Technical Notes on FLEx Dictionary Printing and Export

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January 9, 2024

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1 Introduction

FLEx provides multiple ways for users to export and/or print their dictionary data. Some options simply export the data in some format that could be shared with others. Some options are designed for producing online or printed dictionary data configured using dictionary configuration options. Some options allow formatted data to be output to a file which can then be edited prior to actual printing. It's also assumed that any Print process can be redirected to a PDF rather than a printer using Microsoft Print to PDF, PrimoPDF, etc. Print options vary in the kind of page headers/footers that are available, including guidewords to help users find dictionary entries on a page. Some options allow double-column and some don't. Some options bog down badly on larger dictionaries.

2 Print formatted dictionary

Prior to printing, in Lexicon Edit, make sure you are sorting on headword. If you sort on fields other than headword, lexeme form, or citation form, it will print in that order but will not include alpha headers. You may also want to filter the results in some way. For example, by using regular expressions, you could filter for ^[a-c] to print all entries starting with a through c. Or you could filter for ^a[a-k] to print all entries starting with aa through ak. Typically, you should make sure no filters are active so that you print everything. However, large dictionaries may run into limitations with software processing the export. The amount of memory on your machine may also limit the size you can handle in one export. Breaking the dictionary into multiple exports can provide a work-around in these cases. Even if a referenced entry is not included in the range of exported entries, the entries in the range will still be complete.

FLEx provides multiple dictionary views, or configurations that can be accessed and modified by right-clicking a dictionary view and choosing Configure Dictionary View, or via Tools…Configure…Dictionary. For technical users, holding Ctrl while right-clicking an entry gives an Inspect entry option that shows the guid of the entry and the xhtml that is generated for this entry. You can also create additional publications in Lists…Publications. Then you can choose which entries, senses, and examples you want to exclude from a particular publication.

Once sorting and filters are set appropriately, go to the Dictionary view and select the desired Publication using the combo selector on the left side of the title bar, and the desired View using the combo selector on the right side of the title bar. Then you can use one of the print or export options to complete your job.

2.1 File…Print…

The quickest way to get a printed copy of a dictionary is to go to the Dictionary view and then use File…Print. This will print the sorted, filtered, and configured view to a printer or to PDF. This prints single-column with fixed page headers and footers. In FW9.1.4 a feature was added that allowed printing all tabs instead of just the current tab. If there is more than one tab in the document view, File…Print will bring up a "Generate all entries before printing" dialog. If you click No, it will print the single tab. If you click Yes, it will generate the entire dictionary in one view for printing.

In FW9.1.14, a new feature was added to the print process to print really large dictionaries that were running out of memory. If your dictionary is not over 10,000 entries, it will print directly to the printer using the normal print dialog. If it is over 10,000 entries, the printing will go into a PDF file using an approach to avoid running out of memory. When done, the PDF file will be opened in your PDF viewer, or your selected reader, which could be Microsoft Edge. The PDF file can then be printed from there. The PDF file is written to %temp%\FieldWorks_Print.YYYY-MM-DD, PPPP.pdf with the date and total number of pages in the file name. The point where it switches to a PDF file can be controlled by an environment variable (FIELDWORKS_PRINT_LIMIT) with a value of the number of entries where it will switch to PDF mode. Dictionary reversals use this same print feature.

The header contains the dictionary name at the left, and the full path of the file being printed in the temp directory on the right. The footer has P of TP (e.g., 1 of 100) on the left and a timestamp on the right. Printing breaks a page without any orphan/widow control. The Print dialog will normally allow you to print a selected range of pages, although it doesn't reduce the processing time very much.

Advantages:
- Simple to use.
- Good for proofreading and marking up corrections.
- FW9.1.4 and later will print the full dictionary in one pass.
- FW9.1.14 and later will print very large dictionaries to a PDF.

Disadvantages:
- Cannot control headers/footers
- Cannot use double columns

2.2 Pathway (various outputs)

Pathway https://software.sil.org/pathway/download/) is an add-on to FLEx that provides dictionary/reversal exports to several programs. Although Pathway is not officially supported at this point, it still provides the best print options in FLEx. Install Pathway 1.18.1 or later for FieldWorks 9, since earlier versions had some bugs that have been fixed in this version.

Pathway has standard editions and beta editions. InDesign and XeLa Tex exports are not fully developed, but are considered experimental, and thus they are only available in the beta editions. Pathway also comes in a translation (BTE) version if you want to use it for scripture, and a standard (SE) version if you will only be using it with FLEx. Note that the installed version number does not distinguish between the standard and beta versions.

Beta versions offer all of the following options (when supporting software is installed) while the Standard version omits the 2 beta options.

- Browser (HTML5)
- DictionaryForMIDs
- E-Book (Epub2 and Epub3)
- InDesign (beta)
- OpenOffice/LibreOffice
- Pdf (Using Prince)
- XeLa Tex (beta)

The big green bar at this site is the standard edition of Pathway (PathwaySE-Setup-1.18.1.5997.msi), To use the InDesign or XeLa Tex exports, you should install the Pathway Beta Standard Edition 1.18.1 (PathwaySE-BetaSetup-1.18.1.5997.msi) link under Windows other versions. The installed version number is identical between the standard and beta versions.

The above installers will not install any additional software that some Pathway options require, such as LibreOffice and Prince. There are older Pathway Bootstrap programs at (https://software.sil.org/pathway/download/older-versions/) that attempt to install this additional software, which may still work. Or you can just install the software you need directly.

In FLEx, choose File…Export…Dictionary, Reversal Index Pathway (various outputs) to export via Pathway. This brings up an Export Through Pathway dialog. You can choose between various destinations including OpenOffice/LibreOffice, Pdf (via Prince), etc. After selecting the Destination, you can choose between multiple stylesheets, including FieldWorksStyles, TwoColumn, etc. Next, click More and choose options in several tabs. As a minimum, you need to add a Title. Click the checkbox for complying with copyrights, then click OK to produce the export. This creates a folder with the style and date in Documents\Publications\<projectname>\Dictionary\. An xhtml export is made in this folder for the dictionary and an optional first analysis reversal index. It is then processed depending on the destination, and the results opened in the selected output program.

Pathway provides default stylesheets which you can customize, and you can create your own stylesheets. Pathway Configuration Tool is a separate program in the Start menu that lets you modify, add, or delete stylesheets. FLEx Tools…Configure…Dictionary determines how fields are formatted in the body of an entry as well as the basic indents for entries. Pathway Configuration Tool allows you to configure the page settings (e.g., page size, page margins, number of columns, header and footer info, etc.).

When you export via Pathway, an archive file of your current project and publication is made for REAP (SIL Repository for Electronic Archiving and Publishing). A RAMP file is included in the output directory which allows you to upload your data to REAP. FLEx provides a File…Archive with RAMP option for uploading this file to REAP. See https://www.sil.org/about/news/ramp-new-resource-archiving-language-and-culture-research for information on RAMP.

Advanced

In Pathway Configuration Tool, you can add custom css style rules for a new stylesheet that you create. When you create a new stylesheet, it makes a copy of the selected stylesheet, and a style element is added to "%LOCALAPPDATA%\SIL\Pathway\DictionaryStyleSettings.xml" with the name you specified. In that element, the file attribute lists the name of the custom style sheet in the SIL\Pathway\Dictionary directory. In that .css file, after the @ line, you can add custom css rules that will be used when using this style. Caution! If you add custom style rules and then make a change to the stylesheet Pathway Configuration Tool, it will wipe out your changes. So be sure to keep a backup copy.

In the Export Through Pathway dialog, when you click More, and go to the Processing Options tab, there is a "Preprocessing Transformation" box that allows you to check one or more xslt transformations that will be applied after CssSimpler is run. These xslt transforms are in c:\Program Files (x86)\SIL\Pathway\Preprocessing\Dictionary directory. Transforms that show in the dialog have 8.3.x in the process element of byVer.xml. If you want to add additional

transforms in the dialog, you can put the transforms in
"%LOCALAPPDATA%\SIL\Pathway\Dictionary directory.

If you need to do something special to solve a problem, Pathway provides a way to interrupt the process after FLEx exports the data, and runs a CssSimpler program over the data and stylesheet to flatten FLEx's hierarchical styles and so they can be used by LibreOffice, etc. In HKCU\Software\SIL\Pathway you can add a string variable PathwayExportBatch with true or any other value. During an export, this will create PathwayExport.bat in the exported document directory and stop after CssSimpler is run. You can make any changes you need to make, then run PathwayExport.bat to complete the process. You can also add a special batch file that gets called to do special processing once the html/css files have been exported and processed via CssSimpler. To do this, add a Process directory under Documents\Publications\<ProjectName>\Dictionary and insert BeforePwExport.bat which will then be called between when FLEx lets go and PathwayExport is run. You can put a pause or other commands in the batch file as needed.

Advantages:
- Pathway provides various options for formatting page layout including headers with guidewords (headwords for first and last entries on a page).
- You can include the dictionary and one reversal index in the same export.

Disadvantages:
- Pathway may not have further development, so the chances of having bugs fixed are not good. Some issues can be worked around with various techniques.
- Pathway fails to interpret some newer css rules, so all outputs, including conversion of xhtml to Word, will ignore those rules.
- Pathway can only handle one reversal index. If you have more than one, you'll have to do separate exports for the additional indexes and then merge them into the final output.

2.2.1 OpenOffice/LibreOffice

When you choose OpenOffice/LibreOffice from the Export Through Pathway dialog, the output is a LibreOffice Writer file which allows you to do further editing after the export. LibreOffice also provides options for printing to a printer, and exporting as a PDF or a Microsoft Word file.

When done, the output directory contains main.odm which is a master LibreOffice document that references main.odt, containing dictionary data, and FLExRev.odt, containing the first analysis reversal index. It also contains a .ramp file that can be used to archive this publication in REAP.

When LibreOffice opens, it asks about updating links. Normally reply Yes to this. This loads the .odt files into the .odm file. Pathway uses macros to produce proper page headers with guidewords. For this to work, you need to set LibreOffice to Medium or Low security. By default, it will be High. To set it, use Tools…Options…LibreOffice…Security, click Macro Security, and choose the level you want. With Medium security, it will ask every time before executing macros, and you'll need to click "Enable Macros" to continue. If you choose Low, it will automatically execute macros without asking. If you save the document at this point, the entire document will be in main.odm, which can be passed to people wanting a copy of the publication.

Pathway adds many custom styles for formatting the document to look similar to the configuration settings in FLEx. If you go to Styles…Manage Styles, you can see the various styles. The buttons at the top choose between character, paragraph, page, etc. If you change a style in this window, it will affect every place that style is used in the document.

Use File…Print to print the document. Use File…Export…Export As…Export as PDF to save the document as a PDF. PDF files generally match the LibreOffice Print output. Use File…Save As and choose to save the document as a Word file. The Word document maintains the styles, but has some anomalies, such as guidewords not working.

Advantages:
- It includes the dictionary and optional reversal index in a single file as well as an optional table of contents.
- The output is a LibreOffice file which can be edited after exporting from FLEx.
- Styles are used in the export, so you can modify a style in the LibreOffice style sheet to change formatting.
- LibreOffice can print the dictionary, export it to a PDF file, save it to a Microsoft Word file, as well as various other options.
- It can produce single or double column text including guidewords in the headers.
- Pictures are included in the LibreOffice document, but will likely need adjusting.

Disadvantages:
- LibreOffice 64-bit works much better than older versions. It still takes time, but I exported a 30,520 entry lexicon into LibreOffice in 27 minutes resulting in 6,512 pages.
- LibreOffice occasionally gives incorrect guidewords, particularly before alpha headers, and it can be very challenging to fix. To fix this, you need to go into View...FieldNames mode, go to the last entry before the alpha header, right-click Set variable Left_Guideword_L=xxx to the headword for the first entry after the alpha header. Then when you uncheck View...FieldNames, after everything catches up, you should see the correct guideword. Unfortunately, when it goes back out of this mode, LibreOffice repaginates the whole document, often breaking at significantly new locations, which may mess up all of the fine tuning you've done prior to that.
- Links for sound recordings appear in LibreOffice, but they cannot be played from LibreOffice.

2.2.2 Pdf (Using Prince)

When you choose Pdf (Using Prince) from the Export Through Pathway dialog, the output is a PDF file produced through the Prince program.

Advantages:
- The output is a PDF file of the dictionary with page headers with guidewords.

Disadvantages:
- The export does not include a reversal index.
- Unless you pay for Prince, the output has a Prince logo at the top right corner of the PDF output.

- Being a PDF file, you cannot fix any irregularities, unless you have a program for editing PDF files, and it's unknown how useful these programs might be in fixing problems.
- On a Moore project with thousands of pictures and sound files, it did not produce a PDF file for some reason.

2.2.3 InDesign

Adobe InDesign is a powerful commercial program for typesetting, typically used in SIL for Scripture publications, and can also be used for dictionaries, although at this point our support for dictionaries in InDesign is limited. The InDesign export from Pathway is considered experimental because it was never tested and debugged adequately. As a result, it is only available in the beta versions of Pathway.

There are basically two ways to export data from FLEx and import it into InDesign. First, Pathway provides an InDesign export option. Second, Pathway provides a way to import into Microsoft Word, and InDesign does a reasonably good job of importing from Word. Recent experience would favor the Word approach. Both approaches are discussed below.

Advantages:
- Provides high quality printing of large projects.
- Provides powerful editing capability to customize as desired.
- Provides powerful Find/Change option including regex to fix problems.
- Pictures are imported, but will need manual adjusting.
- Allows full control for including title pages, grammar notes, appendices, etc.
- Even though it can take hours for an initial import, InDesign is not using much memory, but may fail on really big dictionaries. Breaking the process into multiple exports can help with this.

Disadvantages:
- Importing an idml (InDesign Markup Language) file from FLEx into InDesign can take hours, but once saved as an indd file, it opens in less than a minute. At least in InDesign 6.0, during the long import process, which includes running macros, the progress dialog doesn't indicate progress. As long as the CPU is still working in Task Manager, it's probably not stuck, and will probably complete. (I waited 120 hours for a really large dictionary before giving up and cancelling the process.)
- A macro for adjusting page frames, including adjustments for full page alpha headers, and setting guidewords is used on initial loading. The guidewords may not come out correctly on import, but it may be a simple fix to correct this in the master tables for pages in InDesign. This macro works on InDesign 6.0, but not more recent versions.
- It's expensive if your entity is not already using it. Approximate cost is $240/year or $32/month. Many SIL entities already have InDesign for Scripture publication.
- The current export assumes InDesign 6.0 CS4, which is old. The macros will not work on newer versions..
- If InDesign is installed on the computer, on export, Pathway installs the 6.0 macros in a Scripts directory under %APPDATA%\Adobe\InDesign\Version 6.0\en_US. If you export to InDesign on a machine without an installed InDesign, and then open

the .idml file on another machine, it will be a mess because the macros have not been run.

2.2.3.1 Import to InDesign from Pathway InDesign Export

This export option is only available when the beta version of Pathway is installed. The export generates an InDesign Markup Language .idml file. The export can be made whether or not InDesign is installed on the computer. If it's not installed, after the export it brings up a dialog asking how to open the .idml file. This file can be opened in any version of InDesign, but it is a very slow process.

After Pathway does an InDesign export, it adds or overwrites the following file. %AppData%\Adobe\InDesign\Version 6.0\en_US\Scripts\Startup Scripts\PlaceFrames.jsx and then attempts to open the .idml file in InDesign. If you have InDesign 6.0 installed, it will run this script on the imported data to flow the data into text frames on as many pages as needed. It will format the alpha headers with full page width, and generate guide words on all pages. Newer versions of InDesign will not find and use this script. The data will still be loaded into frames, but all of the frames are on top of each other on one page. The same thing can be seen in InDesign 6.0 by renaming the Scripts directory under en_US which will disable the scripts from being executed.

2.2.3.2 Import to InDesign from Microsoft Word via Pathway.

The first step in this process is to convert a Flex xhtml export to Micrsoft Word using the process described in 2.2.5 Export to Microsoft Word. When creating a Word document for import into InDesign, it is not necessary to follow any of the steps in the Notes section, since these steps need to be made in InDesign instead.

2.2.4 XeLaTeX

TeX is a powerful free program for typesetting all types of data. However, it takes a high degree of skill to use it. Work has been done to support exporting to XeLaTeX format, but it was never polished up for releasing in Pathway. It was developed around software From TeX Live (https://www.tug.org/texlive/).

2.2.5 Export to Microsoft Word

Pathway does not support a direct export to Microsoft Word. However, it does provide a way to convert an xhtml export from FLEx into a Microsoft Word document. For details on this process, and using Word features to format dictionaries including right-to-left layouts, see https://downloads.languagetechnology.org/fieldworks/Documentation/Publishing%20FLEx%20Dictionaries%20Using%20Microsoft%20Word%20via%20Pathway.pdf.

Advantages:
- The output is a Word document which can be edited after exporting from FLEx.
- Styles are used in the export, so you can modify a style in the Word style sheet to change formatting.
- Word can print the dictionary, or save it to PDF or other file formats.
- Pictures are included in the Word document, but will likely need adjusting.

Disadvantages:
- Links for sound recordings appear in Word, but they cannot be played from Word.

2.3 Print Web page (XHTML)

In FLEx, File…Export…Configured Dictionary Web page (XHTML) exports a dictionary to an .xhtml file. It works best creating a folder for this, as it will also include two .css style sheet files, and pictures and AudioVisual subfolders with picture and sound files in the same folder as the xhtml file.

File…Export…Reversal Index Web page (XHTML) works the same as the dictionary export, but exports the current reversal index to an .xhtml file.

The resulting xhtml file can be opened in a browser to display the formatted dictionary including pictures and sound file links that work. You can print this out using the browser print capability. On really big dictionaries, the browser may run out of memory generating the preview.

Browsers typically have print options that may provide something desirable. For example, in Chrome you can chose to print 2 pages per sheet and not show headers and footers. In Chrome, when you change the pages to print, it starts loading the preview all over, which takes about 15 minutes regardless how many pages you actually choose to print, so make your choice early on so that you only have one long wait.

For really large dictionaries see 2.1 File…Print.

Advantages:
- The output is nicely formatted.
- Pictures and working audio links are included.
- It has live links to referenced words.
- When printing (including printing to PDF, the browser will supply headers and footers with fixed content for page breaks.
- It provides a convenient single-column printout for proofing.
- The whole dictionary is exported in one file.
- Even on a large 30K entry dictionary with 81Mb xhtml file, it loads in Chrome and is very responsive for searching, jumping to linked words, scrolling, etc. once it has fully loaded (1.5 min. using 3.4Gb memory).
- The XHTML file can be converted to a Word document where you can do customizations in many areas (see 2.2.5 Export to Microsoft Word).

Disadvantages:
- You cannot control page headers and footers.
- Copying sections and pasting them into Word or LibreOffice fails to include any of the formatting controlled by the .css style sheets.
- Large dictionaries may overwhelm the browser, especially when printing.

2.4 TshwaneDJe Software

TshwaneDJe Software provides a TLex suite (https://tshwanedje.com/tshwanelex/) for dictionary compilation and printing. TLex is a powerful commercial program that can edit and print very large dictionaries with complex formatting.

Advantages:
- High quality printing of very large dictionaries.
- TLex allows editing dictionaries prior to publication.

Disadvantages:
- Price for the software is $171 - $2495 depending on the purchaser and support provided.
- FLEx data conversions are supported into TLex. They claim that conversions typically handle 95% of the process, with some complex issues requiring cleanup after conversion.
- Cost of conversion from FLEx to TLex depends on the number of hours with an hourly rate of 40 Euros (around $48) per hour.
- Any work in TLex requires learning new software.
- Converting from TLex back to FLEx may not be easy.

2.5 Microsoft Publisher

Microsoft publisher is a good program for editing small brochures and publications. It is less useful for bigger publications. However, if you want to include some data from FLEx, the following steps may produce useable results.

1. Follow 2.2.5 Export to Microsoft Word instructions.
2. Start Publisher
3. Choose BUILT-IN tab
4. Select Import Word Documents…Insert…Insert File
5. Choose Blank page option at top. Make desired selections on right.
6. Click Create and choose the docx file from step 4.
7. The result will be a publisher file with multiple pages with the entries formatted similar to how they were in FLEx. This will include alpha headers, but no page numbers or guidewords.
8. The spacing between records is wide. Use Ctrl+A to highlight the first page, then Home…Paragraph, set Between lines to 1sp, and before/after line spacing to 0. This change will affect all of the pages of the Word import.

Advantages:
- This may provide a way to append a limited set of dictionary entries to a Publication already in Publisher.
- Entry formatting is similar to FLEx including alpha headers

Disadvantages:
- Guidewords are not supported.
- Pictures and sound are not supported.
- Not all formatting from FLEx is supported.

3 Publish formatted dictionary to Internet

Webonary (https://www.webonary.org/) is the primary Internet site maintained by SIL for publishing dictionaries on the Internet. Over 300 dictionaries have been published on this site so far. FLEx provides a convenient way to publish dictionary data on Webonary.

In Webonary, pages are available for

- Explaining aspects of the dictionary,
- Searching for entries in several ways,
- Browsing dictionary entries and multiple indexes based on letters of the alphabet,
- Appendices, and
- Downloading

To obtain a Webonary account for your dictionary, use the Sign Up tab on the website to apply for a Webonary account. Your data from FLEx can then be uploaded to your Webonary site multiple times, as needed. You'll then need to add web content for the additional information via WordPress.

3.1 Upload to Webonary

The preferred way to upload your data, to Webonary is File…Upload to Webonary… which opens the Upload to Webonary dialog in FLEx. The upload process will upload the data using the current dictionary sort and filter, so before going to the dialog, make sure you have filters and sorting set as desired. Normally you should have the dictionary sorted on the Headword field. Note the Upload to Webonary menu is disabled if you are not in the Lexicon area in FLEx.

In the Upload to Webonary dialog, you give the Webonary site name and your Webonary username and password. Then select the Publication you want to use (controls which entries, senses, and examples to include), and Dictionary View (controls the formatting of dictionary entries), and check boxes to indicate the dictionary and reversal indexes you want included. Then click the Submit button. This will upload the data to your Webonary site.

In FieldWorks 9.0 and earlier, the upload process produces a .zip file in your %temp% directory containing the xhtml exports, style sheets, audio, and picture files, and then this file is uploaded to Webonary and it is converted into WordPress posts and indexed. This approach also allows you to customize what's in the zip file and then send it to Webonary via a curl command.

In FieldWorks 9.1 a new API approach was implemented to speed up the upload and make it more reliable. In this version, when you type in the Webonary Site name, underneath the edit box it has 'cloud-api' in the URL. Instead of exporting XHTML files, it generates JSON data that is uploaded directly to Webonary via a new Webonary API. The upload is much faster because it is not writing data to the disk, and the slow processing in Webonary is no longer needed. This process does not allow any post-processing prior to uploading, which may be an issue in some cases.

At least as of this writing, a couple environment variables allow switching between these methods when using FW9.1. Environment variable WEBONARY_API in FW9.1 is set during install to true. If changed to false, or removed, it uses the older upload approach. Optional environment WEBONARYSERVER can be set to webonary.work to upload to a test site instead of the default production webonary.org site. Also as of now, in addition to uploading JSON to Webonary, FLEx also uploads display xhtml for each entry which is used for displaying entries in Webonary. A future goal is to have Webonary create this display xhtml on the fly from the JSON so that we don't have to upload and store it during upload to Webonary.

Advantages:
- It's easy to upload a dictionary and indices to webonary, and it can be repeated as often as you want to keep it current.
- Entry formatting is similar to FLEx
- Pictures and sound links are supported.

Disadvantages:
- The data on webonary is displayed in one way, based on the upload. The user can't adjust the display to show only fields in which they are interested.
- Searching does not allow for limiting the search to selected fields.

3.2 Dictionary, Reversal Index Webonary

File…Export…Dictionary, Reversal Index Webonary is simply an alternate way to get into the Upload to Webonary dialog.

4   Export data for Browsers

4.1 Configured Dictionary and Reversal Web page (XHTML)

File…Export…Configured Dictionary Web page (XHTML) exports a dictionary to an .xhtml file. It works best creating a folder for this, as it will also include two .css style sheet files, and pictures and AudioVisual subfolders with pictures and sound files in the same folder as the xhtml file.

File…Export…Reversal Index Web page (XHTML) works the same as the dictionary export but exports the current reversal index to an .xhtml file.

If you export to a folder, you can copy that folder to other locations and the xhtml files will still display correctly. In other words, the xhtml file is using relative links to the stylesheets and audio/picture files so the directory will work wherever it is located. Browsers will typically handle large dictionaries, supporting sound links, pictures, links to referenced entries, etc., so it provides a nice way to search and read the dictionary from within a directory. The directory can be zipped up and shared with others.

See Section 2.3 for more details, especially for printing purposes.

4.2 Pathway options for Phones and tablets

Pathway features are discussed in Section 2.22.2. These Pathway options are available for phones and tablets.

4.2.1 Browser (HTML5)

In FLEx, choose File…Export…Dictionary, Reversal Index Pathway (various outputs) to export via Pathway. This brings up an Export Through Pathway dialog. Choose Browser (HTML5) to produce this export. The result in the output directory is an HTML5 folder with an index.html file that you should launch in a browser (designed for a mobile device) that provides access to the exported dictionary. It contains a pane on the left side with an alphabet that expands to show the headwords for each letter, and when you click an entry, it switches to show the full entry in the main window. There is also a Search box to type a headword and then jump to the display. A

menu offers a Browse view that gives forward and back buttons that let you go through consecutive entries to see their content. The output folder also contains a zipped copy of the HTML5 directory that can be copied to a device where it can be unzipped.

4.2.2 Dictionary For MIDs

In FLEx, choose File…Export…Dictionary, Reversal Index Pathway (various outputs) to export via Pathway. This brings up an Export Through Pathway dialog. Choose Dictionary For MIDs to produce this export. The result in the output directory is a zip file that can be installed on Android, Java Micro Edition, and Java Standard Edition devices, and any phone, PC, or other device with an HTML5 web browser.

Dictionary for MIDs is designed for simple topical dictionaries, and monolingual or bilingual dictionaries. You can learn more about this format at http://dictionarymid.sourceforge.net/what.html. The file that is installed on the device is a .zip file containing a .jar and .jad file.

4.2.3 E-Book (Epub2 and Epub3)

In FLEx, choose File…Export…Dictionary, Reversal Index Pathway (various outputs) to export via Pathway. This brings up an Export Through Pathway dialog. Choose E-Book (Epub2 and Epub3) to produce this export. The output directory will have two directories, Epub2 and Epub3. Each directory contains one .epub file and a folder containing content, one for Epub2 and the other for Epub3. When this is launched, you'll have an index of words and a formatted dictionary. When you click a word in the index, it displays the desired word somewhere in the window with entries before and after this word so that you can scroll up or down to see words in this area.

Advantages:
- This provides a way to view a dictionary and use an index to find words in an E-Book reader
- At least the Calibre view has a Search box that finds and highlights a word.
- Entry formatting is similar to FLEx

Disadvantages:
- When using the index, the target word is not highlighted, so it takes awhile to find it.
- Sometimes it just jumps to a word reference rather than to the actual word.

4.3 Dictionary App Builder

Dictionary App Builder (https://software.sil.org/dictionaryappbuilder/) is a program that can take data from FLEx and create a customized dictionary app for Android and IOS smartphones and tablets. Dictionary App Builder provides many ways you can customize the data for your app. It can take data from a FLEx LIFT export, or a FLEx xhtml export. You can use a standard style sheet that it provides, or have it display data using the css style sheet provided with the xhtml file so that it looks similar to the dictionary and reversal views in FLEx.

Advantages:
- Provides a high quality app for dictionary distribution.
- It supports sound and pictures.

- It can make use of dictionary and reversal configuration specified in FLEx
- It can be made available through the Google Play and Apple app stores.

Disadvantages:
- It takes some skill and additional software to build the app.

5 Export formatted dictionary for further editing

FLEx exports via Pathway are available for these three programs that use formatting from FLEx and provide for editing the data after export.

- OpenOffice/LibreOffice: See section 2.2.1
- Microsoft Word: See section 2.2.5
- InDesign: See section 2.2.3

6 Inserting entries into documents

Suppose you are writing a grammar paper or other documents where you would like to insert dictionary entries from FLEx. What options are available?

6.1 Screen capture

The easiest approach is to use a screen capture such as Windows 10 Snipping Tool to capture the entry from one of the dictionary views in FLEx and then paste the graphic into your document.

Advantages:
- This does not require any export.
- It's quick, and looks exactly like it does in FLEx even if you don't have special fonts available in your document.
- In Snipping Tool you can use highlighting and crude drawing tools to touch up the screen shot prior to pasting.

Disadvantages:
- Once inserted, it cannot be changed other than enlarging or reducing the size of the graphic.
- You cannot find anything in the entries by searching.

6.2 PDF export

First, export from FLEx to PDF using Prince, Libre Office, Word, File…Print, or saving PDF from xhtml in a browser. If you copy the entry in the PDF and paste it into your document, the result includes most of the formatting color, font, spacing, and begin/end text.

Advantages:
- The actual text is copied in a form that can be adjusted as desired in the document.
- Much of the formatting and spacing is maintained in the copy.
- You can search for text in the entries throughout your document.

Disadvantages:
- This requires an export process to create the PDF.

- Paragraph formatting is lost in the copy, so will need to be made in the document.
- You may need to remove extra paragraph breaks to restore the entry into one paragraph.

6.3 Copy/Paste via clipboard

In any of the FLEx dictionary views, you can highlight the text from an entry and use Ctrl+c to copy and then in your document Ctrl+v to paste. This will copy the text, but none of the formatting, including begin/end text is included. For example, for this entry

a-a *Sebutan lain:* **a-a-a.** *p.* ucapan kecemasan; wah*; expression of shock from bad news; oh!.*
a-a! pabarangna anak kaya'a tongko' kaekae' dodoa. Wah! penyakit anak ini semakin bertambah. *Oh! the child's condition has worsened.*

you'll get this:

a-aSebutan laina-a-apucapan kecemasan; wahexpression of shock from bad news; oh!a-a! pabarangna anak kaya'a tongko' kaekae' dodoa.Wah! penyakit anak ini semakin bertambah.Oh! the child's condition has worsened.

Notice spacing and punctuation between fields is missing as well as any formatting of the text.

Advantages:
- This does not require any export.
- The actual text is copied in a form that can be adjusted as desired in the document.

Disadvantages:
- You have to insert missing space and punctuation, and apply formatting in the document after pasting, including assignment of fonts.
- If you are passing the document to others, either they will need to have the fonts you are using, or you will need to embed the fonts in the document.

6.4 LibreOffice export

After exporting from FLEx to LibreOffice, you can copy an entry from LibreOffice and paste it into your document. This maintains most of the formatting. If the target document is another LibreOffice document, the styles will be copied as well, which may or may not be a benefit.

Advantages:
- The actual text is copied in a form that can be adjusted as desired in the document.
- Most of the formatting is maintained.
- If the target is a LibreOffice document, character and paragraph styles are copied and are used in the copied text instead of hard-coded formatting.

Disadvantages:
- This requires an export process to create the LibreOffice document.
- If the target is a LibreOffice document, the styles being copied may be a distraction as it clutters up the stylesheet.
- If you are passing the document to others, either they will need to have the fonts you are using, or you will need to embed the fonts in the document.

6.5 Word export

After exporting from FLEx to Word, you can copy an entry from Word and paste it into your document. This maintains most of the formatting. If the target document is another Word document, the styles will be copied as well, which may or may not be a benefit.

Advantages:
- The actual text is copied in a form that can be adjusted as desired in the document.
- Most of the formatting is maintained.
- If the target is a Word document, character and paragraph styles are copied and are used in the copied text instead of hard-coded formatting.

Disadvantages:
- This requires an export process to create the Word document.
- If the target is a Word document, the styles being copied may be a distraction as it clutters up the stylesheet.
- If the target is a LibreOffice document, the styles being copied may be a distraction as it clutters up the stylesheet.
- If you are passing the document to others, either they will need to have the fonts you are using, or you will need to embed the fonts in the document.

7 Export dictionary data for other programs

There are several ways to export dictionary data for use in other programs. There are also ways to export interlinear text and data notebook data, but these are beyond the scope of this document, although FieldWorks raw data (section 7.3) and FieldWorks Send/Receive data (section 7.4) cover all data.

WeSay (https://software.sil.org/wesay/): If you want to transfer data from FLEx to WeSay, there are two options. First is Send/Receive using the Lexicon options. This approach uses LIFT, but provides a way to have changes from WeSay merged back into FLEx, with some limitations. Also, as of this writing, any FLEx version from FW9.0 and later will not S/R with WeSay1.6 until a new version of WeSay is produced (LT-20506). If you need to do this, request WeSay 10.0.0 which should work, although it's not on the WeSay sight yet. The other way you can transfer FLEx data to WeSay is to export a LIFT file and open that in WeSay.

Lexique Pro (https://software.sil.org/lexiquepro/): Lexique Pro can work on LIFT or SFM data. In FLEx you can export either LIFT or SFM formats that can be loaded into Lexique Pro.

Toolbox (https://software.sil.org/toolbox/): Toolbox uses SFM data, so exporting from FLEx using one of the SFM options will provide data that Toolbox can use. Note that the SFM data from FLEx is not true MDF, so may require some adjustments before using it in Toolbox.

TLex from TshwaneDJe Software (https://tshwanedje.com/tshwanelex/): TshwaneDJe Software offers to convert FLEx data to TLex for an hourly price. See section 2.4.

7.1 LIFT 0.13 XML

LIFT (Lexicon Interchange FormaT) is an XML format for lexical information (dictionaries). It was designed by SIL to provide a standard for transferring lexical data between programs. FLEx,

WeSay, Lexique Pro, and Dictionary App Builder are some of the programs that use or export/import LIFT data. See https://github.com/sillsdev/lift-standard for details of the LIFT standard. Although version 0.15 has been defined, at this point programs are all using version 0.13. The description for this version is at https://github.com/sillsdev/lift-standard/blob/master/lift_13.pdf.

This is an example of a lexical entry in LIFT.

```
<entry dateCreated="2003-08-07T13:42:42Z" dateModified="2017-05-03T16:41:34Z"
id="*hindoksa_016f2759-ed12-42a5-abcb-7fe3f53d05b0" guid="016f2759-ed12-42a5-abcb-
7fe3f53d05b0">
<lexical-unit>
<form lang="qaa-fonipa-x-kal"><text>-dok</text></form>
<form lang="qaa-x-kal"><text>-dok</text></form>
</lexical-unit>
<trait  name="morph-type" value="bound root"/>
<citation>
<form lang="qaa-x-kal"><text>hindoksa</text></form>
</citation>
<sense id="406e0027-905b-445f-ae17-4653abf47d46">
<grammatical-info value="transitive verb">
<trait name="verb-infl-class" value="2nd verbal conjugation"/></grammatical-info>
<gloss lang="en"><text>to.think</text></gloss>
<gloss lang="es"><text>pensar</text></gloss>
</sense>
</entry>
```

In its current state, LIFT supports much of what's in the FLEx lexicon, but it doesn't cover everything, and some things do not have enough detail to clearly keep track of data during Send/Receive with WeSay, which currently uses LIFT. It's unlikely that SIL will pursue further development of LIFT.

File…Export…Full Lexicon LIFT 0.13 XML will export all of the lexical entries in LIFT format. It does not pay attention to filters, sorting, or publication settings.

File…Export…Filtered Lexicon LIFT 0.13 XML will export the sorted, filtered list of entries. It does not pay attention to publication settings.

FLEx will also import data from LIFT files and attempts to merge it into existing FLEx data. For more information on exporting and importing LIFT data in FLEx, see https://downloads.languagetechnology.org/fieldworks/Documentation/Technical%20Notes%20on%20LIFT%20used%20in%20FLEx.pdf.

7.2 Standard Format (SFM)

Standard Format is a text-based way to store data in records and fields. An SFM marker starts at a new line with a backslash followed by 1 or more ASCII alphanumeric characters. The marker is typically followed by a space and then the data in the field. Some markers do not have content, but are used as flags of some sort. Using different sets of markers SFM has been used over the years in SIL to store many kinds of data including Scripture, dictionaries, interlinear texts, anthropological data, linguistic articles, address lists, etc. There are multiple formats for dictionaries developed in different parts of the world. The most widely used standard is called

Multi-Dictionary Formatter (MDF) described in
http://downloads.sil.org/legacy/shoebox/MDF_2000.pdf.

Here is a sample MDF dictionary entry.

```
\lx dapan
\ps n
\ge spear
\de three-pronged spear with
barbs, used for eels
\ee This is similar to the
unbarbed fv:nasel used
for crayfish.3
\mr dapa-n
\dt 14/Apr/93
```

FLEx provides a way to import any SFM dictionary (except ones using upper Unicode planes) into FLEx, with defaults set for MDF. It also provides a way to export data in a modified MDF format. It is modified because FLEx allows any number of vernacular and analysis writing systems, while the official MDF only supports one vernacular language and English, regional, and national analysis languages. Since FLEx does not have the concept of regional and national, where MDF may have \ge English gloss, \gr regional gloss, and \gn national gloss, the FLEx export may use \g_en English gloss, \g_fr French gloss, etc. There are a few other differences based on differences in the underlying model of dictionaries.

FLEx provides two SFM dictionary exports. Both exports are ordered based on the current sorting of the lexicon. It does not follow dictionary configuration, but instead exports all fields in a standard order.

Choosing File…Export…Full Lexicon (lexeme-based) SFM exports a flat entry format based on lexemes.

Choosing File…Export…Full Lexicon (root-based) SFM exports a hierarchical format with root entries which may include subentries for derived forms, etc.

7.3 FieldWorks raw data

This is not an export—it's just the way that FLEx stores data in the fwdata file inside the project directory. It is an xml format of conceptual object records arranged in guid order. The structure of this file is described in
https://downloads.languagetechnology.org/fieldworks/Documentation/FieldWorks_7_XML_model.pdf. It contains all data stored in FLEx including the lexicon, grammar, data notebook, interlinear texts, scripture imported from Paratext, lists, etc. Other documents that help in understating this file are

- https://downloads.languagetechnology.org/fieldworks/Documentation/Conceptual_model_overview.pdf which is somewhat out of date, especially in interlinear texts.
- https://downloads.languagetechnology.org/fieldworks/Documentation/ModelDocumentation.chm which is also somewhat out of date but includes model diagrams.
- https://downloads.languagetechnology.org/fieldworks/Documentation/MasterFieldWorksModel%20classes%20and%20fields%207000072.xlsx which is up-to-date for FW9.0.1 and later listing information on all classes and fields.

Depending on what you want to export, this may provide a way to get it.

7.4 FieldWorks Send/Receive data

Instead of the flat list of records in the fwdata file, when you do a Send/Receive, the fwdata file is split into a hierarchical form of XML that includes owned objects inside the outer object. For example, a LexEntry element will contain owned allomorphs, morphosyntax analyses, senses, examples, etc. that are scattered around in the fwdata file. You might find this easier to work with for some situations. LexEntry and WfiWordform elements are each broken into ten files based on guids to keep the files smaller. References to lists and other things outside the domain will continue to use guids.

These files are stored under Anthropology, General, Linguistics, and Other folders inside your project folder. The lexical data is under Linguistics\Lexicon

An example of an entry in this format is

```
<LexEntry
  guid="016f2759-ed12-42a5-abcb-7fe3f53d05b0">
  <CitationForm>
    <AUni
      ws="qaa-x-kal">hindoksa</AUni>
  </CitationForm>
  <DateCreated
    val="2003-8-7 13:42:42.127" />
  <DateModified
    val="2007-1-17 19:16:55.877" />
  <HomographNumber
    val="0" />
  <LexemeForm>
    <MoStemAllomorph
      guid="b906f755-3c7d-45b8-a7cd-49b6bc040abe">
      <Form>
        <AUni
          ws="qaa-fonipa-x-kal">dok</AUni>
        <AUni
          ws="qaa-x-kal">dok</AUni>
      </Form>
      <IsAbstract
        val="False" />
      <MorphType>
        <objsur
          guid="d7f713e4-e8cf-11d3-9764-00c04f186933"
          t="r" />
      </MorphType>
    </MoStemAllomorph>
  </LexemeForm>
  <MorphoSyntaxAnalyses>
    <MoStemMsa
      guid="f17bfe28-abef-40c8-b747-0367ac06c620">
      <PartOfSpeech>
        <objsur
```

```
            guid="d7f71543-e8cf-11d3-9764-00c04f186933"
            t="r" />
        </PartOfSpeech>
      </MoStemMsa>
    </MorphoSyntaxAnalyses>
    <Senses>
      <ownseq
        class="LexSense"
        guid="406e0027-905b-445f-ae17-4653abf47d46">
        <Gloss>
          <AUni
            ws="en">to.think</AUni>
          <AUni
            ws="es">pensar</AUni>
        </Gloss>
        <MorphoSyntaxAnalysis>
          <objsur
            guid="f17bfe28-abef-40c8-b747-0367ac06c620"
            t="r" />
        </MorphoSyntaxAnalysis>
      </ownseq>
    </Senses>
</LexEntry>
```

This format is not described in any documentation, however, the basic syntax of the data is identical to the fwdata file described in
https://downloads.languagetechnology.org/fieldworks/Documentation/FieldWorks_7_XML_model.pdf.

If you want to work on a file in this format, but do not normally do Send/Receive, you could make a FieldWorks backup of your current project and restore it to a different name. Then you could S/R from this renamed project to USB, which will create the files in your renamed directory.

8 Miscellaneous

In older versions of FLEx we had some additional exports:

- File…Export…Configured Dictionary XML
- File…Export…Configured Dictionary Index cards (HTML)
- File…Export…Configured Dictionary SFM
- File…Export…Reversal Index SFM

If you find that you need these or some other export, please contact FLEx_DevTeam@sil.org and it will be considered for future versions. As of FW9.0.15, these items have been removed from the export dialog.