certainly not based on any overriding English-language typographic principles (which, possibly, don’t even exist for the case at hand). However, if anyone happens to have a strong view on whether either *fewer* or *more* f-ligature suppression macros should be included in the “basic” group—especially if you can provide references to such discussions in learned circles—I would love to hear from you.

Part 3 of the file `selnolig-english-patterns.sty`, which is enabled if the `hdlig` option is set, provides ligature suppression patterns for the “historic” (Adobe uses the term “quaint”) `ct`, `st`, and `sp` ligatures, in words such as *arctangent* (better than *arctangent*), *painstaking* (better than *painstaking*), and *display* (better than *display*). The `sp` ligature is also suppressed for words of Greek origin containing the `sph` character triple, such as *atmosphere* and *hemisphere*, because in these cases the `ph` character pair (which derives from the Greek letter  $\phi$ , or  $\varphi$ ) is pronounced like “f” and should not be obscured by a preceding `sp` ligature.

Setting the `hdlig` option also enables ligature suppression rules for ligatures such as *th*, *at*, and *et*. These ligatures might occur in words such as *lighthouse* and *pothole*, *aromatherapy* and

---

<sup>15</sup>Examples of such words are *surfing*, *oafish*, *leafier*, *goofiest*, *fluffily*, and *goofiness*.

<sup>16</sup>Examples are *aloofly* and *gruffly*.

*albatross*, and *ninety* and *nonetheless*. Ligature suppression rules are provided for the following discretionary ligatures: *th*, *at*, *et*, *as*, *is*, *us*, *sk*, *ll*, and *fr*. Part 3 of [Appendix C](#) lists these rules.

Part 4 of this file, which is also processed if the `hdlig` option is set, deals with cases where one discretionary typographic literature, say *as*, pre-empts the use of a typographic ligature, say *st* or *ph*, in words such as *fast*/*fast* and *clasp*/*clasp*. Note that the issue being addressed in this part is not that of a ligature crossing a morpheme boundary but of the pre-emption of one typographic ligature by another ligature within the same morpheme. This issue is discussed in more detail in [Section 7.6](#).

### 6.2.2 Additional hyphenation exception patterns

TeX's hyphenation algorithms are widely acknowledged to be very good. However, for the English language case at least, it tends to miss quite a few permissible hyphenation points when dealing with words that end in *-f-ing*, *-ff-ing*, *-f-ier*, *-ff-ier*, *-f-iest*, *-f-less*, *-f-like*, etc. Hyphenation exception lists are provided in the files `selnolig-english-hyphex.sty` and `selnolig-german-hyphex.sty`, respectively, for English and German words.

The German-language hyphenation exception list is currently much the shorter of the two. This is because it is assumed that writers of German-language documents use the `babel` package while setting the option `ngerman` option (or one of the related options); doing so also loads specialized hyphenation patterns suitable for German text.<sup>17</sup> The German hyphenation exception list of the `selnolig` package therefore only needs to provide a fairly short list of words for which I've noticed that `babel`'s hyphenation algorithm throws errors. Among these words are (with `babel`'s incorrect hyphenation points) *Kau-f-in-dex*, *Lau-f-in-dex*, *Schif-fer-b-art*, *Schil-fin-sel*, and *Schil-f-feld*.

It is possible to instruct `selnolig` *not* to load the package's hyphenation exception lists. You may want to do so, say, if you must use UK-English hyphenation patterns and therefore mustn't make use of the US-English hyphenation patterns provided by the package. (To the best of my knowledge, though, most of the hyphenation patterns indicated in `selnolig-english-hyphex.sty` are common to UK and US English.) To skip loading the additional hyphenation patterns when invoking the `selnolig` package, you should specify the option `noadditionalhyphenationpatterns`.<sup>18</sup>

As was already noted in [Section 2.3](#), if you use the `babel` package with, say, the `ngerman` option, be sure to load `selnolig` package *after* the `babel` package; that way, the `selnolig` package's additional hyphenation exception patterns won't be overridden by `babel`'s settings.

Incidentally, if the files `selnolig-english-hyphex.sty` and `selnolig-german-hyphex.sty` are located in a directory that's in the search path of your TeX distribution, these packages may be loaded by users via the usual `\usepackage` statements without having to load the entire `selnolig` package.

---

<sup>17</sup>As was already noted earlier, the `selnolig` package is also compatible with the `hyphsubst` package.

<sup>18</sup>I am obviously not trying to make it too easy to invoke this option ...



### 6.2.3 Controlling how much is written to the .log file

By default, none of the inner workings of the `selnolig` package are written to the .log file. However, if you execute the command `\debugon`, detailed information about each pattern match that is encountered is written to the .log file. Incidentally, because of the built-in redundancy of some of the `\nolig` command, it is possible that more than one pattern match will be found for a given word. E.g., for the verb “auffahren”, two separate `\nolig` commands simultaneously apply, and the following lines are written to the .log file:

```
pattern match: auffahren - auff
pattern match: auffahren - ffahr
Do ligature suppression for: auffahren
Inserting noliga whatsit before glyph: f
```

It is also possible that words with more than one ligature suppression point are found. For example, if the word “Auflaufform”—which happens to have both an `fl`- and an `ff`-ligature that should be suppressed—is encountered, the following lines are written to the .log file; note that in this case, two separate `\nolig` commands “catch” the `fl` and `ff` ligatures:

```
pattern match: Auflaufform - fform
pattern match: Auflaufform - Aufl[aäeioöuü]
pattern match: Auflaufform - auff
pattern match: Auflaufform - flauf
Do ligature suppression for: Auflaufform
Inserting noliga whatsit before glyph: l
Inserting noliga whatsit before glyph: f
```

As these examples suggest, setting `\debugon` can result in fairly copious amounts of information being written to the .log file.

## 7 Further issues

### 7.1 Known bugs

Remark: The first four bugs in the following list may turn out to be related, i.e., may be caused by a single bug in the package’s lua code.

1. The `\nolig` search-and-nolig-whatsit-insertion patterns do not appear to work properly on the final word in the argument of a command (e.g., `\footnote{}` and `\section{}`) *unless* that word (including any trailing punctuation mark) is followed by one or more space characters before the closing curly brace of the command’s argument is encountered.

For instance, the `fl` ligature in “kopflos” is not broken up by either `\footnote{kopflos.}` or `\section{Kopflosigkeit}`. The package does work as expected if the commands are modified to `\footnote{kopflos. }` and `\section{Kopflosigkeit }`.

2. The `\nolig` search-and-insert patterns also don’t seem to work on words (including, if present, any trailing punctuation marks) that are followed immediately by a `%` (comment) character. The workaround is the same as for the preceding bug: be sure to leave one or more spaces between the word and the comment character.
3. If the content of an `\item` directive in an `itemize` or `enumerate` environment *ends* with a word (including an associated punctuation mark) that contains a ligature that should be suppressed —i.e., if it is followed immediately by another `\item` directive or an `\end{itemize}` or `\end{enumerate}` statement—the ligature suppression again fails. The remedy in this circumstance is to leave a blank line between the end of one `\item`’s content and the next `\item` instruction or the `\end{itemize}` or `\end{enumerate}` instruction.
4. If the final word (again, possibly, with an associated punctuation character) in a sentence immediately *prior* to the start of an `enumerate`, `itemize`, or other such environment contains a ligature that should be suppressed, the `\nolig` macro again will not work properly. The recommended remedy is to leave a blank line between that sentence and the start of the environment in question. Inserting an “invisible” instruction, such as `\vphantom{x}`, also works.
5. The `\nolig` search-and-insert operations currently don’t work properly if the first part of the search string, i.e., the part *before* the `|` symbol, contains a character with an Umlaut (dieresis) or other diacritic.
6. I’m not sure if the following matter constitutes a bug or “just” a case of incompatibility between two packages. The `selnolig` package does not appear to interact well with the `ngerman` package; however, as was noted earlier, it interacts nicely with the `babel` package (with one or more of the `ngerman`, `german`, `austrian`, and `naustrian` options set). Unless someone can convince me that using the `ngerman` package is truly preferable to using the `babel` package with one of the available German language options, I probably won’t bother figuring out how to fix this incompatibility.

## 7.2 Composite words made up of two different sets of primitive words

More so in German than in English, there may be composite words which are made up of two different pairs of primitive words. For instance, the words `Saufladen` and `Wachstube` may be constructed as `Sauf-laden`/`Sau-fladen` and as `Wachs-tube`/`Wach-stube`, respectively. In one case,

using the `fl` and `st` ligatures would be wrong; in the other, using the ligatures would help greatly in indicating the intended meaning of the composite words. Software can't "know" on its own which one of the two possible meanings is intended. Writers, of course, can choose to insert explicit hyphen characters to indicate unambiguously the intended meaning.

It turns out that if the `ngerman` option is set and the `babel` package is loaded as well, the `selnolig` package will break up the `fl` ligature in `Saufladen` but not the `st` ligature in `Wachstube`, i.e., the words will be typeset as “Saufladen” and “Wachstube”, respectively. If that's not what you want, you'll need to mark up the words explicitly, say as follows: `Sau\keeplig{fl}aden` and `wachs\breaklig tube`.

### 7.3 Lists of words fitting German and English language non-ligation patterns

Extensive lists of German and English language words for which one or more ligatures should be suppressed are provided in the files `selnolig-german-wordlist.tex` and `selnolig-english-wordlist.tex`.<sup>19</sup> Obviously, I can't and won't make a claim that either of these lists is complete. Suggestions for additional words are always welcome.

The files `selnolig-german-test.tex` and `selnolig-english-text.tex` are “driver programs” that load the `selnolig` package and then run it on the respective lists of German- and English-language words. To compile the driver programs, be sure to use `LuaATEX`.

### 7.4 How to provide additional ligature suppression patterns

As already noted, it's not possible to claim that the non-ligation search-and-insert patterns set up in `selnolig-english-patterns.sty` and `selnolig-german-patterns.sty` are complete (or, for that matter, ever will be entirely complete). If you come across words containing ligatures that ought to be suppressed but aren't caught by the rules set up by the package's files, it is straightforward to create one or more new non-ligation rules to deal with the cases you've discovered.

Suppose, say, that you're preparing a special edition of Thomas Mann's novel “Der Tod in Venedig”—using an “Antiqua” (Roman) font since very few people nowadays can manage to read **blackletter** text with ease—and notice that the `selnolig` package does not appear to include a macro to suppress the unwanted `ffl`-ligature in the word “inbegriffleitend”.<sup>20</sup> To rectify this problem, while simultaneously creating a search pattern that will also catch cases of inappropriate `ffl`-ligatures in the (hopefully quite a bit more common) words “Jugendtreffeiter” and “Kunststoffleitung”, you could add the following `\nolig` macro to your document's preamble:

---

<sup>19</sup>I started the list of German language words with the examples provided by the `rmligs` script, but have come up with quite a few more words since then.

<sup>20</sup>This word really does occur in the aforementioned novel! A Google search for this word, incidentally, suggests that (i) Thomas Mann pretty much invented this particular word and (ii) it's not used by anyone else, except for the occasional blogger who muses how to possibly translate this word into other languages...

```
\nolig{ffleit}{ff|leit}
```

With this macro in place, the words will now be typeset as *inbegriffleitend*, *Jugendtreffleiter*, and *Kunststoffleitung*.<sup>21</sup>

## 7.5 How to use the `selnolig` package to suppress certain ligatures *globally*

The main purpose of the `selnolig` package is, obviously, to disable certain ligatures selectively. However, it can also be used to suppress ligation globally for selected character pairs.<sup>22</sup>

Suppose, for instance, that you have a font that provides ligatures for the `fb`, `fh`, `fj`, and `fk` character pairs (as well as, possibly, the `ffb`, `ffh`, `ffj`, and `ffk` character triples). If you wanted to suppress the four former `f`-ligatures globally (and also break up the latter ligatures as `ff-b`, `ff-h`, `ff-j`, and `ff-k`, respectively), you could do so by issuing the following commands:

```
\nolig{fb}{f|b}  
\nolig{fh}{f|h}  
\nolig{fj}{f|j}  
\nolig{fk}{f|k}
```

In fact, these commands are already included among the `\nolig` macros that are enabled if the package's `ngerman` option is set.<sup>23</sup> This is done because I was unable to come up with a single instance of a *German* language word involving these character combinations that doesn't also involve a morpheme boundary collision.

Of course, your document may contain some *non-German* language words as well, for which you would not necessarily want to suppress these ligatures. Suppose, say, that you need to typeset the name *Kafka* and do not wish to suppress the `fk`-ligature for this specific word. To override the global setting created by the `\nolig{fk}{f|k}` macro, you could write each instance of this word as `Ka\mbox{fk}a` to generate *Kafka* instead of *Kafka*. Alternatively—and this is the method implemented by the `selnolig` package—one may provide suitable `\keeplig` macros to preserve the `fk`-ligature in names such as *Kafka*, *Safka*, *Piefke*, *Potrafke*, *Sprafke*, *Shirafkan*, and *Tirafkan*.

Or, suppose the `selnolig` package's `ngerman` option is enabled and your document features some words of *Nordic* origin containing the `fj` character pair, such as *Sognefjord* and *Dovre fjell*. Observe that because the `fj` character pair contained in these words does not span a morpheme boundary, the `fj`-ligature should not be broken up, i.e., the words should be typeset as *Sognefjord*

---

<sup>21</sup>The file `selnolig-german-patterns.sty` actually provides the macro `\nolig{fleit}{f|leit}` to take care of these words. Typesetting of the surname *Kaltefleiter*, for which it's presumably appropriate to employ the `fl`-ligature, is handled via a `\keeplig` macro.

<sup>22</sup>I first became aware of the potential need for such a feature after reading Frank Mittelbach's posting, [Suppress certain ligatures generally](https://tex.stackexchange.com/questions/111111/suppress-certain-ligatures-generally), on [tex.stackexchange.com](https://tex.stackexchange.com).

<sup>23</sup>These four macros are also enabled if the `selnolig` package's `english` and `broad-f` options are set.

and Dovrefjell, respectively. `\keeplig` macros are therefore provided for words containing the particles fjord, fjell, fjäll, and fjör as well as for names such as Eefje, Sufjan, Prokofjew, and Astafjew.

## 7.6 What if one ligature pre-empts a subsequent, more appropriate ligature?

If a font provides many discretionary ligatures, the likelihood increases that the use of a ligature for the first two characters of a *character triple* might pre-empt the use of a more appropriate ligature for the last two characters of that triple.<sup>24</sup> In this section, we examine the use of `\nolig` instructions to address this contingency, focusing on cases of *st*, *sp*, *th*, and *ta* character pairs being preceded by character pairs (for which the font provides ligatures) that end in *s* or *t*, respectively. This focus is dictated largely by the discretionary ligatures provided by the text font used for this user guide (Garamond Premier Pro). Other ligature-rich fonts may provide further possibilities for one ligature inappropriately pre-empting that for a trailing character pair.<sup>25</sup>

### 7.6.1 Ligatures for *as*, *is*, and *us* that pre-empt an *st* ligature

Suppose that the text font in use provides ligatures for the *as*, *is*, and *us* character pairs as well as for the *st* character pair. By T<sub>E</sub>X's rules for forming typographic ligatures, words that contain the character *triples* *ast*, *ist*, or *ust* will see the first two characters ligated, pre-empting the use of a typographic ligature for the trailing *st* character pair. There are three separate reasons why this outcome may not be desirable.

First, given the rather distinctive look of the *st* ligature, the word *stochastic* may look a bit odd if the *st* ligature is used only once—*stochastic*—simply because the *as* ligature pre-empts the second *st* ligature; readers may prefer the look of *stocha<sup>st</sup>tic*. Second, non-use of the *st*/*st* ligature may be undesirable if the same word occurs twice and in close visual proximity, once set in the upright font shape—for which there are no ligatures for the *as*, *is*, and *us* character pairs, and

---

<sup>24</sup>To be sure, the issue of ligature pre-emption is not limited to “discretionary” ligatures; it can also occur with “common” f-ligatures. Suppose that a certain font provides *ff*, *fi*, and *fl* ligatures but no *ffi* and *ffl* ligatures, and consider how words containing *ffi* and *ffl* character triples will be typeset. Left to its own devices, T<sub>E</sub>X would let the leading *ff*-ligature pre-empt the trailing *fi*- and *fl*-ligatures, resulting in typographically incorrect outcomes for words such as *wolffish* (better: *wolffish*), *safflower* (*safflower*), *auffinden* (*auffinden*) and *Schaffleisch* (*Schaffleisch*).

<sup>25</sup>For the Garamond Premier Pro text font, I've discovered the following peculiar exception to the general rule that T<sub>E</sub>X always gives precedence to a ligature for the first two characters of a character triple: for the character triple *fis* (as in *fist* and *fish*), T<sub>E</sub>X gives preference to the trailing *is* ligature over the preceding *fi* ligature, causing these words to be typeset as *fish* and *fist*, respectively. I can't tell if this outcome is a conscious design feature or a bug.

For now, `\selnolig` is set to override this behavior, i.e., to always give preference to the leading *fi* ligature over the trailing *is* ligature for words that contain the strings *fist* and *fish*; hence, they'll be rendered as *fist* and *fish*, respectively. Note that if the `broad-f` option was set, this setting implies that words such as *deafish*, *dwarfish*, *elfish*, *oafish*, *selfish*, *unselfish*, *wolfish*, *draffish*, *giraffish*, *gruffish*, *offish*, *raffish*, *sniffish*, *standoffish*, *stiffish*, and *toffish*, as well as the associated adverbs ending in *-ly*, will not feature an *is* ligature. Of course, if the `broad-f` option is not in effect, the *fi* and *ffi* ligatures will automatically preempt the *is* ligature in these words.

hence for which the issue of ligature pre-emption doesn't arise—and once in italics: *muſt* vs. *muſt*; readers may prefer the look of *muſt* vs. *muſt*. Taking this matter to a (slight?!) extreme: Do you prefer the look of *Do faſt feſtive fiſts foſter fuſtineſſe*? or that of *Do faſt feſtive fiſts foſter fuſtineſſe*?

Third, there may be cases where an *as* ligature not only pre-empts a subsequent *ſt* ligature but also spans a morpheme boundary, as in the words *infrastructure* and *seastrand*.<sup>26</sup> For such words, the *as* ligature should probably be suppressed in any case to increase the words' legibility: *infrastructure* and *seastrand*.

If the `hdlig` option is set, it is assumed that you prefer giving preference to the distinctive-looking *ſt* ligature over *as*, *is*, and *us* ligatures. The following commands are therefore provided:<sup>27</sup>

```
\nolig{ast}{a|st}
\nolig{ist}{i|st}
\nolig{ust}{u|st}
```

### 7.6.2 Ligatures for *as*, *is*, and *us* that pre-empt an *ſp* ligature

The same three reasons for not letting *as*, *is*, and *us* ligatures pre-empt an *ſt* ligature also apply to the case of the equally distinctive looking *ſp* ligature. The `selnolig` package therefore provides macros to ensure the use of the trailing *ſp* ligature in words such as *clasp*, *haſp*, *hiſpanic*, *raſpberry*, *teaspoon*, *waſp*, *criſp*, *liſp*, *whiſper*, *wiſpy*, and *cuſp*. [Aside: Why isn't the *ſp* lig shown in *clasp* and *liſp*?!]

### 7.6.3 Ligatures for *at* and *et* that pre-empt a *th* ligature

Suppose that a font provides ligatures for the *at*, *et*, and *th* character pairs. By T<sub>E</sub>X's rules for forming ligatures, without special intervention the word `mathematics` will be typeset as *mathematics* rather than as *mathematics* because the *at* ligature pre-empts use of the *th* ligature. The same happens for words such as *bath*, *Kathryn*, and *pathology*.<sup>28</sup> Given the prevalence and distinctive pronunciation of the *th* character pair in the English language, as well as the high frequency of this character pair in words of Greek origin (for which the Latin-alphabet *th* character pair derives from the Greek character *θ*, or *ϑ*), it seems undesirable to let the *at*-ligature pre-empt the *th* ligature for these words.

<sup>26</sup>This case was already noted in [Footnote 24](#), where two words are noted for which the *ff*-ligature, which might improperly pre-empt *fi*- and *fl*-ligatures, happens to span a morpheme boundary.

<sup>27</sup>Be aware, though, that the second of these three commands, while correct for most words that contain the string `ist`, unnecessarily suppresses the *is* ligature for words where the *ſt* character pair crosses a morpheme boundary. Examples of this case are words that start with *dis-t...*—e.g., *distend*, *distribute*, *distrust*, *disturb*—or with *mis-t...*—e.g., *mistake*, *mistranslate*, *mistype*. (Note that the *ſt*/*ſt* ligature is already—and appropriately!—suppressed for these words.) At this time there are no plans to address this (overall minor?) problem.

<sup>28</sup>A longer list of words for which the *at* ligature pre-empts the *th* ligature is given in the ancillary document `selnolig-english-test.pdf`.

Fixing the *at*–*th* ligature pre-emption issue globally, e.g., via `\nolig{ath}{a|th}`, is not completely innocuous because doing so will also suppress the *at* ligature for words such as *boathook*, for which the *th* ligature would span a morpheme boundary and thus shouldn't be employed anyway. For such words, then, there's no need to suppress the *at* ligature. These cases, fortunately, can be dealt with by providing `\keeplig` macros that deliberately let the *at* ligature take precedence over the trailing *th* ligature.

Suppressing an *et* ligature in favor of a subsequent *th* ligature via `\nolig{eth}{e|th}` is almost universally correct, either because the *th* ligature *should* take precedence—as in the words *ethics*, *methane*, and *teeth*—or because the *et* ligature would cross a morpheme boundary and hence shouldn't be used anyway, as in the words *forethought* and *rethink*.

I say that it's *almost* universally correct to do so because there are some words, such as *Beethoven*, *prophethood*, and *sweetheart*, for which the *th* ligature would be inappropriate anyway and hence the use of the *et* ligature would be unproblematic. To address this issue, `\keeplig` macros are provided for these words, deliberately letting the *et* ligature take precedence over the *th* ligature and resulting in them being typeset as *Beethoven*, *prophethood*, and *sweetheart*, respectively.<sup>29</sup>

#### 7.6.4 Ligatures for *at* and *et* that pre-empt a *ta* ligature

There seem to be only very few words for which an *at* ligature might inappropriately pre-empt a more important *ta* ligature. One such word is *atap*, which may be more readable if it's typeset as *atap* rather than as *atap*.<sup>30</sup> Because of the apparent paucity of such cases, I have decided for now not to provide specific ligature suppression rules to handle them.

To the best of my (admittedly not exhaustive) knowledge, all words for which an *et* ligature might inappropriately pre-empt the use of a trailing *ta* ligature are words for which the *et* ligature crosses a morpheme boundary and hence probably shouldn't be used anyway.<sup>31</sup> As such, the *et*-related ligature suppression rules already in place, which are set up to deal with morpheme boundary crossing cases, should suffice to catch these cases as well.

---

<sup>29</sup>Note that this method works if the font being used provides *both* *et* and *th* ligatures. If the text font you employ provides only the *th* ligature but not the *et* ligature, these `\keeplig` macros should be disabled.

<sup>30</sup>It's not advisable, however, to specify a macro such as `\nolig{atap}{a|tap}` to address this case, because of words such as *catapult* and *catacomb*, for which the use of the *at* ligature is presumably innocuous. Somebody please correct me if this assumption is not correct.

<sup>31</sup>Examples are *betake*, *betatter*, *bristletail*, *caretaker*, *cheetah*, *detach*, *detail*, *detain*, *dovetail*, *foretaste*, *horsetail*, *pretake*, *pretax*, *retable*, *retack*, *retard*, *retarget*, *timetable*, *whitetail*, and *wiretap*. Incidentally, the author of the `selnolig` package has a slight preference for seeing his surname typeset as *Loretan* rather than as *Loretan*...



## Appendices

### A The package's main style file: selnolig.sty

```
% !TeX root = selnolig.tex
% !TEX TS-program = lualatex

\ProvidesPackage{selnolig}[2012/12/06]
\RequirePackage{luatexbase,luacode}

% This entire package is placed under the terms of the
% LaTeX Project Public License, version 1.3 or later
% (http://www.latex-project.org/lppl.txt).
% It has the status "maintained".
%
% Author: Mico Loretan (loretan dot mico at gmail dot com)

% Part 1: Preliminaries
% -----

\def\selnoligpackagename{selnolig}
\def\selnoligpackageversion{0.157}
\def\selnoligpackagedate{2012/12/06}

% Announce who we are. Exit immediately if not running
% under lua(la)tex.
\typeout{---- Package \selnoligpackagename,
Version \selnoligpackageversion,
Date \selnoligpackagedate ----}

\RequirePackage{ifluatex}
\ifluatex\else
  \typeout{=====}
  \typeout{The package selnolig requires LuaLaTeX. }
  \typeout{      Exiting immediately.          }
  \typeout{=====}
  \endinput
\fi

% A couple of ancillary macros to check if various
```

```

% ligature features (specifically: liga, clig, rlig, hlig,
% and dlig) are available and/or enabled for the text font
% in use.
% (These macros are courtesy of Clemens Niederberger; see
% also http://tex.stackexchange.com/a/82443/5001.)
\usepackage{expl3}
\ExplSyntaxOn
\cs_new_eq:NN \IfFontFeatureExists \fontspec_if_feature:nTF

\cs_new:Npn \mico_fontfeature_if_active:nTF #1
  { \tl_if_in:NnTF \l_fontspec_rawfeatures_sclist { #1 } }

\cs_new_eq:NN \IfFontFeatureActive \mico_fontfeature_if_active:nTF
\ExplSyntaxOff

% If the 'fontspec' package isn't loaded by the time
% LaTeX executes the '\begin{document}' directive,
% exit with an error message.

\AtBeginDocument{%
  \@ifpackageloaded{fontspec}{}{%
    \typeout{=====}
    \typeout{ The selnolig package requires the      }
    \typeout{ 'fontspec' package, but it doesn't      }
    \typeout{ seem to be loaded. Exiting now...      }
    \typeout{=====}
    \endinput}
}

% Set up some fundamental Boolean variables, their
% default values, and define user-selectable options.

% The two main language options are 'english' and
% 'german'. We provide the 'otherlang' option just
% in case a user some day wants to provide ligature
% suppression patterns for languages other than
% English and German.

\newif\if@english\@englishfalse

```

```

\newif\if@german\@germanfalse
\newif\if@otherlang\@otherlangfalse

\DeclareOption{english}{\@englishtrue}
% synonymous options...
\DeclareOption{usenglish}{\@englishtrue}
\DeclareOption{ukenglish}{\@englishtrue}
\DeclareOption{USenglish}{\@englishtrue}
\DeclareOption{UKenglish}{\@englishtrue}
\DeclareOption{american}{\@englishtrue}
\DeclareOption{british}{\@englishtrue}
\DeclareOption{canadian}{\@englishtrue}
\DeclareOption{australian}{\@englishtrue}
\DeclareOption{newzealand}{\@englishtrue}

\DeclareOption{ngerman}{\@germantrue}
% synonymous options...
\DeclareOption{german}{\@germantrue}
\DeclareOption{austrian}{\@germantrue}
\DeclareOption{naustrian}{\@germantrue}
\DeclareOption{swiss}{\@germantrue}
\DeclareOption{swissgerman}{\@germantrue}

\DeclareOption{otherlang}{\@otherlangtrue}
\DeclareOption{otherlanguage}{\@otherlangtrue}

% For English, the default is to load only a fairly small
% or 'basic' set of non-ligation rules pertaining to
% f-ligatures. Among them are the "standard five" (ff,
% fi, fl, ffi, and ffl) as well as the ft ligature.
%
% Two options to override this "basic" setting:
% - broad-f many more non-ligation rules for f-ligatures,
%           incl fb, fh, fj, and fk character pairs
% - hdlig non-ligation rules for 'historic' and/or
%         'discretionary' ligatures, e.g., ct, sp, st,
%         sk, th, as, is, us, fr, ll, et, at, and ta

\newif\if@broadset\@broadsetfalse
\newif\if@hdligset\@hdligsetfalse

```

```

\DeclareOption{broad-f}{\@broadsettrue}
\DeclareOption{hdlig}{\@hdligsettrue}

% The package also provides hyphenation exception
% patterns for English and German language words.
% Loading these patterns is enabled by default. This
% can be disabled by providing the option
% 'noadditionalhyphenationpatterns'.

\newif\if@addhyph\@addhyphtrue
\DeclareOption{noadditionalhyphenationpatterns}{\@addhyphfalse}

% Check if 'historic' and/or 'discretionary' ligatures
% are enabled; if yes, set @hdligset to true.
% Perform this test only if fontspec is already loaded.
% Perform a two-step test in case only a "basic" font,
% such as Latin Modern Roman, is loaded.
\@ifpackageloaded{fontspec}{%
  \IfFontFeatureExists{hlig}{%
    \IfFontFeatureActive{hlig}{\@hdligsettrue}{%
      \IfFontFeatureActive{dlig}{\@hdligsettrue}{%
        }{}
      }{}
    }{}
  }{}

% The 'basic' option automatically sets the
% preceding Booleans to 'false', even if historic
% and/or discretionary ligatures are enabled.

\DeclareOption{basic}{\@broadsetfalse\@hdligsetfalse}

% Last but not least, an option to set all Boolean
% variables (other than '@addhyph') to 'true'
% simultaneously.

\DeclareOption{all}{%
  \@englishtrue
  \@broadsettrue \@hdligsettrue
  \@germantrue
  \@otherlangtrue}

```

```

% Finally, process all options
\ProcessOptions\relax

% Part 2: Load the lua code and set up the user macros
% -----

\directlua{ require("selnolig.lua") }

% The main user macro is called '\nolig':
\newcommand\nolig[2]{
  \directlua{
    suppress_liga( "\luatexluaescapestring{#1}",
                  "\luatexluaescapestring{#2}" )
  }
}

% A second user macro allows global overriding of
% rules set up by '\nolig':
\newcommand\keeplig[1]{
  \directlua{
    always_keep_liga( "\luatexluaescapestring{#1}" )
  }
}

% A third user macro: '\breaklig'. This is hopefully
% easier to remember than '\-\hspace{0pt}'
\newcommand\breaklig{\-\hspace{0pt}}

% Record operations of selnolig package to the log file:
% enabled via '\debugon' command

\newcommand\debugon{%
  \directlua{
    debug=true
  }
}

% Part 3: What to do if 'english' option is set
% -----

```

```

\if@english
  % load English-language ligature suppression rules
  \usepackage{selnolig-english-patterns}

  % load additional hyphenation exception patterns
  \if@addhyph
    \usepackage{selnolig-english-hyphex}
  \fi
\fi

% Part 4: What to do if 'german' option is set
% -----

\if@german
  % load German-language ligature suppression rules
  \usepackage{selnolig-german-patterns}

  % load additional hyphenation exception patterns
  \if@addhyph
    \usepackage{selnolig-german-hyphex}
  \fi
\fi

% Part 5: What to do if 'otherlang' option is set
% -----

\if@otherlang
  % currently nothing included
\fi

```

## B The package's lua code: selnolig.lua

```
-- lua code for the selnolig package, to be loaded
-- with an instruction such as
-- \directlua{ require("selnolig.lua") }
-- from a (Lua)LaTeX .sty file.
--
-- Author: Mico Loretan (loretan dot mico at gmail dot com)
-- (with crucial contributions by Taco Hoekwater,
-- Patrick Gundlach, and Steffen Hildebrandt)
-- Date: 2012/12/06
--
-- The entire selnolig package is placed under the terms
-- of the LaTeX Project Public License, version 1.3 or
-- later. (http://www.latex-project.org/lppl.txt).
-- It has the status "maintained".

local glyph = node.id('glyph')
local glue = node.id("glue")
local whatsit = node.id("whatsit")
local userdefined

for n,v in pairs(node.whatsits()) do
  if v == 'user_defined' then userdefined = n end
end

local identifier = 123456 -- any unique identifier
local noliga={}
local keepliga={} -- String -> Boolean
debug=false

function debug_info(s)
  if debug then
    texio.write_nl(s)
  end
end

local blocknode = node.new(whatsit, userdefined)
blocknode.type = 100
blocknode.user_id = identifier
```



```

local prefix_length = function(word,byte)
    return unicode.utf8.len(string.sub(word,0,byte))
end

function process_ligatures(nodes,tail)
    local s={}
    local current_node=nodes
    local build_liga_table = function(strlen,t)
        local p={}
        for i = 1, strlen do
            p[i]=0
        end
        for k,v in pairs(t) do
            -- debug_info("Match: "..v[3])
            local c= string.find(noliga[v[3]],"|")
            local correction=1
            while c~=nil do
                --debug_info("Position "..(v[1]+c))
                p[v[1]+c-correction] = 1
                c = string.find(noliga[v[3]],"|",c+1)
                correction=correction+1
            end
        end
        --debug_info("Liga table: "..table.concat(p, ""))
        return p
    end
    local apply_ligatures=function(head,ligatures)
        local i=1
        local hh=head
        local last=node.tail(head)
        for curr in node.traverse_id(glyph,head) do
            if ligatures[i]==1 then
                debug_info("Inserting noliga whatsit before glyph: "..unicode.utf8.char(curr.char))
                node.insert_before(hh,curr, node.copy(blocknode))
                hh=curr
            end
            last=curr
            if i==#ligatures then
                --debug_info("Leave node list on position: "..i)
                break
            end
        end
    end
end

```

```

        end
        i=i+1
    end
    if(last~=nil) then
        -- debug_info("Last char: "..unicode.utf8.char(last.char))
    end
end
for t in node.traverse(nodes) do
    if t.id==glyph then
        --s[#s+1]=string.lower(unicode.utf8.char(t.char))
        s[#s+1]=unicode.utf8.char(t.char)
    elseif t.id== glue then
        local f=string.gsub(table.concat(s,""),"[\\?!\\,\\.]+","")
        local throwliga={}
        for k,v in pairs(noliga) do
            local count=1
            local match = string.find(f,k)
            while match do
                count=match
                keep=false
                debug_k1=""
                for k1,v1 in pairs(keepliga) do
                    if v1 and string.find(f,k1) and string.find(k1,k) then
                        debug_k1=k1
                        keep=true
                        break
                    end
                end
                if not keep then
                    debug_info("pattern match: "..f.." - "..k)
                    local n = match + string.len(k) - 1
                    table.insert(throwliga,{prefix_length(f,match),n,k})
                else
                    debug_info("pattern match nolog and keeplig: "..f.." - "..k.." - "..debug_k1)
                end
                match= string.find(f,k,count+1)
            end
        end
        if #throwliga==0 then
            -- debug_info("No ligature suppression for: "..f)
        else

```

```

        debug_info("Do ligature suppression for: "..f)
        local ligabreaks = build_liga_table(f:len(),throwliga)
        apply_ligatures(current_node,ligabreaks)
    end
    s = {}
    current_node = t
end
end
end -- end of function process_ligatures(nodes,tail)

function suppress_liga(s,t)
    noliga[s] = t
end

function always_keep_liga(s)
    keepliga[s] = true
end

function drop_special_nodes (nodes,tail)
    for t in node.traverse(nodes) do
        if t.id == whatsit and t.subtype == userdefined and t.user_id == identifier
        then
            node.remove(nodes,t)
            node.free(t)
        end
    end
end
end

luatexbase.add_to_callback( "ligaturing",
    process_ligatures, "Filter ligatures", 1 )

```

## C English-language ligature suppression patterns: selnolig-english-patterns.sty

```
% !TeX root = selnolig.tex
% !TEX TS-program = lualatex

\ProvidesPackage{selnolig-english-patterns}%
[2012/12/06]

% This entire package is placed under the
% terms of the LaTeX Project Public License,
% version 1.3 or later
% (http://www.latex-project.org/lppl.txt).
% It has the status "maintained".
%
% Author: Mico Loretan
% (loretan dot mico at gmail dot com)

% Part 1: "Basic" f-ligature patterns
% =====

% (a) ff -> f-f

\nolig{lfful}{lf|ful}
% shelfful bookshelffuls -- TeXBook, p. 19

% (b) fi -> f-i
% no cases in 'basic' group

% (c) fl -> f-l

\nolig{fless}{f|less}
% beefless leafless ...
% Also: cuffless stuffless

\nolig{flike}{f|like}
% dwarflike elflike ...
% Also: rufflike clifflike

\nolig{flife}{f|life}
% halflife shelflife

\nolig{flive}{f|live}
% halflives shelflives

\nolig{fline}{f|line}
% halflife roofline offline

\nolig{leaflet}{leaf|let}
\nolig{Leaflet}{Leaf|let}
% leaflet(-s, -ed) leafleting
% leafletting leafletted
% leafleteer(s)

\nolig{pdflatex}{pdf|latex}
\nolig{Pdflatex}{Pdf|latex}
% better to write 'pdf\LaTeX', right?

% (d) ffi -> ff-i

\nolig{faffian}{faff|ian}
% Pfaffian
% (must avoid picking up 'affianced')

\nolig{lffian}{lff|ian}
% Wolffian Wulffian
```

```

% (e) ffl -> ff-l

\nolig{fflaw}{ff|law}
% scofflaw scofflaws

\nolig{fflink}{ff|link}
% cufflink cufflinks

\nolig{ffload}{ff|load}
% offload offloads offloaded

% (f) ffi -> f-fi

\nolig{haffinch}{haf|finch}
% chaffinch(es)

\nolig{lffish}{lf|fish}
% wolffish

% (g) ffl -> f-fl

\nolig{afflower}{af|flower}
% safflower

% (h) ft -> f-t

\nolig{ieftain}{ief|tain}
\nolig{alftime}{alf|time}
\nolig{alftone}{alf|tone}
\nolig{ooftop}{oof|top}
\nolig{ooftree}{oof|tree}
% chieftain halftime halftone
% rooftop rooftree

\nolig{ifth}{if|th}
% fifth(s)
\nolig{elfth}{elf|th}
% twelfth(s)
% (Obscuring the 'th' pair with an
% 'ft' ligature just looks weird!)

\nolig{lftr}{lf|tr}
% wolftrap calftrap

\nolig{eaftr}{eaf|tr}
% leaftrap (gutters, pools ...)

\nolig{fftr}{ff|tr}
% offtrack

% Part 2: Additional f-ligature suppression
% patterns if 'broad' option is set.
% =====

\if@broadset

% (a) ff -> f-f
% no cases in 'broad' group

% (b) fi -> f-i

\nolig{elfin}{elf|in}
\nolig{Elfin}{Elf|in}

\nolig{afing}{af|ing}
% chafing leafing loafing sheafing
% strafing vouchsafing

```

<code>\nolig{eefing}{eef ing}</code>	<code>\nolig{oafish}{oaf ish}</code>
% beefing reefing	<code>\nolig{serfish}{serf ish}</code>
	<code>\nolig{wolfish}{wolf ish}</code>
<code>\nolig{iefing}{ief ing}</code>	<code>\nolig{Deafish}{Deaf ish}</code>
% briefing debriefing	<code>\nolig{Dwarfish}{Dwarf ish}</code>
	<code>\nolig{Elfish}{Elf ish}</code>
<code>\nolig{ifing}{if ing}</code>	<code>\nolig{Oafish}{Oaf ish}</code>
% coifing fifing jackknifing knifing	<code>\nolig{Serfish}{Serf ish}</code>
% midwifing waifing wifing	<code>\nolig{Wolfish}{Wolf ish}</code>
<code>\nolig{oofing}{oof ing}</code>	<code>\nolig{beefier}{beef ier}</code>
% goofing hoofing roofing ...	<code>\nolig{comfier}{comf ier}</code>
	<code>\nolig{goofier}{goof ier}</code>
<code>\nolig{lfing}{lf ing}</code>	<code>\nolig{gulfier}{gulf ier}</code>
% golfing rolfing ...	<code>\nolig{leafier}{leaf ier}</code>
	<code>\nolig{reefier}{reef ier}</code>
<code>\nolig{arfing}{arf ing}</code>	<code>\nolig{surfier}{surf ier}</code>
% barfing bedwarfing dwarfing...	<code>\nolig{turfier}{turf ier}</code>
<code>\nolig{serfing}{serf ing}</code>	<code>\nolig{Beefier}{Beef ier}</code>
<code>\nolig{Serfing}{Serf ing}</code>	<code>\nolig{Comfier}{Comf ier}</code>
<code>\nolig{kerfing}{kerf ing}</code>	<code>\nolig{Goofier}{Goof ier}</code>
<code>\nolig{Kerfing}{Kerf ing}</code>	<code>\nolig{Gulfier}{Gulf ier}</code>
% Don't specify 'erfing' search string	<code>\nolig{Leafier}{Leaf ier}</code>
% b/c of 'butterfinger'	<code>\nolig{Reefier}{Reef ier}</code>
	<code>\nolig{Surfier}{Surf ier}</code>
<code>\nolig{urfing}{urf ing}</code>	<code>\nolig{Turfier}{Turf ier}</code>
% (wind-) surfing turfing	% (Mustn't perform 'fier -> f-ier'
	% substitution because of words
<code>\nolig{rfism}{rf ism}</code>	% such as pacifier, reifier, etc.)
% dwarfism	
<code>\nolig{rfist}{rf ist}</code>	<code>\nolig{afiest}{af iest}</code>
% dwarfist	<code>\nolig{efiest}{ef iest}</code>
	<code>\nolig{lfiest}{lf iest}</code>
<code>\nolig{deafish}{deaf ish}</code>	<code>\nolig{mfiest}{mf iest}</code>
<code>\nolig{dwarfish}{dwarf ish}</code>	<code>\nolig{ofiest}{of iest}</code>
<code>\nolig{elfish}{elf ish}</code>	<code>\nolig{rfiest}{rf iest}</code>
% elfish selfish unselfish, etc.	

```

% leafiest beefiest reefiest ...
% (Mustn't do 'fiest -> f-iest'
%   subst. b/c of 'fiesta')

\keeplig{amselfish}
\keeplig{stelfink}

\nolig{fily}{f|ily}
% beefily goofily
% This rule also catches the
%   ffily -> ff-ily case:
% daffily fluffily gruffily ...

\nolig{oofiness}{oof|iness}
% goofiness
% (Mustn't do 'finess -> f-iness'
% substitution b/c of 'finesse')

% (c) fl -> f-l

\nolig{aloofly}{aloof|ly}
\nolig{briefly}{brief|ly}
\nolig{chiefly}{chief|ly}
\nolig{deafly}{deaf|ly}
\nolig{liefly}{lief|ly}

\nolig{Aloofly}{Aloof|ly}
\nolig{Briefly}{Brief|ly}
\nolig{Chiefly}{Chief|ly}
\nolig{Deafly}{Deaf|ly}
\nolig{Liefly}{Lief|ly}
% (Mustn't perform 'fly -> f-ly' subst.
% b/c of 'fly' 'butterfly' ...)

% (d) ffi -> ff-i

\nolig{affish}{aff|ish}
\nolig{offish}{off|ish}
\nolig{iffish}{iff|ish}
\nolig{uffish}{uff|ish}
% draffish offish sniffish gruffish

\nolig{ffing}{ff|ing}
% baffing biffing bluffing...

\nolig{ffier}{ff|ier}
% buffier chaffier ...

%\nolig{ffily}{ff|ily}
% Caught by 'fily -> f-ily' rule

\nolig{ffiness}{ff|iness}
% fluffiness huffiness ...

\nolig{waffie}{waff|ie}
\nolig{Waffie}{Waff|ie}

\nolig{ffies}{ff|ies}
% baffies biffies jiffies stuffies ...
% buffiest chaffiest ...

% (e) ff1 -> ff-l

\nolig{ffly}{ff|ly}
% bluffly gruffly ruffly ...

% (f) ffi -> f-fi
% nothing additional in 'broad' group

% (g) ff1 -> f-fl
% nothing additional in 'broad' group

```

```

% -----

% (h) ft -> f-t
\if@hdligset

\nolig{ifteen}{if|teen}
% fifteen fifteens fifteenth

\nolig{fifti}{fif|ti}
\nolig{Fifti}{Fif|ti}
% fifties fiftieth fiftieths

\nolig{fifty}{fif|ty}
\nolig{Fifty}{Fif|ty}
% fifty fiftyish

% (i) fb, fh, fj, and fk ligatures

% suppress these ligatures globally, but make
% exceptions for Kafka, fjord, and fjell
\nolig{fb}{f|b}
\nolig{fh}{f|h}
\nolig{fj}{f|j}
\nolig{fk}{f|k}

\keeplig{Kafka}
\keeplig{fjord}
\keeplig{fjell}

\fi % end of \if@broadset block

% Part 3: Discretionary ligatures crossing
% morpheme boundaries
% st, ct, sp,
% th, at, et, as, is, us, ta, ll, sk

% -----

\nolig{osstalk}{oss|talk}
% crosstalk
\nolig{gstai}{gs|tai}
% dogstail
\nolig{nstak}{ns|tak}
% painstaker painstaking
\nolig{stight}{s|tight}
% gastight
\nolig{stooth}{s|tooth}
% houndstooth
\nolig{steeth}{s|teeth}
% houndsteeth

%% dis-t... words
\nolig{dista}{dis|ta}
\nolig{Dista}{Dis|ta}
% distant distasteful
\nolig{distem}{dis|tem}
\nolig{Distem}{Dis|tem}
% distemperate
\nolig{disten}{dis|ten}
\nolig{Disten}{Dis|ten}
% distended
\nolig{distil}{dis|til}
\nolig{Distil}{Dis|til}
% distil distillation
\nolig{distin}{dis|tin}
\nolig{Distin}{Dis|tin}
% distinct distinguish
\nolig{disto}{dis|to}
\nolig{Disto}{Dis|to}

```



% distort distortion	\nolig{mistru}{mis tru}
\nolig{distr}{dis tr}	\nolig{Mistru}{Mis tru}
\nolig{Distr}{Dis tr}	% mistrust mistruth
% distract distribution distrust	\nolig{istrys}{is trys}
\nolig{distu}{dis tu}	% mistryst
\nolig{Distu}{Dis tu}	\nolig{mistu}{mis tu}
% disturb	\nolig{Mistu}{Mis tu}
	% mistune Mistutor
%% mis-t... words	\nolig{istyp}{is typ}
\nolig{mista}{mis ta}	% mistype
\nolig{Mista}{Mis ta}	
% mistake mistaken mistaught unmistakable	\nolig{aastricht}{aas tricht}
\nolig{mistea}{mis tea}	% Maastricht
\nolig{Mistea}{Mis tea}	
% misteach	\nolig{esthet}{es thet}
\nolig{istend}{is tend}	\nolig{aesthet}{aes thet}
% mistend distend	\nolig{Esthet}{Es thet}
\nolig{isterm}{is term}	\nolig{Aesthet}{Aes thet}
% misterm misterms	% aesthetic esthetic unesthetic
\nolig{isth}{is th}	
% misthink misthought misthrew misthrow	% (B) ct -> c-t
% isthmus calisthenic	% -----
\nolig{istime}{is time}	
% mistime mistimed	\nolig{rctan}{rc tan}
\nolig{istitl}{is titl}	% arctangent
% mistitle	\nolig{rctat}{rc tat}
\nolig{istook}{is took}	% coarctation
% mistook	
\nolig{istouc}{is touc}	% (C) sp -> s-p
% mistouch	% -----
\nolig{mistrac}{mis trac}	
\nolig{Mistrac}{Mis trac}	\nolig{othesp}{othes p}
% Mistrace	% clothespin clothespress
\nolig{mistran}{mis tran}	\nolig{speople}{s people}
\nolig{Mistran}{Mis tran}	% business- congress- crafts-
% Mistranscribe Mistranslate	% dis- news- sales- spokes-
\nolig{istrea}{is trea}	% towns- trades- tribes- people
% mistreat mistreatment	\nolig{sperson}{s person}

% business- congress- crafts- drafts-	\nolig{risprud}{ris prud}
% news- sales- spokes- person	% jurisprudence
\nolig{espas}{es pas}	\nolig{spiec}{s piec}
% trespass trespassing	% crosspiece frontispiece
\nolig{isplat}{is plat}	
% cisplatin	\nolig{ewspa}{ews pa}
	% newspaper
\nolig{disp}{dis p}	\nolig{ewspr}{ews pr}
\nolig{Disp}{Dis p}	% newsprint
% disparage disparaging ...	
	% (D) th -> t-h
\nolig{misp}{mis p}	% -----
\nolig{Misp}{Mis p}	
% misplace misperception misprint	\nolig{eethov}{eet hov}
	% Beethoven
\nolig{susp}{sus p}	\nolig{thook}{t hook}
\nolig{Susp}{Sus p}	% boathook meathook pothook
% suspend suspension suspicious	\nolig{thouse}{t house}
\nolig{sph}{s ph} % 'ph' from Greek 'phi'!	% boathouse cathouse courthouse ...
% atmosphere biosphere hemisphere	\nolig{othol}{ot hol}
% spherical asphodel phosphorous phosphate	% foothold knothole potholder ...
% blaspheme blasphemy	\nolig{lthol}{lt hol}
	% bolthole
\nolig{transpa}{trans pa}	\nolig{sthol}{st hol}
% transparent transpacific	% posthole pesthole
\nolig{transpe}{trans pe}	\nolig{rathol}{rat hol}
% transpersonal	\nolig{Rathol}{Rat hol}
\nolig{transpie}{trans pie}	% rathole
% transpierce	\nolig{arthog}{art hog}
\nolig{transpl}{trans pl}	% warthog
% transplant	\nolig{stha}{st ha}
\nolig{transpol}{trans pol}	% firsthand postharvest posthaste
% transpolar	\nolig{thawk}{t hawk}
\nolig{transpor}{trans por}	% nighthawk
% transport transportation	\nolig{horth}{hort h}
\nolig{transpos}{trans pos}	% shorthair shorthand shorthorn
% transpose transposon	\nolig{arthei}{art hei}
	% apartheid antiapartheid

\nolig{thead}{t head}	% -----
% bolthead cathead fathead ...	
\nolig{therd}{t herd}	\nolig{lbatr}{lba tr}
% goatherd neatherd	% albatross
\nolig{theap}{t heap}	\nolig{atroop}{a troop}
% dustheap	% paratrooper
\nolig{theart}{t heart}	\nolig{eatra}{ea tra}
% fainthearted sweetheart ...	% seatrain seatransport
\nolig{uthear}{ut hear}	
% outhear outheard	% (F) et -> e-t
\nolig{thill}{t hill}	% -----
% anthill foothill	
\nolig{thood}{t hood}	\nolig{ninet}{nine t}
% adulthood knighthood ...	\nolig{Ninet}{Nine t}
\nolig{thunt}{t hunt}	% ninetieth ninetieths ninety nineteen nineties
% pothunt outhunt	
\nolig{l}{ort hol}	\nolig{ametag}{ame tag}
% porthole	% nametag
\nolig{sthum}{st hum}	\nolig{betat}{be tat}
% posthumous	\nolig{Betat}{Be tat}
\nolig{uthau}{ut hau}	% betatter beta
% outhaul	\nolig{betr}{be tr}
\nolig{uthit}{ut hit}	\nolig{Betr}{Be tr}
% outhit	% betray betroth
\nolig{uthom}{ut hom}	
% outhomer	\nolig{deta}{de ta}
\nolig{uthow}{ut how}	% detach detain detail
% outhowl	\nolig{etect}{e tect}
\nolig{uthum}{ut hum}	% detect undetectable detective
% outhumor	\nolig{detent}{de tent}
\nolig{uthust}{ut hust}	\nolig{Detent}{De tent}
% outhustle	% detent detention
\nolig{tthour}{tt hour}	\nolig{detest}{de test}
% watthour kilowatthour	\nolig{Detest}{De test}
\nolig{sthm}{s thm}	% detest
% asthma isthmus	\nolig{detr}{de tr}
	\nolig{Detr}{De tr}
% (E) at -> a-t	% detract detrain detriment detritus

\molig{etail}{e|tail}  
% bristletail detail dovetail horsetail  
\molig{etah}{e|tah}  
% cheetah chetah  
\molig{etak}{e|tak}  
% betake retake caretaker  
\molig{etax}{e|tax}  
% betax  
\molig{eteach}{e|teach}  
% reteach  
\molig{etell}{e|tell}  
% foretell fortunetelling  
\molig{eterg}{e|terg}  
% detergent  
\molig{eterio}{e|terio}  
% deteriorate  
\molig{eterm}{e|term}  
% determent determinant preterm  
\molig{etext}{e|text}  
% pretext retext teletext  
\molig{etick}{e|tick}  
% bluetick detick  
\molig{etide}{e|tide}  
% betide yuletide  
\molig{etigh}{e|tigh}  
% retighten  
\molig{etime}{e|time}  
% betime lifetime peacetime sometime  
\molig{etrain}{e|train}  
% detrain drivetrain housetrain retrain  
\molig{etrap}{e|trap}  
% firetrap livetrapp mousetrap  
\molig{etree}{e|tree}  
% axletree saddletree shoetree  
  
\molig{imetable}{ime|table}  
% timetable

\molig{reteen}{re|teen}  
% preteen  
\molig{retend}{re|tend}  
% pretend  
\molig{retenc}{re|tenc}  
% pretence  
\molig{retens}{re|tens}  
% pretense pretension  
\molig{retent}{re|tent}  
\molig{Retent}{Re|tent}  
% pretentious retention retentive  
\molig{retest}{re|test}  
\molig{Retest}{Re|test}  
% pretest retest  
  
\molig{reta}{re|ta}  
\molig{Reta}{Re|ta}  
% retag retape retake  
% foretaste caretaker  
% pretaste pretape pretaxretain  
% retain retake retaliate retard  
% retarget retaste wiretap  
\keeplig{pretable} % interpretable  
\keeplig{cretar} % secretary  
\molig{retie}{re|tie}  
\molig{Retie}{Re|tie}  
% retie entireties sureties  
\molig{retil}{re|til}  
\molig{Retil}{Re|til}  
% retile  
\molig{retim}{re|tim}  
\molig{Retim}{Re|tim}  
% retime beforetime  
\molig{retint}{re|tint}  
\molig{Retint}{Re|tint}  
% retint  
\molig{retir}{re|tir}

<code>\nolig{Retir}{Re tir}</code>	
% retire retiring	% (G) as -> a-s
<code>\nolig{retitl}{re titl}</code>	% -----
<code>\nolig{Retitl}{Re titl}</code>	
% retitle pretitling	<code>\nolig{eastran}{ea stran}</code>
<code>\nolig{retra}{re tra}</code>	% seastrand
<code>\nolig{Retra}{Re tra}</code>	<code>\nolig{aspore}{a spore}</code>
% retrace retrack retract retrans retransmit	% diaspora megaspore tetraspore
<code>\nolig{retre}{re tre}</code>	<code>\nolig{aseps}{a seps}</code>
<code>\nolig{Retre}{Re tre}</code>	% asepsis
% pretreat retread retreat retrench	<code>\nolig{asept}{a sept}</code>
<code>\nolig{retri}{re tri}</code>	% aseptic aseptically
<code>\nolig{Retri}{Re tri}</code>	<code>\nolig{asund}{a sund}</code>
% pretrim pretrial retrieve retribution	<code>\nolig{Asund}{A sund}</code>
% retries retrim	% asunder
<code>\nolig{retu}{re tu}</code>	<code>\nolig{aspec}{a spec}</code>
<code>\nolig{Retu}{Re tu}</code>	<code>\nolig{Aspec}{A spec}</code>
% return retune unreturnable	% aspect infraspecific intraspecies
	% intraspecific
<code>\nolig{uetooth}{ue tooth}</code>	<code>\nolig{infras}{infra s}</code>
% bluetooth	<code>\nolig{Infras}{Infra s}</code>
	% infrastructure infraspecific
<code>\nolig{deter}{de ter}</code>	<code>\nolig{megast}{mega st}</code>
<code>\nolig{Deter}{De ter}</code>	<code>\nolig{Megast}{Mega st}</code>
% deter determine deteriorate undeterred	% megastructure megastar
<code>\nolig{ceties}{ce ties}</code>	<code>\nolig{megasp}{mega sp}</code>
% niceties	<code>\nolig{Megasp}{Mega sp}</code>
<code>\nolig{feties}{fe ties}</code>	% megaspores megascopic
% safeties unsafeties biosafeties	<code>\nolig{aspoon}{a spoon}</code>
	% teaspoon
<code>\nolig{fety}{fe ty}</code>	
% safety	% how to do 'asea'?
<code>\nolig{lety}{le ty}</code>	
% subtlety teletype teletypewriter	% (H) is -> i-s
<code>\nolig{rety}{re ty}</code>	% -----
% surety entirety retype pretype	
<code>\nolig{etyp}{e typ}</code>	% (a) not across morpheme boundaries
% archetype archetypal retype pretype	% (The following may be a bug in fontspec)

```

\nolig{fish}{fi|sh}
\nolig{fist}{fi|st}
\nolig{Fist}{Fi|st}

% (b) across morpheme boundaries

%% Mustn't do global \nolig{antis}{anti|s}
%% because of words such as sycophantism,
%% vigilantism, and mantissa.

\nolig{antisa}{anti|sa}
\nolig{Antisa}{Anti|sa}
% antisag antisatellite
\nolig{antisc}{anti|sc}
\nolig{Antisc}{Anti|sc}
% antiscience
\nolig{antise}{anti|se}
\nolig{Antise}{Anti|se}
% antisecrecy antisense antiseptic
\nolig{antisha}{anti|sha}
\nolig{Antisha}{Anti|sha}
% antishark antiship antishock
\nolig{antishi}{anti|shi}
\nolig{Antishi}{Anti|shi}
% antishark antiship antishock
\nolig{antisho}{anti|sh}
\nolig{Antisho}{Anti|sh}
% antishark antiship antishock
\nolig{antisk}{anti|sk}
\nolig{Antisk}{Anti|sk}
% antiskid
\nolig{antisl}{anti|sl}
\nolig{Antisl}{Anti|sl}
% antislavery antislip
\nolig{antismo}{anti|smo}
\nolig{Antismo}{Anti|smo}
% antismog antismoke

\nolig{antismu}{anti|smu}
\nolig{Antismu}{Anti|smu}
% antismuggling antismut
\nolig{antisn}{anti|sn}
\nolig{Antisn}{Anti|sn}
% antisnob
\nolig{antiso}{anti|so}
\nolig{Antiso}{Anti|so}
% antisocial antisolar
\nolig{antisp}{anti|sp}
\nolig{Antisp}{Anti|sp}
% antispasmodic antispeculative
\nolig{antist}{anti|st}
\nolig{Antist}{Anti|st}
% antistatic antistick antistress
\nolig{antisu}{anti|su}
\nolig{Antisu}{Anti|su}
% antisubmarine antisubversion
\nolig{antisyl}{anti|sy}
\nolig{Antisyl}{Anti|sy}
% antisymmetric antisymphilitics

\nolig{multis}{multi|s}
\nolig{Multis}{Multi|s}
% multiscreen multisense multisensory
% multiservice multisided multisite
% multisize multiskilled multisource
% multispecies multispectral multispeed
% multisport multistage multistate
% multistemmed multistep multistoried
% multistory multistranded multisyllabic
% multisystem

\nolig{isph}{i|sph}
% hemisphere planisphere hemispheric

% (I) us -> u-s
% -----

```

<pre> %% (no examples yet)  % (J) sk -&gt; s-k % (available in EB Garamond font) % -----  \nolig{skeep}{s keep} % greenskeeper groundskeeper miskeep \nolig{iskai}{is kai} % triskaidekaphobia \nolig{thsk}{ths k} % rathskeller \nolig{misk}{mis k} \nolig{Misk}{Mis k} % miskeep miskept miskick misknow  % (K) ll -&gt; l-l % -----  \nolig{llike}{l like} % animallike soullike \nolig{lless}{l less} % soulless tailless  % (L) fr -&gt; f-r % -----  \nolig{oofr}{oof r} % proofread proofroom proofrock  % Part 4: Disabling one discretionary % ligature so that a subsequent, more % important one doesn't get pre-empted </pre>	<pre> % -----  % (i) as, is, and us preceding st % .....  \nolig{ast}{a st} \nolig{ust}{u st} \nolig{ist}{i st}  % (ii) as, is, and us preceding sp % .....  \nolig{aspar}{a spar} \nolig{Aspar}{A spar} % asparagus Caspar aspartame asparkle \nolig{asper}{a sper} \nolig{Asper}{A sper} % aspersion Casper Jasper exasperate \nolig{aspir}{a spir} \nolig{Aspir}{A spir} % aspire aspirator aspirin \nolig{gasp}{ga sp} \nolig{Gasp}{Ga sp} % gasp \nolig{hasp}{ha sp} \nolig{Hasp}{Ha sp} % hasp \nolig{lasp}{la sp} % clasp unclasp beclasp enclasp \nolig{rasp}{ra sp} \nolig{Rasp}{Ra sp} % grasp rasp raspberry \nolig{wasp}{wa sp} \nolig{Wasp}{Wa sp} % wasp waspish  \nolig{risp}{ri sp} % crisp </pre>
---	--

```

\nolig{ispani}{i|spani}
% hispanic
\nolig{lisp}{li|sp}
\nolig{Lisp}{Li|sp}
% lisp lispig
\nolig{whisp}{whi|sp}
\nolig{Whisp}{Whi|sp}
% whisper
\nolig{wisp}{wi|sp}
\nolig{Wisp}{Wi|sp}
% wisp

\nolig{cusp}{cu|sp}
\nolig{Cusp}{Cu|sp}
% cusp bicuspid tricuspid
\nolig{ausp}{au|sp}
\nolig{Ausp}{Au|sp}
% auspicious inauspicious

% (iii) at and et preceding th
% .....

%% If you have 'at' and 'et' ligatures as
%% well as the 'th' ligature -- and want
%% the 'th' ligature to take precedence,
%% make sure the following macros are
%% active (i.e., not commented out).

\nolig{ath}{a|th}
\nolig{eth}{e|th}

% The preceding instructions are a bit too

% broad as they also suppress the at ligature
% for words such as boathook, flathead,
% etc., and the 'et' ligature in words such as
% Beethoven, prophethood, and sweetheart.
% To address these cases, we provide \keeplig
% macros:

\keeplig{oathook} % boathook
\keeplig{eathook} % meathook
\keeplig{athouse} % bathouse boathouse cathouse
\keeplig{rathole} % rathole
\keeplig{Rathole}
\keeplig{athead} % cathead fathead flathead meathead
\keeplig{atherd} % goatherd neatherd
\keeplig{eatheart} % greathearted

\keeplig{Beethoven}
\keeplig{ophethood}
\keeplig{eetheart}

% (iv) at and et preceding ta
% .....

\nolig{Loretan}{Lore|tan} % :-)

% All other cases seem to involve 'at'
% or 'et' crossing a ligature boundary.
% As such, these cases should be dealt
% with in Part 3 of this file.

\fi %% end of \@ifhdlgset

```



## D German-language ligature suppression patterns: selnolig-german-patterns.sty

Introductory notes:

- To accommodate the practice of Swiss-German writers of not using the “ß” character (and using “ss” in its place), all search-and-insert strings that contain an “ß” character are duplicated with equivalent search-and-insert strings containing “ss”.

```
% !TeX root = selnolig.tex
% !TEX TS-program = lualatex
```

```
\ProvidesPackage{selnolig-german-patterns}%
[2012/12/06]
```

```
% This entire package is placed under the
% terms of the LaTeX Project Public License,
% version 1.3 or later
% (http://www.latex-project.org/lppl.txt).
% It has the status "maintained".
%
% Author: Mico Loretan
% (loretan dot mico at gmail dot com)
```

```
%% Note use of %%%% for \nolig commands
%% with an Umlaut in first part of search
%% string: they're commented out because
%% of lingering bugs in the lua code that
%% prevents the correct application of the
%% required searches that involve Umlaute.
%% (The comments will be removed once the
%% bugs in the lua code are removed.)
```

```
% 1. ff -> f-f
```

```
% -----
```

```
\nolig{Brieff}{Brief|f}
\nolig{brieff}{brief|f}
% Brief-f... (viele Fälle)
\nolig{Cheff}{Chef|f}
\nolig{cheff}{chef|f}
% Cheffahrer Cheffront ...
\nolig{Golff}{Golf|f}
\nolig{golff}{golf|f}
% many words...
\nolig{Hanff}{Hanf|f}
\nolig{hanff}{hanf|f}
% Hanffasern Hanffeld
\nolig{Schilff}{Schilf|f}
% Schilffeld Schilfflöte Schilffloß
\nolig{Senff}{Senf|f}
\nolig{senff}{senf|f}
% Senffabrik senffleck
\nolig{Tieff}{Tief|f}
\nolig{tieff}{tief|f}
% Brief-f... (viele Fälle)
```

```
\nolig{auff}{auf|f}
\nolig{Auff}{Auf|f}
% Dozens (hundreds?) or words that start
% with auf-, Kauf-f-, and Lauf-f-
% Need to provide a few \keeplig macros
% to deal with historic names and words
% of French origin.
\keeplig{Stauffach} % Stauffacher
\keeplig{Stauffer} % Stauffer
\keeplig{Hohenstauffen}
\keeplig{chauffier}
```

<code>\keeplig{Chauffier}</code>	<code>\nolig{mpffüh}{mpf füh}</code>
<code>\keeplig{chauffeur}</code>	% Kampfführung
<code>\keeplig{Chauffeur}</code>	<code>\nolig{opffris}{opf fris}</code>
	% Topffrisur Zopffrisur
<code>\nolig{affall}{af fall}</code>	<code>\nolig{ffall}{f fall}</code>
% Straffall	% Anruffallen auffallen
<code>\nolig{haffell}{haf fell}</code>	<code>\keeplig{Oppenhoffallee}</code>
% Schaffell (Vorsicht: Staffellauf...)	
<code>\nolig{affris}{af fris}</code>	<code>\nolig{ffeue}{f feue}</code>
% Schlaffrisur	% Dorfffeuerwehr Torfffeuer Lauffeuer
<code>\nolig{iffall}{if fall}</code>	<code>\nolig{ffolg}{f folg}</code>
% Tariffalle Streiffall	% Impffolgen
<code>\nolig{ffunk}{f funk}</code>	<code>\nolig{rafford}{raf ford}</code>
% Brieffunktion Abrufffunktion	% Strafforderung
<code>\nolig{ffrosch}{f frosch}</code>	<code>\nolig{rifford}{rif ford}</code>
<code>\nolig{ffrösch}{f frösch}</code>	% Tarifforderung
% Pfeiffrosch Pfeiffrösche	<code>\nolig{fform}{f form}</code>
<code>\nolig{ffahr}{f fahr}</code>	% Kopfform Gughupfform aufformen
% Schiffahrt Schleiffahrt Tariffahrplan	<code>\nolig{fförm}{f förm}</code>
<code>\nolig{ffant}{f fant}</code>	% reifförmig schweifförmig
% Schleiffantasie	<code>\nolig{ffrag}{f frag}</code>
<code>\nolig{ffens}{f fens}</code>	% Streiffragen
% Schlaffenster Tariffenster	<code>\nolig{ffond}{f fond}</code>
<code>\nolig{ffami}{ffami}</code>	% Tariffondslösung
% Zwölffamilienhäuser	<code>\nolig{ffrei}{f frei}</code>
<code>\nolig{ffarb}{f farb}</code>	% tariffrei
% Zwölffarbenmaschine zwölfarbig	<code>\nolig{ffried}{f fried}</code>
<code>\nolig{lffach}{lf fach}</code>	% Dorffrieden Dorffrieden
% elffach zwölfach	<code>\nolig{ffürst}{f fürst}</code>
<code>\nolig{nffach}{nf fach}</code>	<code>\nolig{fforsch}{f forsch}</code>
% fünffach	% Schlafforschung Impfforschung
<code>\nolig{pffront}{pf }</code>	<code>\nolig{ffrist}{f frist}</code>
% Kampffront	% Prüffrist Ablauffrist
<code>\nolig{ifffront}{if } % {if front}</code>	<code>\nolig{ffund}{f fund}</code>
% Tarifffront	% Brückenkopffundament

\keeplig{iffund}	\nolig{ffeld}{f feld}
% diffundieren	% Prüffeld Schilffeld Kampffeld
	\keeplig{ffeldien} % Schnüffeldienst
\nolig{ffäch}{f fäch}	\keeplig{offeldru} % Kartoffeldruck
% Brieffächer	
\nolig{ffäh}{f fäh}	% 2. fi -> f-i
% hoffähig kampffähig	% -----
% auffährt lauffähig	
\nolig{ffäll}{f fäll}	\nolig{Chefi}{Chef i}
% straffällig unauffällig	\nolig{chefi}{chef i}
\nolig{fförd}{f förd}	% Chefideologe Chefindianer Chefinformatiker
% ruffördernd kreislauffördernd schafffördernd	\nolig{chafi}{chaf i}
\nolig{fführ}{f führ}	% Schafimperium Schafinnereien
% Kampfführung aufführen	\nolig{chlafi}{chlaf i}
\nolig{ffrei}{f frei}	% Schlafglu schlafinduzierend
% Schlaffrei	
\nolig{ffreq}{f freq}	\nolig{pfinst}{pf inst}
% Schlaffrequenz	% Wahlkampfinstitution
\nolig{ffestl}{f festl}	\nolig{finstru}{f instru}
% Straffestlegung	% Zupfinstrumente Schleifinstrument Greifinstrument
\nolig{ffreu}{f freu}	\nolig{findex}{f index}
% Straffreude Brieffreund	% Kaufindex Pfandbriefindex
% \nolig{ffälsch}{f fälsch}	\nolig{ufindi}{uf indi}
% % Brieffälschung	% Kaufindices Laufindizes
\nolig{ffeinde}{ffeinde}	\nolig{ufinter}{uf inter}
% -feinde	% Kaufinteresse
\nolig{ffeindsch}{ffeindsch}	\nolig{fingenieur}{f ingenieur}
% -feindschaft	% Prüffingenieur Kaufingenieur
\nolig{ffeindl}{ffeindl}	\nolig{finsel}{f insel}
% -feindlich	% Schafinsel Schilfininsel
\nolig{ffetz}{ffetz}	\nolig{fintrig}{f intrig}
% Brieffetzen Stofffetzen	% Briefintrige Hofintrige
	\nolig{ufiss}{uf iss}
\nolig{ffirm}{f firm}	% aufisst
% Brieffirmen Tariffirmen	\nolig{finfo}{f info}
\keeplig{affirm}	% Tarifinformation Telefoninformation
\keeplig{Affirm}	

```

% 3. fl -> f-l
% -----

\nolig{aufl}{auf|l}
\keeplig{bauflä} % Anbaufläche
\keeplig{Bauflä} % Anbaufläche
\keeplig{hauflug} % Schauflug
\keeplig{hauflüg} % Schauflüge
\keeplig{nauflut} % Donauflut
\keeplig{lauflüg} % Blauflügel (Libelle)

\nolig{Aufl[aäeioöuü]}{Auf|}
% mustn't do \nolig{Aufl}{Auf|l} b/c
% of "Auf1." (abbrev/ w/ ligature!)

% auflachen
% aufladbar aufladen Sauf-laden
% auflandig auflanden Kaufland
% auflassen, auflassende
% auflauern, auflauerte
% Auflauf Auflaufform Aufläufe
% auflaure auflaßt auflebend auflegend
% auflehnend auflesen
% Kaufleidenschaft Kaufleute
% aufleuchten aufliegende
% aufließet aufließet
% auflisten
% auflockern
% auflodern
% drauflos
% Auflösung
% auflüde

\keeplig{zuflach} % abzuflachen
\keeplig{uflachs} % anzuflachsen
%\nolig{auflad}{auf|lad}
%\nolig{Auflad}{Auf|lad}
%\nolig{uflan}{uf|lan}
%\nolig{uflass}{uf|lass}
%\nolig{uflauer}{uf|lauer}
\nolig{fläuf}{f|läuf}
%\nolig{uflaur}{uf|laur}
%\nolig{uflaß}{uf|laß}
%\nolig{ufleb}{uf|leb}
%\nolig{ufleg}{uf|leg}
%\nolig{uflehn}{uf|lehn}
%\nolig{ufleid}{uf|leid}
%\nolig{ufles}{uf|les}
%\nolig{ufleuch}{uf|leuch}
%\nolig{uflieg}{uf|lieg}
%\nolig{aufliess}{auf|liess}
%\nolig{Aufliess}{Auf|liess}
%\nolig{aufließ}{auf|ließ}
%\nolig{Aufließ}{Auf|ließ}
%\nolig{uflock}{uf|lock}
\nolig{flod}{f|lod}
%\nolig{uflos}{uf|los}
%\nolig{uflust}{uf|lust}
%\nolig{uflös}{uf|lös}
%\nolig{uflüd}{uf|lüd}

\nolig{Chefl}{Chef|l}
\nolig{chefl}{chef|l}
%Cheflieferant -limousine -lobbyist -los
\nolig{fleut}{f|leut}
% Hofleute
\nolig{flist}{f|list}
% Prüfliste Rufliste Kaufliste
\nolig{flauf}{f|lauf}
% Auflauf

```

<code>\nolig{afleder}{af leder}</code>	<code>\keeplig{ieflaute}</code>
% Schafleder	% Chemieflaute
<code>\nolig{aflos}{af los}</code>	<code>\keeplig{ieflügel}</code>
% straflos schlaflos	% Akademieflügel Jalousieflügel
<code>\nolig{flein}{f lein}</code>	
% Laufleine Scherflein Wölflein	
% Köpflein Zöpflein	<code>\nolig{fleit}{f leit}</code>
<code>\nolig{flig}{f lig}</code>	% Dampfleitung Hofleitung Bauhofleiter
% schweflig würflig knifflig mufflig	% Kaufleitung Notrufleitung aufleiten
<code>\nolig{flisch}{f lisch}</code>	% inbegriffleitend Kraftstoffleitung
% teuflisch Tüpfelscheißer	<code>\keeplig{Kalteteiler}</code>
	% a surname...
<code>\nolig{fläuf}{f läuf}</code>	
% Tiefläufer Aufläufe	<code>\nolig{pfleu}{pf leu}</code>
<code>\nolig{flöff}{f löff}</code>	% Natriumdampfleuchten Kopfleuchte
% Tieflöffelbagger auflöffeln	<code>\nolig{pflied}{pf lied}</code>
% Schöpflöffel	% Kampflied
<code>\nolig{aflied}{af lied}</code>	<code>\nolig{flok}{f lok}</code>
% Schlaflied	% Dampflokomotive
<code>\nolig{lflos}{lf los}</code>	<code>\nolig{mpflos}{mpf los}</code>
% hilflos	% kampflos kopflos
<code>\nolig{pfleist}{pf leist}</code>	<code>\nolig{flust}{f lust}</code>
% Dampfleistung Knopfleiste	% Kampflost Impflust kauflostig Rauflost
% Kopfleiste	
<code>\nolig{iefl}{iefl l}</code>	<code>\nolig{fland}{f land}</code>
% Tieflage Tieflager Tieflieger	% Hofland Kaufland Sumpfland Tiefland
% schieflachen schieflaufen schiefliegt schieflief	% Straflandesgericht Dorflandwirtschaft
% brieflich	<code>\keeplig{flandern}</code> % Ostflandern
% Briefleistung Brieflesen Brieflaufzeiten	<code>\keeplig{flandrisch}</code>
<code>\keeplig{iefluss}</code>	
<code>\keeplig{ieflüss}</code>	<code>\nolig{fländ}{f länd}</code>
% Energiefluss Energieflüsse Batterieflüssigkeit	% hofländlich Sumpfländer Tiefländer
<code>\keeplig{iefläch}</code>	
% Karosseriefläche Deponiefläche	<code>\nolig{fleb}{f leb}</code>
<code>\keeplig{ieflosk}</code>	% Hofleben Kopfleben Druckkopflebensdauer
% Melodiefloskel	<code>\keeplig{huffleb}</code>
<code>\keeplig{ieflut}</code>	% shuffleboard
% Euphorieflut Nostalgieflut	

`\nolig{opflast}{opf|last}`  
 % kopflastig  
`\nolig{pflos}{pf|los}`  
 % kopflos kampflos  
`\nolig{pfloch}{pf|loch}`  
 % Knopfloch  
`\nolig{pflöch}{pf|löch}`  
 % Knopflöcher  
`\nolig{flehr}{f|lehr}`  
 % Dorflehrer Eislauflehrerin  
`\nolig{flohn}{f|lohn}`  
 % Tariflohn Tieflohnland  
`\nolig{flöhn}{f|löhn}`  
 % Tariflöhne  
`\nolig{fler}{f|ler}`  
 % Freiberufler Schaufler  
 % Löffler Büffler Schnüffler  
`\nolig{oflad}{of|lad}`  
 % Biohofladen  
`\nolig{orflad}{orf|lad}`  
 % Dorfladen  
`\nolig{urflad}{urf|lad}`  
 % Surfladen  
`\nolig{ufleu}{uf|leu}`  
 % Kaufleute aufleuchten  
  
`\nolig{flage}{f|lage}`  
 % Rohstofflager Straflager Auflage  
`\keeplig{siflage}`  
 % Persiflage -persiflage  
  
`\nolig{flaun}{f|laun}`  
 % Kauflaune Wurflaune Kampflaune  
`\nolig{uflaut}{uf|laut}`  
 % Ruflaute Ruflautstärke  
`\nolig{ofläd}{of|läd}`  
 % Biohofläden

`\nolig{rfläd}{rf|läd}`  
 % Dorfläden  
`\nolig{ufläd}{uf|läd}`  
 % Kaufläden auflädt  
`\nolig{weifle}{weif|le}`  
 % bezweifle verzweifle  
`\nolig{weiflu}{weif|lu}`  
 % Verzweiflungsakt  
  
`\nolig{flich}{f|lich}`  
 % tariflich reiflich unbegreiflich  
 % glimpflich schimpflich behilflich  
 % brieflich verwerflich  
 % sträflich gräflisch markgräflisch  
 % beruflich nebenberuflich  
 % käuflich unverkäuflich  
 % höflich bischöflich  
 % unerschöpflich dörflich  
 % vortrefflich begrifflich  
  
 % Vorsicht mit Pflicht and pflicht:  
     `\keeplig{Pflicht}`  
     `\keeplig{pflicht}`  
 % Sonderregel fuer Sumpfpflicht(er):  
`\nolig{Sumpfpflicht}{Sumpf|licht}`  
  
`\nolig{fling}{f|ling}`  
 % Prüfling Fünfling Sträfling Täufling  
  
 % 4. ffi -> f-fi  
 % -----  
`\nolig{lffing}{lf|fing}`  
 % Zwölffingerdarm  
`\nolig{ffieb}{f|fie}`

<pre> % Sumpffieber Wahlkampffieber \nolig{nffing}{nf fing} % fünffingrig Fünffingergebirge \nolig{ffisch}{f fisch} % Kampffisch Wolffisch \nolig{iffing}{if fing} % Greiffinger \nolig{ffilm}{f film} % Werwolffilm \nolig{ffüß}{f füß} % Greiffüße \nolig{ffüss}{f füss} % Greiffüsse (Schweizer...) \nolig{ffuss}{ffuss} % Grieffuss \nolig{ffigu}{ffigu} % Streiffigur  \nolig{ffind}{f find} % Straffindung \nolig{hoffing}{hof fing} % Bischoffinger  \nolig{ffisch}{f fisch}  % 5. ffi -&gt; ff-i % -----  \nolig{Stoffi}{Stoff i} \nolig{stoffi}{stoff i} % Rohstoffindustrieller Rohstoffimporte % Baustoffingenieur Kunststoffingenieur \nolig{Schiffi}{Schiff i} % Schiffinstandsetzung Luftschiffidee </pre>	<pre> % 6. ffl -&gt; ff-l % -----  \nolig{offline}{off line} \nolig{Offline}{Off line} % offline, Offline \nolig{offlad}{off lad} % Sprengstoffladung \nolig{offleck}{off leck} % Treibstoffleck \nolig{offlief}{off lief} % Brennstofflieferungen \nolig{fflamp}{ff lamp} % Kompaktleuchtstofflampe \nolig{fflung}{ff lung} % Stafflung \nolig{afflu}{aff lu} % Gafflust \nolig{ifflo}{iff lo} % Schifflogbuch grifflos Griffloch \nolig{iffLö}{iff lö} % GriffLöcher \nolig{offlo}{off lo} % wirkstofflos Sauerstoffloch \nolig{offlÖ}{off lö} % Harnstofflösung Stofflöwe Sauerstofflöcher \nolig{ffland}{ff land} % Iffland Rifflandschaft Kunststofflandschaft \nolig{fflast}{ff last} % Rohstofflastigkeit Treibstofflaster \nolig{ffleist}{ff leist} % Griffleiste Stoffleiste \nolig{uffloch}{uff loch} % Suffloch \nolig{ufflon}{uff lon} % Mufflon </pre>
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\nolig{Treffl}{Treff l}	\nolig{fflimm}{f flimm}
% Trefflokal	% Vorhofflimmern
\nolig{Pfiffl}{Pfiff l}	\nolig{fflug}{f flug}
% Pfiffaute	% Tiefflug Kampfflugzeug Chefflugleiter
\nolig{Schiffl}{Schiff l}	\nolig{iefflieg}{ief flieg}
\nolig{schiffl}{schiff l}	% tieffliegend
% Schifflache Schiffladung Schifflinie	
\nolig{Griffl}{Griff l}	\nolig{iefflog}{ief flog}
\nolig{griffl}{griff l}	% tiefflog
% Griffängen grifflos Griffflaschen Griffleiste	\nolig{iefflög}{ief flög}
% angrifflustig	% Tiefflüge
\nolig{Stoffl}{Stoff l}	\nolig{Hofflög}{Hof flög}
\nolig{stoffl}{stoff l}	% Hofflügel
	\nolig{mpffl}{mpf fl}
\nolig{fflieb}{ff lieb}	% Sumpffläche Sturzkampfflieger
% Riffliebende	\nolig{opffl}{opf fl}
	% Totenkopfflagge
% 7. ffl -> f-fl	%\keeplig{Knoepff} % Knoepffler
% -----	
\nolig{fflatt}{f flatt}	\nolig{iffleck}{if fleck}
% aufflattern	% Schleifflecklein
\nolig{fflech}{f flech}	\nolig{fflüs}{f flüs}
% aufflechten	% Schleifflüsigkeit
\nolig{fflasch}{f flasch}	\nolig{fflex}{f flex}
% Wegwerfflasche	% Tarifflexibilität
\nolig{lfflach}{lf flach}	\nolig{ffluch}{f fluch}
% Zwölfflach	% Tarifflicht Werwolffluch
\nolig{nfflach}{nf flach}	\nolig{ffluch}{f fluch}
% Fünfflach	% Tarifflichtling
\nolig{ffläch}{f fläch}	
% Lauffläche Kampfflächen	% 8. ft -> f-t
% Zwölfflächner (dodecahedron)	% -----
\nolig{fflut}{f flut}	\nolig{Auft}{Auf t}
% Brieffluten	\nolig{auft[äähioöruü]}{auf t}
\nolig{ffleisch}{f fleisch}	% auftat Auftakt
% Schafffleisch	



% auftäten auftätowieren	% Hälfte elfte zwölfte
% aufteilen	% zwölfter elfter
% Lauftherapie Kreislauftheorie	
% auftischen	\nolig{nfte}{nf te}
% auftoupiern	% Fünfte fünfter
% herauftönen	
% auftreiben auftreten Sauftrotteln	%%%\nolig{üfte}{üf te}
% aufturn	% prüfte überprüfte
% auftürmen kauftüchtig	
	\nolig{rfte}{rf te}
\nolig{ftheor}{f theor}	% durfte bedurfte surfte
% Golftheorie Kampftheorien Auflauftheorien	% dürfte schlürfte
	% unbedarfte
\nolig{Schlaft}{Schlaf t}	% schärfte verschärfte
\nolig{schlaft}{schlaf t}	
% Schlaftablette -teddy -tee -temperatur	\nolig{lfto}{lf to}
% -therapeut -therapie -tier -tod -trank	% Zwölftonmusik Elftonner Golftour
	\nolig{nftopf}{nf topf}
\nolig{Straft}{Straf t}	% Senftopf
\nolig{straft[aäehioöü]}{straf t}	\nolig{urfto}{urf to}
% Straftarif - team -technisch -tendenz	% Freiwurftor Surftour
% -termin -theologisch -tilgung -tor -tribunal	\nolig{orfto}{orf to}
	% Dorftourismus
% but: don't suppress ft liga for words such as	
% bestraft, vorbestraft, etc.	\nolig{lftö}{lf tö}
	% zwölfjönend
\nolig{Briefft}{Brief t}	\nolig{nftö}{nf tö}
% Brieftasche Brieftaube	% Senftöpfchen
\nolig{Cheft}{Chef t}	\nolig{Dorft}{Dorf t}
% Cheftheoretiker Cheftestpilot Cheftrainer	
	\nolig{rftö}{rf tö}
\nolig{iefta}{ief ta}	% Dorftölpel
% Tieftaucher Brieftasche Brieftaube	\nolig{rftr}{rf tr}
\nolig{iefte}{ief te}	% Wurftraining Surftrip Freiwurftreffer
% vertiefte verbriefte Brieftext	% Dorftrotteln Dorftratsch Dorftradition
	\nolig{rftu}{rftu}
\nolig{lftte}{lf te}	% Wurfteuch

\nolig{rftü}{rftü}	% Vernunftüberlegung Zunftüberlieferung
% Dorftümpel	
\nolig{fnton}{f nton}	\nolig{oftü}{of tü}
% Pfeifton Zwölftonmusik Rufton	% Hoftür
\nolig{urfata}{urf ta}	\nolig{lfta}{lf ta}
% Wurftalent Auswurfaste Surftalent	% elftausend zwölftausend Golftasche
\keeplig{tdurfta} % Notdurftanlage	
\nolig{fty[pr]}{f ty}	\nolig{uftas}{uf tas}
% Schiffstyp Stofftyp waldorftypisch	% Ruftaste Vorlauftaste
% Dorftyran Hoftyrann	
\nolig{ftrain}{f train}	\nolig{ftax}{f tax}
% Lauftrainer	% Ruftaxi
\nolig{eiftr}{eif tr}	
% Eingreiftruppe Nadelstreifträger	\nolig{pft[aäehioöü]}{pf t}
\nolig{eifte}{eif te}	% Wettkampftag Kampftaktik
% schleifte reife seifte	% wahlkampftauglich Schnupftabak
\nolig{iefto}{ief to}	% kämpfte schimpfte schrumpfte
% Stieftochter Tiefton	% klopfte schöpfen
\nolig{ieftö}{ief tö}	% Schimpftiraden Mehrkampftitel Stapftiefe
% Stieftöchter tieftönend	% Dampftopf Sumpftour
\nolig{ftrunk}{f trunk}	% Kampftruppe Wettkampftrubel
% schlaftrunken	% Kopftreffer Zopfträger
\nolig{rftig}{rf tig}	% Kopftuch Schnupftuch
% dürftig bedürftig	% Kampftätigkeit Kampftänzer
\keeplig{otdurft}	% Herzklopföne Wahlkampftöne
% notdürftig	% Kopftücher Kopftüchlein Schnupftücher
\nolig{ftag}{f tag}	\nolig{fft[aäehioöü]}{ff t}
% Taufstag Fünftagewoche	% Stofftasche Stofftapete Sauerstofftank
\nolig{nftause}{nf tause}	% schaffte hoffte klaffte verpuffte
% fünftausend Fünftausender	% Stofftheorie
\nolig{nftü}{nf tü}	% Stofftier Stofftiger Stofftisch Tuch
% fünftürig Senftüte	% Auspufftopf Kunststofftonne
\keeplig{nftüb}	% Stofftradition Stofftrennung
	% Kunststofftube Stoffturnschuhe
	% Stofftäschchen

% Auspufftöpfe Kunststofftöpfe  
 % Kunststofftüten

%%%\nolig{prüfte}{prüf|te}  
 %%%\nolig{Prüfte}{Prüf|te}

%% various \keeplig macros for ft case:

\keeplig{Zünfte} % Zünfte  
 \keeplig{zünfte} % zünftig  
 \keeplig{kunfte} % Unterkunft  
 \keeplig{künfte} % Unterkünfte  
 \keeplig{lufte} %  
 \keeplig{Luft} %  
 \keeplig{lüfte} %  
 \keeplig{Lüfte} %  
 \keeplig{dufte} %  
 \keeplig{Duft} %  
 \keeplig{düfte} %  
 \keeplig{Düfte} %  
 \keeplig{hüfte} %  
 \keeplig{Hüfte} %  
 \keeplig{werfte} %  
 \keeplig{Werfte} %  
 \keeplig{Warfte} %  
 \keeplig{Gruftas} % Gruftasseln  
 \keeplig{grüfte} % Holzkammergrüfte  
 \keeplig{Kraft} %  
 \keeplig{otdurfte} %

% 9. fb -> f-b, fh -> f-h, fk -> f-k  
 % -----

% Disable these ligatures globally.  
 % I can't think of a single \*German\* word  
 % for which these ligatures would not

% cross a morpheme boundary.

\nolig{fb}{f|b}  
 \nolig{fh}{f|h}  
 \nolig{fk}{f|k}

% However, there are words of \*non-German\*  
 % origin for which the 'fk' ligature  
 % shouldn't be suppressed. Use \keeplig macros  
 % to define such cases.

\keeplig{Kafka}  
 \keeplig{kafka}  
 \keeplig{Piefke}  
 \keeplig{Safka}  
 \keeplig{Potrafke}  
 \keeplig{Sprafke}  
 \keeplig{Shirafkan}  
 \keeplig{Tirafkan}  
 \keeplig{Selfkant}

% 10. fj -> f-j  
 % -----

% Suppress this ligature globally  
 \nolig{fj}{f|j}

% Once more, there are some words of \*non-German\*  
 % (e.g., Nordic and Slavic) origin for which the  
 % 'fk' ligature should not be suppressed. Use  
 % \keeplig macros to define such cases.

\keeplig{fjord}  
 \keeplig{fjell}  
 \keeplig{Prokofjew}  
 \keeplig{Sufjan}% Stevens  
 \keeplig{Eefje} % Dutch first name

\keeplig{fjäll} % Tegefjäll: Swedish skiing	%\folligset
\keeplig{Astafjew}	%
% Russian author (Wiktor) and	%\nolig{thaft}{t haft}
% soccer player (Maksim)	% % ernsthaft Heimathafen statthaft
\keeplig{fjör}	%\nolig{thalt}{t halt}
% A bunch of Icelandic places; catches	% % enthalten festhalten mithalten
% both German Isafjördur and Icelandic	%\nolig{thaub}{t haub}
% Ísafjörður	% % Zimthaube Fronthaube
\keeplig{Ísafjarðarbær}	%\nolig{thaus}{t haus}
% A city in Iceland	% % Rathaus Kunsthaus Gasthaus
	%\nolig{thielt}{t hieht}
	% % enthielt
% 11. fff -> ff-f	%\nolig{thalb}{t halb}
% -----	% % anderthalb
% Just in case there's a font that has a	%\nolig{thall}{t hall}
% triple-f ligature:	% % Kunsthalle Sporthalle
	%\nolig{theit}{t heit}
\nolig{fff}{ff f}	% % Beliebtheit
% griffest Stofffarbe Sprengstofffalle	%\nolig{thab}{t hab}
	% % Machthaber
% This macro will also break up any 'fffl'	%\nolig{thin}{t hin}
% ligatures into 'ff' and 'fl' parts.	% % weithin schlechthin mithin
% Example words: Sauerstoffflasche,	%\nolig{thergang}{t hergang}
% Schlifffläche, Stofffleck,	% % Tathergang
% Kunststoffflügel, Kunststofffläche	%\nolig{thergeb}{t hergeb}
	% % althergebracht
	%\nolig{thergeh}{t hergeh}
	% % weithergeholt
	%\nolig{sther}{st her}
% 12. Experimental and highly incomplete,	% % selbsthergestellt selbstherrlich
%%% and therefore commented out for now:	%\nolig{späth}{spät h}
%%% Macros to suppress the th-ligature	%\nolig{Späth}{Spät h}
%%% for selected German words.	%\fi

## E Reporting bugs and other issues with the selnolig package: A suggested template

```
% !TEX TS-program = lualatex
% selnolig-bugreport.tex, 2012/12/06

\documentclass{article}
\usepackage[margin=1in]{geometry}
\usepackage{fontspec}

\setmainfont{Latin Modern Roman}
% if desired, you may set a different text font...
% Comment out the next instruction if you don't use babel;
% and set the language version that meets your needs.
\usepackage[ngerman]{babel}
% Choose either ngerman or english as the language option
\usepackage[ngerman]{selnolig}

\begin{document}
\paragraph*{Version of selnolig package used:}
\selnoligpackageversion, \selnoligpackagedate % defined in selnolig.sty

\subsection*{Type-I errors: Words for which ligatures are incorrectly not being suppressed}

List words here

\subsection*{Type-II errors: Words for which ligatures are suppressed incorrectly}

List words here

\subsection*{Other issues}

Examples: problems with user guide; problems caused by the package's lua code

(and, please, suggestions for bug fixes)
\end{document}
```