The selnolig package: Selective suppression of typographic ligatures*

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Abstract

The selnolig package suppresses typographic ligatures selectively, i.e., based on predefined search patterns. The search patterns focus on ligatures deemed inappropriate because they span morpheme boundaries. 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.

For English and German language documents, the selnolig package provides extensive rules for the selective suppression of so-called "common" ligatures. These comprise the ff, fi, fl, ffi, and ffl ligatures as well as the ft and fft ligatures. Other f-ligatures, such as fb, fh, fj and fk, are suppressed globally, while making exceptions for names and words of non-English/German origin, such as Kafka and fjord.

For English language documents, the package further provides ligature suppression macros for a number of so-called "discretionary" or "rare" ligatures such as ct, st, and sp.

The selnolig package requires use of the LuaLaTeX format provided by a recent TEX distribution such as TEXLive 2012 or 2013 and MiKTEX 2.9.

Contents

*Current version: 0.214b. Features of the selnolig package are subject to change without prior notice.

The main text font used in this document is "Garamond Premier Pro". "EB Garamond" is used for words that involve the *sk*, fb, fh, fj, fk, ffb, ffh, ffj, and ffk glyphs. Both "common" and "discretionary" typographic ligatures are enabled for these fonts—*and* are suppressed selectively using selnolig's macros.

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1 Introduction

The ability of TEX and Friends to use typographic ligatures has long been cherished by its users. Indeed, the automated and transparent use of typographic ligatures by TEX and Friends is often offered up as one of the reasons for using these programs to obtain high-quality typeset output.

However, even though the automatic use of typographic ligatures is highly desirable in general, there are words for which the use of certain typographic ligatures may not be appropriate. The TEXbook observes, on page 19, that the word `shelfful` may look better if it is typeset as "shelfful", i.e., *without* the ff-ligature, rather than as "shelfful". 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 three of these words are composed of two *morphemes*: the first morpheme ends in an "f" or "ff" while the second morpheme starts with either an "f" (in the case of shelfful) 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; all words—other than nonsense words, I suppose—contain at least one morpheme. The words apple and orange contain one morpheme each, and the words apples, oranges, shelfful, cufflink, and offload each contain *two* morphemes. Stated formally, the main purpose of the selnolig package is to provide methods and rules for automated yet selective (rather than global) suppression of typographic ligatures that span morpheme boundaries.

For English language documents, the need to suppress typographic ligatures that span morpheme boundaries does not appear to be a hugely pressing typographic concern, possibly because English doesn't feature composite words that frequently. However, in other languages, such as German, composite words are much more common. In these languages, there is naturally a much greater potential for composite words to feature instances of `ff`, `fi`, `fl` etc. across morpheme boundaries. In German typography, a ligature that spans a morpheme boundary appears to be something that should be avoided at (nearly) all cost, presumably because these ligatures have the potential to impair seriously the intelligibility of the composite words in question. Words such as elffach and kopflos simply look wrong to a German reader; they should be typeset as elffach and kopflos.[1]

TEX and Friends offer several methods for suppressing ligatures on a case-by-case basis.[2] However, these methods must be applied separately to each and every occurrence of all words that contain unwanted ligatures. As such, these case-by-case methods are both time-intensive and tedious. Moreover, there's always a residual risk that some words for which certain ligatures should be suppressed will be overlooked in the editing process.

What has *not* been available so far is a LATEX package that (a) provides a list of word patterns and entire words for which ligatures should be suppressed and (b) systematically discovers all instances of these patterns in a document and applies the non-ligation rules automatically to all words for which one or more pattern

[1] For German texts, I believe that the *Duden* provides authoritative backing for questions related to selective ligature suppression. For English texts, I'm not aware of the existence of a document issued by an official or quasi-official body that prescribes whether ligatures that span morpheme boundaries should be suppressed. If anybody can provide such a reference, I would be happy to list it.

[2] In LATEX, 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 LuaLATEX.

matches obtain. The selnolig package is meant to address this need. The package is currently set up to handle non-ligation issues for English and German language documents by providing extensive lists of ligature suppression rules tailored to the respective languages. Of course, I make no claim as to the completeness of either list. The package therefore makes it straightforward for users to provide their own supplemental ligature suppression rules to treat words not already covered by the package.[3]

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 and fft ligatures. The latter two ligatures, while not provided by the Computer Modern and Latin Modern font families, are frequently available in oldstyle (also known as "Garalde") font families.[4] Oldstyle-type font families generally feature a great variety of typographic ligatures. Given the popularity of these font families for typesetting documents, it seems useful on the selnolig package to provide ligature suppression rules for the ligatures provided by these font families.

For both English and German language documents, the fb, fh, fj, and fk ligatures are suppressed *globally*; see also Section 5.5. However, exceptions are provided in order not to suppress these ligatures for selected words of *non-English/German* origin, such as fjord, fjell, Prokofjew, and Kafka.

For English language documents, the selnolig package recognizes an option called `broadf`; if it is set, additional f-ligatures will be suppressed selectively. The package also features an option called `hdlig` to provide selective ligature suppression for discretionary (aka rare) and historic ligatures, including the ct, st, and sp character pairs. Ligature suppression rules are also provided for the character pairs *sk*, *th*, *at*, *et*, *as*, *is*, and *us*. At this time, no macros for the selective suppression of ligatures classified as historic and/or discretionary are provided for German language documents.[5]

The selnolig package also provides supplemental hyphenation exception lists for both English and German language words. The words in these lists are generally composite and contain one or more typographic ligatures that should be suppressed.

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

2.1 How do I load the selnolig package in the preamble of my document?

- 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}
```

[3] If you come up with such words, please email them to me so that I can augment and update the package's ligature suppression rules. A suggested template for reporting such cases is provided in Appendix E.

[4] In some oldstyle font families, the "ft" and "fft" ligatures are rendered as "ft" and "fft", respectively.

[5] A remark on the classification of various forms of typographic ligatures in OpenType fonts: Among the ligature-rich OpenType fonts I'm familiar with, there appears to little terminological standardization as to which typographic ligatures are labelled "historic" and which ones are labelled "discretionary". To wit, the fonts Latin Modern Roman, Garamond Premier Pro, and Hoefler Text report having "only" discretionary ligatures, whereas Junicode, Cardo, EB Garamond, and Palatino Linotype report having both historic and discretionary ligatures. Interestingly, none of these fonts report having ligatures classified as either "contextual" or "required".

Synonymous language 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 option `broadf`; see Section 5.2. If you enable "historic" and/or "discretionary" ligatures (e.g., ct, st, sp, *th*, *as*, *is*, and *us*) for your document's text font(s), be sure to specify the option `hdlig` as well. The options `hdlig` and `broadf` may be specified independently.

- If your document is written in German, load the package as follows:

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

  Synonymous language 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 in the `\documentclass` instruction, LaTeX 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, you will need to specify various `\nolig` macros yourself in order to suppress typographic ligatures. This approach may be called for if you write in a language other than German or English.

2.2 Any hints on how to get started with LuaLaTeX?

The ligature suppression macros of the selnolig package *require* the use of LuaLaTeX; they will not work under either pdfLaTeX or XeLaTeX.[6] If you've been using pdfLaTeX until now, the requirement to use LuaLaTeX will likely force you to make some changes to your existing documents. Fortunately, these changes should be minor and straightforward to implement, because LuaLaTeX is (for the most part) a strict superset of pdfLaTeX. Almost all documents that compile correctly under pdfLaTeX should also compile correctly under LuaLaTeX. Two required changes are:

(i) Do not load the `inputenc` and `fontenc` packages.

(ii) Insert the instruction `\usepackage{fontspec}` in the preamble.[7] Then, use commands such as `\setmainfont` and `\setsansfont` to load the fonts you wish to use.

Depending on your TeX distribution, the default font family used by LuaLaTeX will be either Computer Modern or Latin Modern. If you wish to use a different font family, further font-related instructions will be required. *How* to specify fonts and font families and set up various font-related options in LuaLaTeX

[6] If the selnolig package is not run under LuaLaTeX, a warning message will be issued and only the package's supplemental hyphenation rules will be available to the user.

[7] If the selnolig package is run under LuaLaTeX but the fontspec package isn't loaded by the time the `\begin{document}` statement is encountered, selnolig will terminate with an error message.

are topics that go far beyond the scope of this user guide. I urge you to become familiar with the very well-written user guide of the fontspec package.

You will also need to use a TEX distribution that features a fairly recent version of LuaLATEX. TEXLive 2013, TEXLive 2012, and MiKTEX 2.9 satisfy this requirement; versions of TEXLive before 2011 probably do not. If you use a command-line interface to compile a document named, say, `myfile.tex`, type

```
lualatex myfile
```

rather than either `latex myfile` or `pdflatex myfile`. If you use a text editing program with pull-down menus or buttons to invoke a suitable compiler, be sure to select `LuaLaTeX`.

The first time one runs LuaLATEX on a document with a new set of fonts, the compilation speed will likely be quite slow, because LuaLATEX has to create various cache files to store font-related information. Subsequent compilation runs should be much faster.

The answers to the questions Frequently loaded packages: Differences between pdfLATEX and LuaLATEX? and Using LuaTEX as a replacement for pdfTEX, both posted to tex.stackexchange.com, provide very useful information for people who are new to LuaLATEX and at least somewhat familiar with pdfLATEX's ways of getting things done. Another great resource for people who wish to become more more familiar with LuaLATEX is A Guide to LuaLATEX by Manuel Pégourié-Gonnard.

2.3 Anything else I need to do or know?

For multilingual support, LuaLATEX and the selnolig package work well 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 supplemental hyphenation patterns provided by the selnolig package won't get clobbered by babel's hyphenation settings.[8]

LuaLATEX natively supports the so-called UTF-8 input encoding scheme; in fact, it is also the *only* input encoding scheme that LuaLATEX knows about. The selnolig package assumes that that TEX files it operates on conform to this input encoding method. Nowadays, many modern TEX-aware editors support UTF-8 directly, and selnolig should have no problems with TEX files produced by these editors. Legacy files, however, may use other input encoding systems. If your input files currently use a different input encoding scheme, such as LATIN1, you must convert them to UTF-8. Several methods exist for changing a file's input encoding scheme; see the question How to change a .tex file's input encoding system (preferably to UTF-8)? and the associated answers on `tex.stackexchage.com` for some possibilities.

If your document is written in German, it is assumed that all vowels with diereses (Umlaute) are entered as ä, ö, ü, etc. rather than, say, 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`. It is also assumed that you use the triple-f (modern) spelling of words such as `Schifffahrt`, `Stofffarbe`, and `grifffest` as well as the double-t (modern) spelling of words such as `Mannschafttest`.

[8] The selnolig package is also compatible with the hyphsubst package (which, if used, should be loaded with a `\RequirePackage` statement *before* the `\documentclass` instruction). With TEXLive2013, it may also be possible to use the polyglossia package with LuaLATEX and hence with selnolig, but I haven't verified that this is the case.

Finally, all babel-style `"|` ligature-suppressing shortcuts should either be removed entirely or be replaced with `\breaklig` instructions; the selnolig package's `\breaklig` macro is explained in Section 4.2.3 below.[9]

3 The selnolig package's approach to breaking up ligatures

3.1 Free, derivational, and inflectional morphemes: What's their relationship to ligature suppression?!

Good typography supports and enhances the readability of the text that's being typeset. There are, obviously, a great many facets to readability. One of them is the ease with which readers can discern the *meaning* of the individual words they read. Typographic ligatures that do not span morpheme boundaries are generally thought to contribute to the text's readability. Conversely, ligatures that span morpheme boundaries within a word may impair readability.

What, then, are morphemes? Briefly put, morphemes are the smallest linguistic units within a word that carry *meaning*. Because words are, by definition, standalone units of text, each word contains at least one morpheme.[10] Morphemes are classified as *free* morphemes if they can stand alone as words (e.g., cat, dog, sea, see), and as *bound* morphemes if they can not. E.g., the letter `s` in the words cats, dogs, and rivers indicates the plural forms of the associated nouns, but the `s` particle cannot stand alone as a (meaningful) word. A bound morpheme must therefore be associated with a free morpheme.

Bound morphemes can be divided further into derivational and inflectional morphemes. A *derivational* morpheme changes the meaning of the associated free morpheme in a fundamental way. E.g., the "un" in "untrue" reverses the meaning of the associated free morpheme "true", and the "ful" in "shelfful" changes the word's meaning from a noun to a quantity measure (two shelffuls of books on typography). An *inflectional* morpheme, in contrast, signifies a less fundemental change: in nouns (and, depending on the language, adjectives as well), inflectional morphemes indicate plural forms (child vs. children, cat vs. cats) and other forms of declination;[11] in verbs, inflectional morphemes indicate conjugation, such as a change in tense. E.g., call vs. called, walk vs. walked, but also "I swim" vs. "she swims", etc.

Words containing more than one morpheme can contain either "just" free morphemes—rooftop, newspaper, etc.—or free and bound morphemes joined together—untrue, shelfful, selfish, etc. The bound morphemes in a word generally occur either as a prefix or a suffix to the word's "main part" or "stem" (the free morpheme). Prefixes almost invariably represent derivational morphemes (e.g., true vs. untrue; do vs. redo and undo). Suffixes, in contrast, can represent either derivational or inflectional morphemes. For instance, the suffixes `like` and `less` in dwarflike and leafless are derivational morphemes, whereas the suffix `ed` in hounded and bounded is an inflectional morpheme.

[9] On my LuaLaTeX system, whenever a `"|` command is encountered, I either get a bad crash that requires a reboot of the computer (under MacTeX 2012) or I get a stern error message about "Forbidden control sequence found while scanning use of `\FancyVerbGetVerb`" (under MacTeX 2013).

[10] Please don't get me involved in discussions of what it may mean to have words without meaning…

[11] In English, the virtually sole type of declension is to indicate plural status. In other languages, declination can occur to indicate nominative, genitive, dative, accusative, etc. forms—of nouns *and* adjectives. E.g., in German one says das Kind, des Kindes, dem Kinde: here, the particles `es` and `e` represent inflectional morphemes.

The main take-away of this discussion for good typography is this: not all morphemes are created equal. More specifically, not all ligatures that span morpheme boundaries are equally inimical to good readability. The selnolig package adopts the following approach: First, ligatures that cross the boundaries of two free morphemes are suppressed. Second, ligatures that that cross the boundary of a free morpheme and an associated derivational morpheme are also suppressed—with certain exceptions. Third, ligatures that span the boundary between a free morpheme and an inflectional morpheme are not suppressed. As will be shown below, this distinction is particularly relevant for decisions related to the suppression (and non-suppression) of ft and fft ligatures in German texts.

Finally, observe that morphemes (which convey meaning) need not coincide with *syllables* (which convey pronunciation and sound). Indeed, a word can contain several syllables but consist of only one morpheme (e.g., apple, orange, banana), or it can consist of only one syllable but contain more than one morpheme (e.g., cats, dogs, reads, reeds, seas, and sees). The fact that a ligature may span a syllable boundary within a word (and, possibly, a hyphenation point as well) does not, by itself, imply that this ligature should be suppressed. To wit, consider the German adjective "straff" and its associated forms straffe, straffer, straffen, etc.: the free morpheme in all of these words is `straff`, while the suffixes `e`, `er`, and `en` represent inflectional morphemes. Even though there's a syllable boundary between the two `f`s for all modified forms of this adjective, the ff-ligature is applied to all of them as it doesn't span a morpheme boundary. If TeX's hyphenation algorithm decides it needs to hyphenate the word straffen as straf-fen to get a good line break, it can do so and break up the ligature in the process. However, there's simply no need to break up a ligature pre-emptively just because it spans a hyphenation point or syllable boundary.

3.2 Ligature suppression rules: English language case

Typographic ligatures are suppressed selectively in the following cases:

- if two free morphemes are joined: halfline → halfline, shelflife → shelflife, rooftop → rooftop, halftone → halftone, wolftrap → wolftrap, houndstooth → houndstooth, arctangent → arctangent, newspaper → newspaper, clothespin → clothespin, etc.
- if a prefix (almost invariably a derivational morpheme) and main word are joined: offload → offload, mistrust → mistrust, display → display, etc.
- if a main word and a suffix are joined, *if* the suffix is a derivational morpheme that begins with an f or an l (other than ly): shelfful → shelfful, leafless → leafless, dwarflike → dwarflike, etc.
- The ft ligature is also suppressed in words that end in `fth`: fifth → fifth, and twelfth → twelfth. Note that the particle `th` in these words is a derivational morpheme. Moreover, in English the `th` character pair is pronounced in a distinctive way, and it seems inadvisable to obscure its presence with an ft ligature.

In addition, if the `broadf` option is set, the selnolig package will suppress ligatures that arise if the main word ends in f and the suffix starts with an i, regardless of whether the suffix is a derivational or an inflectional morpheme: elfin, selfish, golfing, surfing, beefier, fluffily, goofiness, standoffish, jiffies, buffiest. Setting the

`broadf` option also instructs `selnolig` to split up ffi ligatures in words such as fluffiness and fluffily. Note that the option `broadf` is *not* enabled by default. This is because I believe that any slight gain in readability that could result from breaking up the fi and ffi ligatures between word stems and suffixes of this type would be more than outweighed by the visual clashes created between the unligated f (ff) and i glyphs. Finally, setting the `broadf` option also instructs `selnolig` to suppress fl ligatures in words such as chiefly, briefly, and gruffly and ft ligatures in words such as fifty and fiftieth.

3.3 Ligature suppression rules: German language case

For German words, the following principles (with various exceptions and adjustments) apply when it comes to decide which ligatures to break up and which ones to allow. These rules are built mainly from statements found in the *Duden* and various websites that have taken an interest in this subject, with adaptations for the ft and fft ligatures.

- Case 1: Joining of two free morphemes. Ligatures are suppressed where they to span two *free* morphemes. Examples: Schilfinsel → Schilfinsel, Zupfinstrument → Zupfinstrument, Baustoffingenieur → Baustoffingenieur, Wasserstoffionen → Wasserstoffionen; Impffurcht → Impffurcht, Senffabrik → Senffabrik, Schorfflecken → Schorfflecken; Ablauflogik → Ablauflogik, Huflattich → Huflattich, fünffingrig → fünffingrig; Brieftaube → Brieftaube, Stoffteil → Stoffteil, elfteilig → elfteilig, etc.

- Case 2: Joining of a prefix (derivational morpheme) ending in `f` and a main word (free morpheme). Ligatures are suppressed in this case as well. In German, by far the most common prefix that gives rise to the need to suppress various f-ligatures is the word "auf", as in aufbrechen, auffassen, Aufführung, auffliegen, auffischen, aufisst, aufjaulen, aufklingen, Auflage, Auftrag, auftreten, etc.

- Case 3: Joining of a main word (free morpheme) ending in "f" or "ff" and a suffix (either a derivational or an inflectional morpheme) starting with "f", "i", "l", or "t".

  - Case 3a: Suffixes (bound morphemes) that start with an "f", e.g., `-fach` and `-faltig`. Examples: fünffach and zwölffaltig. The ff-ligature should be suppressed.
  - Case 3b: Suffixes (bound morphemes) that start with an "i", such `-ig`, `-in`, and `-isch`. Examples: streifig, äffisch, Chefin, Chefinnen. The fi and ffi ligatures should *not* be suppressed.

    I haven't found a clear justification for this rule so far. I assume it is made because unligated fi pairs may be sufficiently unsightly as to constitute an infraction against good typography that's even more grievous than having fi and ffi ligatures span the boundary between a main word and a suffix.
  - Case 3c: Suffixes (bound morphemes) that start with an "l", e.g., `-lich`, `-ling`, and `-los`. Example words: trefflich, höflich, Prüfling, kopflos, and straflos. The rule is to suppress the fl-ligature in all of these instances.
  - Interlude I: In ambiguous cases that could give rise to fl-ligatures that involve certain suffixes, preference should be given—according to *Duden*—to "how the syllables are pronounced and

how a word would be hyphenated", leading to a suppression of the fl-ligature. For instance, the fl-ligature is suppressed in Verzweiflung, Bezweifler, schweflig, and würflig; note that the "true" suffixes in these words are `-ung`, `-er`, and `-ig`, respectively, rather than `-lung`, `-ler`, and `-lig`.[12]

This convention may also be applied to justify the non-use of the fl-ligature in words such as knifflig and mufflig as well as in the present-tense/first-person-singular forms of verbs such as büffeln, löffeln, schaufeln, stiefeln, verteufeln, and zweifeln: they are typeset *without* the fl-ligature, i.e., as büffle, löffle, schaufle, stiefle, verteufle, and zweifle, respectively.

– Interlude II: If a word *ends* with an `fl` character pair (say, because of an abbreviation that's in effect), *Duden* says it's OK to use the fl ligature even if the f and l characters belong to different morphemes. E.g., in the abbreviation "Aufl.", the fl-ligature *is* employed even though the ligature should not be used for the unabbreviated form of the word (*viz.*, Auflage).

  Although not mentioned explicitly by *Duden*, I believe this convention may be extended to justify the use of the ff-ligature in the abbreviation "Auff. " (short for Aufführung, say) and of the ft-ligature in the abbreviation "Auft." (short for Auftrag, say).

  This convention further suggests (implies?!) that it's permissible (a) to use the ff ligature in surnames that end in ff, such as Orff and Hausdorff, and (b) to use the ffi- and ffl-ligatures in abbreviated names such as Steffi and Steffl.

– Case 3d: Word stem (free morpheme) ending in `f` and derivational or inflectional morphemes starting with `t`. Unfortunately, not much official wisdom seems to exist to guide this case, possibly because in German ft and fft ligatures are not (yet?) used as widely as are the other f-ligatures. The following rules should thus be understood to be somewhat provisional.

  * The convention mentioned in "Interlude II" above, about not breaking up an fl-ligature if it occurs at the very end of a word, may be adapted to the case of ft and fft ligatures: these ligatures are allowed *if* they occur at the very ends of words (and of word fragments that form syllables), as in verschärft, gestreift, gerafft, Dahingerafftsein, unbedarft, and Unbedarftheit. Note that in these cases, the ft and fft ligatures span a morpheme boundary and the letter `t` is an *inflectional* morpheme that indicates a conjugation of the associated verb.
  * Should ft and fft ligatures be broken up in the past-tense and past-participle forms of verbs that do not end in ft but, rather, in -fte, -ften, -ftes, -ftest, etc? Example words: streifte, schlürftest, and rafften. Because these suffixes are merely *inflectional* rather than

[12] In my opinion, this reasoning—going by how the syllables are divided and how the composite words are hyphenated—for suppressing fl-ligatures is not entirely satisfactory because, morphologically speaking, the words Schwefel, Würfel, Zweifel, etc. contain two morphemes: a stem and the *derivational* morpheme `el`: `Schwef|el`, `Würf|el`, and `Zweif|el`, etc. It is therefore not really necessary to create a separate new rule to justify the (non-)use of the fl-ligature in these cases. One could, instead, rely on the presence of two morphemes to motivate the suppression of the fl-ligature for words such as schweflig, teuflisch, würfle, and Verzweiflung, as their components are `schwef|[e]l|ig`, etc. I believe it's fair to say, though, that most modern German speakers would barely be aware of the fact that the `el` particle constitutes a separate morpheme in words such as Würfel and Griffel ("wurf"-el and "griff"-el), and that they would be entirely unaware of its presence in words such as Schwefel and Zweifel. At any rate, the typographical convention *not* to use the fl-ligature for words such as schweflig, Verzweiflung, and würflig does *not* appear to be based on the fact that letters f and l in these words belong to different morphemes.

derivational morphemes, the selnolig package takes the approach of *not* breaking up the ft and fft ligatures in these cases.[13]

* It would also seem OK to use the ft-ligature in the expressions "zu fünft" and "zu elft" since it occurs at end of the word. In contrast, the ft-ligature should *not* be used in "Beethoven's Fünfte Synphonie" and "zum elften Mal", since in these cases the `-te` and `-ten` particles are *derivational* morphemes related to the number of times that some event or thing has occurred. Observe that the argument in favor of breaking up the ft-ligature in the words "Fünfte" and "elften" is *not* related to the fact that they happen to have two syllables and that the syllables are divided between the letters "f" and "t".

– Case 4: A free morpheme ends in "ft" (e.g., Saft, Duft, Luft, Kraft, Haft, and Vernunft) and is joined either to another free morpheme or to a suffix (representing either a derivational or an inflectional morpheme). Example words: `Saftladen`, `duftend`, `luftig`, `Kraftfahrzeug`, `verkraften`, `bekräftigen`, `Haftung`, and `vernünftig`. The selnolig package does *not* break up the ft-ligatures in these cases as they don't cross morpheme boundaries. Thus, these words are typeset as Saftladen, duftend, luftig, Kraftfahrzeug, verkraften, bekräftigen, Haftung, and vernünftig, respectively. Given that no morpheme boundary crossings occur, the fact that there's a syllable boundary between `f` and `t` in some cases should be irrelevant to the question of whether not to employ the ft and fft ligatures.

4 Structure of the selnolig 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 the package's main user macros, `\nolig`, `\keeplig`, and `\breaklig`. These macros are explained in more detail in the following subsection.
- The package's user macros rely on lua code contained in the file selnolig.lua.
- The ligature suppression rules for English and German language documents are contained in the files selnolig-english-patterns.sty and selnolig-english-patterns.sty.
- Supplemental hyphenation exception patterns, mostly for composite words that involve one or more ligatures that are to be suppressed, are contained in the files selnolig-english-hyphex.sty and selnolig-english-hyphex.sty.
- A user guide (the document you're reading right now); the source code of the user guide is available in the file selnolig.tex.

[13] I will concede, again, that I haven't yet come across any kind of authoritative discussion of this issue. Should someone be able to furnish a good counterargument to the setting proposed here, I would be happy to change it.

- 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.[14]

4.2 The package's user commands

The file selnolig.sty should be loaded with a `\usepackage` statement, generally with one or more options; see Section 5 for a discussion of the available options.

After setting up several Boolean switches to structure the processing of options, the package next loads the file selnolig.lua, which contains the package's lua code. The package then sets up several user macros. The three main user macros are `\nolig`, `\keeplig`, and `\breaklig`.

4.2.1 The `\nolig` macro

The package's 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{lfful}{lf|ful}
```

instructs LuaLaTeX to suppress automatically the ff-ligature in words such as "shelfful", "bookshelfful", and "selffulfilling".

More than one ligature suppression point may be provided in the second argument of a `\nolig` instruction. For instance, one *could* specify `\nolig{Auflaufform}{Auf|lauf|form}` to suppress both the fl- and the ff-ligatures in the words Auflaufform and Auflaufformen. For added flexibility, the selnolig package actually uses two separate `\nolig` commands to suppress the two ligatures in this word; see also Section 6.3.

It is possible to use Lua-style 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 rules

```
\nolig{Dorff[aäeiloöruü]}{Dorf|f}
\nolig{dorff[aäeiloöruü]}{dorf|f}
```

to search for words that contain the strings `Dorff` and `dorff` followed by a letter in the set `aäeiloöruü`.[15] Incidentally, it is not absolutely necessary, in the second argument of the `\nolig` command, to provide any material *after* the vertical bar that indicates the non-ligation point. However, the readability of your `\nolig` instructions may suffer if you suppress that material.

If you examine the `\nolig` instructions provided in the files selnolig-german-patterns.sty and selnolig-english-patterns.sty, you'll notice quickly that there's some redundancy built into the package's ligature suppression rules. For instance, the need to suppress the ff-ligature in the word "auffallen" is catered to both

[14] The two "test" files also load the package showhyphens to indicate automatically all instances where LuaLaTeX might insert hyphenation points.

[15] These particular search strings are used so as not to suppress the ff-ligatures in words that *end* in either `Dorff` or `dorff`, such as is the case with the surnames Dorff and Hausdorff.

by `\nolig{auff}{auf|f}` and by `\nolig{ffall}{f|fall}`. This redundancy is there by design, because not all words that might fit one pattern will also fit the other. Providing some redundancy of this type seems like a reasonable way to proceed.

The arguments of the `\nolig` command, as well as of the package's other user commands, are case-sensitive.

4.2.2 The `\keeplig` macro

The instruction `\keeplig{<string>}` lets users override `\nolig` instructions selectively, i.e., words that contain fragment `<string>` will not see the corresponding `\nolig` instruction enforced. For a `\keeplig` macro to work properly, its argument must be a string that includes *as a subset* a string treated by one or more `\nolig` instructions.

Having the `\keeplig` macro is very useful because it permits the specification of simpler, i.e., less restrictive, `\nolig` instructions; any Type-II errors that may arise from having `\nolig` macros whose scope may be insufficiently restrictive can be fixed by providing judiciously chosen `\keeplig` macros.[16]

Consider the following example: If the `ngerman` option is set, the package uses the macro

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

to break up the fl-ligature in words such as begrifflich, beruflich, brieflich, glimpflich, hilflich, höflich, käuflich, sträflich, tariflich, trefflich, unerschöpflich, and verwerflich (and quite a few more such words), which all contain the suffix `-lich` (a derivational morpheme). This particular `\nolig` instruction also catches the word "Lauflicht", which contains the free morphemes `Lauf` and `licht`.

It turns out that the scope of this `\nolig` rule is a bit too broad, since it also catches certain words, such as `Pflicht` and `verpflichten`, for which the fl-ligature should *not* be suppressed. However, rather than provide a large number of slightly more restrictive `\nolig` macros just to avoid including the Pflicht- and pflicht-words, the package provides the command

```
\keeplig{flicht}
```

This instruction tells selnolig to override the action of the `\nolig{flich}{f|lich}` instruction for all words that contain the string `flicht`. Most words affected by this `\keeplig` instruction happen to contain the strings "Pflicht" and "pflicht". Interestingly, this instruction also serves to preserve the fl-ligature in words such as "anflicht", "flicht", and "verflicht"—the third-person-singular forms of the verbs anflechten, flechten, and verflechten.

Probably somewhat surprisingly, at least at first glance, it is *not necessarily* the case that ligatures contained in the argument of a `\keeplig` instruction—which is, after all, provided to override the action of a `\nolig` rule—will in fact be used. Why not? It is because, as was noted above, *more than one* `\nolig` instruction can apply to a given word. Consider, for instance, the aforementioned word `Lauflicht`; it turns out to be the case that this word caught by two `\nolig` rules and one `\keeplig` rule (all contained in the file selnolig-german-patterns.sty):

[16] In the present context, a Type-II error is the suppression of a ligature that is, in fact, valid for the word at hand.

```
\nolig{aufl}{auf|l}
\nolig{flich}{f|lich}
\keeplig{flicht}
```

Because the string `aufl` is *not* a subset of the string `flicht`, the instruction `\keeplig{flicht}` does not undo the action of `\nolig{aufl}{auf|l}`. Hence, the word `Lauflicht` happily ends up being typeset as Lauflicht, i.e., *without* an fl-ligature.

Interestingly—nobody has ever argued that German, or German typography, is easy, right?!—the rule `\keeplig{flicht}` is itself a bit too broad since it also catches the word `Sumpflicht` (composed of the free morphemes `Sumpf` and `licht`), for which the fl-ligature *should* in fact be suppressed. To address this situation, the file selnolig-german-patterns.sty provides the rule

```
\nolig{Sumpfl}{Sumpf|l}
```

This rule suppresses the fl-ligature not only for Sumpflicht but also for Sumpflabkraut and Sumpfleiche [!].

4.2.3 The `\breaklig` macro

The macro `\breaklig`, which doesn't take an argument, is provided as a hopefully easy-to-remember version of the lower-level 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*.[17]

The selnolig package does not provide a dedicated macro to override the action of a `\nolig` instruction on an ad hoc basis, i.e., to *require* the use of a typographic ligature on a one-off basis. The LaTeX kernel command `\mbox{<string>}` already provides this capability.

4.3 Further steps in the package's startup process

After the user commands of the selnolig have been set up, the remaining steps in the package's startup process depend on which language-related options are set:

- If *no* language-specific options are in effect, the setup process terminates. Users may, of course, still provide their own `\nolig` and `\keeplig` rules and insert `\breaklig` instructions as they deem to be necessary.
- 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 detailed list of `\nolig` and `\keeplig` rules adapted to English language typographic usage; Appendix A provides a complete listing of these rules. The latter file contains a list of hyphenation exceptions, mainly for words that contain one or more potential non-ligation points and for which TeX's hypenation algorithm either misses valid hyphenation points or selects invalid hyphenation points; see Section 6.2 below.

[17] 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 just that.

- 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 suppression rules appropriate for German typographic usage; Appendix B 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 Additional ligature-related matters

5.1 The package's 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 user guide was compiled with both the english and ngerman options set.

The ligature suppression rules associated with English and German are listed in Appendices A and B, respectively.[18]

5.2 English language case: The broadf and hdlig options

The ligature suppression patterns for English language words, contained in the file selnolig-english-patterns.sty and listed in Appendix A below, are grouped into four parts. The first two parts concern the suppression of 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 broadf option is specified.

For English-language documents, only a fairly limited number of f-ligature suppression rules is enabled by default, i.e., if the broadf 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 most?) people would agree that it's 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 particles -ing, -ish, -ier, -iest, -ily, and -iness.[19] The same goes for the fl (ffl) ligature in

[18] To give an admittedly imperfect impression of just how much more complex the task is to create ligature suppression rules for German rather than it is for English: As of the mid-May 2013 version of the package, the "basic" English f-ligature suppression rules consist of 32 \nolig and 17 \keeplig instructions. (Including the rules that are activated if the broadf and hdlig options are both activated, the tally rises to about 420 \nolig and 52 \keeplig instructions.) The file selnolig-german-patterns.sty, in contrast, contains about 700 \nolig and 335 \keeplig directives. Recall that the package currently provides rules only for a set of "basic" f-ligatures for German words.

[19] Examples of such words are surfing, oafish, leafier, goofiest, fluffily, and goofiness.

words that end in f (ff) followed by -ly.[20] 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 `broadf` option explicitly.

My choices regarding which f-ligature suppression rules belong to the "basic" and "broadf" groups are almost entirely pragmatic. They are certainly not based on any overriding English-language typographic principles (which, possibly, don't even exist). 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 involving the ct, st, and sp ligatures. Examples are words such as arctangent (rather than arctangent), painstaking (rather than painstaking), and trespass (worse: trespass). Furthermore, the st and sp ligatures are suppressed automatically for words of Greek roots that contain the `sth` and `sph` character triples, such as anaesthesia, isthmus, atmosphere and hemisphere. In such cases, I'd argue that using the distinctive-looking st and sp ligatures unnecessarily obscures the `th` and `ph` character pairs (which derive from the single Greek letters θ/ϑ and ϕ/φ, respectively). Given that the `ph` character pair is usually pronounced as "`f`", the readability of the words that contain the character triple `sph` would likely suffer if they were typeset *with* an sp ligature, e.g., as atmosphere and spherical, say.

Setting the `hdlig` option also enables ligature suppression rules for additional discretionary ligatures such as *th*, *at*, and *et*. These ligatures might be deemed inappropriate for use in words such as *lighthouse*, *pothole*, *aromatherapy*, *albatross*, *ninety*, and *nonetheless*; with the `hdlig` option set, these words will be typeset as *lighthouse*, *pothole*, *aromatherapy*, *albatross*, *ninety*, and *nonetheless*. Ligature suppression rules are provided for the following discretionary ligatures, which occur only in the *italic* font shape of the font family used in this document: *th*, *at*, *et*, *as*, *is*, *us*, *sk*, *ll*, and *fr*. Part 3 of Appendix A lists these rules.

Part 4 of the file selnolig-english-patterns.sty, which is also processed if the `hdlig` option is set, deals with cases where one discretionary typographic literature, say *as*, might pre-empt the use of a more appropriate but trailing typographic ligature, say *st* or *sp*, in words such as *fast* → *fast* and *clasp* → *clasp*. Note that the issue being addressed in this part is not that of a ligature improperly spanning a morpheme boundary; instead, it is the possibility that TEX might pre-empt one typographic ligature with another ligature within one and the same morpheme. This issue is discussed in more detail in Section 5.6 below.

5.3 Composite words with ambiguous morphology

There may be pairs of composite words which look alike but are made up of two different pairs of morphemes. For instance, the German 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. For words such as these, software isn't smart enough to "discern" which possible meaning is intended.[21]

[20] Examples are aloofly and gruffly.

[21] 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",

Writers, of course, could (and should?) choose to insert explicit hyphen characters to indicate the intended meaning.

An even more complicated example is the word `Chefinnenleben`, which contains three morphemes. This word can be deconstructed as `Chefinnen-leben` ("lives of female bosses") *or* as `Chef-innenleben` ("inner life, or lives, of a boss"). Thus, the word's middle particle—"innen"—can function both as a suffix (in this case, an inflectional morpheme) to "Chef" and as a free morpheme that modifies the third morpheme, "Leben". Software isn't smart enough yet to discern which usage is intended.

The macros of the selnolig package are set *not* break up the fi-ligature in the shorter words Chefin and Chefinnen, in keeping with the principle that the fi-ligature is permitted for suffixes that start with an "i". In contrast, selnolig will break up the fi-ligature in the longer words Chefinnenleben and Chefinnenräume, because in these cases the working assumption is that `innen` acts as a prefix of sorts to the third morpheme (Leben or Räume). If this is *not* what you want, i.e., if you really do mean to refer to lives or spaces of female bosses, be sure to use `\mbox{fi}` instructions to preserve the fi-ligatures. Better yet: write the words in question using explicit hyphens, i.e., as Chefinnen-Leben and Chefinnen-Räume.

5.4 How to provide additional ligature suppression patterns

As already noted, I do not 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 (yet) by the selnolig package, you could insert `\breaklig` instructions to suppress the ligatures on a case-by-case basis. Alternatively, you could create your own non-ligation rules to deal with the cases you've discovered on a document-wide basis.

Suppose, say, that you've been tasked with preparing a special edition of Thomas Mann's novel "Der Tod in Venedig". Suppose further that you have chosen to use an "Antiqua" (Roman) font to typeset the new edition, as fewer and fewer people nowadays can manage to read with ease text set in a **period-appropriate blackletter font**. Moreover, the font you've chosen features a ligature for the ffl character triple. During these preparations, you happen to notice (i) that the novel contains the word `inbegriffleitend`[22] and (ii) that the selnolig package does not (yet) appear to include a macro to suppress the ffl-ligature for this word. To address this problem—while simultaneously creating a search pattern that also catches inappropriate ffl-ligatures in the (hopefully quite a bit more common!) words `Jugendtreffleiter` and `Kunststoffleitung`—you could add the following `\nolig` rule to your document's preamble:

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

respectively. If that's *not* what you want, you'll need to mark up the words explicitly, say as follows: `Sau\mbox{fl}aden` and `Wachs\breaklig tube`.

[22] This word really does occur in the aforementioned novel! This novel may also be pretty much the *only* place where the word inbegriffleitend is used. I performed a Google search for this word; the only occurrences of this word, apart from online editions of Thomas Mann's novel, are on sites of a couple of French bloggers who agonize over how this word might possibly be translated from German to French…

With this rule in place, the words will be typeset as inbegriffleitend, Jugendtreffleiter, and Kunststoffleitung, respectively.[23]

5.5 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.[24]

For instance, suppose that you are typesetting a Turkish text. The Turkish alphabet features both a dotted i and a dotless ı character. I understand that in Turkish typesetting practice, the fi and ffi ligatures should *never* be employed, so as to avoid creating any doubts as to whether it's an i or an ı character that follows the "f" character. To satisfy the need of Turkish typography for global suppression of the fi and ffi ligatures, one could issue the command

```
\nolig{fi}{f|i}+
```

in the document's preamble.

Or, suppose 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 into ffb, ffh, ffj, and ffk, 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 activated automatically if the package's `ngerman` or `english` options are set. This is done because I was unable to come up with a single instance of a *German* or *English* language word involving these character combinations that doesn't also involve a morpheme boundary collision.

Of course, your document may contain words *not* of German or English origin that contain some of these character pairs and do not involve a morpheme boundary crossing. For such words, it is not desirable to suppress the corresponding ligatures. One such word is `Kafka`: one may not wish to suppress the fk-ligature for this specific word. The selnolig package provides `\keeplig` macros to preserve the fk-ligature in names such as Kafka, Safka, Piefke, Potrafke, Sprafke, Shirafkan, and Tirafkan.[25]

Your documents may also words of *Nordic* origin that contain the `fj` character pair, such as `Sognefjord` and `Dovrefjell`. Because the `fj` character pair in these words does not span a morpheme boundary,

[23] Just in case this discussion has you worried: the file selnolig-german-patterns.sty provides the even more general (i.e., less restrictive) macro `\nolig{fleit}{f|leit}`, to cover these and further words.

[24] I first became aware of the potential need for such a feature from reading Frank Mittelbach's posting, Suppress certain ligatures generally, on `tex.stackexchange.com`.

[25] Aside: It was Felix Lehmann's desire to preserve the fk ligature when typesetting "Kafka" that stimulated the creation of the package's `\keeplig` macro. Of course, once the `\keeplig` macro was created, all kinds of further great uses for this macro were quickly discovered.

the fj-ligature should not be broken up; i.e., the words should be typeset as Sognefjord and Dovrefjell, respectively. The package therefore provides `\keeplig` rules to take care of (a) words that contain the particles fjord, fjör, fjell, and fjäll and (b) names such as Eefje, Sufjan, Prokofjew, and Astafjew.

A "rare" typographic ligature that may warrant global suppression, at least for English language documents, is *ij*.[26] To the best of my knowledge, a morpheme boundary crossing occurs for all English language words that contain the `ij` character pair: *antijam*, *bijection*, *demijohns*, and *hijack*. By the logic set forth above, this ligature should therefore be suppressed for all of these words.[27] The *ij* ligature also seems inappropriate for most words that came into English from languages such as French, Japanese, and Spanish, including *bijou* (jewel), *gaijin* (foreigner), *jipijapa* (Panama hat), and *marijuana* (Maryjane). (What?! Were you maybe thinking of a different meaning of this word? Why would you?!) The *ij* ligature is therefore suppressed *globally* by the selnolig package if the options `english` and `hdlig` are set. However, this ligature *does* get used a lot in Dutch. Thus, the selnolig package issues various `\keeplig` directives so that this ligature isn't suppressed for some names and words of Dutch origin, such as *de Bruijn* and *rijsttafel*.[28]

5.6 What if one ligature pre-empts a trailing, 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.[29] 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 fonts used for this user guide (Garamond Premier Pro, EB Garamond, and Sabon Next). Other ligature-rich fonts may provide further possibilities for one ligature inappropriately pre-empting that for a trailing character pair.[30]

---

[26] In many fonts I'm familiar with, including the one used for this user guide, the `ij` character pair is available in the upright font shape as a *digraph* rather than as a true, i.e., joined-up, ligature.

[27] If this ligature weren't suppressed, the preceding words would be typeset as *antijam*, *bijection*, *demijohns*, and *hijack*.

[28] The word *rijsttafel*, incidentally, features three consecutive "rare" ligatures. Another word that contains three rare ligatures, though not consecutive ones, is *isthmus*.

[29] 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, TEX 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).

[30] For the Garamond Premier Pro text font, I've discovered the following preculiar exception to the general rule that TEX 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`), TEX 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 `broadf` option is set (as is the case for the document you're reading), 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.

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 TEX'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 (at least) three distinct 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 *stochastic*. 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 hence for which the issue of ligature pre-emption doesn't arise—and once in italics: must and *must*; readers may prefer the look of must and *must*. Or, consider the words "historian" and "history" when typesetting them in italics: I'd say it's much better to typeset them as *historian* and *history* rather than as *historian* and *history*. Moreover, I suspect that Austrians—at least the ones who care about discretionary typographic ligatures…—may prefer to see the name of their country typeset as *Austria* rather than as *Austria*. Finally, do you prefer the look of *Do fast festive fists foster fustiness?* or that of *Do fast festive fists foster fustiness?* You prefer the latter look too? Great!

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*.[31] For such words, the *as* ligature should probably be suppressed in any case to increase the words' legibility: *infrastructure* and *seastrand*.

The `selnolig` package is set to give preference to the distinctive-looking *st* ligature over *as*, *is*, and *us* ligatures. To this end, the following commands are provided:[32]

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

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 rules to ensure that the *sp* ligature is used in words such as *clasp*, *hasp*, *hispanic*, *raspberry*, *teaspoon*, *wasp*, *crisp*, *lisp*, *whisper*, and *cusp*.

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 TEX's rules for forming ligatures, without special intervention the word `mathematics` will be typeset as *mathematics* rather than as

[31] This case was already noted in Footnote 29, 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.

[32] 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.

mathematics because the first *at* ligature pre-empts the *th* ligature. The same happens for words such as *bath*, *Kathryn*, and *pathology*. Given the commonness and the distinctive pronuciation 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 single Greek character θ/ϑ), it seems undesirable to let the *at*-ligature pre-empt the *th* ligature for these words.

Fixing the *at*–*th* ligature pre-emption issue globally—e.g., via `\nolig{ath}{a|th}`—is not completely innocuous, though, 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 are dealt with by providing specific `\keeplig` rules to re-enable the use of the *at* 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; however, there are some words, such as `Beethoven`, `prophethood`, and `sweetheart`, for which the *th* ligature would be inappropriate anyway and for which the use of the *et* ligature would hence be unproblematic. To address this issue, `\keeplig` rules are provided to override the rule `\nolig{eth}{e|th}` for words such as *Beethoven*, *prophethood*, and *sweetheart*.[33]

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

There seem to be only few words for which an *at* ligature might inappropriately pre-empt a *ta* ligature. One such word is `atap`, which may be more readable if it's typeset as *atap* rather than as *atap*.

To the best of my (admittedly not exhaustive) knowledge, virtually 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. Examples are *betake, betatter, bristletail, caretaker, cheetah, detach, detail, detain, dovetail, foretaste, horsetail, pretake, pretax, retable, retack, retard, retarget, timetable, whitetail,* and *wiretap*. As such, the *et*-related ligature suppression rules already put in place to deal with morpheme boundary crossing cases should suffice to catch these cases as well.[34]

6 Further issues

6.1 Known bugs

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

[33] 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 no *et* ligature, these `\keeplig` rules should be disabled.

[34] Of course, there may also be cases of persons' names which include the string `eta` for which the *ta* ligature should not be pre-empted by an *et* ligature. For instance, the author of this package prefers to see his surname typeset as *Loretan* rather than as *Loretan*...

1. The `\nolig` directives don't work properly on the final word in the argument of a TEX macro (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 macro's argument is encountered.

   To wit, ligatures aren't broken up for `\footnote{kopflos.}` or `\section{Shelfful}`. Things work as expected, though, if the commands are modified to `\footnote{kopflos. }` and `\section{Shelfful }`, respectively.

2. The `\nolig` macros also don't operate correctly 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. In `itemize` or `enumerate` environments, if the content of an `\item` directive *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 either another `\item` directive or an `\end{itemize}` or `\end{enumerate}` statement—ligature suppression again fails.

   The remedy, in these cases, 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) of a sentence which is followed immediately by an `enumerate`, `itemize`, or other such environment contains a ligature that should be suppressed, ligature suppression 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" item, such as `\vphantom{x}`, also works.

I'm not sure if the following matter constitutes a bug or "merely" a case of incompatibility between two LATEX packages. The selnolig package does not appear to interact well with the LATEX package ngerman. However, as was noted earlier, selnolig interacts nicely with the babel package with one of the options `ngerman`, `german`, `austrian`, and `naustrian` set. Unless someone can convince me that using the ngerman package is truly preferable to using the babel package along with one of the available German language options, I probably won't bother addressing this incompatibility.

6.2 Supplementary 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`, `-f-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 still the shorter of the two; however, this may change in the future. The German word list is shorter in part because it is assumed that writers of

German-language documents use the babel package and select the option ngerman (or one of the related options); doing so also loads specialized hyphenation patterns suitable for German text.[35]

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. (I am obviously not trying to make it too easy to invoke this option ...)

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 via the usual \usepackage statements without having to load the entire selnolig package.

6.3 Ancillary information about the package's activity

If you execute the command \debugon, detailed information about each \nolig and \keeplig pattern match that is encountered is written to the .log file. (The package's default setting is \debugoff.)

Because of the potential redundancy in some of the package's \nolig commands, it is possible that more than one pattern match will occur for a given word. E.g., for the verb "auffahren", two separate \nolig commands apply simultaneously, *viz.*, \nolig{auff[aeiloruyäöü]}{auf|f} and \nolig{ffahr}{f|fahr}. For this word, the following information is written to the .log file:

```
pattern match: auffahren - auff[aeiloruyäöü]
pattern match: auffahren - ffahr
Do ligature suppression for: auffahren
Inserting nolig whatsit before glyph: f
Last char: n
```

It is also possible that words are found with more than one ligature suppression point. 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 - flauf
pattern match: Auflaufform - Aufl[aeiouyäöü]
pattern match: Auflaufform - auff[aeiloruyäöü]
pattern match: Auflaufform - fform
Do ligature suppression for: Auflaufform
```

[35] As was already noted earlier, the selnolig package is also compatible with the hyphsubst package.

```
Inserting nolig whatsit before glyph: l
Inserting nolig whatsit before glyph: f
Last char: m
```

If *both* a `\nolig` and a `\keeplig` command apply to a word—as is the case for `fjord`, to which both `\nolig{fj}{f|j}` and `\keeplig{fjord}` apply—the following (mercifully short) bit of information is written to the `.log` file:

```
pattern match nolig and keeplig: fjord - fj - fjord
```

If more than one `\nolig` directive *as well as* a `\keeplig` instruction apply to a given word, as is the case for the word "Streiflicht", the following information is written to the `.log` file:

```
pattern match nolig and keeplig: Streiflicht - flich - flicht
pattern match: Streiflicht - reifl
Do ligature suppression for: Streiflicht
Inserting nolig whatsit before glyph: l
Last char: t
```

Observe that the first nolig pattern, `flich`, is overridden by the keeplig pattern `flicht`. The second nolig pattern, `reifl`, is *not* overridden, and it is the debugging-related information associated with the second `\nolig` pattern that ends up being written to the `.log` file.

To terminate or suspend the writing of the debugging-related information to the `.log` file, one may execute the command `\debugoff`. To restart the logging of this information, issue the command `\debugon`.

6.4 Suspending and restarting the operation of selnolig's macros

By default, selnolig's macros are switched on (assuming, of course, that your document is compiled under LuaLaTeX). If you want to suspend their operation, you should issue the command

```
\selnoligoff
```

at the desired point in your document. Conversely, if selnolig's macros need to be switched back on, just issue the command

```
\selnoligon
```

6.5 Lists of words that fit German and English non-ligation patterns

Extensive lists of German and English language words for which one or more ligatures should be suppressed are provided in the supplemental files selnolig-german-test.pdf and selnolig-english-test.pdf. I started the list of German language words with the examples provided by the rmligs script; I've added quite a few more words to that list in the meantime. Thanks to the great work of Felix Lehmann and Steffen Hildebrand, explained in more detail in Section 7, the package's German language search patterns actually apply to a much larger

number of words than those listed in selnolig-german-test.pdf. Naturally, suggestions for still more words to be de-ligated 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 LuaLaTeX.

7 License and acknowledgments

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".

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`.[36] Without their expertise in programming in Lua and interfacing the lua code with LaTeX, 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 and fixing bugs, pointing out unclear passages in the user guide, writing scripts to automate the discovery of redundancies and syntax errors in the package's `\nolig` and `\keeplig` instructions, and providing many excellent suggestions for enhancements and other improvements. Steffen also provided crucial modifications to the package's lua code to make possible the `\keeplig` macro.

Even more importantly, Felix and Steffen created scripts to test systematically and comprehensively the package's German `\nolig` and `\keeplig` search patterns for linguistic adequacy and (relative) completeness. They began with a corpus of almost 850 million [!] words, which they marked up with information on the morphological constituents of each word. From this huge word list, they extracted a set of 462,000 unique word forms containing potential f-ligatures. According to their analysis, an early version (ca. late October 2012) of the selnolig package already dealt correctly with 85 percent (394,000) of those word forms, while still generating 21,000 Type I errors and 48,000 Type II errors![37,38] Fortunately (for me at least), they also discovered that a non-negligible part of the 69,000 errors wasn't real but, rather, the result of typos in the words included in the corpus and/or of incorrect morphological analysis. The detailed Type I and II error lists they generated were critical in helping me refine—and occasionally revise completely—the package's `\nolig` and `\keeplig` rules, rapidly bringing down the number of Type I and II errors.[39] All major changes

[36] See especially the questions Any suggestions/requests for features for a new package that allows disabling ligatures for (pre)selected words?, How to suppress the operation of a luatex-defined macro on a string if the string is part of macro or a label, and Ligature suppression algorithm fails if the word in question contains an Umlaut (dieresis) before the ligature.

[37] In the context of the selnolig package, a Type I error is the failure to suppress a typographically inappropriate ligature, and a Type II error is the improper suppression of a typographically valid ligature.

[38] 1,000 words contained more than one potential f-ligature, hence the difference.

[39] For instance, after Steffen wrote the lua code that made possible the `\keeplig` macro, I was able to eliminate, in one fell swoop, more than 10,000 [!!] Type II errors generated by the package's earlier, incorrect suppression of the fl-ligature in words that contain the morpheme `pflicht`.

to the German language ligature suppression patterns are still being subjected to their testing algorithms to streamline the tasks of detecting what's left to improve and catching any newly introduced errors.

Felix and Steffen started the automated testing of the package's `\nolig` and `\keeplig` rules as their finals project for the course *Introduction to Computational Linguistics* at the University of Massachusetts at Amherst in the fall of 2012.[40] They wish to thank the Institut für Maschinelle Sprachverarbeitung at the Universität Stuttgart for granting them a license for the morphological analysis tool SMOR[41] and, in particular, Helmut Schmid for his guidance. They also express their gratitude to the *Web-as-Corpus kool ynitiative* (*WaCky*) for letting them use the SDeWaC corpus,[42] as well as to Rajesh Bhatt (University of Massachusetts at Amherst), Miriam Butt (Universität Konstanz), and Sabine Schulte im Walde (Universität Stuttgart) for helping them find the right resources for their project.

The rmligs 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 rmligs package.[43]

Matthias Vogel very kindly shared with me a set of regular-expression based ligature suppressing macros, named Ligatures-German, he wrote for the WinEdt programmer's editor. Matthias' macros work by inserting the babel `"|` shortcut directives in the appropriate spots in the `.tex` file. These macros, and a file he sent me containing an extensive list of German words for which one or more f-ligatures should be suppressed, led me to thoroughly refine and extend the scope of the selnolig package's ligature-suppressing rules.

Barbara Beeton provided careful and incisive comments on an early version of this user guide and the English-language ligature suppression macros. A suggestion received by David Bellows led me to extend some of the `\nolig` rules in Part 2 (activated by setting the option `broadf`) of the file selnolig-english-patterns.sty. Other contributors to `tex.stackexchange.com` and `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.

[40] Their code and finals paper is available online.

[41] Schmid, H., A. Fitschen, and U. Heid, 2004, "SMOR: A German Computational Morphology Covering Derivation, Composition, and Inflection", *Proceedings of the IVth International Conference on Language Resources and Evaluation (LREC)*, pp. 1263–1266, Lisbon, Portugal.

[42] Baroni, M., 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), pp. 209–226.

[43] All versions of the rmligs package are archived at `http://www.j3e.de/ispell/igerman98/dict/`.

Appendices

A English-language ligature suppression rules: selnolig-english-patterns.sty

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

\ProvidesPackage{selnolig-english-patterns}%
[2013/05/21]

% 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}
 % halfline roofline offline

\nolig{eaflet}{eaf|let}
 % leaflet(-s, -ed) leafleting
 % leafletting leafletted
 % leafleteer(s)

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

\nolig{otfload}{otf|load}
 % for the 'luaotfload' package...


% (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)

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

\nolig{eaftr}{eaf|tr}
 % leaftrap

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


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

% suppress these ligatures globally
\nolig{fb}{f|b}
\nolig{fh}{f|h}
\nolig{fj}{f|j}
\nolig{fk}{f|k}

% But, make exceptions for fjord, fjell, etc
 \keeplig{fjord} % Norwegian spelling
 \keeplig{fjör} % Icelandic spelling, e.g., in
        % Isafjördur and Ísafjörður
 \keeplig{fjarð} % Ísafjarðarbær (in Iceland)
 \keeplig{fjell} % Norwegian
 \keeplig{fjall} % Swedish (?)
 \keeplig{fjäll}
 \keeplig{fjöll}

 \keeplig{Prokofjew}
 \keeplig{Sufjan} % Stevens
 \keeplig{Eefje} % Dutch first name
 \keeplig{Astafjew}
  % Author (Wiktor) and soccer player (Maksim)

% Further exceptions for Kafka, Safka, etc.
 \keeplig{Kafka}
 \keeplig{Safka}
 \keeplig{Potrafke}
 \keeplig{Sprafke}
 \keeplig{Shirafkan}
 \keeplig{Tirafkan}



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

\if@broadfset

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


% (b) fi -> f-i

\nolig{elfin}{elf|in}
```

```
\nolig{Elfin}{Elf|in}
 \keeplig{stelfink} % distelfink


% For words ending in -f-ing, allow for
% "colloquial" abbreviations (-f-in').
\nolig{afing}{af|ing}
\nolig{afin'}{af|in'}
 % chafing leafing loafing sheafing
 % strafing vouchsafing

\nolig{eefing}{eef|ing}
\nolig{eefin'}{eef|in'}
% beefing reefing

\nolig{iefing}{ief|ing}
\nolig{iefin'}{ief|in'}
% briefing debriefing

\nolig{ifing}{if|ing}
\nolig{ifin'}{if|in'}
 % coifing fifing jackknifing knifing
 % midwifing waifing wifing

\nolig{oofing}{oof|ing}
\nolig{oofin'}{oof|in'}
 % goofing hoofing roofing ...

\nolig{lfing}{lf|ing}
\nolig{lfin'}{lf|in'}
 % golfing rolfing selfing ...

\nolig{rfing}{rf|ing}
\nolig{rfin'}{rf|in'}
 % barfing bedwarfing dwarfing...
 % kerfing enserfing ...
 % (wind-) surfing turfing
 \keeplig{tterfinger} % butterfinger

\nolig{rfism}{rf|ism}
 % dwarfism

\nolig{rfist}{rf|ist}
 % dwarfist

\nolig{deafish}{deaf|ish}

\nolig{dwarfish}{dwarf|ish}
\nolig{elfish}{elf|ish}
 % elfish selfish unselfish, etc.
 \keeplig{amselfish} % damselfish

\nolig{oafish}{oaf|ish}
\nolig{serfish}{serf|ish}
\nolig{wolfish}{wolf|ish}

\nolig{Deafish}{Deaf|ish}
\nolig{Dwarfish}{Dwarf|ish}
\nolig{Elfish}{Elf|ish}
\nolig{Oafish}{Oaf|ish}
\nolig{Serfish}{Serf|ish}
\nolig{Wolfish}{Wolf|ish}

\nolig{beefier}{beef|ier}
\nolig{comfier}{comf|ier}
\nolig{goofier}{goof|ier}
\nolig{gulfier}{gulf|ier}
\nolig{leafier}{leaf|ier}
\nolig{reefier}{reef|ier}
\nolig{surfier}{surf|ier}
\nolig{turfier}{turf|ier}

\nolig{Beefier}{Beef|ier}
\nolig{Comfier}{Comf|ier}
\nolig{Goofier}{Goof|ier}
\nolig{Gulfier}{Gulf|ier}
\nolig{Leafier}{Leaf|ier}
\nolig{Reefier}{Reef|ier}
\nolig{Surfier}{Surf|ier}
\nolig{Turfier}{Turf|ier}
 % (Mustn't perform 'fier -> f-ier'
 % substitution because of words
 % such as pacifier, reifier, etc.)

\nolig{fiest}{f|iest}
 \keeplig{fiesta}
 % leafiest beefiest reefiest ...

\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}
\nolig{ffin'}{ff|in'}
 % 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 puffiness

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


% (e) ffl -> ff-l

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


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


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


% (h) ft -> f-t

\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

\fi % end of \if@broadfset block



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

\if@hdligset

% (A) st -> s-t
% -------------
```

```
\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{distr}{dis|tr}
\nolig{Distr}{Dis|tr}
 % distract distribution distrust
\nolig{distu}{dis|tu}
\nolig{Distu}{Dis|tu}
 % disturb

%%% mis-t... words
\nolig{mista}{mis|ta}
\nolig{Mista}{Mis|ta}
 % mistake mistaken mistaught unmistakable
\nolig{mistea}{mis|tea}
\nolig{Mistea}{Mis|tea}
 % misteach
\nolig{istend}{is|tend}
 % mistend distend
\nolig{isterm}{is|term}
 % misterm misterms
\nolig{isth}{is|th}
 % misthink misthought misthrew misthrow
 % isthmus calisthenic
\nolig{istime}{is|time}
 % mistime mistimed
\nolig{istitl}{is|titl}
 % mistitle
\nolig{istook}{is|took}
 % mistook
\nolig{istouc}{is|touc}
 % mistouch
\nolig{mistrac}{mis|trac}
\nolig{Mistrac}{Mis|trac}
 % Mistrace
\nolig{mistran}{mis|tran}
\nolig{Mistran}{Mis|tran}
 % Mistranscribe Mistranslate
\nolig{istrea}{is|trea}
 % mistreat mistreatment
\nolig{mistru}{mis|tru}
\nolig{Mistru}{Mis|tru}
 % mistrust mistruth
\nolig{istrys}{is|trys}
 % mistryst
\nolig{mistu}{mis|tu}
\nolig{Mistu}{Mis|tu}
 % mistune Mistutor
\nolig{istyp}{is|typ}
 % mistype

\nolig{aastricht}{aas|tricht}
 % Maastricht

\nolig{sthes}{s|thes}
 % anaesthesia synesthesia prosthesis
\nolig{sthet}{s|thet}
 % aesthetic esthetic unesthetic
 % prosthetist


% (B) ct -> c-t
```

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

\nolig{rctan}{rc|tan}
 % arctangent
\nolig{rctat}{rc|tat}
 % coarctation

% (C) sp -> s-p
% -------------

\nolig{othesp}{othes|p}
 % clothespin clothespress
\nolig{speople}{s|people}
 % business- congress- crafts-
 % dis- news- sales- spokes-
 % towns- trades- tribes- people
\nolig{sperson}{s|person}
 % business- congress- crafts- drafts-
 % news- sales- spokes- person
\nolig{espas}{es|pas}
 % trespass trespassing
\nolig{isplat}{is|plat}
 % cisplatin (cis-platin, not cisp-latin!)

\nolig{desp}{des|p}
\nolig{Desp}{Des|p}
 % despair desperado despot desperate
 \keeplig{despond} % despondency despondent
 \keeplig{Despond}
 \keeplig{despirit}
 \keeplig{Despirit}
 \keeplig{despoil}
 \keeplig{Despoil}
 \keeplig{sidesp} % sidespin, sidesplitting
 \keeplig{Sidesp}
 \keeplig{widesp} % widespread
 \keeplig{Widesp}
 \keeplig{desprung} % gelandesprung

\nolig{disp}{dis|p}
\nolig{Disp}{Dis|p}
 % disparage disparaging ...

\nolig{misp}{mis|p}
\nolig{Misp}{Mis|p}
 % misplace misperception misprint

\nolig{susp}{sus|p}
\nolig{Susp}{Sus|p}
 % suspend suspension suspicious
\nolig{sph}{s|ph} % 'ph' from Greek 'phi'!
 % atmosphere biosphere hemisphere
 % spherical asphodel phosphorous phosphate
 % blaspheme blasphemy

\nolig{ranspa}{rans|pa}
 % transparent transpacific
\nolig{ranspe}{rans|pe}
 % transpersonal
\nolig{ranspie}{rans|pie}
 % transpierce
\nolig{ranspl}{rans|pl}
 % transplant
\nolig{ranspol}{rans|pol}
 % transpolar
\nolig{ranspor}{rans|por}
 % transport transportation
\nolig{ranspos}{rans|pos}
 % transpose transposon

\nolig{risprud}{ris|prud}
 % jurisprudence
\nolig{spiec}{s|piec}
 % crosspiece frontispiece

\nolig{ewspa}{ews|pa}
 % newspaper
\nolig{ewspr}{ews|pr}
 % newsprint
 % Don't suppress sp lig in "newspeak"!


% (D) th -> t-h
% -------------

\nolig{eethov}{eet|hov}
 % Beethoven
\nolig{thook}{t|hook}
 % boathook meathook pothook
\nolig{thouse}{t|house}
 % boathouse cathouse courthouse ...
\nolig{othol}{ot|hol}
```

```
 % foothold knothole potholder ...
\nolig{lthol}{lt|hol}
 % bolthole
\nolig{sthol}{st|hol}
 % posthole pesthole
\nolig{rathol}{rat|hol}
\nolig{Rathol}{Rat|hol}
 % rathole
\nolig{arthog}{art|hog}
 % warthog
\nolig{stha}{st|ha}
 % firsthand postharvest posthaste
\nolig{thawk}{t|hawk}
 % nighthawk
\nolig{horth}{hort|h}
 % shorthair shorthand shorthorn
\nolig{arthei}{art|hei}
 % apartheid antiapartheid
\nolig{thead}{t|head}
 % bolthead cathead fathead ...
\nolig{therd}{t|herd}
 % goatherd neatherd
\nolig{theap}{t|heap}
 % dustheap
\nolig{theart}{t|heart}
 % fainthearted sweetheart ...
\nolig{uthear}{ut|hear}
 % outhear outheard
\nolig{thill}{t|hill}
 % anthill foothill
\nolig{thood}{t|hood}
 % adulthood knighthood ...
\nolig{thunt}{t|hunt}
 % pothunt outhunt
\nolig{orthol}{ort|hol}
 % porthole
\nolig{sthum}{st|hum}
 % posthumous
\nolig{uthau}{ut|hau}
 % outhaul
\nolig{uthit}{ut|hit}
 % outhit
\nolig{uthom}{ut|hom}
 % outhomer
\nolig{uthow}{ut|how}
 % outhowl
\nolig{uthum}{ut|hum}
 % outhumor
\nolig{uthust}{ut|hust}
 % outhustle
\nolig{tthour}{tt|hour}
 % watthour kilowatthour
\nolig{sthm}{s|thm}
 % asthma isthmus

% (E) at -> a-t
% -------------

\nolig{lbatr}{lba|tr}
 % albatross
\nolig{atroop}{a|troop}
 % paratrooper
\nolig{eatra}{ea|tra}
 % seatrain seatransport

% (F) et -> e-t
% -------------

\nolig{ninet}{nine|t}
\nolig{Ninet}{Nine|t}
 % ninetieth ninetieths ninety nineteen nineties

\nolig{ametag}{ame|tag}
 % nametag
\nolig{betat}{be|tat}
\nolig{Betat}{Be|tat}
 % betatter beta
\nolig{betr}{be|tr}
\nolig{Betr}{Be|tr}
 % betray betroth

\nolig{deta}{de|ta}
 % detach detain detail
\nolig{etect}{e|tect}
 % detect undetectable detective
\nolig{detent}{de|tent}
\nolig{Detent}{De|tent}
 % detent detention
\nolig{detest}{de|test}
\nolig{Detest}{De|test}
 % detest
\nolig{detr}{de|tr}
```

```
\nolig{Detr}{De|tr}
 % detract detrain detriment detritus

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

\nolig{foret}{fore|t}
\nolig{Foret}{Fore|t}
 % foretaste foretell foretold foretime
 % foretoken foretop foretopman
\nolig{imetable}{ime|table}
 % timetable

\nolig{reteen}{re|teen}
 % preteen
\nolig{retend}{re|tend}
 % pretend
\nolig{retenc}{re|tenc}
 % pretence
\nolig{retens}{re|tens}
 % pretense pretension
\nolig{retent}{re|tent}
\nolig{Retent}{Re|tent}
 % pretentious retention retentive
\nolig{retest}{re|test}
\nolig{Retest}{Re|test}
 % pretest retest

\nolig{reta}{re|ta}
\nolig{Reta}{Re|ta}
 % retag retape retake
 % foretaste caretaker
 % pretaste pretape pretaxretain
 % retain retake retaliate retard
 % retarget retaste wiretap
 \keeplig{pretable} % interpretable
 \keeplig{cretar}  % secretary

\nolig{reteam}{re|team}
\nolig{Reteam}{Re|team}
 % reteam reteamed reteaming reteams
\nolig{retear}{re|tear}
\nolig{Retear}{Re|tear}
 % retear retears
\nolig{retemp}{re|temp}
\nolig{Retemp}{Re|temp}
 % retemper retempering

\nolig{retie}{re|tie}
\nolig{Retie}{Re|tie}
 % retie entireties sureties
\nolig{retil}{re|til}
\nolig{Retil}{Re|til}
 % retile
```

```
\nolig{retim}{re|tim}
\nolig{Retim}{Re|tim}
 % retime beforetime
\nolig{retint}{re|tint}
\nolig{Retint}{Re|tint}
 % retint
\nolig{retir}{re|tir}
\nolig{Retir}{Re|tir}
 % retire retiring
\nolig{retitl}{re|titl}
\nolig{Retitl}{Re|titl}
 % retitle pretitling

\nolig{retold}{re|told}
\nolig{Retold}{Re|told}
 % retold
\nolig{retoo}{re|too}
\nolig{Retoo}{Re|too}
 % retook retool
\nolig{retor}{re|tor}
\nolig{Retor}{Re|tor}
 % retore retorn retort retorted
\nolig{retou}{re|tou}
\nolig{Retou}{Re|tou}
 % retouch retouched
\nolig{retra}{re|tra}
\nolig{Retra}{Re|tra}
 % retrace retrack retract retrans retransmit
\nolig{retre}{re|tre}
\nolig{Retre}{Re|tre}
 % pretreat retread retreat retrench
\nolig{retri}{re|tri}
\nolig{Retri}{Re|tri}
 % pretrim pretrial retrieve retribution
 % retries retrim
\nolig{etrors}{e|trors}
 % retrorse
\nolig{retrous}{re|trous}
\nolig{Retrous}{Re|trous}
 % retrousse
\nolig{retry}{re|try}
\nolig{Retry}{Re|try}
 % retry retrying

\nolig{retu}{re|tu}
\nolig{Retu}{Re|tu}
 % return retune unreturnable
\nolig{retwi}{re|twi}
\nolig{Retwi}{Re|twi}
 % retwist retwisting

\nolig{etooth}{e|tooth}
 % bluetooth eyetooth snaggletoothed
\nolig{eteeth}{e|teeth}
 % snaggleteeth eyeteeth

\nolig{deter}{de|ter}
\nolig{Deter}{De|ter}
 % deter determine deteriorate undeterred

\nolig{ceties}{ce|ties}
 % niceties
\nolig{cety}{ce|ty}
 % nicety

\nolig{feties}{fe|ties}
 % safeties unsafeties biosafeties
\nolig{fety}{fe|ty}
 % safety

\nolig{leties}{le|ties}
 % subtleties
\nolig{lety}{le|ty}
 % subtlety teletype teletypewriter

\nolig{rety}{re|ty}
 % surety entirety retype pretype

\nolig{etelev}{e|telev}
 % pretelevision
\nolig{etyp}{e|typ}
 % archetype archetypal retype pretype

% (G) as -> a-s
% -------------

\nolig{eastran}{ea|stran}
 % seastrand
\nolig{aspore}{a|spore}
 % diaspora megaspore tetraspore
\nolig{aseps}{a|seps}
 % asepsis
```

```
\nolig{asept}{a|sept}
 % aseptic aseptically
\nolig{asund}{a|sund}
\nolig{Asund}{A|sund}
 % asunder
\nolig{aspec}{a|spec}
\nolig{Aspec}{A|spec}
 % aspect infraspecific intraspecies
 % intraspecific
\nolig{infras}{infra|s}
\nolig{Infras}{Infra|s}
 % infrastructure infraspecific
\nolig{megast}{mega|st}
\nolig{Megast}{Mega|st}
 % megastructure megastar
\nolig{megasp}{mega|sp}
\nolig{Megasp}{Mega|sp}
 % megaspores megascopic
\nolig{aspoon}{a|spoon}
 % teaspoon

% how to do 'asea'?

% (H) is -> i-s
% -------------

% (a) not across morpheme boundaries
% (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{antisy}{anti|sy}
\nolig{Antisy}{Anti|sy}
 % antisymmetric antisyphilitics

\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
% -------------

% %% (no examples yet)


% (J) sk -> 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
\nolig{atskill}{ats|kill}
 % Catskills Mountains, Catskill Park
\nolig{eekskill}{eeks|kill}
 % Peekskill % a town on the Hudson River


% (K) ll -> l-l
% -------------

\nolig{llike}{l|like}
 % animallike soullike
\nolig{lless}{l|less}
 % soulless tailless

% (L) fr -> f-r
% -------------

\nolig{oofr}{oof|r}
 % proofread proofroom proofrock


% (M) ij -> i-j
% -------------

% The 'ij' ligature seems to have no good
% use in English-language words -- incl.
% words introduced to English from other
% languages, such as marijuana, gaijin, and
% bijou; the 'ij' ligature seems to span
% morpheme boundaries in all of these cases.
% Hence, we disable this ligature globally.
% We do make exceptions for words of Dutch
% origin, where the ij ligature does have
% legitimate uses.

\nolig{ij}{i|j}
 \keeplig{ijs} % rijsttafel (Indonesian dish)
 \keeplig{ijn} % de Bruijn



% Part 4: Disabling one discretionary
% ligature so that a subsequent, more
% important one doesn't get pre-empted
% -----------------------------------

% (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
\nolig{ispani}{i|spani}
 % hispanic
\nolig{lisp}{li|sp}
\nolig{Lisp}{Li|sp}
 % lisp lisping
\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 (as is the
%% case for the font "Garamond Premier Pro",
%% and any other fonts?!) and want a
%% trailing 'th' ligature to take precedence
%% over any preceding 'at' or 'et' ligas,
%% 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} % this will re-enable "th" liga
%%\keeplig{Rathole} %  if "at" liga doesn't exist...
\keeplig{athead} % cathead fathead flathead meathead
\keeplig{atherd} % goatherd neatherd
\keeplig{eatheart} % greathearted sweetheart
\keeplig{eetheart}

\keeplig{Beethoven}
\keeplig{ophethood}


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

\nolig{atap}{a|tap}
 \keeplig{catap} % catapult cataphoresis
 \keeplig{Catap}
 \keeplig{ratap} % rataplan
 \keeplig{Ratap}


\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 \@ifhdligset
```

B German-language ligature suppression rules: selnolig-german-patterns.sty

Introductory note: To accommodate the practice of Swiss-German writers of not using the "ß" character at akk (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}%
[2013/05/21]

% 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)


% A note on the organization of the \nolig
% macros in this file: They are grouped by
% the f-ligature being suppressed: ff -> f-f;
% fi -> f-i, fl -> f-l, etc. Within each of
% these sections, the \nolig commands are
% listed first for word-beginnings and
% second by word-interior search strings,
% alphabetically within each group.


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

\nolig{Auff[aeiloruyäöü]}{Auf|f}
\nolig{auff[aeiloruyäöü]}{auf|f}
 % Hundreds (thousands?!) of words that
 % start with or contain [aA]uff-,
 % [kK]auff-, [lL]auf- and don't end
 % with "ff".
 % We must provide a few \keeplig macros,
 % though, to deal with some surnames and
 % some words of French origin.
 \keeplig{Lauffen}
 \keeplig{Stauffach} % Stauffacher
 \keeplig{Stauffen}  % Stauffenbergattentat
 \keeplig{stauffen}
 \keeplig{Stauffer}
 \keeplig{stauffer}
 \keeplig{Stauffisch}
 \keeplig{stauffisch}

 \keeplig{chauffier}
 \keeplig{Chauffier}
 \keeplig{chauffeur}
 \keeplig{Chauffeur}
 \keeplig{chauffement} % Echauffement

\nolig{Brieff}{Brief|f}
\nolig{brieff}{brief|f}
 % Brief-f... (viele Fälle!)
\nolig{Cheff}{Chef|f}
\nolig{cheff[aäeioöruü]}{chef|f}
 % Cheffahrer Cheffront ...
 \keeplig{cheffekt} % Lacheffekt Wischeffekt
 \keeplig{Scheffel}
 \keeplig{scheffel} % scheffeln
 \keeplig{cheffizi} % hocheffizient
 \keeplig{cheffé} % Scheffé (a statistician)
\nolig{cheffl[aiou]}{chef|fl}
\nolig{Dampff}{Dampf|f}
\nolig{dampff}{dampf|f}
 % (viele Fälle!)
\nolig{Dorff[aäeiloöruü]}{Dorf|f}
\nolig{dorff[aäeiloöruü]}{dorf|f}
 % (viele Fälle!)
\nolig{Hanff}{Hanf|f}
\nolig{hanff}{hanf|f}
 % Hanffasern Hanffeld
\nolig{Hoff[aäiloöruü]}{Hof|f}
 % (viele Fälle!)
```

```
 \keeplig{Hoffacker}
 \keeplig{Hoffart}
 \keeplig{Hoffärt}  % Hoffärtigkeit
 \keeplig{Hoffricht} % Hoffrichter
 \keeplig{Hoffranz} % Hoffranzen (?)

\nolig{Golff}{Golf|f}
\nolig{golff}{golf|f}
 % (viele Fälle!)
\nolig{Hoffern}{Hof|fern}
\nolig{hoffern}{hof|fern}
 % Hofferne hofferner
\nolig{Hoffest}{Hof|fest}
 % Hoffest Hoffesterlös Hoffestteam
\nolig{Impff}{Impf|f}
 % Impffurcht Impffortbildung
\nolig{Kampff}{Kampf|f}
\nolig{kampff}{kampf|f}
 % kampffertig Kampffigur
 % Kampffuchs Kampffüchse
\nolig{Kopff[aäeoöruü]}{Kopf|f}
\nolig{kopff[aäeoöruü]}{kopf|f}
 % (viele Fälle!)
 % [kK]opffi -> caught by pffi rule
 % [kK]opffl -> caught by pffl rule
\nolig{Klopff}{Klopf|f}
\nolig{klopff}{klopf|f}
 % Schenkelklopffrohsinn klopfrei
\nolig{Prüff}{Prüf|f}
\nolig{prüff}{prüf|f}
 % (viele Fälle!)
\nolig{Ruffach}{Ruf|fach}
 % Ruffach
\nolig{ruffach}{ruf|fach}
 % Hausnotruffachberater beruffachlichen
\nolig{Rumpff}{Rumpf|f}
 % Rumpffassung
\nolig{Schaffang}{Schaf|fang}
\nolig{Schaffarm}{Schaf|farm}

\nolig{Schilff}{Schilf|f}
\nolig{schilff}{schilf|f}
 % Schilffeld Schilfflöte Schilffloß
\nolig{Senff}{Senf|f}
\nolig{senffa}{senf|fa}
 % Senffabrik senffarbig Senffleck

\nolig{Sumpff}{Sumpf|f}
\nolig{sumpff}{sumpf|f}
 % (viele Fälle!)
\nolig{Tariff}{Tarif|f}
\nolig{tariff}{tarif|f}
 % (viele Fälle!)
\nolig{Tieff}{Tief|f}
\nolig{tieff}{tief|f}
 % (viele Fälle!)
 \keeplig{tieffekt}
  % Multieffekt Konfettieffekt
 \keeplig{tieffiz}
  % Antieffizienz


\nolig{chaffron}{chaf|fron}
 % Schaffron
\nolig{eiffest}{eif|fest}
 % reiffest

\nolig{ffabrik}{f|fabrik}
 % Strumpffabrik
\nolig{ffacet}{f|facet}
 % Relieffacetten
\nolig{ffachl}{f|fachl}
 % beruffachlich golffachlich
\nolig{ffachm}{f|fachm}
 % Huffachmann Wahlkampffachmann
 % Golffachmesse Fünffachmord
\nolig{ffäch}{f|fäch}
 % Brieffächer Einwurffächer fünffächrig
\nolig{ffaden}{f|faden}
 % Einzelknopffaden Knüpffaden
\nolig{ffäd}{f|fäd}
 % Einzelknopffäden Tropffäden
\nolig{ffähig}{f|fähig}
 % hoffähig kampffähig lauffähig
\nolig{ffahn}{f|fahn}
 % Totenkopffahne Dorffahne Wahlkampffahnen
\nolig{ffahr}{f|fahr}
 % Schifffahrt Schleiffahrt Tariffahrplan
\nolig{ffähr}{f|fähr}
 % Dampffährdienst
\nolig{ffaktor}{f|faktor}
 % Hoffaktor Schlupffaktoren
\nolig{ffakult}{f|fakult}
```

```
 % Rumpffakultät
\nolig{ffall}{f|fall}
 % Anruffalle auffallen Straffall
 % Tariffalle Streiffall Maulwurffalle
 \keeplig{ffallee} % Oppenhoffallee
 \keeplig{ffallerg} % Duftstoffallergie
 \keeplig{ffallokat}% Rohstoffallokation
\nolig{ffäll}{f|fäll}
 % straffällig unauffällig
\nolig{ffalt}{f|falt}
 % Fünffaltigkeit Dickkopffalter
 \keeplig{iffalt} % Segelschiffalter
 \keeplig{offalt} % Kraftstoffalternativen
\nolig{ffält}{f|fält}
 % fünffältig
\nolig{ffami}{f|fami}
 % Zwölffamilienhäuser
 \keeplig{Diffami} % Diffamierung
 \keeplig{diffami} % diffamierend
\nolig{ffanat}{f|fanat}
 % Schärffanatiker
\nolig{ffans}{f|fans}
 % Waldhoffans
 \keeplig{riffans} % Griffansätze
 \keeplig{toffans} % Sprengstoffanschlag
\nolig{ffanta}{f|fanta}
 % Schlaffantasie Straffantasie
\nolig{ffarb}{f|farb}
 % Zwölffarbenmaschine zwölffarbig
 \keeplig{ffarbeit}
\nolig{ffärb}{f|färb}
 % Kopffärbung
\nolig{ffaschi}{f|faschi}
 % Schulhoffaschismus
\nolig{ffassad}{f|fassad}
 % Innenhoffassade
\nolig{ffäul}{f|fäul}
 % Sumpffäulnis

\nolig{ffecht}{f|fecht}
 % Klopffechter
\nolig{ffeder}{f|feder}
 % -f-feder...
\nolig{ffedr}{f|fedr}
 % zwölffedrig
\nolig{ffehl}{f|fehl}
 % Schärffehler
\nolig{ffeier}{f|feier}
 % Hoffeierlichkeiten
\nolig{ffeind[els]}{f|feind}
 % -f-feinde -f-feindlich -f-feindschaft
 \keeplig{ffeindealer} % Koffeindealer
\nolig{ffeld}{f|feld}
 % Prüffeld Schilffeld Kampffeld
 \keeplig{Büffeld} % Büffeldecke
 \keeplig{büffeld}
 \keeplig{ffeldenk} % Scheffeldenkmal
 \keeplig{Iffeld} % Iffeldorf
 \keeplig{Löffeld} % Löffeldüngung
 \keeplig{löffeld}
 \keeplig{Müffeld} % Müffeldoktor
 \keeplig{müffeld}
 \keeplig{nüffeld} % Schnüffeldienst -droge
 \keeplig{Riffeld} % Riffeldielen
 \keeplig{taffeld} % Staffeldach -diplomatie
 \keeplig{toffeld} % Kartoffeldruck -dieb
 \keeplig{Trüffeld} % Trüffelduft -dorf
 \keeplig{trüffeld}
 \keeplig{Waffeld} % Waffelduft
 \keeplig{waffeld}

\nolig{ffell}{f|fell}
 % Werwolffell Schaffell
 \keeplig{ffelleck} % Waffelleckereien
 \keeplig{ffellinde}% Scheffellinde
 \keeplig{Muffell} % Muffellämmer
 \keeplig{muffell} % muffellig
 \keeplig{öffell}
  % Löffellamm Kochlöffellängen
 \keeplig{taffell} % Staffellauf -läufer
 \keeplig{toffell}
  % Kartoffellager -liebhaber
  % Pantoffellarve Kunstoffelle
 \keeplig{üffell} % Büffelleber -leder -leib
  % Trüffelleidenschaft Schnüffellust
\nolig{ffeile}{f|feile}
 % Prüffeile
\nolig{ffenster}{f|fenster}
 % Hinterhoffenster Schlaf- Tarif-
\nolig{fferien}{f|ferien}
 % Reiterhofferien Bauernhofferien
\nolig{ffernseh}{f|fernseh}
```

```
 % Abruffernsehen
\nolig{ffertig}{f|fertig}
 % schlaffertig
\nolig{ffestl}{f|festl}
 % Straffestlegung
\nolig{ffests}{f|fests}
 % Straffestsetzung
 % Hoffestspiele Dorffestspiel
\nolig{ffetisch}{f|fetisch}
 % Schaffetischisten
\nolig{ffetus}{f|fetus}
 % Schaffetus
\nolig{ffett}{f|fett}
 % Huffett Rumpffett Scharffetter
 \keeplig{Buffett} % Buffettheke
 \keeplig{Büffett}
 \keeplig{buffett}
 \keeplig{büffett} % Obstbüffett
\nolig{ffetz}{f|fetz}
 % Brieffetzen Stofffetzen
 \keeplig{Buffetz} % Buffetzeit
 \keeplig{Büffetz} % Büffetzusammenstellung
\nolig{ffeud}{f|feud}
 % Kasernenhoffeudalismus
\nolig{ffeue}{f|feue}
 % Dorffeuerwehr Torffeuer Lauffeuer

\nolig{ffilet}{f|filet}
 % Meerwolffilet
\nolig{ffindung}{f|findung}
 % Beruffindungsprozess
\nolig{ffirm}{f|firm}
 % Brieffirmen Tariffirmen
 \keeplig{affirm}
 \keeplig{Affirm}

\nolig{ffolg}{f|folg}
 % Impffolgen
\nolig{ffoli}{f|foli}
 % Relieffolien
\nolig{ffolter}{f|folter}
 % Tropffolter
 \keeplig{Affoltern} % town near Zurich
\nolig{ffond}{f|fond}
 % Tariffondslösung
\nolig{fforder}{f|forder}
 % Tarifforderung Strafforderung
\nolig{fförder}{f|förder}
 % rufförderndnd kreislauffördernd schlaffördernd
\nolig{fforell}{f|forell}
 % Werfforellen
\nolig{fform}{f|form}
 % Kopfform Gugelhupfform aufformen
\nolig{fförm}{f|förm}
 % reiffömig schweiffömig
\nolig{fforsch}{f|forsch}
 % Schlafforschung Impfforschung
\nolig{fforen}{f|foren}
 % Abrufforen
\nolig{fforu}{f|foru}
 % Schlafforum
\nolig{ffoto}{f|foto}
 % Schlaffotogalerie
\nolig{fföt}{f|föt}
 % Wolffötus

\nolig{ffracht}{f|fracht}
 % Dampffrachter
\nolig{ffrag}{f|frag}
 % Streiffragen
 \keeplig{Suffrage} % Suffragette
 \keeplig{suffrage}
\nolig{ffrak}{f|frak}
 % Rumpffraktion
 \keeplig{toffrak} % Flüssigstoffrakete
\nolig{ffrank}{f|frank}
 % Fünffrankenstück
\nolig{ffräs}{f|fräs}
 % Baumstumpffräse
\nolig{ffrau}{f|frau}
 % Hoffrau Kauffrau
 \keeplig{ffraum} % Sprengstoffraub
 \keeplig{ffraub} % Treffraum
 \keeplig{ffrausch} % Klebstoffrausch
 \keeplig{ffraup} % Stoffraupe

\nolig{ffreak}{f|freak}
 % Surffreak
 \keeplig{toffreak} % Schadstoffreaktionen
\nolig{ffregat}{f|fregat}
 % Kampffregatte Dampffregatte
\nolig{ffrei}{f|frei}
```

```
 % tariffrei Schlaffrei
 \keeplig{chiffrei}% Schiffreise
 \keeplig{toffrei} % stoffrein sauerstoffreich
 \keeplig{uffreis} % Puffreis
 \keeplig{luffrei} % schluffreich
 \keeplig{iffreig} % Riffreigen
\nolig{ffremd}{f|fremd}
 % hoffremd
\nolig{ffreq}{f|freq}
 % Schlaffrequenz
\nolig{ffreu}{f|freu}
 % Straffreude Brieffreund

\nolig{ffrisch}{f|frisch}
 % Schaffrischkäse zapffrisch
\nolig{ffried}{f|fried}
 % Dorffrieden Hoffrieden
\nolig{ffries}{f|fries}
 % Relieffries
 \keeplig{toffries} % Rohstoffriese
\nolig{ffrist}{f|frist}
 % Prüffrist Ablauffrist
\nolig{ffrisur}{f|frisur}
 % Schlaffrisur Topffrisur Zopffrisur

\nolig{ffront}{f|front}
 % Hoffront Kampffront
 \keeplig{affront}
 \keeplig{Affront}
\nolig{ffrosch}{f|frosch}
 % Pfeiffrosch
\nolig{ffrösch}{f|frösch}
 % Pfeiffrösche
\nolig{ffrucht}{f|frucht}
 % Rumtopffrucht
\nolig{ffrücht}{f|frücht}
 % Rumtopffrüchte

\nolig{ffund}{f|fund}
 % Brückenkopffundament
 \keeplig{iffund} % diffundieren
 \keeplig{toffund} % stoffundurchlässig
\nolig{fführ}{f|führ}
 % Kampfführung aufführen
\nolig{ffunk}{f|funk}
 % Brieffunktion Abruffunktion

\nolig{ffühl}{f|fühl}
 % Scharffühler
\nolig{ffüll}{f|füll}
 % Prüffüllgut Dampffüllung
\nolig{ffürst}{f|fürst}
 % -f-fürst
\nolig{ffuß}{f|fuß}
\nolig{ffuss}{f|fuss}
\nolig{ffüß}{f|füß}
\nolig{ffüss}{f|füss}
 % Greiffuß Greiffüße
 \keeplig{iffuss}
  % Diffusschall -strahlung
\nolig{ffutter}{f|futter}
 % Prüffutter
\nolig{ffütter}{f|fütter}
 % Abruffütterung

\nolig{hoffan}{hof|fan}
 % Waldhoffan
\nolig{hoffersch}{hof|fersch}
 % Talhofferschen
\nolig{hoffest}{hof|fest}
 % Pfarrhoffest Hinterhoffest
\nolig{hoffete}{hof|fete}
 % Schneckenhoffete

\nolig{lffach}{lf|fach}
 % elffach zwölffach

\nolig{offegen}{of|fegen}
 % Hoffegen

\nolig{pffach}{pf|fach}
 % Strumpffach
\nolig{pffern}{pf|fern}
 % rumpffern
\nolig{pffest}{pf|fest}
 % Klopffestigkeit tropffester
\nolig{pffels}{pf|fels}
 % Hirschkopffelsen
\nolig{pffont}{pf|font}
 % Dampffontäne
\nolig{pffüh}{pf|füh}
 % Kampfführung
```

```
\nolig{reiffern}{reif|fern}
 % reiffern
\nolig{rffan}{rf|fan}
 % Surffan
\nolig{rffeel}{rf|feel}
 % Surffeeling
\nolig{rffest}{rf|fest}
 % Surffest
\nolig{rffinn}{rf|finn}
 % Surffinne
\nolig{rffleck}{rf|fleck}
 % Schorfflecken

\nolig{straffern}{straf|fern}
 \keeplig{rtstraffern} % Gurtstraffern
 \keeplig{ssstraffern}
  % Gurtschlossstraffern

\nolig{ünff}{ünf|f}
 % fünffarbig fünffingrig fünfflügelig
 % Fünfflach fünfflammig fünffleckige

\nolig{wurff[aäeiloöruü]}{wurf|f}
 % Auswurffach Einwurffehler
 % Hammerwurffinale


% 2. fi -> f-i
% ------------

\nolig{Aufi}{Auf|i}
\nolig{aufinstr}{auf|instr}
 % aufinstruieren
\nolig{aufirr}{auf|irr}
 % hinaufirrte
\nolig{aufisst}{auf|isst}

\nolig{Briefi}{Brief|i}
\nolig{briefi}{brief|i}
 % Briefidiom Briefinhalt Pfandbriefinhaber

\nolig{Chefi}{Chef|i}
\nolig{chefi}{chef|i}
 % Chefideologe Chefindianer
 % Chefinformatiker
 \keeplig{Chefin} % Chefin Chefinnen
  \nolig{Chefin[a-mo-z]}{Chef|in}
  % Chefinder -indianer -inspektor
  % -inquisitor
 \keeplig{chefin}
  \nolig{chefind}{chef|ind}
 \keeplig{chefibel} % Recherchefibel
 \keeplig{chefiebe} % Recherchefieber
 \keeplig{chefigur} % Nietzschefigur
 \keeplig{chefilm} % Rachefilm
 \keeplig{chefili} % Wäschefiliale
 \keeplig{chefirm} % Geldwäschefirma
 \keeplig{chefisch} % Wäschefische

\nolig{Dorfi}{Dorf|i}
\nolig{dorfi}{dorf|i}
 % Dorfidylle -information -institute
\nolig{Hofi}{Hof|i}
 % (viele Fälle!)
 \keeplig{Hofier} % Hofieren
\nolig{Kampfi}{Kampf|i}
\nolig{kampfi}{kampf|i}
 % Kampfideologie Kampfinstrument
\nolig{Kaufi}{Kauf|i}
\nolig{kaufi}{kauf|i}
 % Kaufidee kaufinteressiert Kaufimpuls
\nolig{Laufi}{Lauf|i}
\nolig{laufi}{lauf|i}
 % Laufidol Kreislaufinsuffizienz
 \keeplig{Laufig}
 \keeplig{Blaufi}
  % Blaufichte Blaufilter Blaufisch
 \keeplig{laufilter} % Planetenblaufilter
 \keeplig{laufiedr} % blaufiedrig
\nolig{rüfi}{rüf|i}
 % Prüfinhalt Prüfinstitution Prüfintervall
\nolig{Rumpfi}{Rumpf|i}
\nolig{rumpfi}{rumpf|i}
 % Rumpfitalien Strumpfindustrie
 \keeplig{rumpfig}

\nolig{chafi}{chaf|i} % Schaf-i...
 % Schafimperium Schafinnereien
 \keeplig{schafigu} % Maharadschafigur
\nolig{chlafi}{chlaf|i} % Schlaf-i-...
 % Schlafiglu schlafinduzierend
 \keeplig{chlafitt} % Schlafittchen
```

```
\nolig{Strafi}{Straf|i}
\nolig{strafi}{straf|i}
 % strafisolierend Strafinstanz
\nolig{Tarifi}{Tarif|i}
\nolig{tarifi}{tarif|i}
 % (viele Fälle!)
 \keeplig{Tarifier} % Tarifierung
 \keeplig{tarifier} % tarifierbar
\nolig{Tiefinn}{Tief|inn}
\nolig{tiefinn}{tief|inn}
 % tiefinnen -innerste -innig -innerste

\nolig{fidee}{f|idee}
 % Kopfidee Luftschiffidee
\nolig{fideol}{f|ideol}
 % Tiefideologie
\nolig{fidentif}{f|identif}
 % Stoffidentifizierung
\nolig{fidentit}{f|identit}
 % Steppenwolfidentität Berufidentität
\nolig{fidol}{f|idol}
 % Golfidol
\nolig{fidyll}{f|idyll}
 % Bauernhofidyll
\nolig{figel}{f|igel}
 % Köpfigel Stoffigel
 \keeplig{figelehrt} % Sufigelehrter
\nolig{fikone}{f|ikone}
 % Laufikone
\nolig{fillus}{f|illus}
 % Sumpfillusion
\nolig{fimman}{f|imman}
 % ablaufimmanente
\nolig{fimmob}{f|immob}
 % Kaufhofimmobilie
\nolig{fimmun}{f|immun}
 % Strafimmunität
\nolig{fimp}{f|imp}
 % Torfimporte Kaufimpuls aufimpft

\nolig{findex}{f|index}
 % Kaufindex Pfandbriefindex
\nolig{findikat}{f|indikat}
 % Impfindikation
\nolig{findiv}{f|indiv}
 % Hofindividualität
\nolig{findiz}{f|indiz}
 % Tarifindizes
\nolig{findust}{f|indust}
 % Golfindustrie
\nolig{finfekt}{f|infekt}
 % Dampfinfektion
\nolig{finfiz}{f|infiz}
 % Laufinfizierte
\nolig{finfo}{f|info}
 % Tarifinformation Telefoninformation
 \keeplig{Delfinfo}
  % Delfinforscher -foto
\nolig{finfra}{f|infra}
 % Hofinfrastruktur
\nolig{finfus}{f|infus}
 % Tropfinfusion
\nolig{fingenieur}{f|ingenieur}
 % Prüfingenieur Kaufingenieur
\nolig{finhab}{f|inhab}
 % Hofinhaber
\nolig{finhalat}{f|inhalat}
 % Kamilledampfinhalationen
\nolig{finhalt}{f|inhalt}
 % Begriffinhalte Kropfinhalt
 \keeplig{Delfinhalt} % Delfinhaltung
 \keeplig{raffinhalt} % Paraffinhaltig
\nolig{finitia}{f|initia}
 % Korallenriffinitiative
\nolig{finjekt}{f|injekt}
 % Dampfinjektionsverfahren
\nolig{finkont}{f|inkont}
 % Ueberlaufinkontinenz
 \keeplig{Delfinkont} % Delfinkontakt

\nolig{finnenaus}{f|innenaus}
 % Schiffinnenausbau
\nolig{finnenohr}{f|innenohr}
 % Schafinnenohr
\nolig{finnenfl}{f|innenfl}
 % Hofinnenflächen
\nolig{finnenl}{f|innenfl}
 % Hofinnenleben
\nolig{finnenraum}{f|innenraum}
 % Kopfinnenraum
\nolig{finnenräum}{f|innenräum}
```

```
 % Schlafinnenräumen
\nolig{finnens}{f|innens}
 % Rumpfinnenseite

\nolig{finner}{f|inner}
 % tiefinnerlich Kopfinneres
\nolig{finnig}{f|innig}
 % tiefinnige
\nolig{finnov}{f|innov}
 % Tarifinnovationen
\nolig{finsass}{f|insass}
 % Raumschiffinsassen
\nolig{finsekt}{f|insekt}
 % Laufinsekt
\nolig{finsel}{f|insel}
 % Schafinsel Schilfinsel Saufinsel
\nolig{finserat}{f|inserat}
 % Titelkopfinserat
\nolig{finsign}{f|insign}
 % Knopfinsignien
\nolig{finspek}{f|inspek}
 % Kirchhofinspektor
\nolig{finsta}{f|insta}
 % Kunstriffinstallateur
 % Schiffinstandsetzung
 % Strafinstanz rumpfinstabil
\nolig{finstinkt}{f|instinkt}
 % Zupfinstinkt
\nolig{finstitu}{f|institu}
 % Strafinstitutionen
\nolig{finstrukt[io]}{f|instrukt}
 % Wurfinstruktion Chefinstruktor
\nolig{finstrum}{f|instrum}
 % Zupfinstrumente Schleif- Greif-
\nolig{finsuff}{f|insuff}
 % Kreislaufinsuffizienz
\nolig{finszen}{f|inszen}
 % Kopfinszenierung
\nolig{fintars}{f|intars}
 % Griffintarsien
\nolig{fintell}{f|intell}
 % Hofintellektueller
\nolig{fintegr}{f|integr}
 % Tarifintegration
\nolig{fintens}{f|intens}
 % eingriffintensiv

\nolig{finter}{f|inter}
 % Feuerschiffinteressierte
 % Begriffinterpretationen
 % Strafinterventionen Rufintervalle
\nolig{finton}{f|inton}
 % Tiefintonieren
\nolig{fintrig}{f|intrig}
 % Briefintrige Hofintrige
\nolig{finvent}{f|invent}
 % Laufinventar
\nolig{finvest}{f|invest}
 % Anlaufinvestitition

\nolig{firis}{f|iris}
 % Sumpfiris
\nolig{fironi}{f|ironi}
 % tiefironisch
\nolig{firre}{f|irre}
 % Dorfirre
\nolig{firru}{f|irru}
 % Werfirrung

\nolig{fisolat}{f|isolat}
 % Strafisolator Schaumstoffisolation
\nolig{fisolie}{f|isolie}
 % Griffisolierung

\nolig{uffax}{uf|fax}
 % Notruffax Abruffax



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

\nolig{Aufl[aeiouyäöü]}{Auf|l}
 % Must avoid catching "Aufl.".
\nolig{aufl}{auf|l}
 % Hundreds (thousands?!) of words
 % However, must allow for quite a few
 % exceptions:
 \keeplig{auflair} % Tierschauflair
 \keeplig{aufläche}% Anbau- Grau- Kau- ...
  % Niveau- Plateau- Schau- Staufläche
 \keeplig{aufliegl}% Taufliieglein
 \keeplig{auflüssig} % Tauflüssigkeit
```

```
\keeplig{baufl}
 % Modellbauflieger Weinbauflecken
\keeplig{Baufl} % Bauflaute
 \nolig{bauflösen}{bauf|lösen}
  % grobauflösend
\keeplig{blaufl}% blaufleckig blauflauschig
 \nolig{blaufloch}{blauf|loch}
  % Ablaufloch
 \nolig{blauflog}{blauf|log}
  % Ablauflogik
\keeplig{Blaufl}% Blauflügel (Libelle)
\keeplig{fraufl}% Frauflüge
\keeplig{Fraufl}
\keeplig{gauflöte} % Rheingauflöte
\keeplig{graufl}% Graufleckentest
\keeplig{Graufl}
\keeplig{onauflo}  % Donauflotte
\keeplig{onauflu}  % Donauflut Donaufluss
\keeplig{Moskaufl}  % Moskauflug
\keeplig{Schauflieg}% Schaufliegen
\keeplig{Schaufloß} % Schaufloßfahrten
\keeplig{schauflöß}
\keeplig{Schauflug}
\keeplig{Schauflüg} % Schauflüge
\keeplig{schauflieg}
\keeplig{schaufloß}
\keeplig{schauflöß} % Wahrschauflöße
\keeplig{schauflug}
\keeplig{schauflüg}


\nolig{Briefl}{Brief|l}
\nolig{briefl}{brief|l}
 % lots and lots of words ...
\nolig{Chefl}{Chef|l}
\nolig{chefl}{chef|l}
 % Cheflieferant -limousine -lobbyist -los
 \keeplig{achefl}
  % Rachefluch Einspracheflut
 \keeplig{ichefl} % Speichefluss
 \keeplig{schefl}
  % Ascheflocken Tuschefleck
 \keeplig{chefläche} % Bracheflächen
\nolig{Dampfl}{Dampf|l}
\nolig{dampfl}{dampf|l}
 % Dampflanze Natriumdampflampe

\nolig{Dorfl}{Dorf|l}
\nolig{dorfl}{dorf|l}
 % Dorfladen Dorflage Dorfleitplan
 \keeplig{dorfliese} % Korridorfliesen
 \keeplig{dorflüg}  % Condorflüge
\nolig{Fünfl}{Fünf|l}
\nolig{fünfl}{fünf|l}
 % fünflitrig Fünflochdüsen
\nolig{Golfl}{Golf|l}
\nolig{golfl}{golf|l}
 % viele Faelle
\nolig{Hanfl}{Hanf|l}
\nolig{hanfl}{hanf|l}
 % Hanfladen Hanfland Hanflegalisierung
 \keeplig{thanflamm} % Methanflamme
\nolig{Hofl}{Hof|l}
\nolig{hofl}{hof|l}
 % Hoflaborant Hoflieferant
 \keeplig{hoflosk} % Echofloskeln
\nolig{Huflatt}{Huf|latt}
\nolig{huflatt}{huf|latt}
 % Huflattich huflattichartig
\nolig{Hufled}{Huf|led}
\nolig{hufled}{huf|led}
 % Hufledерhautentzundung
\nolig{Impfl}{Impf|l}
\nolig{impfla}{impf|la}
 % Schimpflaute
 \keeplig{eimpflanz} % Keimpflanze
\nolig{impfle}{impf|le}
 % Impflegende
 \keeplig{eimpfleg} % Heimpfleger
 \keeplig{timpfleg} % Intimpflege
\nolig{Kampfl}{Kampf|l}
\nolig{kampfl}{kampf|l}
 % Kampflegende kampflüstern
 % Wahlkampflüge
\nolig{Kopfl[äeioöuüy]}{Kopf|l}
\nolig{kopfl[äeioöuüy]}{kopf|l}
\nolig{Köpfl[aäioöuüy]}{Köpf|l}
\nolig{köpfl[aäioöuüy]}{köpf|l}
 % Dutzende (Hunderte?) von Worten...
 % [kK]opfla -> caught by opfla rule
 % [kK]öpfle -> caught by öpfle rule
 \keeplig{kopflaster}% Ökopflaster
 \keeplig{kopfleg}  % Risikopflege
```

```
 \keeplig{kopflaum} % Schokopflaumen
\nolig{Pfeifl}{Pfeif|l}
\nolig{pfeifl}{pfeif|l}
 % Pfeiflaute
\nolig{Prüfl}{Prüf|l}
\nolig{prüfl}{prüf|l}
 % Prüflabor Prüflast Prüflampe
\nolig{Reliefl}{Relief|l}
\nolig{reliefl}{relief|l}
 % Relieflandschaft -lagen -landkarte
 % relieflos
\nolig{Rufl}{Ruf|l}
\nolig{rufl}{ruf|l}
 % viele Fälle, aber...
 \keeplig{Durufl}  % Duruflé
 \keeplig{mbarufl}  % Gambarufluss
 \keeplig{ruflagge} % Peruflagge
 \keeplig{rufleisch} % Kängurufleisch

\nolig{Schafl}{Schaf|l}
\nolig{schafl}{schaf|l}
 % Schafleder Schaflaus Schafleber
\nolig{Schiefl}{Schief|l}
\nolig{schiefl}{schief|l}
 % schieflachen Schieflage schieflaufen
\nolig{Schilfl}{Schilf|l}
\nolig{schilfl}{schilf|l}
 % Schilflabyrinth Schilflieder
\nolig{Schlafl}{Schlaf|l}
\nolig{schlafl}{schlaf|l}
 % lots and lots of words...
\nolig{Schleifl}{Schleif|l}
\nolig{schleifl}{schleif|l}
 % Schleiflack Schleiflade
\nolig{Schrumpfl}{Schrumpf|l}
\nolig{schrumpfl}{schrumpf|l}
 % Schrumpflack

\nolig{Schweifl}{Schweif|l}
\nolig{schweifl}{schweif|l}
 % Schweiflecken
\nolig{Senfl}{Senf|l}
 % Senfladen Senfliebhaber
\nolig{Steifl}{Steif|l}
\nolig{steifl}{steif|l}
 % steiflippig

\nolig{Strafl}{Straf|l}
\nolig{strafl}{straf|l}
 % lots and lots of words..
\nolig{Strumpfl}{Strumpf|l}
\nolig{strumpfl}{strumpf|l}
 % Strumpfladen Strumpfloch
\nolig{Sumpfl}{Sumpf|l}
 % Sumpflabkraut -leiche -licht

\nolig{Surfl}{Surf|l}
\nolig{surfl}{surf|l}
 % Surflizenz Surflegende
 \keeplig{surfleck}% Lasurfleck
 \keeplig{surflüg} % Klausurflügel
 \keeplig{surflüss}% Glasurflüssigkeit
\nolig{Tarifl}{Tarif|l}
\nolig{tarifl}{tarif|l}
 % lots and lots of words...
\nolig{Tiefl}{Tief|l}
\nolig{tiefl}{tief|l}
 % Tieflager stieflich
 \keeplig{tiefläche} % Garantieflächen
 \keeplig{atieflaute}% Demokratieflaute
 \keeplig{atieflut} % Bürokratieflut

\nolig{Topfl}{Topf|l}
\nolig{topfl}{topf|l}
 % Topflappen Topflumpen
 \keeplig{Topflagg}  % Topflaggen
 \keeplig{Topflitz}  % Topflitzer
 \keeplig{Topflor}  % Topflor
 \keeplig{rtopfli}  % portopflichtig
 \keeplig{topfläch}  % Biotopfläche
 \keeplig{topfleg}  % Autopflege
  \nolig{rtopfleg}{rtopf|leg}
   % Schmortopflegen
 \keeplig{topflop}  % Megatopflop
 \keeplig{topflug}  % Nonstopflug
 \keeplig{topflüg}  % Nonstopflüge

\nolig{Torfl}{Torf|l}
\nolig{torfl}{torf|l}
 % Torflieferant Torfloch
 \keeplig{Torflagge}
 \keeplig{Torflügel}
 \keeplig{Torflut}
```

```
 \keeplig{torfläche} % Rotorfläche
 \keeplig{torflasch} % Applikatorflasche
 \keeplig{torflieg} % Motorfliegen
 \keeplig{torflimm} % Monitorflimmern
 \keeplig{torflitz} % Motorflitzer
 \keeplig{torfloss} % Stabilisatorflossen
 \keeplig{torflott} % Exploratorflotte
 \keeplig{torfluch} % Auswärtstorfluch
 \keeplig{torflug}  % Simulatorflug
 \keeplig{torflüg}  % Motorflüge
 \keeplig{torflüss} % Indikatorflüssigkeit
 \keeplig{torfluss}
 \keeplig{torfluß}  % Motorflußschiff


\nolig{Tropfl}{Tropf|l}
\nolig{tropfl}{tropf|l}
 % Tropfleckagen
 \keeplig{tropflug} % Elektropflug

\nolig{Wurfl}{Wurf|l}
\nolig{wurfl}{wurf|l}
 % Wurfluke Abwurfluke Einwurfluke
\nolig{Würfl}{Würf|l}
\nolig{würfl}{würf|l}
 % Würflung würfle

\nolig{aflied}{af|lied}
 % Schlaflied
\nolig{aflos}{af|los}
 % straflos schlaflos
 \keeplig{aflosk} % Propagandafloskel
 \keeplig{rafloss} % lyraflossig
\nolig{aflück}{af|lück}
 % Straflücke
\nolig{ampfl[aäou]}{ampf|l}
 % Dampflokomotive
 % Kampflärm Kampfluftschiff
 \keeplig{ampfläch} % Campfläche
 \keeplig{ampflanz} % Balsampflanzungen
 \keeplig{ampfleg} % Teampflege
\nolig{arflad}{arf|lad}
 % Zeichenbedarfladen
\nolig{äufle}{äuf|le}
 % Häuflein träufle

\nolig{eufle}{euf|le}
 % verteufle
 \keeplig{eufleiß} % treufleißig
 \keeplig{eufleiss} % treufleissig

\nolig{flaberer}{f|laberer}
 % Dumpflaberer
\nolig{flabor}{f|labor}
 % Edelsteinprüflabor
\nolig{flage}{f|lage}
 % Rohstofflager Straflager Auflage
 \keeplig{siflage} % Persiflage
 \keeplig{ouflage} % Camouflage
\nolig{flagun}{f|lagun}
 % Rifflagune
\nolig{flähm}{f|lähm}
 % Kehlkopflähmung
\nolig{flaminat}{f|laminat}
 % Rumpflaminat
\nolig{flamp}{f|lamp}
 % Kompaktleuchtstofflampe Notruflampe
\nolig{fland}{f|land}
 % Hofland Kauf- Sumpf- Tief-
 % Straflandesgericht Dorflandwirtschaft
 % Iffland Rifflandschaft
 % Altelfland Delfland
 \keeplig{flandern} % Ostflandern
 \keeplig{flandrisch}
\nolig{fländ}{f|länd}
 % hofländlich Sumpfländer Tiefländer
\nolig{fläng}{f|läng}
 % Straflänge Rumpflänge Lauflänge
\nolig{flapp}{f|lapp}
 % Seiflappen Topflappen
\nolig{flärm}{f|lärm}
 % Auspufflärm
\nolig{fflatter}{f|flatter}
 % Vorhofflattern aufflattert
\nolig{flauf}{f|lauf}
 % schieflaufen Auflauf Brieflauf
\nolig{fläuf}{f|läuf}
 % schiefläuft Hofläufer Strafläufe
 % Prüfläufe Aufläufe Tiefläufer
\nolig{flaun}{f|laun}
 % Kauflaune Wurflaune Kampflaune
```

```
\nolig{fleb}{f|leb}
 % Hofleben Kopfleben
 % Druckkopflebensdauer
 \keeplig{huffleb} % shuffleboard
\nolig{flehn}{f|lehn}
 % steiflehnig
\nolig{flehr}{f|lehr}
 % Dorflehrer Eislauflehrerin
\nolig{fleiden}{f|leiden}
 % Kropfleidende
\nolig{flein}{f|lein}
 % Laufleine Scherflein Wölflein
 % Köpflein Zöpflein
\nolig{fleist}{f|leist}
 % Dampfleistung Knopfleiste
 % Kopfleiste Auswurfleistung
 % Griffleiste Stoffleiste
 % Abstreifleiste
\nolig{fleit}{f|leit}
 % Dampfleitung Hofleitung Baufhofleiter
 % Kaufleitung Notrufleitung aufleiten
 % inbegriffleitend Kraftstoffleitung
 \keeplig{Kaltefleiter} % a surname...
\nolig{flektür}{f|lektür}
 % Schenkelklopflektüre
\nolig{fler}{f|ler}
 % Freiberufler Löffler Büffler Schnüffler
\nolig{fleut}{f|leut}
 % Hofleute

\nolig{flich}{f|lich}
 % tariflich reiflich glimpflich ...
 % (many words!)
 %% Vorsicht aber mit Pflicht und pflicht,
 %% sowie mit einflicht, verflicht, etc.:
 \keeplig{flicht}
  \nolig{öpflicht}{öpf|licht}
   % kröpflicht (??)

\nolig{flieb}{f|lieb}
 % freiberufliebend riffliebend
\nolig{flief}{f|lief}
 % schieflief Hoflieferant
\nolig{flig}{f|lig}
 % schweflig würflig knifflig mufflig
 % zweigipflig fünfzipflig

\nolig{flila}{f|lila}
 % tieflila stumpflila
\nolig{flinde}{f|linde}
 % Dorflinde Wolflinde Ziegelhoflinde
 % krampflindernd
\nolig{fling}{f|ling}
 % Prüfling Fünfling Sträfling Täufling
\nolig{flini}{f|lini}
 % Wurflinie Straflinie Rumpflinie
\nolig{flinse}{f|linse}
 % Fünflinser Wegwerflinsen
\nolig{flisch}{f|lisch}
 % teuflisch Tüpflischeißer
\nolig{flist}{f|list}
 % Prüfliste Rufliste Kaufliste
\nolig{fliter}{f|liter}
 % Hofliteratur Fünflitermotor
\nolig{flizenz}{f|lizenz}
 % Radfahrprüflizenz

\nolig{flobby}{f|lobby}
 % Maulwurflobbyisten
\nolig{flöch}{f|löch}
 % Sturmwurflöcher Knopflöcher
 % Sufflöcher Grifflöcher
 \keeplig{flöchte}
\nolig{flöff}{f|löff}
 % Tieflöffelbagger auflöffeln
 % Schöpflöffel
\nolig{flohn}{f|lohn}
 % Tariflohn Tieflohnland
 \keeplig{flohnetz} % Wasserflohnetz
\nolig{flöhn}{f|löhn}
 % Tariflöhne
\nolig{flok}{f|lok}
 % Dampflokomotive
\nolig{flord}{f|lord}
 % Wolflord
\nolig{flösch}{f|lösch}
 % Hoflöschmaschine
\nolig{flösu}{f|lösu}
 % Schmierseiflösung

\nolig{fluft}{f|luft}
 % Auspuffluft
\nolig{flung}{f|lung}
```

```
 % Verzweiflungsakt Verteuflung Stafflung
\nolig{flust}{f|lust}
 % Kampflust Impflust kauflustig Rauflust

\nolig{Gipfle}{Gipf|le}
\nolig{gipfle}{gipf|le}
 % gipfle

\nolig{chopfl}{chopf|l}
 % Schopflilie Schopflavendel

\nolig{lflady}{lf|lady}
 % Golflady
\nolig{lflast}{lf|last}
 % Wolflast

\nolig{lflos}{lf|los}
 % hilflos
 \keeplig{lfloss}
 % Walflosse Kiel- Paddel-
 \keeplig{lflosk}
 % Moralfloskel Sozial- Spiel-
\nolig{lürfl}{lürf|l}
 % Schlürflaut

\nolig{nflehm}{nf|lehm}
 % Hanflehm

\nolig{oflad}{of|lad}
 % Biohofladen
\nolig{ofläd}{of|läd}
 % Biohofläden
\nolig{oflück}{of|lück}
 % Vorhoflücke

\nolig{opfla}{opf|la}
 % Topflappen Kopflaus kopflastig
 \keeplig{gopflaum} % Mangopflaumen
 \keeplig{iopflast} % Biopflaster
 \keeplig{nopflaster}% Kinopflaster
 \keeplig{opflair}  % Popflair
 \keeplig{opflanz}
  % Kakaopflanzen Indigopflanzen
\nolig{öpfle}{öpf|le}
 % köpfle tröpfle Knöpfle
\nolig{orflad}{orf|lad}
 % Dorfladen

\nolig{pflaut}{pf|laut}
 % Kehlkopflaut
\nolig{pfleier}{pf|leier}
 % Zupfleier
\nolig{pflehm}{pf|lehm}
 % Stampflehm
\nolig{pfleis}{pf|leis}
 % Knopfleise
\nolig{pfleu}{pf|leu}
 % Natriumdampfleuchten Kopfleuchte
\nolig{pflid}{pf|lid}
 % Schlupflid
\nolig{pflied}{pf|lied}
 % Kampflied
\nolig{pfloch}{pf|loch}
 % Knopfloch
\nolig{pflos}{pf|los}
 % kampflos kopflos
 \keeplig{pfloss} % Pappflossen
\nolig{pflös}{pf|lös}
 % krampflösend Hüftkopflösung
\nolig{pflup}{pf|lup}
 % Kopflupe
\nolig{pflux}{pf|lux}
 % Hüftkopfluxation

\nolig{rfläd}{rf|läd}
 % Dorfläden Surfläden Schulbedarfläden
\nolig{rflück}{rf|lück}
 % Sturmwurflücken
\nolig{rfluke}{rf|luke}
 % Abwurfluke Einwurfluke

\nolig{reifl}{reif|l}
 % Greiflippe Stegreiflieder Streiflacher
 \keeplig{Breifl}
 \keeplig{breifl}
 \keeplig{Dreifl}
 \keeplig{dreifl}
 \keeplig{Freifl}
 \keeplig{freifl}
 \keeplig{eiereifl} % Meiereiflügel
 \keeplig{reifläch} % Freiflächen
 \keeplig{reiflagg} % Reedereiflagge
```

```
 \keeplig{reiflamm} % dreiflammig
 \keeplig{reiflasch}% Milchbreiflaschen
 \keeplig{reiflies} % Fleischereifliesen
 \keeplig{reiflock} % Breiflocken
 \keeplig{reifloh} % Büchereiflohmarkt
 \keeplig{reiflöhe} % Gießereiflöhe
 \keeplig{reiflott} % Fischereiflotte

\nolig{Tafle}{Taf|le}
\nolig{tafle}{taf|le}
 % tafle
 \keeplig{tafleck} % Zahnpastaflecken
 \keeplig{taflege} % Regattaflegel

\nolig{urflad}{urf|lad}
 % Surfladen
\nolig{urfloch}{urf|loch}
 % Balleinwurfloch

\nolig{wafle}{waf|le}
 % schwafle
\nolig{wefle}{wef|le}
 % schwefle
\nolig{weifle}{weif|le}
 % bezweifle verzweifle
 \keeplig{weifleck} % zweifleckig
\nolig{werfl}{werf|l}
 % Wegwerflied
 \keeplig{chwerfl}
 % Schwerflugzeug schwerfließend
 \keeplig{werflitz} % Powerflitzer



% 4. ffi -> f-fi
% --------------

\nolig{affind}{af|find}
 % Straffindung
 \keeplig{araffind} % Paraffinduft

\nolig{ffibel}{f|fibel}
 % Zwiebelknopffibeln
\nolig{ffieb}{f|fieb}
 % Sumpffieber Wahlkampffieber

\nolig{ffigu}{f|figu}
 % Streiffigur
\nolig{ffilm}{f|film}
 % Werwolffilm
\nolig{ffilter}{f|filter}
 % Tropffilter Topffilter
\nolig{ffinal}{f|final}
 % Hammerwurffinale
\nolig{ffinte}{f|finte}
 % Sprungwurffinte
 \keeplig{raffinte} % Paraffintest
\nolig{ffinanz}{f|finanz}
 % Hoffinanz Kauffinanzierung
\nolig{ffistel}{f|fistel}
 % Kropffistel
\nolig{ffixier}{f|fixier}
 % Dampffixiergerät

\nolig{hoffing}{hof|fing}
 % Bischoffinger

\nolig{iffind}{if|find}
 % Tariffindung

\nolig{lffing}{lf|fing}
 % Zwölffingerdarm
\nolig{lffisch}{lf|fisch}
 % Wolffisch

\nolig{nffing}{nf|fing}
 % fünffingrig Fünffingergebirge

\nolig{pffi}{pf|fi}
 % Kopffilm Wahlkampffinanzierung
 % Schlangenkopffisch Kampffisch

\nolig{reiffing}{reif|fing}
 % Greiffinger



% 5. ffi -> ff-i
% --------------

\nolig{Stoffi}{Stoff|i}
\nolig{stoffi}{stoff|i}
```

```
 % Rohstoffindustrieller -importe
 % Baustoffingenieur Kunststoffingenieur
 % Kohlenstoffisotope
 \keeplig{stoffiz}
 % Geheimdienstoffiziere
 \keeplig{stoffig}
 % permit ffi ligature for ff-ig suffix

\nolig{ffinnen}{ff|innen}
 % Schiffinnenraum Schiffinnenausbau


% 6. ffl -> ff-l
% --------------

\nolig{Griffl}{Griff|l}
\nolig{griffl}{griff|l}
 % Grifflängen -laschen -leiste
 % grifflos angrifflustig
\nolig{Offline}{Off|line}
\nolig{offline}{off|line}
 % offline, Offline
\nolig{Pfiffl}{Pfiff|l}
 % Pfifflaute
\nolig{Scheffle}{Scheff|le}
\nolig{scheffle}{scheff|le}
 % Scheffler Geldscheffler
\nolig{Schiffl}{Schiff|l}
\nolig{schiffl}{schiff|l}
 % Schifflache Schiffladung Schifflinie
\nolig{Stoffl}{Stoff|l}
\nolig{stoffl}{stoff|l}
 % lots of words...
\nolig{Treffl}{Treff|l}
\nolig{treffl}{treff|l}
 % Trefflokal

\nolig{afflu}{aff|lu}
 % Gafflust

\nolig{fflamell}{ff|lamell}
 % Rafflamellen
\nolig{fflast}{ff|last}
 % Rohstofflastigkeit Treibstofflaster
\nolig{fflatsch}{ff|latsch}
 % Rifflatschern

\nolig{ffloch}{ff|loch}
 % Suffloch Griffloch Sauerstoffloch
\nolig{fflos}{ff|los}
 % auspufflos

\nolig{ifflo}{iff|lo}
 % Schifflogbuch grifflos Griffloch

\nolig{offlad}{off|lad}
 % Sprengstoffladung
\nolig{öffle}{öff|le}
 % löffle
\nolig{offlo}{off|lo}
 % wirkstofflos Sauerstoffloch
 % offload

\nolig{pufflack}{puff|lack}
 % Auspufflack

\nolig{taffle}{taff|le}
 % staffle

\nolig{ufflad}{uff|lad}
 % Suffladen
\nolig{uffläd}{uff|läd}
 % Sufflädеn
\nolig{luffleck}{luff|leck}
 % Bluffleck
\nolig{üffle}{üff|le}
 % schnüffle büffle trüffle
\nolig{ufflon}{uff|lon}
 % Mufflon



% 7. ffl -> f-fl
% --------------

\nolig{Auffl}{Auf|fl}
\nolig{auffl}{auf|fl}
 % aufflackern aufflammen Aufflickung
 % Auffliegen

\nolig{eiffleck}{eif|fleck}
 % Schleiffflecklein
```

```
\nolig{ffläch}{f|fläch}
 % Lauffläche Kampfflächen
 % Zwölfflächner zwölfflächig
\nolig{fflech}{f|flech}
 % aufflechten
\nolig{ffleisch}{f|fleisch}
 % Schaffleisch Kopffleisch
\nolig{fflexib}{f|flexib}
 % Tarifflexibilitat
\nolig{fflies}{f|flies}
 % Reliefflliesen
\nolig{fflimm}{f|flimm}
 % Vorhofflimmern
\nolig{ffluch}{f|fluch}
 % Tarifflucht Werwolffluch
\nolig{fflüch}{f|flüch}
 % Tarifflüchtling
\nolig{fflug}{f|flug}
 % Tiefflug Kampfflugzeug Chefflugleiter
\nolig{fflüg}{f|flüg}
 % Streifflüge zwölfflügelig Tiefflüge
\nolig{fflur}{f|flur}
  % Klosterhofflur
\nolig{ffluss}{f|flus}
  % Prüffluss
\nolig{fflüs}{f|flüs}
 % Schleifflüsigkeit}
\nolig{fflut}{f|flut}
 % Brieffluten Rückrufflut Anrufflut

\nolig{iefflieg}{ief|flieg}
 % tiefffliegend
\nolig{iefflog}{ief|flog}
 % tiefflog

\nolig{lfflach}{lf|flach}
 % Zwölfflach

\nolig{pffl}{pf|fl}
 % Sumpffläche Sturzkampfflieger
 % Totenkopfflagge Impfflüssigkeit
 \keeplig{Knoepffl} % Knoepffler

\nolig{rfflad}{rf|flad}
 % Torffladen
\nolig{rfflasch}{rf|flasch}
 % Wegwerfflasche

\nolig{ufflot}{uff|lot}
 % Sufflot

\nolig{wurfl}{wurf|l}
 % Freiwurflinie Maulwurflobbyist



% 8. ft -> f-t
% ------------

\nolig{Auft[aähioöruüy]}{Auf|t}
\nolig{auft[aähioöruüy]}{auf|t}
 % (viele viele Fälle; aber: ft-Ligatur wird
 % doch verwendet für "Auft.")

\nolig{Brieft}{Brief|t}
\nolig{brieft}{brief|t}
 % Brieftasche Brieftaube
\nolig{Cheft}{Chef|t}
\nolig{cheft[a-z]}{chef|t}
 % Cheftheoretiker Cheftrainer
 \keeplig{omicheft[ceg]}
\nolig{Dorft}{Dorf|t}
\nolig{dorft}{dorf|t}
 % Dorftrottel -tratsch -tümpel
\nolig{Elfte}{Elf|te}
\nolig{elfte}{elf|te}
 % elfte elftens
 \keeplig{elfterfolg} % elfterfolgreichste

\nolig{Fünft[aäehlroöuy]}{Fünf|t}% Fünftagewoche ...
\nolig{fünft[aehlroöuy]}{fünf|t} % fünftens...
 \keeplig{fünfterfolg} % fünfterfolgreichste
 \keeplig{Fünfterfolg}
 \keeplig{fünfthässl} % fünfthässlichste
 \keeplig{Fünfthässl}
 \keeplig{fünfthellst} % fünfthellste
 \keeplig{Fünfthellst}
 \keeplig{fünfthöchst} % fünfthöchste
 \keeplig{Fünfthöchst}
 \keeplig{fünftlängst} % fünftlängste
 \keeplig{Fünftlängst}
```

```
 \keeplig{fünftleichtest} % fünftleichteste
 \keeplig{Fünftleichtest}
 \keeplig{fünftletzt} % fünftletzte
 \keeplig{Fünftletzt}
 \keeplig{fünftrang}  % fünftrangig
 \keeplig{Fünftrang}
 \keeplig{fünftreichst}% fünftreichste
 \keeplig{Fünftreichst}
 \keeplig{Fünftlig}  % Fünftligaspiel
 \keeplig{Fünftoper} % Fünftoperation
 \keeplig{Fünftrund} % Fünftrunden
 \keeplig{Fünftäon}

\nolig{Golft}{Golf|t}
\nolig{golft[hiruüy]}{golf|t}
 % Golfträume -turnier -typ -talent

\nolig{Greift[eio]}{Greif|t}
 % Greiftest -tentakeln -tier -tor
\nolig{Hanft}{Hanf|t}
 % Hanftaler Hanftau
\nolig{Hoft[aäehioäruüy]}{Hof|t}
\nolig{hoft[aähioöruü]}{hof|t}
 % Hoftor Klosterhoftor

\nolig{Laufte}{Lauf|te}
 % Lauftermin Lauftest Lauftext
\nolig{Prüft[aähioäruüy]}{Prüf|t}
\nolig{prüft[aähioöruü]}{prüf|t}
 % Prüftheorie
\nolig{Ruft[aäehioäruüy]}{Ruf|t}
 % Ruftaxi Rufterz Rufton Ruftöne

\nolig{Schaftal}{Schaf|tal}
\nolig{Schaftor}{Schaf|tor}
\nolig{Schaftreib}{Schaf|treib}

\nolig{Schlaft}{Schlaf|t}
\nolig{schlaft[aähioäruüy]}{schlaf|t}
 % Schlaftablette
\nolig{Schilft[äehiruüy]}{Schilf|t}
\nolig{schilft[hiruüy]}{schilf|t}
 % Schilfteich Schlilftümpel
\nolig{Senft[aäehioäruy]}{Senf|t}
 % Senftube
 \keeplig{Senftenberg}

\nolig{Straft[aähioöruüy]}{Straf|t}
\nolig{straft[aähioöruüy]}{straf|t}
 % (viele Fälle)
 \keeplig{straftheit} % Unbestraftheit
\nolig{Sufft}{Suff|t}
 % Sufftest Sufftext
\nolig{Surft[ähiöüy]}{Surf|t}
 % Surfthema Surftipp
\nolig{Tarift}{Tarif|t}
\nolig{tarift}{tarif|t}
 % Tarifthemen Tariftabelle
\nolig{Tieft}{Tief|t}
 % Tieftänzer -träumen -tresor -tunnel
\nolig{Torft}{Torf|t}
\nolig{torft}{torf|t}
 % Torftabletten Torftaucher Torftoilette
\nolig{Wurft}{Wurf|t}
\nolig{wurft}{wurf|t}
 % Wurftalent Wurftaler

\nolig{fft[aähioöruüy]}{ff|t}
 % Stofftasche Sauerstofftank Stofftheorie
 % Stofftier Stofftiger Stofftischtuch
 % Auspufftopf Kunststofftonne
 % Stofftradition Stofftrennung
 % Kunststofftube Stoffturnschuhe
 % Stofftäschchen Auspufftöpfe
 % Kunststofftöpfe Kunststofftüten

%% Words that start with a capital letter
%%  and end in f-test
\nolig{Abstreiftest}{Abstreif|test}
\nolig{Ankauftest}{Ankauf|test}
\nolig{Hörprüftest}{Hörprüf|test}
\nolig{Hüpftest}{Hüpf|test}
\nolig{Impftest}{Impf|test}
\nolig{Kauftest}{Kauf|test}
\nolig{Klopftest}{Klopf|test}
\nolig{Kneiftest}{Kneif|test}
\nolig{Lichtschweiftest}{Lichtschweif|test}
\nolig{Rückruftest}{Rückruf|test}
\nolig{Schnupftest}{Schnupf|test}
\nolig{Sumpftest}{Sumpf|test}
\nolig{Tropftest}{Tropf|test}
\nolig{Wettkampftest}{Wettkampf|test}
\nolig{tofftest}{toff|test}
```

```
 % Impfstofftest Treibstofftests




\nolig{aftee}{af|tee}
 % Schlaftee
\nolig{auftee}{auf|tee}
 % Kreislauftee
\nolig{lauftest}{lauf|test}
 % Kreislauftest

\nolig{eiftie}{eif|tie}
 % Greiftiefe Steiftier
\nolig{eiftit}{eif|tit}
 % Eingreiftitel
\nolig{eiftr}{eif|tr}
 % Eingreiftruppe Nadelstreifträger
 % Greiftrupp -tier -training
\nolig{elieft}{elief|t}
 % Relieftäfelchen -tropfen -türme
\nolig{enftei}{enf|tei}
 % Senfteig

\nolig{ftabell}{f|tabell}
 % Ruftabelle
\nolig{ftablett}{f|tablett}
 % Schlaftabletten
\nolig{ftafel}{f|tafel}
 % Pfeiftafel
\nolig{ftag}{f|tag}
 % Tauftag Fünftagewoche
\nolig{ftäg}{f|täg}
 % fünftägig elfftägig zwölftägig
\nolig{ftalsg}{f|talsg}
 % schaftalsgrundig
\nolig{ftanz}{f|tanz}
 % Kampftanz Schilftanz
 \keeplig{ftanzahl} % Heftanzahl
 \keeplig{ftanzeig} % Luftanzeige
 \keeplig{ftanzieh} % Schwerkraftanziehung
 \keeplig{ftanzüg} % Haftanzüge
\nolig{ftänz}{f|tänz}
 % Tieftänzer
\nolig{ftari}{f|tari}
 % Anruftarif
 \keeplig{ftaristokr} % Zunftaristokratie

\nolig{ftarn}{f|tarn}
 % Wegwerftarnungen
\nolig{ftasse}{f|tasse}
 % Schürftasse
 \keeplig{ftassel} % Gruftasseln
\nolig{ftatb}{f|tatb}
 % Straftatbestände
\nolig{ftaten}{f|taten}
 % Kampftaten Straftaten
\nolig{ftätig}{f|tätig}
 % Schürftätigkeit
\nolig{ftauch}{f|tauch}
 % Beruftaucher Kreislauftauchgerät
\nolig{ftaugl}{f|taugl}
 % prüftauglich
\nolig{ftaume}{f|taume}
 % Nachruftaumel
\nolig{ftax}{f|tax}
 % Ruftaxi

\nolig{fteam}{f|team}
 % Jugendtreffteam Impfteam
 \keeplig{fteamt} % Streitkräfteamt
\nolig{ftechn}{f|techn}
 % Stampftechnik schlaftechnisch
 % Kraftstofftechnologie Pfeiftechnik
\nolig{ftedd}{f|tedd}
 % Schlafteddy
\nolig{fteich}{f|teich}
 % Schilfteich Dorfteich
 \keeplig{nfteich} % Zunfteiche
 \keeplig{ifteich} % Schrifteiche
\nolig{fteigw}{f|teigw}
 % Dampfteigwaren
\nolig{fteil}{f|teil}
 % fünfteilig Friedhofteil
 % Raumschiffteil Riffteil Stoffteil
\nolig{ftelef}{f|telef}
\nolig{fteleph}{f|teleph} % old spelling...
 % Wegwerftelefon Notruftelefonnummern
\nolig{fteller}{f|teller}
 % Schiefteller
\nolig{ftempel}{f|tempel}
 % Kauftempel
\nolig{ftemper}{f|temper}
 % Schlaftemperatur
```

```
\nolig{ftempo}{f|tempo}
 % Dauerlauftempo
\nolig{ftendenz}{f|tendenz}
 % Klassenkampftendenz
\nolig{ftentak}{f|tentak}
 % Greiftentakeln
\nolig{fteppi}{f|teppi}
 % Schaumstoffteppich Knüpfteppich
\nolig{ftermin}{f|termin}
 % Anpfifftermin Passagierschifferminal
 \keeplig{fterminder}
  % Gesellschafterminderheiten
\nolig{ftermit}{f|termit}
 % Kampftermiten
 \keeplig{ftermitt} % Rauschgiftermittler
\nolig{fterrain}{f|terrain}
 % Kampfterrain
\nolig{fterrass}{f|terrass}
 % Tuffterrassen
\nolig{fterrin}{f|terrin}
 % Kohlkopfterrine
\nolig{fterror}{f|terror}
 % Schadstoffterror
\nolig{ftestat}{f|testat}
 % Prüftestate
 \keeplig{ftestation}
  % Streitkräftestationierung
 \keeplig{ftestatist}
  % Lehrkräftestatistik
\nolig{fteuf}{f|teuf}
 % Dorfteufel Saufteufel
\nolig{ftext}{f|text}
 % Betrefftext Stofftextur Stegreiftexte
 \keeplig{ftextrakt} % Duftextrakt

\nolig{ftheat}{f|theat}
 % Stegreiftheater
\nolig{fthem}{f|them}
 % Wolfthema
 \keeplig{fthemm} % Wirtschafthemmnis
\nolig{ftheor}{f|theor}
 % -f-theorie -f-theorien
\nolig{ftherap}{f|therap}
 % Impftherapie Wurftherapie
 % Schröpftherapeut
\nolig{ftick}{f|tick}
 % Rückruftickets Diskuswurfticket
\nolig{ftief}{f|tief}
 % tieftief (?)
 \keeplig{ftiefigur} % Softiefigur
\nolig{ftier}{f|tier}
 % Wegwerftier Huftier
 \keeplig{haftier} % inhaftieren
 \keeplig{Muftier} % Muftierben
\nolig{ftipp}{f|tipp}
 % Surftipp
\nolig{ftirad}{f|tirad}
 % Schimpftirade
\nolig{ftisch}{f|tisch}
 % Schleiftisch
 \keeplig{stiftisch} % hochstiftisch
 \keeplig{ünftisch}  % zünftisch

\nolig{ftod}{f|tod}
 % Hanftod
 \keeplig{ftodem} % Giftodem
\nolig{fton}{f|ton}
 % Pfeifton Zwölftonmusik Rufton
\nolig{ftön}{f|tön}
 % Pfeiftöne Ruftöne
\nolig{ftool}{f|tool}
 % Prüftool
\nolig{ftopf}{f|topf}
 % Schleiftopf Dampf- Auspuff- Schöpf-
 \keeplig{ftopfer}
  % Duftopfer Gift- Haft-
\nolig{ftöpf}{f|töpf}
 % Senftöpfchen Torftöpfchen
 % Kunststofftöpfe
\nolig{ftorig}{f|torig}
 % schaftorig fünftorig
\nolig{ftour}{f|tour}
 % Streiftour

\nolig{ftrader}{f|trader}
 % Cheftrader
\nolig{ftradition}{f|tradition}
 % Ruftraditionen
\nolig{fträg}{f|träg}
 % Notrufträger
\nolig{ftrain}{f|train}
 % Lauftrainer
```

```
\nolig{ftränk}{f|tränk}
 % Rückruftränke Schaftränke
\nolig{ftransp}{f|transp}
 % Hilftransport Schaftransport
\nolig{fträume}{f|träume}
 % tiefträumend Tiefschlafträume
 \keeplig{afträume} % Einzelhafträumen
 \keeplig{äfträume} % Geschäfträumen
 \keeplig{rifträume}% Schrifträume
 \keeplig{ufträume} % Lufträumen
\nolig{ftrauri}{f|traurig}
 % tieftraurig
\nolig{ftreff}{f|treff}
 % Notruftreffen
\nolig{ftresor}{f|tresor}
 % Tieftresor
 \keeplig{ftresorp} % Luftresorption
\nolig{ftret}{f|tret}
 % Mieftreter
 \keeplig{ftrett} % Luftrettungsdienst
 \keeplig{ftreturn}% Softreturn
\nolig{ftrick}{f|trick}
 % Rückruftricks
\nolig{ftrieb}{f|trieb}
 % auftriebte schaftriebig
\nolig{ftrief}{f|trief}
 % tieftriefend
\nolig{ftrift}{f|trift}
 % schaftriftig Schaftrift
\nolig{ftrimest}{f|trimest}
 % fünftrimestrig zwölftrimestrig
\nolig{ftritt}{f|tritt}
 % Huftritte
 \keeplig{ftritter} % Kernkraftritter
 \keeplig{Luftritt}
\nolig{ftrott}{f|trott}
 % Sauftrottel

\nolig{ftrüb}{f|trüb}
 % tieftrübe
\nolig{ftrunk}{f|trunk}
 % schlaftrunken
\nolig{ftrupp}{f|trupp}
 % Prüftruppe

\nolig{ftuch}{f|tuch}
 % Schnieftuch Kopftuch
\nolig{ftüch}{f|tüch}
 % Schnieftücher
\nolig{ftürk}{f|türk}
 % tieftürkis
\nolig{fturm}{f|turm}
 % Wolfturm
\nolig{ftürm}{f|türm}
 % Wolftürme

\nolig{ftyp}{f|typ}
 % Schifftyp Stofftyp waldorftypisch
\nolig{ftyr}{f|tyr}
 % Dorftyrann Hoftyrann
\nolig{ftwist}{f|twist}
 % Kopftwister

\nolig{graftum}{graf|tum}
 % Burggraftum Markgraftum
\nolig{graftüm}{graf|tüm}
 % Markgraftümer

\nolig{hoftest}{hof|test}
 % Schlachthoftest

\nolig{iefta}{ief|ta}
 % Tieftaucher Brieftasche Brieftaube
\nolig{iefto}{ief|to}
 % Stieftochter Tiefton
\nolig{ieftö}{ief|tö}
 % Stieftöchter tieftönend
\nolig{ieftra}{ief|tra}
 % Tieftraumphase

\nolig{lfta}{lf|ta}
 % elftausend zwölftausend Golftasche
\nolig{lfto}{lf|to}
 % Zwölftonmusik Elftonner Golftour
\nolig{lftö}{lf|tö}
 % zwölftönend
\nolig{lftum}{lf|tum}
 % Werwolftum

\nolig{nftü}{nf|tü}
 % fünftürig Senftüte
 \keeplig{nftüb}
```

```
 % Vernunftüberlegung zunftüblich
  \nolig{nftübchen}{nf|tübchen}
   % Senftübchen

\nolig{ölfte}{ölf|te}
 % zwölfte zwölftens

\nolig{pft[aähioöruüy]}{pf|t}
 % Wettkampftag -trubel -tauglich -töne
 % Kampftaktik -truppe -tätigkeit -tänzer
 % Schnupftabak -tuch -tücher -tüchlein
 % Schimpftiraden Mehrkampftitel
 % Stapftiefe Zopfträger
 % Dampftopf Sumpftour Herzklopftöne
 % Kopftreffer -tuch -tücher
 % Impftabelle -tarif -tierarzt -tod
 \keeplig{pftheit}
 % Gedämpftheit Umkämpftheit
\nolig{pftee}{pf|tee}
 % Schlumpftee (?!)
\nolig{pfteig}{pf|teig}
 % Sumpfteig Hefetropfteig
\nolig{pftender}{pf|tender}
 % Heißdampftenderlok

%\nolig{rftrag}{rf|trag}
 % Wegwerftragtasche Dorftragödie

\nolig{rftr}{rf|tr}
 % Wurftraining Surftrip Freiwurftreffer
 \keeplig{tdurftrö} % Notdurftröhre
 \keeplig{Werftr}  % Werftreparatur
 \keeplig{werftr}
  \nolig{werftrage}{werf|trage}
  % Wegwerftragetasche
\nolig{rftu}{rf|tu}
 % Wurftuch
 \keeplig{Werftu}
 \keeplig{werftu}
  % Werftumfeld Werftunternehmen

\nolig{uftas}{uf|tas}
 % Ruftaste Vorlauftaste Kauftasche
 \keeplig{Duftas} % Duftaspekte
 \keeplig{duftas}
 \keeplig{Gruftas} % Gruftassel
 \keeplig{gruftas}
 \keeplig{Luftas} % Luftasket
 \keeplig{luftas}
 \keeplig{uftassoz}
 % Duftassoziationen Schuftassoziationen

\nolig{urfta}{urf|ta}
 % Wurftalent Auswurftaste Surftalent
 \keeplig{tdurfta} % Notdurftanlage
\nolig{urfto}{urf|to}
 % Freiwurftor Surftour

\nolig{ünftor}{ünf|tor}
 % fünftorig Fünftore-Vorsprung



% 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 names of *non-German*
 % origin for which the 'fk' ligature
 % shouldn't be suppressed:
 \keeplig{Kafka}
 \keeplig{kafka}
 \keeplig{Piefke}
 \keeplig{piefkei} % Ostpiefkei
 \keeplig{Safka}
 \keeplig{Potrafke}
 \keeplig{Sprafke}
 \keeplig{Shirafkan}
 \keeplig{Tirafkan}
 \keeplig{Selfkant}


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

```
% Suppress this ligature globally. Words
% of German origin seem to feature 'fj'
% only across morpheme boundaries.

\nolig{fj}{f|j}
 % aufjauchzen aufjaulen fünfjährig Kampfjet
 % Strafjustizgebäude Dorfjugend Kopfjäger ...

 % Once more, though, there are some words of
 % *non-German* (e.g., Nordic and Slavic)
 % origin for which the 'fj' ligature should
 % not be suppressed. Use \keeplig macros to
 % treat such cases.
 \keeplig{fjord} % Norwegian
 \keeplig{fjör} % Icelandic, e.g.,
        % Isafjördur and Ísafjörður
 \keeplig{Ísafjarðarbær} % city in Iceland
 \keeplig{fjell} % Norwegian
 \keeplig{fjall} % Swedish (?)
 \keeplig{fjäll}
 \keeplig{fjöll}
 \keeplig{Prokofjew}
 \keeplig{Sufjan} % Stevens
 \keeplig{Eefje} % Dutch first name
 \keeplig{Astafjew}
  % Author (Wiktor) and soccer player (Maksim)

% 11. fff -> ff-f
% ---------------
 % Just in case there's a font that
 % features a triple-f ligature:

\nolig{fff}{ff|f}
 % grifffest Stofffarbe Schifffahrt

 % This macro will also break up any 'fffl'
 % ligatures into 'ff' and 'fl' parts.
 % Examples: Sauerstoffflasche Stofffleck
 %      Schliffläche Kunststoffflügel
```

C The package's main style file: selnolig.sty

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

% 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{0.214b}
\def\selnoligpackagedate{2013/05/22}

% Announce who we are. Issue warning message if we're
% not running under LuaLaTeX.

\typeout{=== Package \selnoligpackagename,
      Version \selnoligpackageversion,
      Date  \selnoligpackagedate ===}
\ProvidesPackage{selnolig}[\selnoligpackagedate]

\RequirePackage{ifluatex}

\ifluatex
 \RequirePackage{luatexbase,luacode,expl3}
\else
 \typeout{ ======================================== }
 \typeout{   WARNING  WARNING  WARNING   }
 \typeout{ ---------------------------------------- }
 \typeout{ The ligature suppression macros of the }
 \typeout{ selnolig package *require* LuaLaTeX.  }
 \typeout{ Because you're NOT running this package }
 \typeout{ under LuaLaTeX, ligature suppression  }
 \typeout{ *can not* be performed.        }
 \typeout{========================================}
\fi


% If the 'fontspec' package isn't loaded by the time
```

```
% the '\begin{document}' directive is encoutered, issue
% an error message and exit.

\AtBeginDocument{%
\ifluatex
 \@ifpackageloaded{fontspec}{}{%
 \PackageError{selnolig}{%
  ========================================= \MessageBreak
    Error Alert   Error Alert     \MessageBreak
  ----------------------------------------- \MessageBreak
  The selnolig package *requires* the     \MessageBreak
  'fontspec' package, but it hasn't been   \MessageBreak
  loaded. Exiting now.            \MessageBreak
  =========================================}
 }
\fi
}

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

% The main language options are 'english' and 'german'.
% We provide the option 'otherlang' option just in case
% a user 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}
% synonymous option:
 \DeclareOption{otherlanguage}{\@otherlangtrue}


% For English, the default is to load only a fairly basic
% set of non-ligation rules pertaining to f-ligatures.
% Among them are the "standard five" (ff, fi, fl, ffi,
% and ffl) ligatures as well as the ft ligature.
%
% Two options to override this "basic" setting:
% - broadf  Many more non-ligation rules for f-ligatures,
%      incl. fb, fh, fj, and fk character pairs.
% - hdlig   Additional ligature suppression 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@broadfset\@broadfsetfalse
\DeclareOption{broadf}{\@broadfsettrue}

\newif\if@hdligset\@hdligsetfalse
\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@addlhyph\@addlhyphtrue
\DeclareOption{noadditionalhyphenationpatterns}{\@addlhyphfalse}


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

\DeclareOption{basic}{\@broadfsetfalse\@hdligsetfalse}


% Last but not least, an option to set all Boolean
```

```
% variables (other than '@addlhyph') to 'true'
% simultaneously.

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

% Finally, process all options
\ProcessOptions\relax



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

\ifluatex
 % Load the lua code contained in 'selnolig.lua'.
 \directlua{ require("selnolig.lua") }

 % Commands to switch selnolig's routines on and off
 \newcommand\selnoligon{
  \directlua{ enableselnolig() }
 }
 \newcommand\selnoligoff{
  \directlua{ disableselnolig() }
 }

 % By default, selnolig's macros are switched on
 \selnoligon

 % Record operations of selnolig package to the log
 % file: Enabled via '\debugon' command
 \newcommand\debugon{%
  \directlua{ debug=true }
 }
 \newcommand\debugoff{%
  \directlua{ debug=false }
 }


 % The first 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 by \nolig instructions:
 \newcommand\keeplig[1]{
  \directlua{
   always_keep_liga( "\luatexluaescapestring{#1}" )
  }
 }

\else
 % If *not* running under LuaLaTeX, provide dummy
 % definitions for package's user macros.
 \newcommand{\nolig}[2]{}
 \newcommand{\keeplig}[1]{}
 \let\selnoligon\relax
 \let\selnoligoff\relax
 \let\debugon\relax
 \let\debugoff\relax
\fi


% A third user macro: '\breaklig'. This is hopefully
% easier to remember than having to type "\-\hspace{0pt}".
% (It's defined outside the \ifluatex conditional since
% it doesn't use any lua code.)

\newcommand\breaklig{\-{\hspace{0pt}}}



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

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

 % load additional hyphenation exception patterns
 \if@addlhyph
  \RequirePackage{selnolig-english-hyphex}
 \fi
\fi
```

```
% Part 4: What to do if the 'ngerman' option is set
% ------------------------------------------------

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

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


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

\if@otherlang
  % currently nothing included
\fi
```

D 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: 2013/05/22
--
-- 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".

selnolig = { }
selnolig.module = {
 name     = "selnolig",
 version   = "0.214b",
 date     = "2013/05/22",
 description = "Selective suppression of typographic ligatures",
 author    = "Mico Loretan",
 copyright  = "Mico Loretan",
 license   = "LPPL 1.3 or later"
}

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

 -- Problem: string.find and unicode.utf8.find return
 -- the byte-position at which the pattern is found
 -- instead of the character-position. Fix this by
 -- providing a dedicated string search function.

local unicode_find = function(s, pattern, position)
 -- Start by correcting the incoming position
 if position ~= nil then
  -- debug_info("Position: "..position)
  sub = string.sub(s, 1, position)
  position=position+string.len(sub) - unicode.utf8.len(sub)
  -- debug_info("Corrected position: "..position)
 end
 -- Now execute find and fix it accordingly
 byte_pos = unicode.utf8.find(s, pattern, position)
 if byte_pos ~= nil then
  -- "convert" byte_pos to "unicode_pos"
  return unicode.utf8.len( string.sub(s, 1, byte_pos) )
 else
  return nil
 end
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= unicode_find(noliga[v[3]],"|")
   local correction=1
   while c~=nil do
```

```
    --debug_info("Position "..(v[1]+c))
    p[v[1]+c-correction] = 1
    c = unicode_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 nolig 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
   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]=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 nolig 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

function enableselnolig()
```

```
 luatexbase.add_to_callback( "ligaturing",
  process_ligatures, "Suppress ligatures selectively", 1 )
end

function disableselnolig()
 luatexbase.remove_from_callback( "ligaturing",
  "Suppress ligatures selectively" )
end
```

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

```
% !TEX TS-program = lualatex
% selnolig-bugreport.tex, 2013/05/21

\documentclass{article}
\usepackage[margin=1in]{geometry}
\usepackage{fontspec}
% Choose a different font if desired:
\setmainfont{EB Garamond 12 Regular}

% 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
 % these macros are defined in selnolig.sty

\subsection*{Type-I errors: Words that contain ligatures that should be suppressed}

[List words here]

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

[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}
```