CORPAFROAS Manual

0. Introduction

CorpAfroAs is a pilot corpus aiming at providing a structured database of spontaneous and solicited recordings of AfroAsiatic languages, transcribed, translated, and annotated with a view to allowing complex queries.

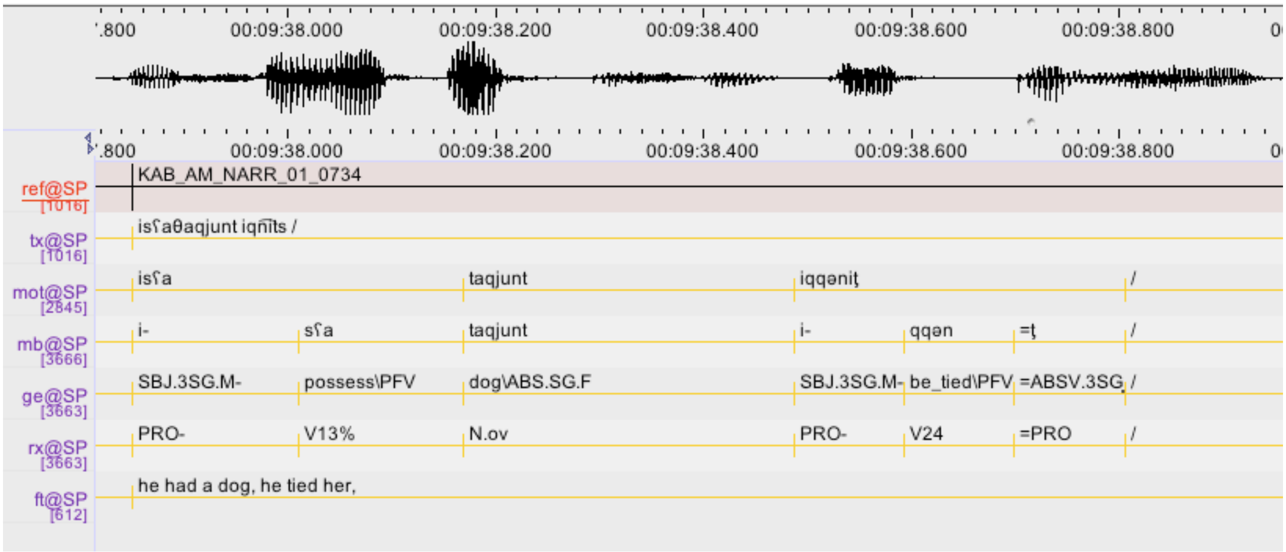
CorpAfroAs is organized along two axes, prosodic analysis, and morphosyntactic glossing. The transcription, segmentation, and annotation of the corpus are linked to the nature of the materials and to the aim of the project, which is typological comparability among languages.

We annotated one hour per language: 20 minutes of conversation/dialogue when possible, plus 40 minutes minimum of narratives/monologues (life stories, folktales…). The minimal length of excerpts is 2 minutes (if possible).

1. Annotation structure

CorpAfroAs organizes its transcription and annotation set in six tiers, which follow the reference tier: tx (phonetic transcription), mot (word transcription), mb (morphemic parsing), ge (gloss), rx (other annotations) and ft (translation).

Screen capture of an ELAN window with waveform and tiers



ref@SP [1016]	KAB_AM_NARR_01_0734						
tx@SP [1016]	isʕaθaqjunt iqn͡its /						
mot@SP [2845]	isʕa		taqjunt	iqqəniţ			/
mb@SP [3666]	i-	sʕa	taqjunt	i-	qqən	=ţ	/
ge@SP [3663]	SBJ.3SG.M-	possess\PFV	dog\ABS.SG.F	SBJ.3SG.M-	be_tied\PFV	=ABSV.3SG	/
rx@SP [3663]	PRO-	V13%	N.ov	PRO-	V24	=PRO	/
ft@SP [612]	he had a dog, he tied her,						

The **text** (tx) line is the one that holds the transcription of **phonological words**. Its purpose is to reflect as closely as possible the spoken data, including truncations, internal and boundary assimilation (the latter may be interesting for the phonology-syntax interface), and other phenomena found in spontaneous speech. Major and minor boundaries (see §3.1 below) are indicated (/ & //), and pauses over 100 to 200 ms appear in a separate unit (the threshold over which we consider that the pause is significant depends on genre, language, rhythm).

Transcription is broad: vowels and consonants are written according to their broad phonetic realization, i.e. in a way that makes the transcription close to the phonetic realization, but with some phonologization, the idea being to retain phenomena that are relevant to segmentation (assimilation, dissimilation, ...).

IPA characters are systematically used (except for geminated consonants which are doubled) as opposed to characters specific to some traditions, unless there is motivation to do differently. The so-called “emphatics” in Arabic and Berber are an example of such a treatment: as they are not necessarily pharyngealized, but can be velarized, while nevertheless forming a homogeneous phonological class, we use a subscript dot; i.e., velarized /dˠ/ and pharyngealized /dˤ/ (IPA) are both written /ḍ/ in our Arabic files.

The **mot** line is mainly an intermediary tier that allows the subsequent segmentation into ‘**morphosyntactic words**’, the definition of those words being language-dependent. This tier does not reflect exactly the (phonological-)word segmentation of the *tx* tier. No morphemic separators (- =) are used, and the transcription is in its essence phonological (i.e. 'regularized' as compared to the broad phonetic one). The vowels and consonants are written according to their phonological value. Phonetic assimilation disappears, but morphophonological changes (which are not automatic and absolute but depend on the morphological environment) remain.

The comparison between **tx** and **mot** lines allows the retrieval of the phonetic and phonological phenomena that are characteristic of connected speech.

The **mot** line is then automatically tokenized into morphemes. Then the resulting **mb** line is glossed in **ge**.

The **mb** line is segmented into morphemes (one cell per morpheme), allowing for allomorphs and all such variation desirable for a varied morpheme inventory. Whereas the mot lines may include allomorphs, the mb line has a single underlying form for each morpheme. Separator - goes in the cell that contains the affix, while separator = goes in the cell that contains the clitic.

The comparison between the **mot** and **mb** lines makes it possible to pinpoint morphophonological phenomena in the language (variations, allomorphs, etc.) as well as word structures (clitics, affixes).
All annotations are based on the transcription of the **mb** line.

The **ge** line is the morpheme-by-morpheme gloss of the **mb** line. Its syntax is based on the Leipzig Glossing Rules (see §6.1. below).

The **rx** line is the tier in which all information relevant and necessary for retrieval purposes is entered: part-of-speech, but also complementary morphological information (neutralization or syncretism, morphological verb-class, etc.), as well as syntactic (grammatical roles, etc.) and semantic (stative verb, etc.) information. If there is more than one label per cell, we separate them with a slash.
The labels used in **rx** are sometimes the same as those used in **ge**. But they cover a different domain. For instance PREP in **ge** is a special prepositional paradigm of affixes, which is found in Berber, Semitic and Chadic. The prepositions in **ge** are glossed by their value only (either grammatically, e.g. LOC, or semantically, e.g. 'between'). In **rx**, PREP means that the morpheme is a preposition. This is useful for specific queries, because sometimes, the same morpheme can be a preposition, or a conjunction.

Finally, the **ft** line was apparently unproblematic, but eventually raised some questions since it appeared that translating each minor unit was only possible in some languages, while others were better translated using larger units. It also appeared that translating a text was in no way an easy task, since contrary to the translation of isolated examples for grammatical purposes, text translations must also provide equivalences for pragmatic dimensions.
We therefore decided to merge the **ft** line into groups that were longer than the prosodic units of the tx line. Further investigations on CorpAfroAs are needed, in order to propose a segmentation that will fit more closely the pragmatic organization of speech (and therefore, presumably, facilitate its translation into another language). For verb final languages, such as Beja, a **Mft** free translation line was added, with chunks which can be longer than in the **ft** line, to make the free translation more reader friendly (see 6.4).

2. Fieldwork

2.1. Recording material

Most of the recordings were done with the flashdisk EDIROL by Roland, R-09 wave/mp3 recorder, and a Sennheiser MKE 2-60 Gold-C microphone. We recommend at least this type of device, in order to preserve a high sound quality for archiving purposes, as well as for prosodic analysis.

Other digital recorders are also acceptable, provided they allow .wav recordings (mp3 are unsuitable for long-term archiving, and not optimal for prosodic analysis).

The following practical points have to be borne in mind:

Settings: Wav format; frequency rate: 44.1 Khz; depth: 16 bits; Channel: Mono.

- Alcaline batteries last approx. 5 hours of continuous recording. Only alcaline or rechargeable batteries should be used.
- An external hard disk is strongly advised, in order to stock the audio files.
- The Memory Card that is in the pack (2.0 GB) allows recording approx. 3 hours.
- Be careful when opening the battery compartment, it is very fragile.
- In the case of a power cut, the Edirol does NOT automatically switch to the battery feed, even if there are batteries inside.
- We should regularly check that the recording is going smoothly. The device flashes intermittently when it is recording, so we can think everything is OK, whereas the external microphone is switched off. Sometimes the microphone is not fully inserted into its socket in the Edirol. Therefore, make sure that the contact point of the microphone is reached when you plug it into the Edirol.
- Batteries must be changed BEFORE the ‘low battery’ indicator starts flashing, because then it is too late, the last recorded document is corrupt. Batteries should be changed when the last battery unit is reached on the display screen.
- The basic settings of the Edirol for our purposes are: Mic Gain = High, AGC= off, Low cut=off, and External mike = Mono. The Hold button must be off.

For narratives, as for conversation, the preferred method is to ask the speaker to tell her/his story to another speaker of the language, instead of to the collector. This in order to avoid adaptation of the language to the sometimes low competence of the fieldworker in the language, or to avoid codeswitching in the vehicular language used for communication.

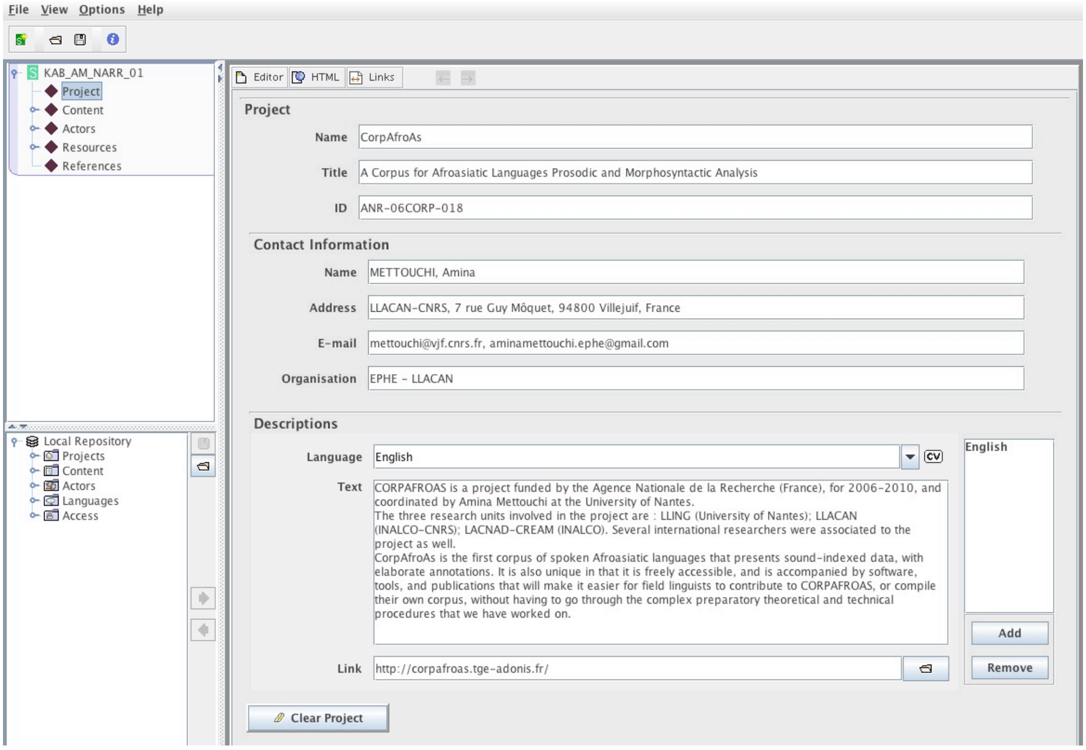
For conversation each speaker has her/his own recording device and microphone. And it is preferable to restrict the interaction to two speakers, otherwise the transcription process becomes too complex.

2.2. Consent and metadata

Three levels of consent have been considered relevant:
a) consent to the recording
b) consent to restricted diffusion (community of researchers, password to consult the data)
c) consent to unrestricted diffusion (open access on the web).
Written consent forms can be used, but a **recorded** spoken consent is valid, and often preferred by consultants.

The first level of consent is not sufficient for corpus projects, as it prevents the data from being viewed by other researchers. It should be limited to short files and exceptional situations. It is of course a prerequisite to levels (b) and (c).

We use the IMDI format for the metadata of our files.
The link is http://www.mpi.nl/IMDI/.



Project

Name: CorpAfroAs

Title: A Corpus for Afroasiatic Languages Prosodic and Morphosyntactic Analysis

ID: ANR-06CORP-018

Contact Information

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Organisation: EPHE - LLACAN

Descriptions

Language: English

English

Text: CORPAFROAS is a project funded by the Agence Nationale de la Recherche (France), for 2006-2010, and coordinated by Amina Mettouchi at the University of Nantes.
The three research units involved in the project are : LLING (University of Nantes); LLACAN (INALCO-CNRS); LACNAD-CREAM (INALCO). Several international researchers were associated to the project as well.
CorpAfroAs is the first corpus of spoken Afroasiatic languages that presents sound-indexed data, with elaborate annotations. It is also unique in that it is freely accessible, and is accompanied by software, tools, and publications that will make it easier for field linguists to contribute to CORPAFROAS, or compile their own corpus, without having to go through the complex preparatory theoretical and technical procedures that we have worked on.

Link: http://corpafroas.tge-adonis.fr/

For Corpafroas, we used the following labels:

For Content Type

*Genre: all members (NARR, CONV) have ticked “Discourse”.

*Subgenre: if not Language play (for riddles, humor), or Procedural (for instructions), we ticked “Narrative” or “Conversation”.

*Task: We left it Unspecified

*Modalities: We all ticked “Speech”

*Subject: we decided to use this entry as a sub-subgenre specification:

- Narrative = Folktale, Personal experience story, Free style, Historical narrative, Religious story, Description, Anecdote;
- Conversation = Personal experience story, Informal conversation, Debate, Description;
- Procedural = Traditional medicine, Recipe;
- Language Play = Riddle, Humor, …

3. Methodology of prosodic segmentation

Once we have recorded and documented the data, we need to transcribe it. Our purpose in CorpAfroAs is to provide an accurate prosodic segmentation of the data. We therefore use Praat for that purpose (see below).

Speech is naturally segmented into prosodic units. Our purpose is therefore to segment our data according to its natural segmentation, avoiding the type of segmentation marks that is often inspired by written sources (full stops, commas etc.), and does not fit the transcription of spoken data. We do not segment our data into clauses, sentences or phrases.

The basic unit we chose for the segmentation of CorpAfroAs is the Intonation Unit. The Intonation Unit (henceforth: IU) is recognized by its boundaries (using the following cues: pause, pitch reset, final lengthening before the boundary and initial rush after it) and by its single coherent intonation contour.

The IU may encapsulate a clause, but it may also consist of lesser syntactic units, like noun phrases, adverbials etc. In several cases an IU may not correspond to a coherent syntactic unit as traditional grammar would suggest.

We detect intonation units on the basis of perception (of the researcher, in collaboration with native speakers), along with (or following) an acoustic check of boundary cues on Praat for control. Praat allows the precise location of the boundary on the transcription file. We therefore start our transcription/segmentation with Praat, not ELAN. Moreover, Praat files can be used for further studies on intonation, which is not possible with ELAN.

3.1 Intonation units

In practice, segmentation of a discourse flow into intonation units is mostly made by detecting their boundaries. The major perceptual and acoustic cues for boundary recognition are the following:

(1) final lengthening; (2) initial rush (anacrusis); (3) pitch reset; (4) pause.

Still, some inner-unit prosodic features can be used for the recognition and segmenting of a speech stretch into intonation units. The main two "internal" features are:

(1) declination; (2) isotony (or tonic parallelism).

We distinguish between units with minor (non-terminal) break and units with major (terminal) breaks, using the software Praat. No other specification (tones, contours, etc.) is given to those boundaries, but the fact that the transcription is indexed to the sound, itself available in .wav format, will allow more in-depth prosodic studies on the available data.

A major unit is one that is perceived as carrying a terminal boundary tone. A minor unit is perceived as carrying a continuing boundary tone. The distinction between major and minor units is a fine-grained one, which becomes clearer with practice. Pitch dropping towards the bottom of the range is the unmarked cue of final boundary. But final boundaries can sometimes go up. A convenient procedure is to listen to the current Intonation Unit, without getting influenced by the following one: if you feel the utterance should be continued, then the IU is minor (non-terminal). Note that the size of pitch reset is not decisive for distinguishing between major and minor.

For more information: Izre'el and Mettouchi, Representation of Speech in CorpAfroAs: Transcriptional Strategies and Prosodic Units (http://web.me.com/aminamettouchi/CORPAFROAS/Publications.html).

There can be confusion between pauses and prosodic breaks. Intonation-unit boundaries are not necessarily indicated by pauses, but rather by a cluster of acoustic parameters. Pauses are silent moments whose duration can be calculated. Pauses are not necessarily the sign of the presence of a boundary but they often do indicate a boundary.

There can be other cues for segmentation: parallelism of the two pitch curves, length of the final syllable, rush of the following one, creaky voice, pitch reset … Please note that some languages rely more on some cues than others do. So it might be the case that the language a researcher is working on uses duration or creaky voice as dominant cues, and his/her mother-tongue does not. This makes intuitive recognition more difficult for a language which is not the researcher's mother tongue. However, those cues are easily learned by practice, and their identification is of crucial scientific importance.

Note that because prosody interacts with syntax (and other domains) in cognitive processing, there often are "mismatches" between prosodic grouping and traditional syntactic units (although in narratives, clause-boundaries tend to coincide with intonational boundaries). This is normal, and should not make researchers uneasy.

There might be intonation units consisting of one word. Do not hesitate to mark those units.

Note also that there can be mismatches between intonation units and the final translation into English. This is a practical problem, linked to the on-screen display of our texts. One solution to that is to index longer stretches of discourse to the translation (i.e. have translation units that cover more than one IU). For prosodic units larger than the Intonation Unit as defined in CorpAfroAs, see Izre'el and Mettouchi (draft), pdf on the CorpAfroAs website.

A good way of learning to identify intonation units is by beginning with folktales or fables: intonation units will be more stylized and easy to recognize, and this will familiarize researchers with that type of segmentation. Conversation (which is more difficult to segment) would then be broached more easily.

3.2. Transcription and segmentation in Praat

Once the recording is finalized in the form of a .wav file corresponding to a narrative or a conversation (leaving a small blank at the beginning and the end of the file), and once it has been given a name (LanguageCode_InitialsRersearcher_type_number.wav (type = *CONV(ersation) or NARR(ation) ; number = file's serial number*), it is ready for annotation.

Example of a file name: KAB_AM_NARR_03.wav is a file in Kabyle, recorded and transcribed by Amina Mettouchi, that is a narrative, the third one in the Kabyle database.

It is recommended to have those files stored in a special Praat folder, within a larger corpus folder, which for us was named: CorpAfroAs.

When you open Praat you will find three menus at the top of the 'Praat Objects' screen: New, Read, Write.

Go into Read and select:

Read from file…

The name of the file you select, here KAB_AM_NARR_03.wav, will appear on the list of “Objects”.
You select it (click on it) and choose from the menu to the right.

3.2.1. Opening an audio sound-file in Praat

File, Read from file: this takes a lot of the computer’s memory, and may slow down applications. Editing is possible.
File, Open long sound file: this draws less on the computer’s memory. Any editing is possible.

3.2.2. Creating a Mono object from a stereo one

Convert, Convert to mono

3.2.3. Saving an audio file

Write, Write to .wav file

We must have a sound file in Praat that corresponds exactly to what we want in the final stage. Do all the changes (noises at the beginning, etc.) in Praat at the very beginning of the procedure (edit, etc). Then save your file as .wav.
Start with a short blank (< 70 ms) so that it's easier to listen to. Do that BEFORE any transcription in Praat.

3.2.4. Cutting the sound file into a new file / Editing a file

If you wish to cut a sound file into a smaller file you must first “Edit” the original file you recorded, which you named for instance “Tale of the seven girls.wav”. It appears in the window called “Sound”. You select the part you wish to cut by clicking-dragging the mouse on the part you need, and then you choose in the menu “File” of this window, “extract selected sound (time from 0)”. The sound appears in the window “Praat objects”. You must rename it (using the option “rename” below the list of Praat objects), for instance: KAB_AM_NARR_04.wav.
It can be easier to cut files using another device (Audacity, or SoundForge for example) before opening them in Praat. Praat is more useful if you want to cut the sound into smaller chunks, for analytical purposes for instance.
If the file is fine as it is, you may want first to just play the sound, or have a look at F0 or Intensity values. In that case, click on “edit” in the “Praat objects” window, and click on the “visible part” below your Sound window.

If you want to stop the sound playing, press “Escape” on your keyboard.
If you want to see the spectrogram, click on ‘spectrum’, ‘show spectrogram’. To deselect, click again. Same thing for Pitch, Intensity. Spectrograms are essential in order to locate precisely the intonation unit boundary, as they display the relevant cues allowing the recognition of consonants and vowels.
If you want to have values for F0 and Intensity, just place the cursor somewhere in the file and click. A vertical line appears, and values are given on the right and left of the window.

Once the .wav file is in the Objects menu, we need to annotate it.

Click on the file you want to annotate, and choose from the menu to the right of Praat objects:

3.2.5. Creating an annotation object Textgrid

Annotate, to Text Grid
Within the menu of “Annotate”, choose
To TextGrid…
Annotate
All Tier names:
For a single speaker annotation: ref@SP
2 speakers: ref@SP1 ref@SP2 (without comma)
3 speakers: ref@SP1 ref@SP2 ref@SP3
Point Tiers: nothing (delete the content of the box if any)

You may prefer to have two transcription tiers for each speaker, one for the broad phonetic transcription and one for the phonological transcription into grammatical words (which will serve to generate the *mot* tier in ELAN). In this case you should list in the *All Tier names* box: ref@SP tmp@SP (ref@SP1 tmp@SP1 ref@SP2 tmp@SP2... for multiple speakers).

Now you have two objects: the new element which you created is called “TextGrid X” (where “X” is the name of the audio file you chose to work on), and the sound file which you had loaded (which automatically has the same name).

3.2.6. Visualizing aligned sound with the text

Select both the Sound and TextGrid files (with the *maj* or *ctrl* buttons)

Click on Edit

A window opens, with multiple lines; from the top:

- a line showing the signal in black (you won’t use it much);
- a line containing a blue *and* a green line (if the commands 'show pitch' and 'show intensity' have been activated); they are the pitch and the intensity lines, respectively; do not worry if the blue line is not beautiful — e.g., if it is not continuous and looks flat: we’ll try to have it look nicer in a second;
- a yellow line: it will contain your transcription:

What if you are not happy with your blue line?

You may try to correct this by changing the values of the pitch.

To do this you look at the top of your window: you go to the menu

- Pitch

and select

- Pitch settings

Which values are to be chosen? The values will change from speaker to speaker, especially according to gender and age. They may also change in the course of the recording. Therefore, adjustments are to be made.

For adult males, it is better to choose low values, such as 15, or 30, or 50 as low value, and 200, or 300 as high value.

For females better values range from 50 to 500, sometimes higher.

In general, do *not* trust Praat if the blue line (the pitch) shows sudden and very sharp (vertical or almost so) changes. Try changing the pitch settings in that case.

You can start working on the transcription:

You can select a part of the window by clicking and dragging with the mouse and then clicking on “sel” (for “select”) on the lower left-hand part of the window.

You can always revert to the whole picture by clicking on “all”.

You can make as many selections as you want.

3.2.7. Creating the boundaries of the prosodic units

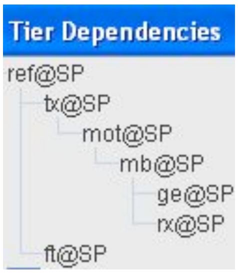
Begin with segment delimitation while using the spectrograms as well as the wave-form for boundary indication.

Click on the audio area at the beginning of a segment. Click on the small circle on the vertical line in the desired tier in order to create a boundary.
Click on the audio area at the end of the selected segment, Click on the small circle on the vertical line in the desired tier in order to create a boundary.
Boundaries are created also for pauses that last more than 200 ms.

Note that in Praat there is automatically a left and a right boundary in the sound file (beginning and end) you are working on: DON'T ADD THEM.

3.2.8. Transcription strategy

Praat may contain various transcription tiers for one sound file (phonetic transcription tier, orthographical tier, words tier, phonemes tier…), but those multiple tiers are not hierarchically dependent. In the CorpAfroAs ELAN annotation model, the annotation tiers are hierarchically dependent: *ref* is the main tier directly related to time. It has two time associated tiers: *tx* and *ft*. Then the *mot* tier is a child of *tx* tier, *mb* tier a child of *mot* tier, finally *ge* and *rx* are associated to *mb*.



Tier Dependencies

```
ref@SP
   tx@SP
      mot@SP
         mb@SP
            ge@SP
            rx@SP
   ft@SP
```

For this reason we recommend two or three ways of entering the transcription for importation into ELAN.
As the *mot* tier can be generated in ELAN by tokenizing a text tier, the simplest procedure is to prepare a transcription line in Praat containing as many (grammatical) words as necessary for the *mot* tier. This line should be named *ref@SP*. When imported into ELAN, that *ref* tier will be duplicated into a *tx* tier, which will be used to generate the *mot* line. The initial (*morphophonological*) transcription of this *tx* tier will then be modified by hand so that it becomes a broad phonetic line, with phonological words instead of grammatical ones.
On the other hand, you may prefer to enter the broad phonetic transcription from the start in the *ref@SP* tier of Praat, because you are planning to use Praat for some prosodic or phonetic investigation for example. Then after importation into ELAN, you will have to duplicate that *ref* tier as an intermediary tier whose annotations will be modified by hand to reflect the grammatical words transcription. That intermediary tier will be tokenized into a *mot* tier, then the *mot* tier will be made dependent on a *tx* line (created from another copy of the *ref*), and the intermediary tier will be deleted. That process is more complex than the previous one. See 4.3 for an alternative.

A two-tier transcription Praat file, with a *ref@SP* tier (broad phonetics) and a *tmp@SP* tier (grammatical words), is about the same complexity to deal with: after importation into ELAN, you will have to duplicate the *tmp* tier as an intermediary *tx* tier. That *tx* tier will be tokenized into a *mot* tier. Then the *ref* tier will be duplicated into the real *tx* tier and the *mot* tier will be made dependent of it, then the intermediary *tx* tier will be deleted. Those last two methods are described on the website (in the TOOLS tab).

3.2.9. Typing Methods

To enter the phonetic transcription in Praat there are three options:
- On PC and Mac, using the Praat trigraphs method (see below)
- On PC, using the AFU keyboard (for more details see the section AFU keyboard)
- On Mac, using the Ukelele keyboard. For more details see the section Ukele keyboard

Click on the segment in the selected tier. A box will open.
Write down the annotated text. To save and leave the editing box, do Ctrl/Enter.

Special characters

We should use IPA whenever it is unproblematic to do so. The full list of characters is to be decided among each language family.
For Berber and Semitic, we have had a discussion on emphatics and affricates. The decision for emphatics is to use the traditional under-dotted letters in mot (and possibly tx) (cf explanation above in section 1), since there is a scientific basis for that decision. For affricates we decided to use the single IPA character in tx (ex: ts, ʧ, ʤ).

Units with minor break and units with major break

Put a slash (or double slash) at the end of the text of each IU, after a space. In other terms: / (non terminal) // (terminal) are to appear at the end of a cell containing speech. Pause cells also have boundary marks. All pauses above 200ms are obligatorily marked and their duration entered in the corresponding cell.

3.2.9.1. Method using Praat trigraphs (PC and Mac)

In the Textgrid window, open the Help menu on the right, click on Phonetic Symbols, and open the various lists. Charts appear; under each phonetic symbol, a series of characters beginning with an anti-slash is given. For instance, under schwa, you can read \sw. This is the sequence you should type to obtain a schwa in your annotation tier in the Praat textgrid line, type your characters using the trigraphs method. Then, as often as you like, in the Edit menu, click on *Convert entire Textgrid to Unicode*.

3.2.9.2. Using the AFU keyboard (PC)

Those who have a French Windows system may download the new Microsoft keyboard "AFU", with some extra characters (non-IPA emphatics) accessibility, in a zipped form : "reflex07.zip" (http://corpafroas.tge-adonis.fr/Tools_files/reflex07.zip)

1) Unzip the file at the root.

2) Go to the "reflex" folder just created by the unzip and Double-click on the "setup" file.

The keyboard should be installed beside the French one.

NB: If a keyboard with the same name already exists, start by removing it:

1) Launch, configuration panel, add/delete programs

2) Select Français (Afr-U), Delete

You will find a description of this keyboard in the file: "AFU'reflex.doc" in the "reflex" folder or the "OutilsInfo" folder of the list.

You can choose this keyboard by clicking on the AFU keyboard icon on the bottom right of the screen.

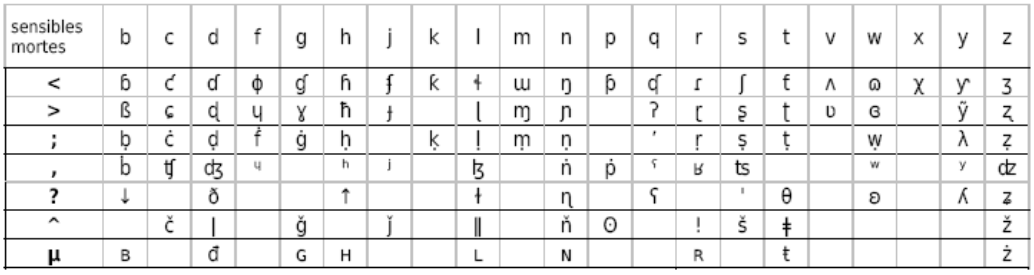
How the Microsoft keyboard works:

As this keyboard is based on a french keyboard, it can be used for French as well as phonetics.

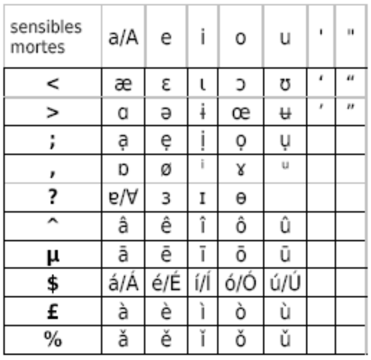
Deadkeys are typed before the base character. E.g : <e gives ɛ

' < '	to access the more frequent special characters
' > '	for some other frequent phonetic characters (retroflex…)
' ; '	mainly characters with dot underneath
' . '	character with dot above
' , '	double articulation, other diacritics

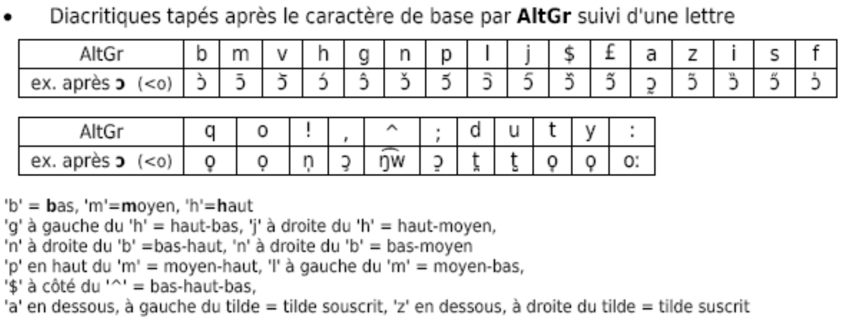
'µ, $, £, %' to access vowels with tone/accent incorporated characters



sensibles mortes	b	c	d	f	g	h	j	k	l	m	n	p	q	r	s	t	v	w	x	y	z
<	ɓ	ƈ	ɗ	ɸ	ɠ	ɦ	ʄ	ƙ	ɬ	ɯ	ŋ	β	ʠ	ɾ	ʃ	ƭ	ʌ	ɷ	χ	ʏ	ʒ
>	ß	ɕ	ɖ	ɥ	ɣ	ħ	ɟ		ɭ	ɱ	ɲ		ʔ	ɽ	ʂ	ʈ	ʋ	ɞ		ỹ	ʐ
;	ḅ	ċ	ḍ	ḟ	ġ	ḥ		ḳ	ḷ	ṃ	ṇ		ʼ	ṛ	ṣ	ṭ		ẉ		λ	ẓ
,	ḃ	ʧ	ʤ	ᶣ		ʰ	ʲ		ɮ		ṅ	ṗ	ˤ	ʁ	ʦ			ʷ		ʸ	ʣ
?	↓		ð			↑			ɫ		ɳ		ʕ		ˈ	θ		ɵ		ʎ	ʑ
^		č	ǀ		ǧ		ǰ		ǁ		ň	ʘ		ǃ	š	ǂ					ž
µ	ʙ		ȡ		ɢ	ʜ			ʟ		ɴ			ʀ		ȶ					ż



sensibles mortes	a/A	e	i	o	u	'	"
<	æ	ɛ	ɩ	ɔ	ʊ	‘	“
>	ɑ	ə	ɨ	œ	ʉ	’	”
;	ạ	ẹ	ị	ọ	ụ		
,	ɒ	ø	ⁱ	ɤ	ᵘ		
?	ɐ/Ɐ	ɜ	ɪ	ɵ			
^	â	ê	î	ô	û		
µ	ā	ē	ī	ō	ū		
$	á/Á	é/É	í/Í	ó/Ó	ú/Ú		
£	à	è	ì	ò	ù		
%	ǎ	ě	ǐ	ǒ	ǔ		



- Diacritiques tapés après le caractère de base par **AltGr** suivi d'une lettre

AltGr	b	m	v	h	g	n	p	l	j	$	£	a	z	i	s	f
ex. après **ɔ** (<o)	ɔ̀	ɔ̄	ɔ̆	ɔ́	ɔ̂	ɔ̌	ɔ᷄	ɔ᷅	ɔ᷇	ɔ᷈	ɔ᷉	ɔ̰	ɔ̃	ɔ̈	ɔ̋	ɔ̇

AltGr	q	o	!	,	^	;	d	u	t	y	:
ex. après **ɔ** (<o)	ɔ̹	ɔ̜	n̥	ɔ̰	ŋ͡w	ɔ̠	t̪	t̺	ɔ̝	ɔ̞	oː

'b' = **b**as, 'm'=**m**oyen, 'h'=**h**aut
'g' à gauche du 'h' = haut-bas, 'j' à droite du 'h' = haut-moyen,
'n' à droite du 'b' =bas-haut, 'n' à droite du 'b' = bas-moyen
'p' en haut du 'm' = moyen-haut, 'l' à gauche du 'm' = moyen-bas,
'$' à côté du '^' = bas-haut-bas,
'a' en dessous, à gauche du tilde = tilde souscrit, 'z' en dessous, à droite du tilde = tilde suscrit

3.2.9.3. Favorite Characters in Mac

For Mac users, a simpler method consists in defining your list of favorite characters from the character palette (near the battery sign at the top-right of the screen), character viewer (create 'favorites') and then simply click on them when needed while writing in Praat. Make sure that you have downloaded and installed the CharisSIL font (or another Unicode font), and that your favorite characters are in that font.

3.2.9.4. With the Ukelele keyboard (Mac)

Install Ukelele on your computer in the “Applications” folder :
http://mac.softpedia.com/get/System-Utilities/Ukelele.shtml or
http://scripts.sil.org/cms/scripts/page.php?site_id=nrsi&id=ukelele

A. Open Ukelele. An empty keyboard appears.
You have to base any keyboard you will create on a Unicode one: the easy way to do that is to modify an existing Unicode keyboard adding the phonetic characters you need. A set of keyboards is provided with Ukelele. You find them in Ukelele > System keyboards > Unicode, and in Ukelele > Logitech Keyboard Layouts (Italian, French and Spanish keyboards and in the Logitech folder).

B. Create your phonetic keyboard in Ukelele

- File > New Based On... > Applications → Ukelele → Logitech Keyboard Layouts
- choose the keyboard you need (for example Logitech Italian or French or Spanish).
- File > Save as > Choose a name > Format: Keyboard layout file → Macintosh Hard disk → Library → Keyboard Layouts > Save.

The combinations you'll create for the insertion of phonetic characters are those shown in the AFU table (see section "How the keyboard works (Microsoft)").

C. Create the dead keys

- Keyboard > Create Dead key.

Note that below the keyboard there is a message "Press or click the new dead key".

- Click on the one you want, for example you may start with "<", which is the the first one in the AFU table.

A window appears asking to enter a name of the dead key state, i.e. the group of characters associate to that dead key. You can leave the default name

- "State 0" > OK.

Another window appears. You have to

- press the dead key button "<" and then OK.

The keyboard is cleared because you have to fill it with new characters associated to the dead key you have chosen. If you want to go back to the whole keyboard you have to leave the actual dead key state: Keyboard > Leave Dead Key State.

D. Create the combinations

In order to create the combinations with a deadkey you have to enter in the "dead key state" you determined previously:

- Keyboard > Enter Dead Key State > Choose the name of the State (State 0 in our example) > OK.
- Open the document "AFU-reflex.doc" (you will find it in the zipped file *reflex07.zip* (see above)).
- Select the first character associated to your first dead key. Copy the character and go back to your Ukelele keyboard. Double click on the key you want to assign, paste in the window that appears > OK.
- Repeat the same procedure for the insertion of the other characters associated to the first dead key.

E. Repeat the same procedures as in D. to create new dead key associations and add more associated phonetic characters.

F. Save everything, close Ukelele and restart the computer!

You can use the functions of the keyboards only if you have restarted the computer! This is valid every time you further modify the keyboard. You can re-open the same keyboard in order to modify it and update it any time you need.

G. Using the keyboard

- Go to System preferences > International > Input source > Show keyboard, tick the name of the keyboard you have created, the little icon of the keyboard will appear at the top right beside the energy indicator. Select it whenever you need it and with any program .

For the annotation of code-switching, see §6.3.

3.2.9.5. Saving annotations in Praat

Warning: Check in the Praat menu that the *Text Writing Preferences* is set to UTF-8

- File, Write TextGrid to Text file

Be careful not to forget this step! Otherwise you'll loose the annotated text when leaving Praat.

3.3. Notation and symbols

These recommandations concern the segmentation into prosodic units and their annotations. In Praat it concerns the *ref@SP* tier (and the *tmp@SP* tier, if any). As this tier will be duplicated as *tx@SP* tier after importation into ELAN, these recommendations remain the same for the *tx* tier.

All pauses above 200 ms are obligatorily marked. For pauses between 100 ms and 200 ms, each member decides for each text on the minimal duration of the pause (according to what is perceptible in this text), and indicates her/his choice in the grammatical sketch.

Regarding word-internal pauses: we mark the duration of the pause, e.g. be(761)eda

If breath intake (BI) (which can be physiological or rhetorical and is different from a normal pause) is audible, duration of pause is given together with the abbreviation, e.g. BI_210, for Breath Intake of 210 ms.

a) */ (non-terminal) // (terminal).* Don't forget to type a space before boundary marks.

b) Truncations of a word inside the intonation unit or of an intonation unit:

If a word is truncated and is inside the IU, use # right at the end of the truncated word, without a space, and mark the end of the unit with the relevant sign (/ or //) :

ex : *he ca# came //*

If an intonation unit is abruptly cut, then add a space and use ##, **instead** of / or //.

ex: he decided to ## the father answered //

c) Overlaps are not marked as they are visually obvious in the Elan layout.

d) Noise and peripheral phenomena are indicated in between braces, without space between braces and text, with an underscore between English words if there are several of them. (Afterwards, the braces and their contents can be erased in the *mot* line).
ex: u:tak{door_banging,_someone_enters_the_room} rha

e) External laughter {LAUGHTER}, laughter of the speaker (LAUGHTER).

f) Incomprehensible passages are conventionally marked in all tiers by XX.

g) If we hear a word perfectly, but we do not know its meaning, we transcribe it in *ref@SP*.

h) Lengthening: in *ref@SP* only, we use the IPA symbols ː three times in case of phonetic lengthening, e.g;. aːːː
Phonological length is marked just with one IPA symbol ː e.g. aː
Ex :
tx əmːːː (hesitation marker)
mot əm
mb əm
ge əm
rx HESIT
Some languages (Wolaitta) have to mark their vowel length as " aa " in *ref@SP* line instead of aːːː, because they have to place tonal markers on the first or second mora of the syllabe (case alternations).

i) Consonant gemination: write two consonants.

j) Sung passages: %from beginning to end%

4. From Praat to ELAN

Important
Don't forget the following steps in Praat before importing into ELAN:

In Praat, *Preferences*, check that *Text writing Preferences* is set to 'UTF-8'. If it isn't, change it to UTF-8 and write again to Textgrid to save the new file in UTF-8; if you don't do that, an Elan importation error will occur ("*operation interrupted...*").
This is to be checked each time you update the Praat version.

In the textGrid, the initial interval tiers (initially Mary John Bell) should be labelled

a) *ref@SP* (not *tx*), or *ref@SP1* and **r***ef@SP2* if there are two speakers, etc. in case you have just one line of transcription (into grammatical words) per speaker,

b) *ref@SP* (for the broad phonetic transcription into phonological words) and *tmp@SP* (for the morpho-phonological transcription into grammatical words) for a two-line transcription (or *ref@SP1***,** *tmp@SP1***,** *ref@SP2, tmp@SP2***,** etc. if there are several speakers). This case will not be treated here, but on the web site.

If for some reason the name of the Praat tier was not *ref*, rename it from Praat

- Open the textGrid in Praat, Select the corresponding object, Edit
- Tier, Rename Tier, Change the name of the tier to *ref* , Ok

If you have used the trigraph method to transcribe, convert the entire textGrid to Unicode

- Edit the textGrid object,
- Edit, Convert entire textGrid to Unicode.

To save the corrected textGrid

- File, Write TextGrid to text file

Before you start importing Praat documents, copy **Corpo1.etf**, **Corpo2.etf and Corpo3.etf** files into the *ELAN* folder, and if you are using Toolbox, copy **refCorp.typ** and **mdf.typ** in the *Toolbox*\Settings folder. This is done once and for all.

The Praat transcribed document including the intonation unit boundaries is now ready to be opened in ELAN in order to be prepared for the other annotations.

4.1. How to import a Praat document into Elan

Creating a new ELAN Document.

- File, New
- in *Files of type*, select: *Media files* (NOT *Template*), and choose in the left window the audio file you want to annotate.
- Click on the > > button between the 2 windows, then click on OK.

To give the new ELAN document a name:

- File, Save As: (enter the name of your file in the following format):

LanguageCode_Author's Initials_type_num

type = conv(ersation) or narr(ation); num = serial number of the file.

Importing the model of linguistic types

ELAN needs information on the hierarchical dependency of the tiers. To be consistent throughout the corpus, we will load a template for that.

- *Type, Import Types, Browse*, look for *Corpo1.etf* (*Corpo2.etf* if 2 speakers; *Corpo3.etf* if 3 speakers), *Import, Close*.

Deleting the *Default* tier

We don't need this default tier.

- right-Click on *Default*; Select *Delete Default*; press YES.

Importing the TextGrid file created with Praat

- *File, Import, Praat TextGrid, Browse*, look for and select the *TextGrid* file you want to import;
- Check the *Skip empty interval/annotations* box to avoid the creation of empty segments. *Next*;
- Make sure that *Linguistic type*: ***ref*** is selected under *Type Name*, NOT *default'*
- *Finish*
- *Operation completed*, OK

4.2. Preparing the *mot* line in Elan from a one-tier transcription in Praat

- As we need a main labelled and numbered reference line *ref* for each annotation unit as well as a *tx* line, we will have to duplicate the *ref@SP* tier to create the *tx* tier. Then the *ref* tier will be labelled and numbered. Next, after the importation of the other tiers, the *mot* tier will be filled in by tokenizing the *tx* tier into it. Finally, the *tx* tier will be modified by hand to reflect the broad phonetics transcription of the sound file.

- **Creating a new *tx* tier**
- In order to create a new *tx* tier, let's duplicate the *ref* tier.
- If there is only one speaker:
- In the Tier menu

- *Copy Tier*
- select *ref@SP, Next*
- once again: select *ref@SP*, *Next*
- as *Type Name*, choose *tx*, *Finish*

- *Operation completed,* OK

A tier *ref@SP-cp* was created.

If there are 2 speakers:

- *Copy, Tier*
- select *ref@SP1*, *Next*
- once again: select *ref@SP1*, Next
- select as *Linguistic type* : *tx*, *Finish*

Second speaker :

- *Copy, Tier*
- select *ref@SP2*, *Next*
- once again: select *ref@SP2, Next*
- select as *Linguistic type*: *tx*, *Finish*

And so on for other speakers.

Renaming the new *ref@SP-cp* tier as *tx@SP*

(resp. *ref@SP1-cp* as *tx@SP1, ref@SP2-cp* as *tx@SP2*... if multiple speakers)

In the Tier menu:

- *Change tier attributes*
- Select *ref@SP-cp*
- Type *tx@SP* as its new *Tier Name*
- Click on *Change*

For multiple speakers, do the same for each *ref@SP1-cp, ref@SP2-cp* or *ref@SP3-cp*

- *Close* the window when finished

Labelling and numbering the *ref* tier(s)

(for more than one speaker, do the same thing with *ref@SP1, ref@SP2* and *ref@SP3*)

- *Tier, Label and Number,* select *ref@SP*
  - *Include label part*:

    1 speaker: **LanguageCode_Author's Initials_type_num** (= *name of the .wav file*)

    more than 1 speaker: **LanguageCode_Author's Initials_type_num_SPnumber**
  - *Insert other delimiter* : _ (underline symbol)
  - OK, *Close*

Importing the remaining tiers

- *Tiers, Import Tiers, Browse*, look for *Corpo1.etf, Import, Close.*

(for two speakers, look for*Corpo2.etf*, for three speakers, look for *Corpo3.etf*)

Filling in the *mot* tier

We will just tokenize (i.e. split the words of the prosodic units into individual cells) the grammatical word tier(s) *tx@SP* into the *mot@SP* tier(s). (Respectively *tx@SP1* into *mot@SP1*; *tx@SP2* into *mot@SP2*; *tx@SPp* into *mot@SP3* for multiple speakers):

- *Tier, Tokenise tier*
- Source : *tx@SP*
- Destination *: mot@SP*
- *Start, Close*

Displaying the tiers in the right order

The imported tiers may appear in a mixed order

- Click-Drag and Drop the labels of the tiers you want to move

or

- Right-click on the labels area
- *Sort Tiers, sort by hierarchy*

Changing the transcription of the tx tier

The *tx@SP* line(s) contain(s) the morphophonological transcription. This line has to be changed in ELAN by hand, unit by unit, into a broad phonetic transcription closely mirroring the audio file (assimilations and dissimilations retained), and containing phonological words instead of grammatical words.

At the end the ELAN file is correctly prepared and the *mot* tier is ready to be segmented into morphemes and annotated with the help of the lexicon and the internal parser.

4.3. Exporting the transcription lines to Praat (for further prosodic investigations)

This is a parenthesis for those who are concerned about having both a broad phonetic transcription and a grammatical word transcription in Praat. Here is a way of obtaining that result through ELAN, instead of doing those two transcriptions in Praat. Indeed, it is easy to export tiers content and time delimitation from ELAN to Praat.

From ELAN:

- File, Export As, choose *Praat textGrid*
- Uncheck the *Show only root tiers* checkbox
- Choose *tx* and *mot* (even *ref* if you want*)*, OK
- Choose the directory where to save the textGrid, and give the file a name

Now, this textGrid can be opened in Praat. The first tier will be the broad phonetic translation, the second one the grammatical word transcription. Be aware that the time boundaries of each word of the *mot* tier are correctly inside the time boundaries of the *tx* unit they belong to, but they are not correctly related to their real time duration because ELAN just divides the duration of the parent *tx* unit into equal cells for each word contained in this unit. If you are concerned about the real time duration of each word, you will have to move the boundaries of each word to align them according to their proper duration, by playing the sound of the current word (click on the bar under it).

5. ELAN-CorpA: Elan for CorpAfroAs

You are now in Elan for CorpAfroAs .

Changing the ELAN preferences

While typing your annotations, if you want to save a cell in ELAN, the default method is CTRL+ENTER (or CMD+ENTER in Mac). But there is a faster way: in the *Edit/preferences* menu, there is an item *writing preferences,* which contains *editing* in which you can choose *enter key commits changes in the inline edit box*. Then, by pressing only the ENTER key, you save your changes.

When a virtual keyboard is used, system shortcuts may conflict with some ELAN shortcuts. The solution is to change the ELAN shortcuts in the menu: *Edit, Preferences, Edit shortcuts*.

Interlinearizing process into ELAN

Until now, ELAN was not able to generate the segmentation and glossing lines *mb*, *ge* and *rx* on its own. What was possible was:

- doing the job manually by splitting the segments and adding the gloss in the cells,

- exporting the data prepared in ELAN to Toolbox, then parsing and annotating using the functionalities of Toolbox, then re-importing the Toolbox file into ELAN.

The idea was to simplify this process by giving the user access to some Toolbox-like functionalities directly in ELAN, i.e to allow the segmentation of words by means of a lexicon containing affixes, and to propose glossing by looking up into the same lexicon .

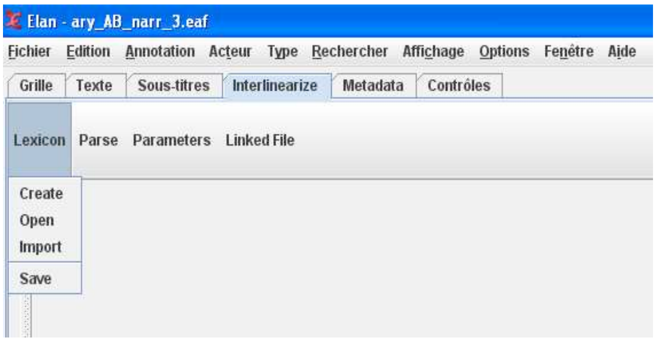
To do this, an « Interlinearize » tab has been added .

Once a file is opened, Click on the « *Interlinearize* » tab.

Creating, Opening, Importing a lexicon

The interlinearizing process relies on the existence of a lexicon which can be

- a brand new ELAN lexicon
- an existing ELAN lexicon
- a lexicon imported from Toolbox into ELAN


Elan - ary_AB_narr_3.eaf
Fichier Edition Annotation Acteur Type Rechercher Affichage Options Fenêtre Aide
Grille Texte Sous-titres Interlinearize Metadata Contrôles
Lexicon Parse Parameters Linked File
Create
Open
Import
Save

The « *Lexicon* » menu allows the choice

Click on the «*Lexicon* » tab

Creating an ELAN lexicon

When you choose *Create*, a file selection window will open. Choose the folder where you want to save your lexicon and give it a name. The **.eafl** extension will be automatically added.

On the left part of the screen, you will see a table with the different columns of the lexicon and a menu above, and on the right part of the screen, a display area with tabs and buttons relative to the interlinearizing process and the lexicon management (cf. figure below ary_AB_narr_3.eaf.)

Opening an ELAN lexicon

When you choose *Open*, a file selection window will appear. Choose the folder where your lexicon was saved (extension .eafl), select it, then open it.

Importing a Toolbox dictionary

When you choose *Import*, a file selection window will appear. Choose the folder where your Toolbox dictionary is saved, select it.

Not all the fields of a Toolbox dictionary are needed for the interlinearizing process (examples, definitions...). ELAN is aware of the following concepts (right box):

Lexeme (all kinds of entries in the lexicon: word entries, stems, word forms, affixes),

Variant (alternate form of a lexeme, principally depending on the context),

Underlying form (underlying segments of an entry or a variant of it),

Gloss (the meaning or sense of the lexeme),

Part of speech (grammatical category). This is not used in the CorpAfroAs format.

Tier X (category related to the entry, may be grammatical or other),

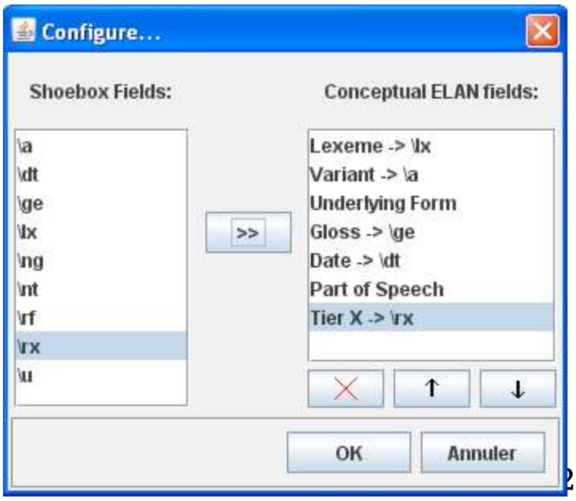
Date (last modified date of the entry).

Those ELAN lexicon concepts (right box) have to be related to the fields found in the Shoebox/Toolbox file (left box) for a correct importation of the dictionary data.

It is imperative for Lexeme, Gloss and Tier X to be related to a Shoebox/Toolbox field

If you don't have an \rx field in Toolbox, associate the Toolbox part of speech field (e.g \ps) to ELAN Part of Speech. This will copy the content of the Toolbox field into Tier X.".

You can define the relations you want by pairing the fields and concepts one by one,


Configure...

Shoebox Fields:

\a
\dt
\ge
\lx
\ng
\nt
\rf
\rx
\u

Conceptual ELAN fields:

Lexeme -> \lx
Variant -> \a
Underlying Form
Gloss -> \ge
Date -> \dt
Part of Speech
Tier X -> \rx

from the right box to the left and clicking on the > > button.

- Select (click on) the concept in the right box
- Select the corresponding label field in the left box
- Click on the arrow button > > between the two boxes

Now, the concept selected from the right box has an arrow followed by the label of the corresponding Toolbox field.

To delete a correspondence, select the concept in the right box

- Click on the *red cross button*

To move a correspondence on top of the concept above

Click on the upward arrow button

To move a correspondence under the concept below

- Click on the *downward arrow button*

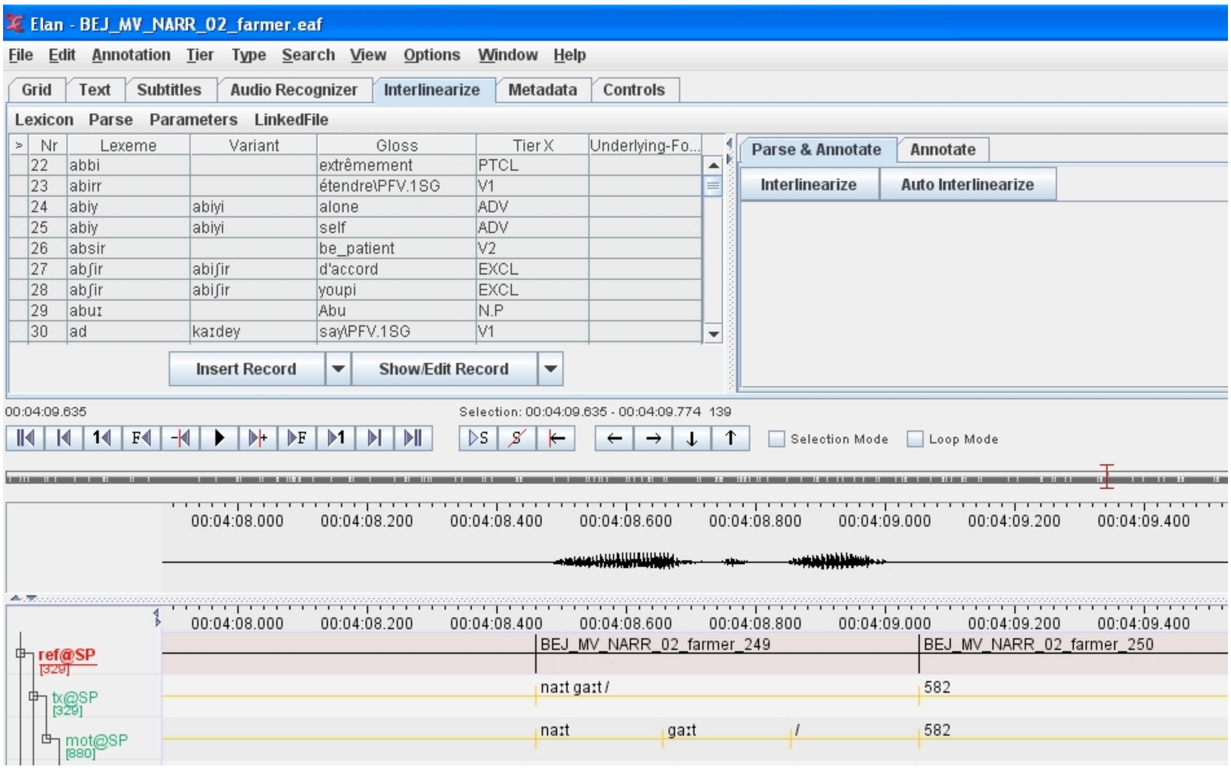
When all the correspondences are ok,

- Click on the « OK » button.

The program retrieves all the relevant data for interlinearization and copies them in a new ELAN lexicon file (that you will save); this newly created XML file (with **.eafl** extension) will be used as a lexicon for the interlinearizing process.

On the left part of the screen, a table showing the lexicon data is displayed with a menu above. On the right side, there are tabs and buttons for the interlinearizing process (*Segmentations*) and for the lexicon management (*Lexicon*).

Be aware that importation will not actually isolate the possibly multiple gloss of a lexeme, separated by a semicolon in the Toolbox gloss tier. Those entries must be edited in ELAN-CorpA to isolate each gloss and giving them their proper (rx) category.


Elan - BEJ_MV_NARR_02_farmer.eaf
File Edit Annotation Tier Type Search View Options Window Help
Grid Text Subtitles Audio Recognizer Interlinearize Metadata Controls
Lexicon Parse Parameters LinkedFile
Insert Record
Show/Edit Record
Parse & Annotate
Annotate
Interlinearize
Auto Interlinearize
Selection Mode
Loop Mode
ref@SP
tx@SP
mot@SP

>	Nr	Lexeme	Variant	Gloss	Tier X	Underlying-Fo...
	22	abbi		extrêmement	PTCL	
	23	abirr		étendre\PFV.1SG	V1	
	24	abiy	abiyi	alone	ADV	
	25	abiy	abiyi	self	ADV	
	26	absir		be_patient	V2	
	27	abʃir	abiʃir	d'accord	EXCL	
	28	abʃir	abiʃir	youpi	EXCL	
	29	abuɪ		Abu	N.P	
	30	ad	kaɪdey	say\PFV.1SG	V1	

00:04:09.635 Selection: 00:04:09.635 - 00:04:09.774 139

BEJ_MV_NARR_02_farmer_249 BEJ_MV_NARR_02_farmer_250

naɪt gaɪt / 582

naɪt gaɪt / 582

Self-opening of the lexicon

To the right of the *Lexicon* section menu, there is the *Linkedfile* menu. By default, the checkbox before the name of the lexicon is checked, so this lexicon will open automatically next time you open the ELAN file to which it is associated. If for some reason you don't want to open the lexicon automatically when opening the ELAN file, uncheck the lexicon in the *Linkedfile.*

Setting up the interlinearization process

Before launching the interlinearization process on the words of a tier, you have to choose this tier and define the associated annotation tiers. By default, those lines are « *mot* » for the line containing the words to be segmented and annotated, « *mb* » for the line containing the morpheme breaks, « *ge* » for the gloss of the morphemes, and « *rx* » for the *grammatical* labels of the morphemes. If those tiers already exist, the current annotations will be overwritten during the interlinearization process.

If those tiers don't exist in the ELAN files, do the following:

Parameters, tier Parameters, configure interlinear Tiers

Choose the source tier to be segmented and annotated: *Choose interlinear tier* (*mot*)

Click on *OK*

Choose the labels for the morpheme breaks tier (*mb*), gloss (*ge*) and category (*rx*)

Click on the *Create tiers* button

The tiers are created, the process can start.

Remark that if a tier already exists with the same label as one of those you just enterede during the *configure interlinear tiers* process, a new tier will be created with this label ended by *–cp*, avoiding the loss of the original one. If you want to overwrite that existing tier, you should delete it beforehand.

Principles of annotation into ELAN

There are three kinds of entries (called here *Lexeme)* into the ELAN lexicon:
Lemma (base form chosen to represent the various forms of a word in context) – which may present alternate (contextual) forms known herein as *variants*,
Stem, which is a form which cannot appear on its own as a word; it needs a complementary affix. A stem may present a symbol (e.g _) to its left or right (or both) to distinguish it from a lemma if desirable,
or an *Affix*. Affixes represent all the morphemes that can be agglutinated to a lemma, a stem or another affix. By default, the affixes present a hyphen (-) to the left or to the right if they are respectively suffixes or prefixes. Clitics can be distinguished by the use of an equal sign (=) to the left or right, reduplication can also be represented by a tilde ~ at the beginning of the segment (cf. *parameters*)

Lookup at the words in the lexicon

The principle of the ELAN-CorpA annotation is, as a first step, to try and match the current word with the *lemma or stems* of the lexicon, or with their alternate forms (*variants*). If the word is found in the lexicon, the value of the fields *Lexeme*, *Gloss* and *Tier X* of the entry goes to the corresponding *mb*, *ge* and *rx* tiers under the current word in the annotation area. Notice that if the word corresponds to a variant of a lexeme, it is the underlying *lexeme* value that shows in the *mb* tier.
Now as a second step, if the word is not found, the parser tries to segment it using the affixes of the lexicon.

Segmentation

When a word is not found in the lexicon, the parsing process takes place, trying to match all the affixes (prefixes, suffixes, clitics, reduplications...) of the lexicon to the end and/or beginning of the word. When an affix matches, the parser isolates the affix, and the rest of the word is, in turn, searched in the lexicon, and so on. If the rest is not found, an asterisk will precede it, meaning it is a possible new entry. All the combinations are explored and the various segmentations are displayed in the *Segmentations* section. At this stage, to parse a new word, you should start by entering its affixes.

Affixes

To add a new affix in the lexicon, you can right-click the word containing this affix, in the segmentation area, and choose « *Insert a record* ». In the box where the word appears, delete everything but the affix. If it is a prefix, type a hyphen at the end, if it is a suffix, type the hyphen at the beginning.

When you launch the interlinearization process, the affix you entered is isolated from the word, then the rest is searched into the lexicon and if not found, the parser tries to find all the affixes that match the end or beginning of the rest, and so on. At the end, all the possible parsings of the word are displayed in the table of the segmentation area. If the parser did not give you the correct parsing, you have to add the (lexical or grammatical) morphemes that will fit this parsing, in the lexicon.

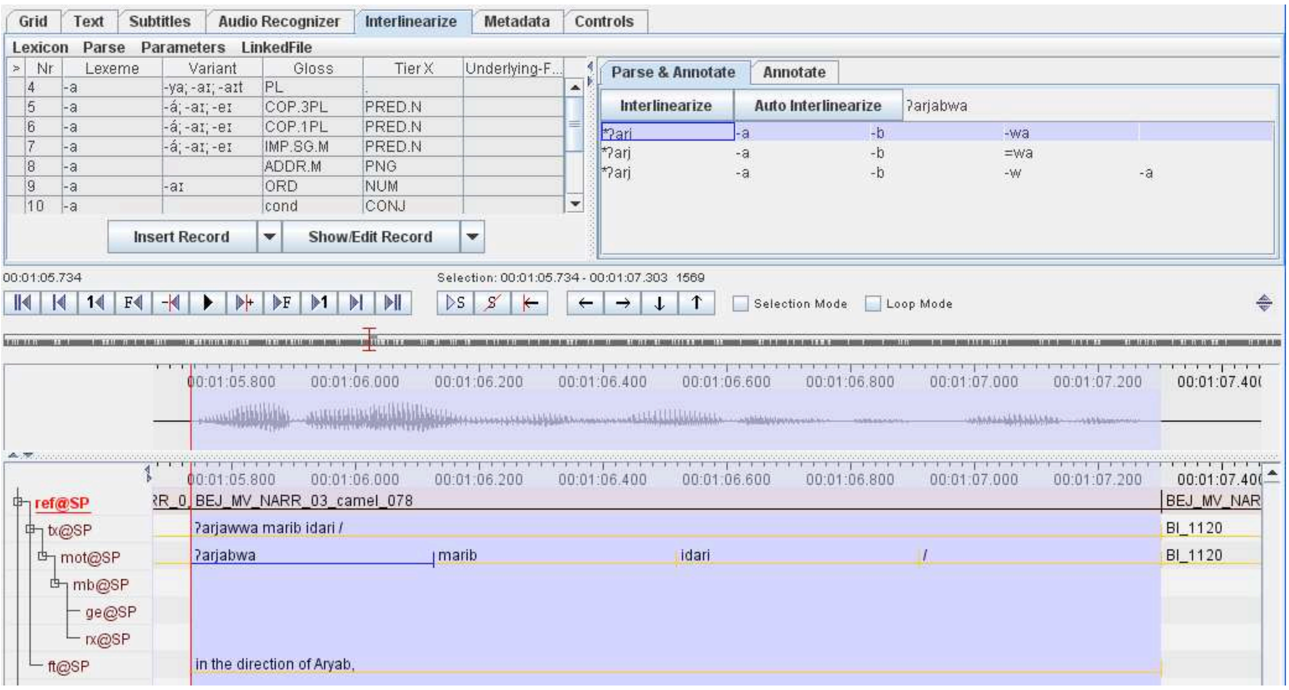
Launching the interlinearization process

The parser will search, one by one, all the words of the source tier in the lexicon, and if it doesn't find anything, it will try all the possible segmentations allowed by the current lexicon depending on the affixes it contains.

Click on the first word of the line to be annotated. Its segment will be underlined in blue.

Click on the « *Interlinearize* » button in the ***Segmentations*** section (to the right side of the screen).

The different possible morpheme breaks of the word are displayed in the ***Segmentations*** section, and now the lexicon will only show the entries that are involved in the morpheme break of the current word. The last unsegmentable segment is preceded by an asterisk, meaning that it has not been found in the lexicon.



>	Nr	Lexeme	Variant	Gloss	Tier X	Underlying-F...
	4	-a	-ya; -aɪ; -aɪt	PL	.	
	5	-a	-á; -aɪ; -eɪ	COP.3PL	PRED.N	
	6	-a	-á; -aɪ; -eɪ	COP.1PL	PRED.N	
	7	-a	-á; -aɪ; -eɪ	IMP.SG.M	PRED.N	
	8	-a		ADDR.M	PNG	
	9	-a	-aɪ	ORD	NUM	
	10	-a		cond	CONJ	

ʔarjabwa

*ʔari	-a	-b	-wa	
*ʔarj	-a	-b	=wa	
*ʔarj	-a	-b	-w	-a

00:01:05.734

Selection: 00:01:05.734 - 00:01:07.303 1569

ref@SP: ʀR_0 BEJ_MV_NARR_03_camel_078 | BEJ_MV_NAR

tx@SP: ʔarjawwa marib idari / | BI_1120

mot@SP: ʔarjabwa | marib | idari | / | BI_1120

mb@SP

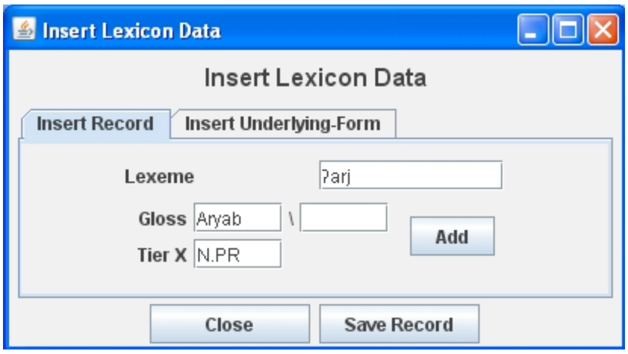
ge@SP

rx@SP

ft@SP: in the direction of Aryab,

In the above example, the word **ʔarjabwa** presents three possible segmentations. The suffixes **-a**, **-b** and **-wa** found in the lexicon lead to the isolation of a possible stem ***ʔarj**.

Adding an entry into the lexicon (*Insert record*)


Insert Lexicon Data

Insert Lexicon Data

Insert Record | Insert Underlying-Form

Lexeme: ʔarj

Gloss: Aryab \

Tier X: N.PR

To add a new word to the lexicon, whether a lexeme, a stem or an affix, click on the « *Insert record* » button, in the *Segmentations* area, or here just Right-click on the word preceded by an asterisk (in the above example, ***ʔarj**)

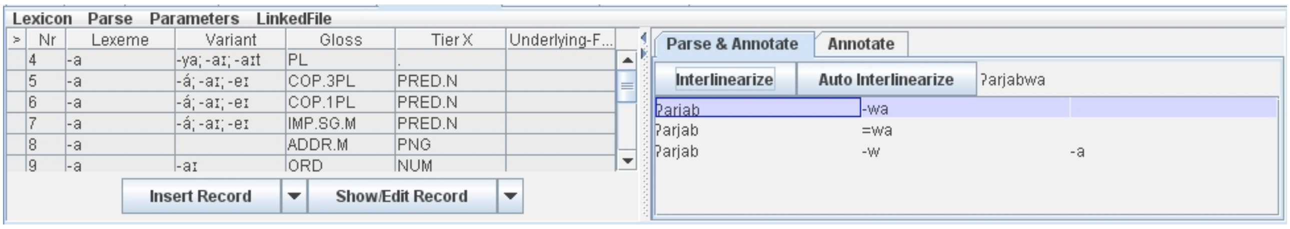
Selected tab: *Insert record*

A window appears with the selected word. It can be modified. For example, here the word to be added is ʔarjab which is glosed as the proper noun Aryab.

Click on *Save Record* button

If the morpheme you are glossing contains morphological features which cannot be segmented, or that you do not want to isolate as a separate morpheme, you can use the box to the right of symbol '\' to enter those features. Notice that you do not have to type the delimiter (\) before the grammatical label, it will be added automatically in the annotation line.

Once the entry is created, the process may be launched again with the « *Interlinearize* » button.


Lexicon Parse Parameters LinkedFile

>	Nr	Lexeme	Variant	Gloss	Tier X	Underlying-F...
	4	-a	-ya; -aɪ; -aɪt	PL	.	
	5	-a	-á; -aɪ; -eɪ	COP.3PL	PRED.N	
	6	-a	-á; -aɪ; -eɪ	COP.1PL	PRED.N	
	7	-a	-á; -aɪ; -eɪ	IMP.SG.M	PRED.N	
	8	-a		ADDR.M	PNG	
	9	-a	-aɪ	ORD	NUM	

Parse & Annotate | Annotate

Interlinearize | Auto Interlinearize | ʔarjabwa

ʔarjab	-wa	
ʔarjab	=wa	
ʔarjab	-w	-a

Here, as the new word *ʔarjab* has been entered into the lexicon, three new possible segmentations remain.

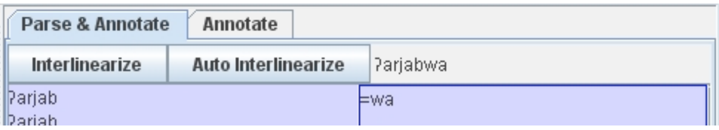
Selecting the segmentation and the gloss

When there are several possible segmentations for the word, you have to choose the one that fits

Double-click on the appropriate first segment of the correct segmentation line (here ***ʔarj** on the first line**)**.

The lexicon narrows down to the corresponding entries (which can be multiple in case of polysemy or homonymy).

Double-click on the correct entry in the lexicon area, depending on the gloss and the category.


Parse & Annotate | Annotate

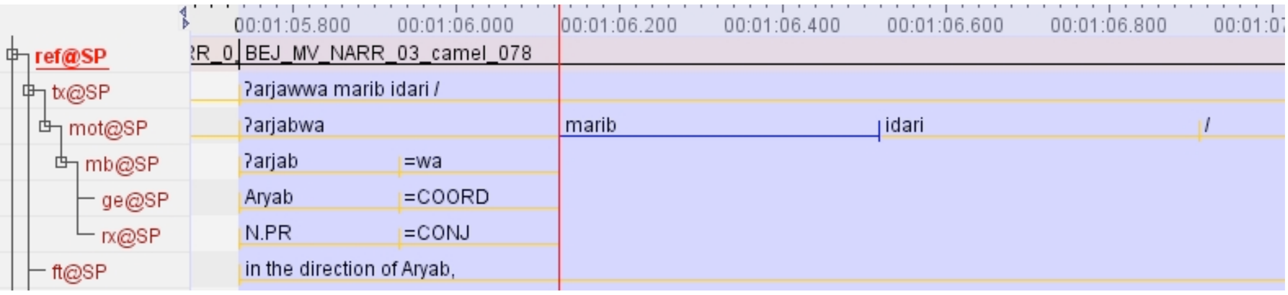
Interlinearize | Auto Interlinearize | ʔarjabwa

ʔarjab =wa

ʔarjab

The annotation of the first segment is displayed under it, in the *Segmentation* area, then the next segment is selected.
And so on: a double-click on the selected segment will narrow down the lexicon to the corresponding entries, then a double-click on the correct entry in the lexicon will display the values of this choice under the current segment. (Notice that, for saving clicks and time, when the next segment is automatically selected in the segmentation area, you can double-click directly on the correct lexicon entry without double-clicking on the current segment in the *Segmentation* section; in this case the lexicon will stay fully displayed.)

When the last segment of the current word is annotated, the chosen annotations are transferred under the word (in the annotation area), each in its own tier, and the next word is selected.

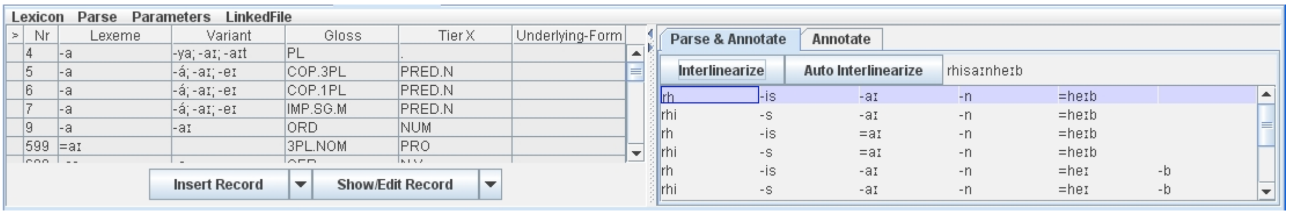


ref@SP	ʔR_0	BEJ_MV_NARR_03_camel_078			
tx@SP		ʔarjawwa marib idari /			
mot@SP		ʔarjabwa	marib	idari	/
mb@SP		ʔarjab	=wa		
ge@SP		Aryab	=COORD		
rx@SP		N.PR	=CONJ		
ft@SP		in the direction of Aryab,			

Extended features of the parsing

Morphophonology (lemma and variant)

When a morphophonological change appears at the boundary of a stem and an affix (or of two successive affixes), you should always bear in mind that the parser searches for a match between what remains to be treated and the lexicon entries at *Lexeme* or *Variant* level.



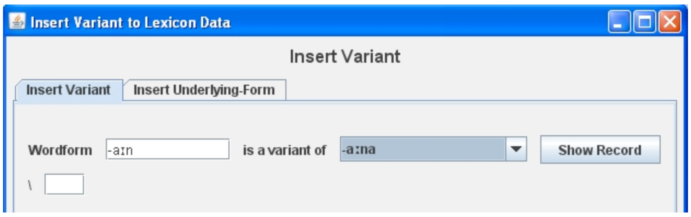
>	Nr	Lexeme	Variant	Gloss	Tier X	Underlying-Form
	4	-a	-ya; -aɪ; -aɪt	PL	.	
	5	-a	-á; -aɪ; -eɪ	COP.3PL	PRED.N	
	6	-a	-á; -aɪ; -eɪ	COP.1PL	PRED.N	
	7	-a	-á; -aɪ; -eɪ	IMP.SG.M	PRED.N	
	9	-a	-aɪ	ORD	NUM	
	599	=aɪ		3PL.NOM	PRO	

rhisaɪnheɪb

rh	-is	-aɪ	-n	=heɪb	
rhi	-s	-aɪ	-n	=heɪb	
rh	-is	=aɪ	-n	=heɪb	
rhi	-s	=aɪ	-n	=heɪb	
rh	-is	-aɪ	-n	=heɪ	-b
rhi	-s	-aɪ	-n	=heɪ	-b

In the example above, the parser cannot give the correct segmentation of the word ‘rhisa:nhe:b’ (should be rh –is -a:na =he:b) because of the collapse of the vowel ‘a’ of the suffixe ‘-a:na’ before the last clitic ‘=he:b’. When ‘=he:b’ is isolated, for the parser being able too correctly isolate the suffixe ‘-a:na ‘ already in the lexicon, we can enter ‘-a:n’ as a variant of it..

Adding a variant to an entry



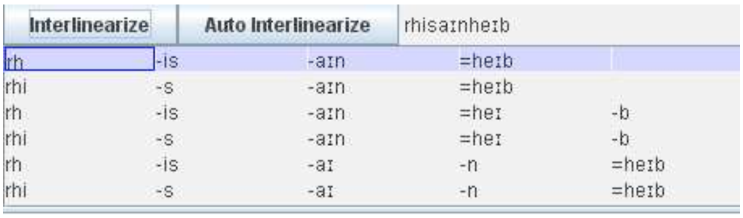
Wordform -aːn is a variant of -aːna

\

Change the « *Insert Record* » button into « *Insert Variant* » button with the downward little arrow, then click on it.

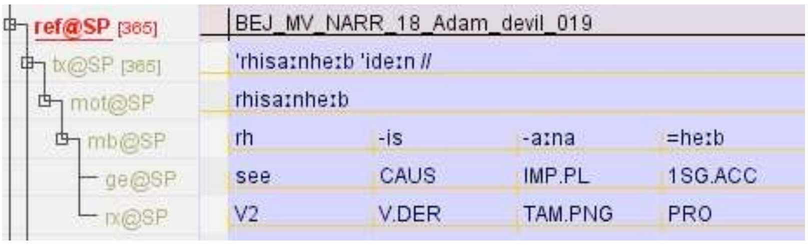
Enter the variant form (-a:n) and select the associated entry (-a:na).

Save the record



rhisaːnheːb

rh	-is	-aːn	=heːb	
rhi	-s	-aːn	=heːb	
rh	-is	-aːn	=heː	-b
rhi	-s	-aːn	=heː	-b
rh	-is	-aː	-n	=heːb
rhi	-s	-aː	-n	=heːb

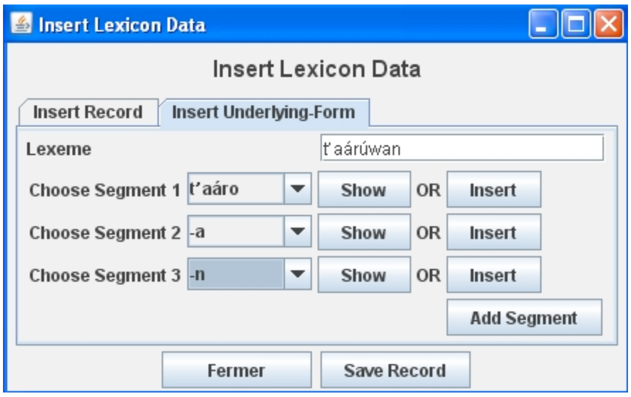


ref@SP [365]	BEJ_MV_NARR_18_Adam_devil_019			
tx@SP [365]	'rhisaːnheːb 'ideːn //			
mot@SP	rhisaːnheːb			
mb@SP	rh	-is	-aːna	=heːb
ge@SP	see	CAUS	IMP.PL	1SG.ACC
rx@SP	V2	V.DER	TAM.PNG	PRO

As the parser searches for a match at the level of the *lexeme* or the *variant* level of the entries, it will now propose the variant '-a:n' of the entry '-a:na' as fitting the match. The annotation may then continue by validating the correct entries of the lexicon, and the morphem '-a:n' will be returned with its *lexeme* base form value '-a:na' to the *mb* annotation tier.

When the morphophonology is too complex for the parser to give the correct segmentation, even with alternate forms of affix or stem, it is always possible to give the correct segmentation directly into an entry of the lexicon. But be aware that the various segments composing the current entry have to already exist in the lexicon.

Inserting an underlying form



Insert Lexicon Data

Insert Lexicon Data

Lexeme	t'aárúwan			
Choose Segment 1	t'aáro	Show	OR	Insert
Choose Segment 2	-a	Show	OR	Insert
Choose Segment 3	-n	Show	OR	Insert

Right-Click on the word to enter in the segmentation area,, or or Click the « *Insert Record* » button .

Select the « *Insert underlying form*» tab

Find the first segment (here *t'aáro*) in the drop list in front of *Choose Segment 1*

idem for segment 2, (here *-a*)

then add a segment if necessary by clicking the *Add button*, and choose the segment (here *–n*)

Validate with the *Save Record* button, then close the window.

In case of homonymy or polysemy of the lexical entries, it can be difficult to choose the right morpheme among several for the current segment. The *Show* button allows displaying the content of the lexical entry to verify if it is the correct one.

From this window, it is also possible to add an entry that is lacking in the lexicon and would be necessary for the segmentation.

Click on the *Insert* button on the same line as the current segment. A little window *Insert Morpheme* will open allowing you to add an entry in the lexicon. Validate with OK. This entry will constitute the new segment for the word to be segmented.

It should be noted that this method of giving the parser an ad hoc segmentation for a word, should be avoided as much as possible and only be used when the parser fails to give the correct segmentation with regard to the content of the lexicon (lemma, variants and affixes). As a matter of fact, this kind of specific entry of the lexicon only resolves the segmentation of one word (or maybe a complex combination of affixes). Recall that the principle of the parser consists in providing the lemma in one part and the affixes in the other part (with possible alternate forms), a method which is less time consuming and more consistent and less error-prone.

The auto-interlinearization function

To save time in the process of interlinearization, it is possible to choose the automatic process which will continue word after word, whenever the segmentation of the words is possible, unique and without ambiguity in the glossing.

Launching of the auto-interlinearization process

This function can be launched from any word in the annotation base tier (here the *mot* tier).

Click on the first word where the process must start (the base line of the word turns blue)

Click on the *Auto-Interlinearize* button

The segmentation starts, and will continue word by word until a word cannot be segmented or until an ambiguity arises.

Parse-lexicon

Once the annotation of a text is completed, another type of lexicon can be created with all the words of the text as entries and their glossed segmentations as data. This lexicon may be saved as a *Parse lexicon,* or merged with an older one. It can be used then for increasing the speed of the *auto-interlinearize* process.

Creating, merging, opening a *Parse lexicon*

To export the lexicon of the words and their glossed segmentation, go to the *Lexicon* area and choose the *Parse* menu

Parse, Export Parse data

Browse to the destination folder and give the file a name. The extension **.eafp** will be added.

To merge the current segmentations and annotations of the text with an older *Parse lexicon*, choose the *Parse* menu in the *Lexicon* area :

Parse, Export Parse data

Browse to the destination folder and select the parse file in which you want to merge the new parsing.

To open a *Parse* lexicon for the *auto-interlinearize* process, choose the *Parse* menu
Parse, Open Parse data

Self-loading of a *Parse lexicon*

By default, once a *parse* lexicon has been created for an ELAN annotation file, it will be automatically opened next time the annotation file is opened. If you want to avoid this, you have to delete the link between these two files,
Go to the *Linked File* menu in the *Lexicon* area
Uncheck the checkbox before the name of the *Parse* file
The *Parse* file will not be loaded next time the ELAN file is opened.

Saving the linked files

When you close the ELAN annotation file, a window will appear allowing you to unselect the linked files (lexicon and/or parse) you do not want to save (for any reason). Normally you should save the lexicons.
Anyway, it is advisable to save the ELAN lexicon regularly during the intelinearizing process with the *Save* item in the *Lexicon* menu, because the Ctrl/S shortcut in ELAN will not save the lexicons.

6. Glossing principles

The whole glossing process is crucial, because all the queries and their results depend on the consistency and accuracy of the annotations. This is why glossing must not be seen as simply giving the descriptive morpheme-by-morpheme annotation that allows a reader to better understand the meaning of an example, or the details of a morphosyntactic construction, in a paper or grammar.
Glossing in a software such as Elan for CorpAfroAs implies thinking about the implications of the chosen labels and chosen annotation system for future retrieval of relevant data. What is meant by relevant data is data organized as a body of query results such as to enable the resolution of a problem. For instance, (a) "what type of verb is preferably used in the Imperfective aspect in my corpus", or (b) "what are the contexts of use of the different focus particles of my corpus", or (c) "when are color terms realized as adjectives and when are they realized as verbs in my corpus", or (d) "how often is the distinction between genitive and locative neutralized in my corpus", etc.
The resolution of (a) implies that verb types should be coded in *rx*, and aspect should be annotated in *ge*; the resolution of (b) implies that different focus particles should be given systematically different annotations, be it by different labels or by different numbers

(FOC1, FOC2, etc.); the resolution of (c) implies that adjectives and verbs be tagged in *rx*; the resolution of (d) implies that neutralization should be indicated in *rx* while case is annotated in *ge*, etc.
In order for those queries to be formulated, the proper annotations have to be used in both GE and RX.

6.1. Principles of glossing in the GE line

Morphological glosses are in capital letters; lexical glosses in small letters (exception: proper nouns have initial capitals, negative glosses have a small n as prefix (nFCT = non-factual);

Lexical glosses refer to basic stems only, irrespective of the semantic changes induced by derivational and other material; e.g., Gawwada **ʧox-** ‘to milk’ is glossed “milk-”, **ʧox~x** ‘to milk one teat only of a cow’ is glossed “milk~SEM-”

Digits are used for persons; no dot is used between them and the following alphabetic gloss: e.g.: SBJ.3SG.M ‘third singular masculine subject’.

Glosses reflect the order of elements: prefix(es), stem, suffix(es).

The ordering of elements within a single tag reflects a general principle “the more inclusive (general) category precedes the more specific one(s)”.

Composite tags: with a dot between elements also found as single tags. E.g.: PFV.NEG for Perfective Negative.

If a verb has a Ø person marker, this should be indicated by square brackets (cf. Leipzig glossing rules)
ex: ʃrəb = drink\PFV[3SG.M] (‘he drank’)
ʃrəb-t = drink\PFV-1SG (‘I drank’)

Epenthesis at morpheme boundary: Keep the epenthetic segment with the suffix (i.e. to the right of the boundary), or the prefix (i.e. to the left of boundary): e.g. jə-lla (not j-əlla).

When feminine gender marking is optional only gloss F when overtly marked (in the example below raː=k can be either F or M).

raː=k	raː=**ki**
see=OBL.2SG	see=OBL.2SG.**F**

Morphological feminine is marked as F in ge line even if it has a collective or diminutive meaning. The meaning is given in rx (DIM for diminutive, COL for collective)

Plural with ablaut are glossed “\PL” on the ge tier.

mb	klaːb
ge	dog\PL
rx	N

Mixed plurals with both ablaut and affixes (e.g. in Arabic):

mb	tərq –aːn
ge	road\PL-PL
rx	N-AFFX

Construct state

Construct state is glossed in GE as CS if it has a morphological realization.

Example:

\tx	ʕaddət		sukkan	ṭṛabləs	/
\mot	ʕəddət		sukkaːn	ṭṛaːbləs	/
\mb	ʕədd	-t	ukkaːn	ṭṛaːbləs	/
\ge	number	-F\CS	inhabitant\PL	Tripoli	/
\rx	N	-AFFX	N	N.PR	/

\ft The number of Tripoli inhabitants

\tx	alf u tamən mijt nasama /		
\mot	aːlf	u	təmn
\mb	aːlf	u	təmn
\ge	thousand	and	eight\CS
\rx	NUM	CONJ	NUM

\mot	miːjt	nasama			/
\mb	miːj	-t	nasam	-a	/
\ge	hundred\CS	-F\CS	person	-F	/
\rx	NUM	-AFFX	N	-PNG	/

\ft One thousand and eight hundred persons

The aspectual markers of the verbal system, in case of specific patterns of the stem, PFV and IPFV are glossed only once in the ge tier (not also on the personal indices): \PFV and \IPFV after the translation of the verb. Always gloss IPFV and PFV in the ge line.

Demonstratives: In general for demonstratives we use PROX or DIST in the ge tier and DEM in the rx tier. If the language has only one DEM then use DEM in the ge tier and DEM in the rx tier.

Pre-/post/ad-positions are translated on the ge tier according to their semantic value (only one translation serving as gloss, even if the preposition has several meanings in ft) or role (e.g. DAT, GEN). A complete list will be given in the grammatical sketch of each language.

Converbs should be labelled semantically, not numbered.

Subject affixes or clitics:
If in your language personal indexes are agreement markers, only mark 3SG.M in ge, and PNG in rx. The "lexical" subject (if any) should then be marked SBJ in rx (in addition to its characterization as N.M. for instance, for noun + masculine).
If in your language personal indexes are bound pronouns carrying grammatical function, then use SBJ.3SG.M in ge, and AFFX (or CL) in rx. 'Lexical' subjects should also be labelled SBJ in rx if word order alternations are to be retrieved.

In Omotic, both reported discourse and a kind of emphasis when one repeats his/her own discourse (marked by extra-lengthening of the last vowel of the utterance) are glossed RD in ge tier (keeping the lengthening of the vowel on the mot line). The difference between repetition of the same speaker's words and reported discourse is glossed in the rx tier.

General symbols

symbol	description	examples, notes
_	separates parts of the lexical description of a stem	pull_out, go_home
.	separates parts of morphemes	PFV.3SG.M
-	affix boundary	-DET
\	stem alternation	\PFV

~	stem reduplication (complete or partial)	~IPFV
=	clitic boundary	=DET
< >	encloses material in another language (codeswitching)	<lavaliz>
>	the sign > immediately preceding a gloss label in tier rx indicates that this gloss refers to the source of grammaticalization of the morpheme. This indication is optional.	>DEM

6.2. Principles of glossing in RX tier

The \rx tier gives us two types of information:

- on morphosyntax : the paradigm or part of speech the morpheme belongs to; for that, we use a more or less standardized set of labels called the "ps" labels (written in capital letters);
- on certain phenomena which are either not directly accessible through the \ge and ps labels (covert categories; circumfixes; apophony) or which relate the morpheme to other morphemes in the corpus (homonymy, etc.); these are called indices (written in small letters)

Elements of Syntax

- Labels and indices are separated by slashes: PRO/cov. "ps" labels are followed by indices. The different elements of compound "ps" labels are separated by dots: PRO.DEICT;
- "ps" labels are arranged more or less in the same way as in \ge, going from left to right from general to particular.
- Indices will tend to be idiosyncratic: they will reflect the current state of research in terms of unsolved problems, questions, current typological debates, etc. As full names for these labels would be far too long we finally opted for abbreviations.

6.3. Code-switching glossing principles

In general, the choice of a gloss for CSW phenomena depends on what we think should be retrieved by the users of the corpus. Possible glosses are also dependent on the different theoretical approaches to CSW. During our discussion two main options for CSW glossing emerged:

1) A gloss intended to mark a distinction between inter-sentential and intra-sentential CSW.

2) A gloss intended to mark the embedded language against the matrix language.

We consider that the priority of marking CSW, for this project, is essentially because we cannot gloss loan elements as we gloss our language. Therefore, the proposal is to mark, with an easily retrievable symbol, the embedded language against the matrix language regardless of the kind of CSW. Thus, we propose to mark CSW by mean of the symbols <…> embedding the code-switched elements in the lines tx, mot, mb, ge and ft. We put in rx the language following the abbreviation for codeswitching CSW.ENG (ISO abbreviation for the language).
As in the following examples (from Moroccan Arabic):

\tx <donc>əlħəlldjaːlu huːwamṛaħaːmla //

\mot <donc> əlħəll djaːlu huːwa mṛa ħaːmla //

\mb <donc> əl=ħəll djaːl=u huːwa mṛ-a ħaːml-a //

\ge <donc> DEF=solution of=OBL.3SG.M 3SG.M woman-Fpregnant-F //

\rx CSW.FRA DET=N.M PREP.POSS=PRO PRO.IDP N-AFFX ADJ-AFFX //

\ft <so> it’s solution is the pregnant woman

We can use standard orthography if there is one. However, we suggest using IPA, when it is necessary or relevant to highlight the degree of phonological integration of the "code-switched" elements.
Example of IPA transcription from Juba Arabic, code-switching toward Sudanese Standard Arabic and English:

\tx de amulu gal<luɣa al-arabiyya al-fusħa>

\mot de amulu gal <luɣa al-arabiyya al-fusħa>

\mb de amulu gal <luɣa al-arabiyya al-fusħa>

\ge PROX.SG do say <luɣa al-arabiyya al-fusħa>

\rx PRO.DEM V SVC CSW.ARB

\ft “they call (it) <the classical Arabic>”

Generally speaking, we decided not to mark lexical borrowings, but the separation of loan-words from CSW is not always clear. The parameter of phonetic realization of the code-switched items cannot be a solution since it is relevant only in certain sociolinguistic conditions (it is relevant for Moroccan Arabic but not for Juba Arabic). At the same time, it is not possible to rely on the evaluation of the individual's language skills, because bilingualism is also a very relative factor. Thus, only the contributor can decide if the occurrence of a given item in his/her language could be due to a contingent lexical need (in this case he/she is dealing with a case of CSW) or if it is a common borrowed form. Everyone will have to choose whether it is integrated borrowing or some kind of CSW. The theoretical choice (CSW, borrowing, interference...) is explained in the grammatical sketch presenting our language.

For instance in Juba Aarabic, the high occurrence of the forms *sistá* < "sister", *partí* < "party", *ánkol* < "uncle" would lead one to consider them as loanwords. Conversely, it seems that the use of plant names from Bari is due to the fact that those are the only words that can express the contingent semantic reference needed by the speakers.

\tx <keɲuket> da ja:::ni
\mot <keɲuket> de jani
\mb <keɲuket> de jani
\ge <keɲuket> PROX.SG that_is
\rx CSW.BFA DEM INTJ
\ft "The <kenyuket> is..."

Apart from CSW, there is another contact-induced phenomenon that can be signaled in the \rx tier. This is the synchronic morphosyntactic interference (INTF) occurring in Juba Arabic. This is exclusively related to the post-creole continuum in which Juba Arabic is integrated, which resulted in the functional integration of morphological material from (Sudanese) Arabic. Differently from CSW, instances of interference are glossed also in the \ge tier (note that the list of the glosses used for marking interference on \ge is the same as in other Arabic dialects and will be provided in the grammatical sketch). The label INTF is followed by canonical \rx glosses describing the morphosyntactic categories related to interference from Arabic.

\tx ʃedera <haggu> kebir
\mot ʃedera <ħaggu> kebir
\mb ʃedera <ħagg=u> kebir
\ge trunk <of=OBL.3.SG.M> big
\rx N <INTF.PREP.POSS=3.SG.M> ADJ
\ft its trunk is big

6.4. Free translation in Elan

As the main segment into CorpAfroAs model is the prosodic unit, the free translation of some segments may become semantically inadequate and then a wider segmentation tier may be necessary for the free translation line.

It is provided to add a Mft tier to translate longer chunks (M is for ‘main’). But this tier cannot be dependent on *ref* because its segments are wider than the refs. An independent tier synchronized to time as the tier *ref* can be created on the base of the *ft* segments (or *ref*).

To add this tier,

- Tier, Copy Tier
- Select *ft*, Next
- Select Transcription (No parent), Next
- Select the (only) linguistic type *ref*, Finish

A new tier named *ref-cp* has been created. We will rename it.

- Right click on the tier label
- Change attribute of *ref-cp*
- Tier name : *Mft*, Change

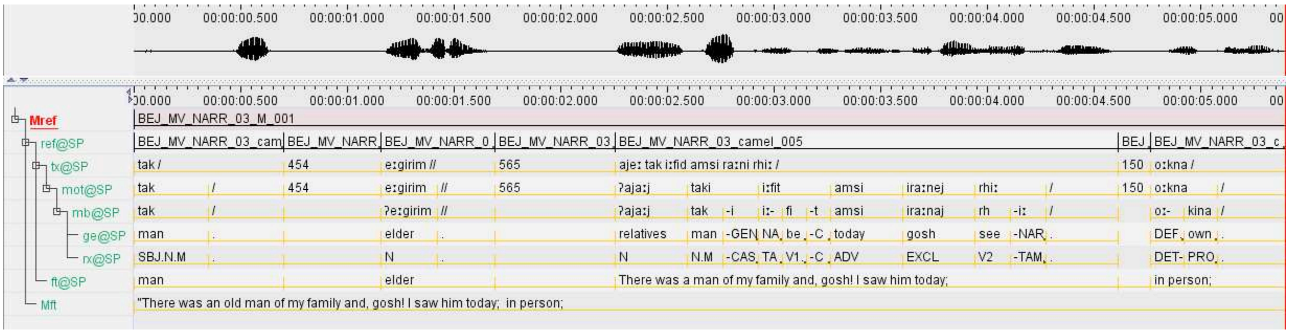
The segments from *Mft* can now be merged to form wider segments as needed to allow a correct free translation.

- On the *Mft* tier, Select the first segment that need to be merged with next.
- Right-click on it, Select Merge with next annotation

The texts (copied from *ft*) of the merged segments have been concatenated.

- Edit the free translation text as needed

There can be a development of this. Instead of renaming *Mft* the copy of the tier *ref*, we could have renamed it *Mref* (for ‘main’ *ref)*. Then after merging the segments that needed to, we could have created a copy of this *Mref* with the linguistic type *ft* and rename it *Mft*. Then the *Mref* tier could be labelled and numbered just as *ref* have been. Finally, tier *ref* could be made child of *Mref* with the linguistic type ‘included in’.



Mref	BEJ_MV_NARR_03_M_001						
ref@SP	BEJ_MV_NARR_03_cam	BEJ_MV_NARR	BEJ_MV_NARR_0	BEJ_MV_NARR_03	BEJ_MV_NARR_03_camel_005	BEJ	BEJ_MV_NARR_03_c
tx@SP	tak /	454	eːgirim //	565	ajeː tak iːfid amsi raːni rhiː /	150	oːkna /
mot@SP	tak /	454	eːgirim //	565	ʔajaːj taki iːfit amsi iraːnej rhiː /	150	oːkna /
mb@SP	tak /		ʔeːgirim //		ʔajaːj tak -i iː- fi -t amsi iraːnaj rh -iː /		oː- kina /
ge@SP	man .		elder .		relatives man -GEN NA be -C today gosh see -NAR .		DEF own .
rx@SP	SBJ.N.M .		N .		N N.M -CAS TA V1 -C ADV EXCL V2 -TAM .		DET- PRO .
ft@SP	man		elder		There was a man of my family and, gosh! I saw him today;		in person;
Mft	"There was an old man of my family and, gosh! I saw him today; in person;						

6.5. Search in Elan

You can search a word or a gloss in order to replace it. Once you have found it, you choose the correct occurrence and then you replace it:

Search, Find (And replace)

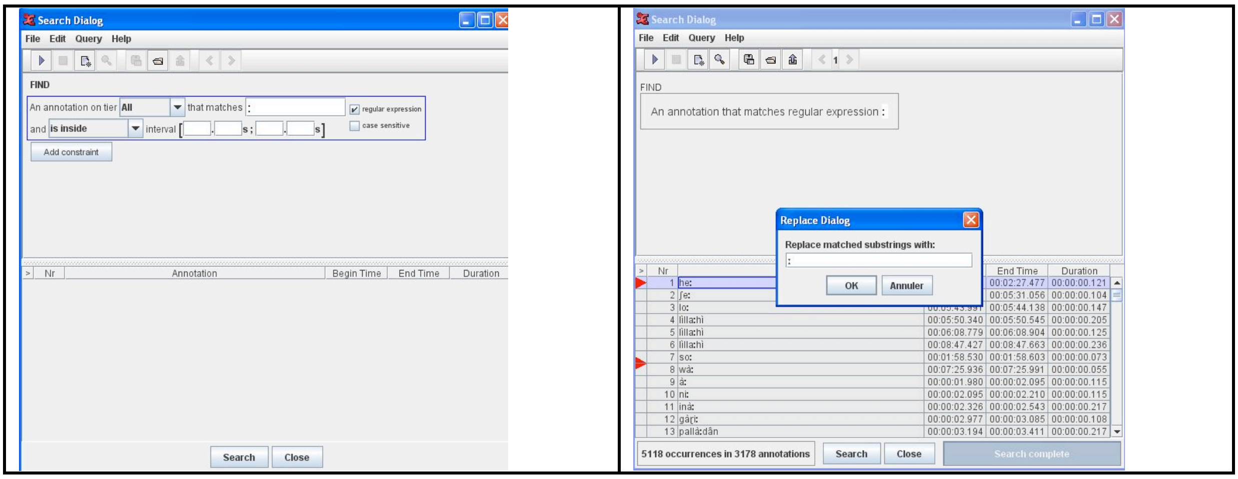
An annotation on tier: select the tier where you want to replace (you can select all tiers)

That matches: what do you want to replace, here the colon character ‘ : ’

Check *regular expression*

Click on *Search*

The list of occurrences appears.



FIND

An annotation on tier All that matches :
☑ regular expression
□ case sensitive
and is inside interval [. s ; . s]

FIND

An annotation that matches regular expression :

Replace Dialog

Replace matched substrings with: ː

Nr	Annotation	Begin Time	End Time	Duration
1	he:		00:02:27.477	00:00:00.121
2	ʃe:		00:05:31.056	00:00:00.104
3	lo:	00:05:43.991	00:05:44.138	00:00:00.147
4	lìlla:hì	00:05:50.340	00:05:50.545	00:00:00.205
5	lìlla:hì	00:06:08.779	00:06:08.904	00:00:00.125
6	lìlla:hì	00:08:47.427	00:08:47.663	00:00:00.236
7	so:	00:01:58.530	00:01:58.603	00:00:00.073
8	wà:	00:07:25.936	00:07:25.991	00:00:00.055
9	à:	00:00:01.980	00:00:02.095	00:00:00.115
10	ni:	00:00:02.095	00:00:02.210	00:00:00.115
11	inà:	00:00:02.326	00:00:02.543	00:00:00.217
12	gàɽi:	00:00:02.977	00:00:03.085	00:00:00.108
13	pallà:dân	00:00:03.194	00:00:03.411	00:00:00.217

5118 occurrences in 3178 annotations

Edit, Replace

Replace matched substrings with: type the replacement character (here the API character ‘ː’)

OK (the search window displays no more occurrences, they have been replaced)

7. Toolbox as alternative to Elan-CorpA

The new Elan document (as at the end of section 4) can be exported in Toolbox format. Toolbox is now used to segment the words into morphemes and to annotate them by means of a lexicon. When segmentation and annotation are finished, the Toolbox document is imported back into Elan.

If empty segments still exist in ELAN, they can be deleted there, but it is simpler to do this during the Toolbox annotation, just by deleting the empty records one by one. When importing back into ELAN they will no longer exist. Then the final ‘labeling’ of the segments may be done. In this process, pauses will be enumerated in sequence with spoken IUs.

Before exporting to Toolbox, each tier in ELAN needs to have its 'Participant' parameter set to SP if there is only one speaker; if there are 2 speakers, it must be set to SP1 for the first speaker tier and SP2 for the second speaker tier; if there are 3 speakers, SP1 for the first speaker tier, SP2 for the second speaker tier, and SP3 for the third speaker tier. Don't forget to check (via the *Change tier attributes* button) that each tier has an SP as participant.

Creating a new Toolbox project

Use *Start New Project* from *Start, All programs, Toolbox*, to create a new folder with all the standard settings files (standard database types and language encodings files). By default, this new project manages a dictionary and a text file to be interlinearized. These standard settings may be adapted afterwards.

Create your Toolbox project

Start with the creation of your main folder (let's say CorpAfroAs) where you want.

Then, Click on the Windows *Start* button, and look in *All the programs* for the *Toolbox* menu, then launch *Start New Project*.

Click on *Next*, then *Browse* until you find the folder you have just created.

Choose the (CorpAfroAs) folder in which you are going to install the Toolbox project. The selection window adds *Toolbox* at the end of the path you chose (if it adds *Toolbox project* delete *project*). Then validate with *OK*.

Click on *Next*, *Next*, then *Finish*.

Remark: Below the *CorpAfroAs* T*oolbox* folder, a *Settings* folder was created that contains all the necessary standard setting files, and the project file itself *Toolbox Project.prj*. A shortcut to this file was placed on the Desktop.

On the desk, rename the shortcut *Toolbox Project* into *CorpAfroAs*. (*Right-Click* on the icon, *Rename* it).

Remark: this will rename the shortcut, not the project name itself.

Start your project

Double-click on the shortcut *CorpAfroAs* located on the Desktop. Toolbox will open. It contains two empty databases, *Texts.txt* and *Dictionary.txt.*

Close the *Texts.txt* database by clicking on the *red cross* of its window (top-right) (we will not use this standard database).

Remark: The *Dictionary.txt* database is displayed twice as *Dictionary.txt:1* and *Dictionary.txt:2*. You should close one of these windows.

Rename the project < optional >

The default name of the toolbox project is *Toolbox Project* and is displayed at the bottom right of the toolbox window. We suggest renaming it by saving it under a different name as follows:

In the *Projet* menu, choose *Save as*, and give the project a new name, eg. *CorpAfroAs*, then click on *Save*. The name of the project is changed.

Close Toolbox by means of the menu *File, Quit* (beware, *Quit!*, not *Close*)

Correct the shortcut of your project

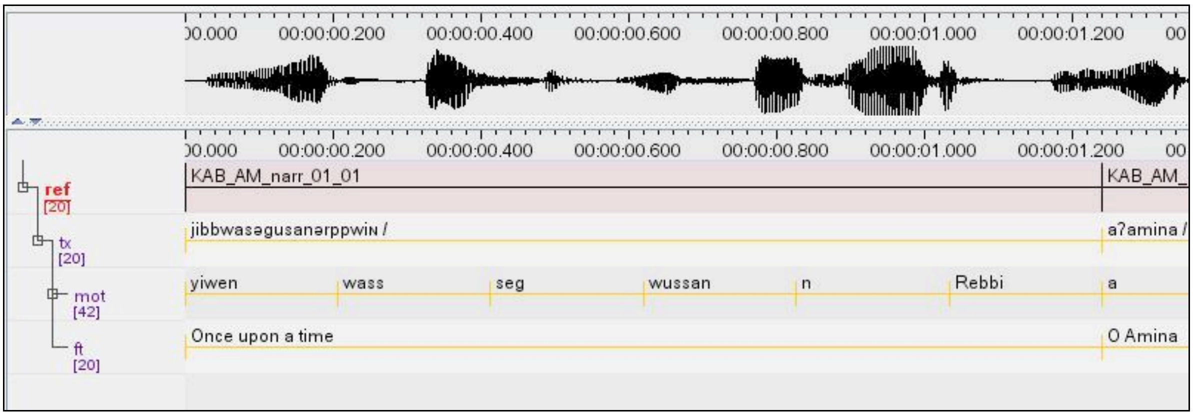
Since we've changed the name of the file project, we have to correct the shortcut that has to point to this new name, for doing this :

Right-Click on the *CorpAfroAs* icon on the Desk.

Select *Properties* and change the filename in *target* which should point to X\CorpAfroAs\Toolbox\Settings\CorpAfroAs.prj (where X is the root where you firstly created the folder CorpAfroAs. Then close with *OK*.

Export the ELAN transcription to Toolbox / Shoebox

In ELAN, the delimitation of the prosodic units is made in the *ref* tier, and the various segments are transcribed in the *tx* tier. The words of each segment are split into individual cells in the *mot* tier, by means of the *tokenize* process. The translation associated to each prosodic unit is made in the *ft* tier (free translation).



ref [20]: KAB_AM_narr_01_01 | KAB_AM_

tx [20]: jibbwasəgusanərppwiɴ / | a?amina /

mot [42]: yiwen | wass | seg | wussan | n | Rebbi | a

ft [20]: Once upon a time | O Amina

The ELAN file is then exported as a Toolbox/Shoebox file:

File, Export As, Shoebox file (it seems there is a bug when exporting as *Toolbox* file)

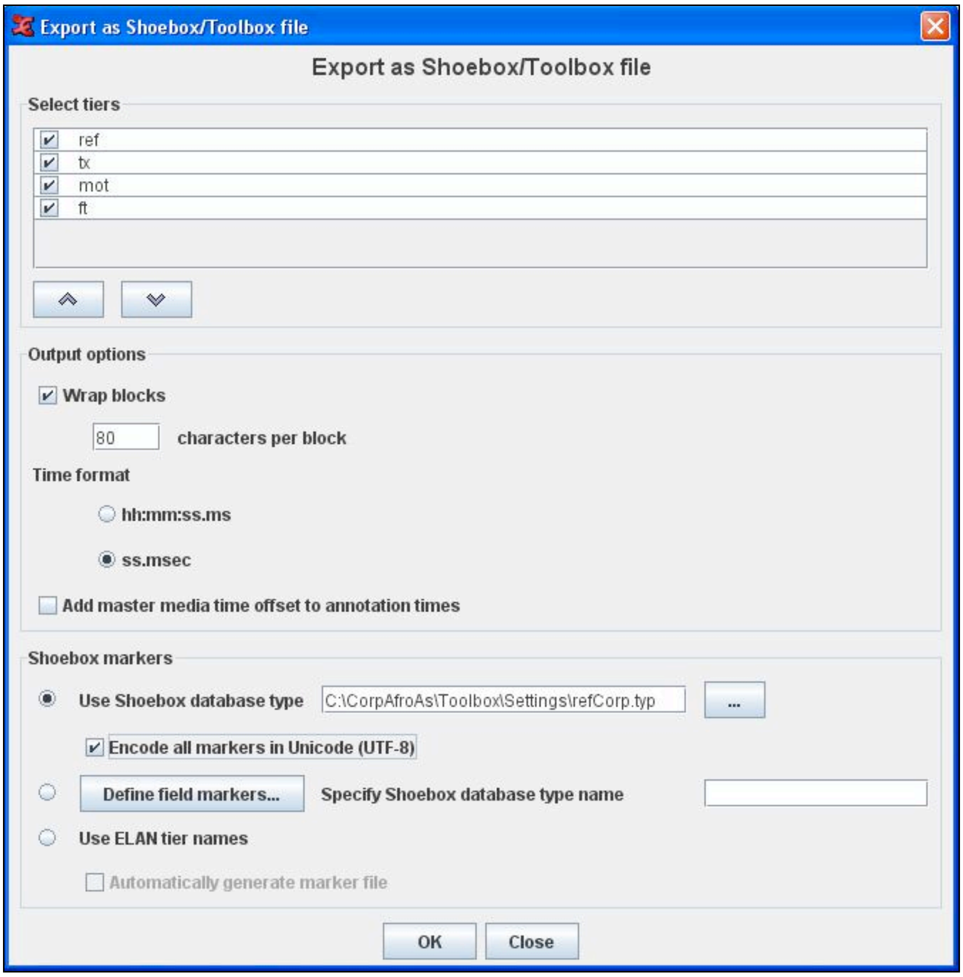
Select *Time format*: **hh:mn:ss.ms** if there is more than one speaker

Check *Use Shoebox database type*

If it is not already there, Click on the <…> button and Look for the *refCorp.typ* file (it should be in the folder *CorpAfroAs\Toolbox\Settings*)

Tick *Encode all markers in Unicode (UTF-8)*

OK



Export as Shoebox/Toolbox file

Select tiers

☑ ref
☑ tx
☑ mot
☑ ft

Output options

☑ Wrap blocks

80 characters per block

Time format

○ hh:mm:ss.ms
● ss.msec

□ Add master media time offset to annotation times

Shoebox markers

● Use Shoebox database type C:\CorpAfroAs\Toolbox\Settings\refCorp.typ

☑ Encode all markers in Unicode (UTF-8)

○ Define field markers... Specify Shoebox database type name

○ Use ELAN tier names

□ Automatically generate marker file

Select the folder to which to export the file: e.g. *CorpAfroAs\Toolbox* and give it a name (it should be the same as the ELAN file, with .txt extension)

Save

Close Elan

Import the Elan transcription into Toolbox

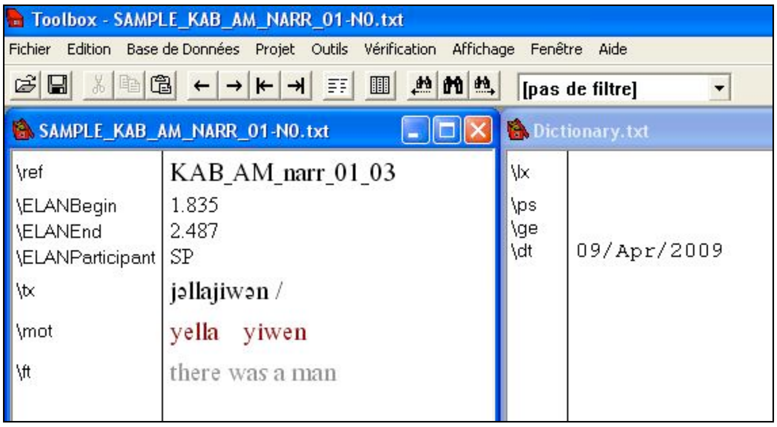
Launch Toolbox with its shortcut on the desk

File, Open

Look for the folder *Toolbox* (here *CorpAfroAs*) where the file to import is located, and select it

Click on *Open*

The file will open, showing the first record corresponding to the first segment referenced in the ELAN document. One can display the next/preceding segment by means of the arrow buttons.

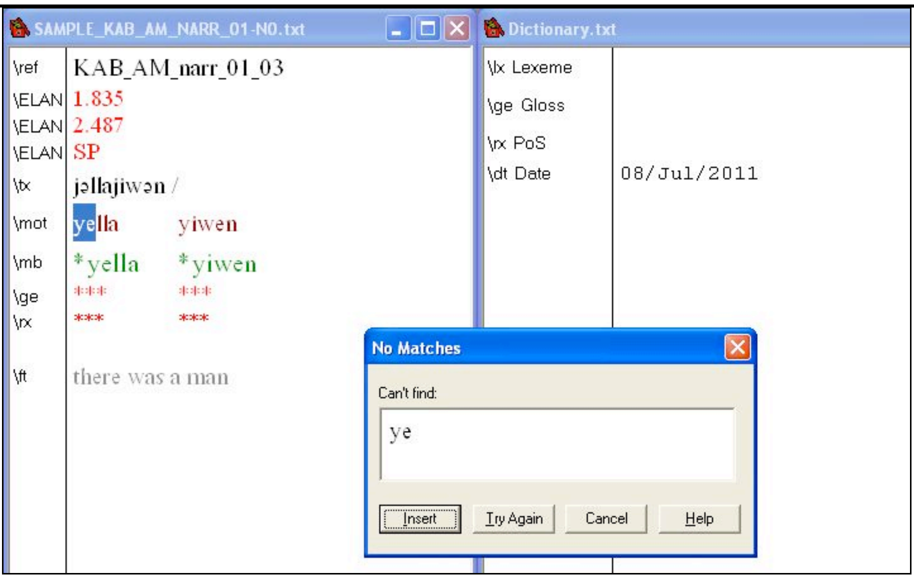


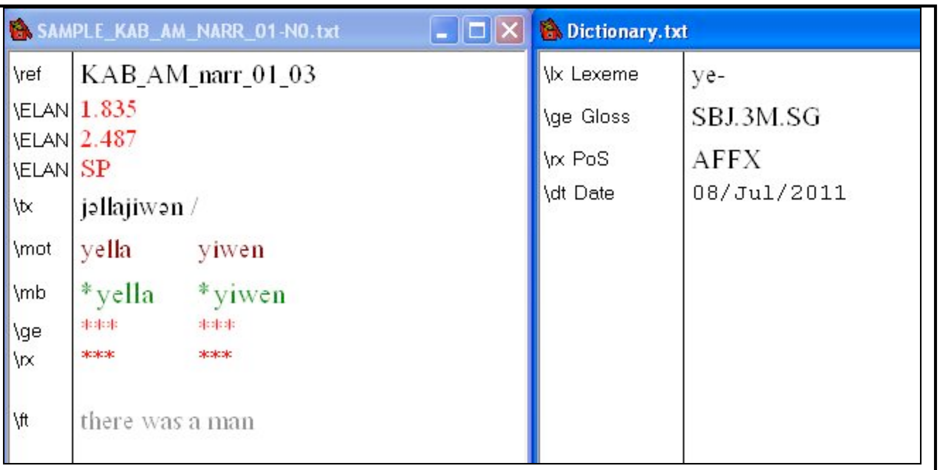
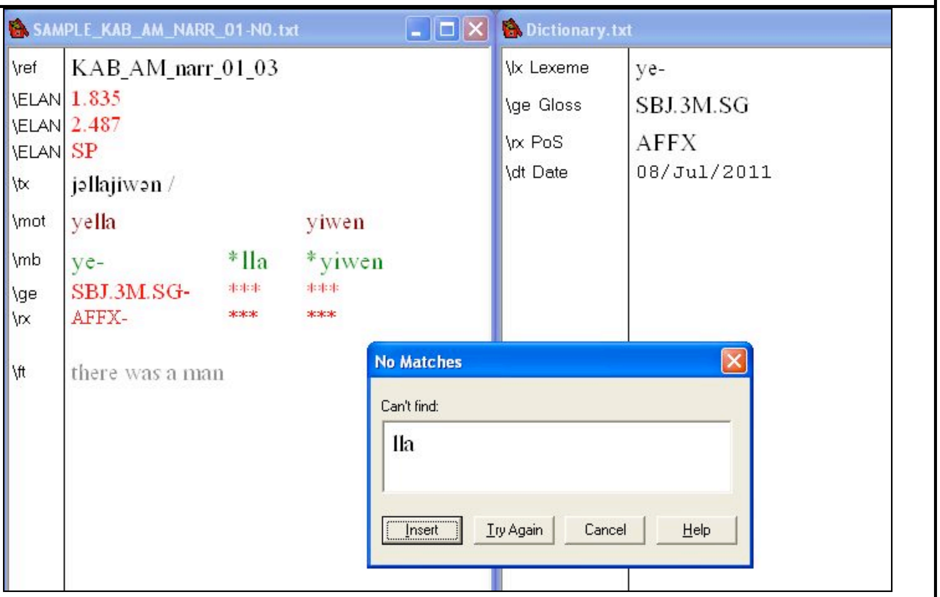
```
\ref              KAB_AM_narr_01_03
\ELANBegin        1.835
\ELANEnd          2.487
\ELANParticipant  SP
\tx               jəllajiwən /
\mot              yella   yiwen
\ft               there was a man
```

```
\lx
\ps
\ge
\dt   09/Apr/2009
```

The interlinear process begins by clicking on the *interlinear* button (or Alt/i). When the dictionary is empty, no word is found, and then each word is annotated with asterisks.

Insertion of (lexical and/or grammatical) **morphemes** into the **dictionary**

Select the prefix **ye** Right-Click on the prefix to open the insertion pop-up window Insert into the dictionary by clicking on insert *To enter a homonymous morpheme, do a Ctrl/Right-Click on the morpheme*	 \ref KAB_AM_narr_01_03 \ELAN 1.835 \ELAN 2.487 \ELAN SP \tx jəllajiwən / \mot yella yiwen \mb *yella *yiwen \ge *** *** \rx *** *** \ft there was a man \lx Lexeme \ge Gloss \rx PoS \dt Date 08/Jul/2011 No Matches Can't find: ye Insert · Try Again · Cancel · Help

A hyphen is added to the right of the morpheme to indicate that it is a prefix, then the gloss (after the label \ge) and the part of speech (after \rx) are added.	 SAMPLE_KAB_AM_NARR_01-NO.txt \ref KAB_AM_narr_01_03 \ELAN 1.835 \ELAN 2.487 \ELAN SP \tx jəllajiwən / \mot yella yiwen \mb *yella *yiwen \ge *** *** \rx *** *** \ft there was a man Dictionary.txt \lx Lexeme ye- \ge Gloss SBJ.3M.SG \rx PoS AFFX \dt Date 08/Jul/2011
Place the cursor back on the word to be interlinearized on the mot line, in the text window. Click on the *interlinear* button (or Alt/i) The word is segmented; the rest of the word **lla** can now be entered into the dictionary, and so on…	 SAMPLE_KAB_AM_NARR_01-NO.txt \ref KAB_AM_narr_01_03 \ELAN 1.835 \ELAN 2.487 \ELAN SP \tx jəllajiwən / \mot yella yiwen \mb ye- *lla *yiwen \ge SBJ.3M.SG- *** *** \rx AFFX- *** *** \ft there was a man Dictionary.txt \lx Lexeme ye- \ge Gloss SBJ.3M.SG \rx PoS AFFX \dt Date 08/Jul/2011 No Matches Can't find: lla

Special characters in Toolbox

If you want to use for instance the apostrophe as part of a character, you have to declare it as such in the Encoding Language devoted to the text (*tx*, *mot*) and morpheme (*mb*) lines. In order to do that :

Project, Encoding languages,

Choose the *language*, then the *Sort Order tab*

then add e.g. the digraphs ts' and q' where you want them in the alphabetical order.

Make sure that the apostrophe is not elsewhere in other boxes (e.g. ‘character to ignore’ or ‘diacritics’…)

It is possible to correct the segmentation of a prosodic unit that is too long. It is to be done in Toolbox, not in Praat.

French special characters

Members working on French codeswitching have "ç", "é" etc. which are problematic. The problem is due to the encoding language of the ge and rx fields in Toolbox. The encoding was ‘Default’ or ‘English’ and these encodings were not declared as Unicode. To turn these encodings into a Unicode format do the following for each of them:

Project, Language Encodings, 'Default', Modify, Options, Advanced, check Unicode.

The annotations containing French special characters need to be corrected before the importation into ELAN is done. The French entries of the dictionary need to be corrected too.

How to correct a prosodic unit in Toolbox?

In Toolbox, each record refers to a temporal segment of the audio file, delimited with Praat, then imported into ELAN and finally exported into Toolbox. If, for some reason, a temporal segment corresponding to a prosodic unit has to be split into two prosodic units, the process for integrating this correction into Toolbox is as follows:

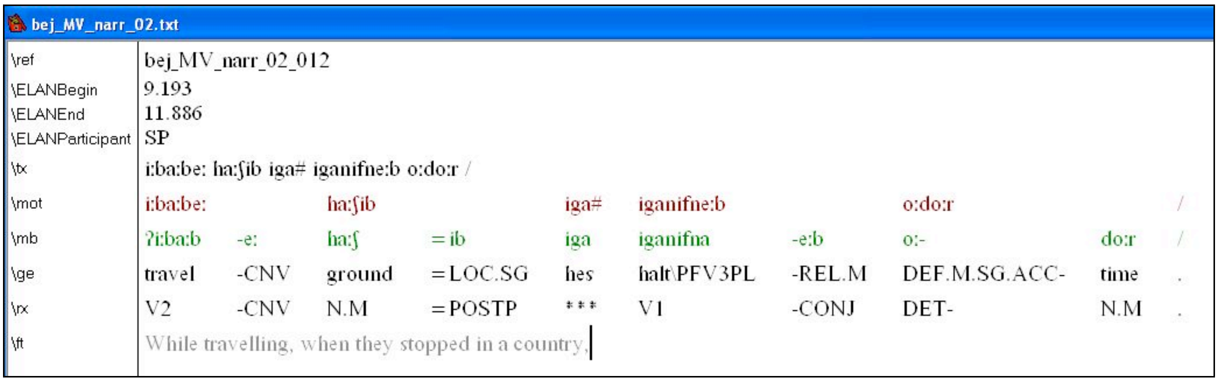
In Praat

Check and remember the temporal index corresponding to the new boundary between the two new units.

In ELAN

It is not necessary to correct the file in ELAN: when the Toolbox file is re-imported into ELAN, it will be updated automatically.

In Toolbox



```
bej_MV_narr_02.txt
\ref             bej_MV_narr_02_012
\ELANBegin       9.193
\ELANEnd         11.886
\ELANParticipant SP
\tx              i:ba:be: ha:ʃib iga# iganifne:b o:do:r /
\mot             i:ba:be:         ha:ʃib           iga#  iganifne:b           o:do:r                /
\mb              ʔi:ba:b  -e:     ha:ʃ    =ib      iga   iganifna    -e:b     o:-             do:r  /
\ge              travel   -CNV    ground  =LOC.SG  hes   halt\PFV3PL -REL.M   DEF.M.SG.ACC-   time  .
\rx              V2       -CNV    N.M     =POSTP   ***   V1          -CONJ    DET-            N.M   .
\ft              While travelling, when they stopped in a country,
```

Duplicate the record corresponding to the unit to modify

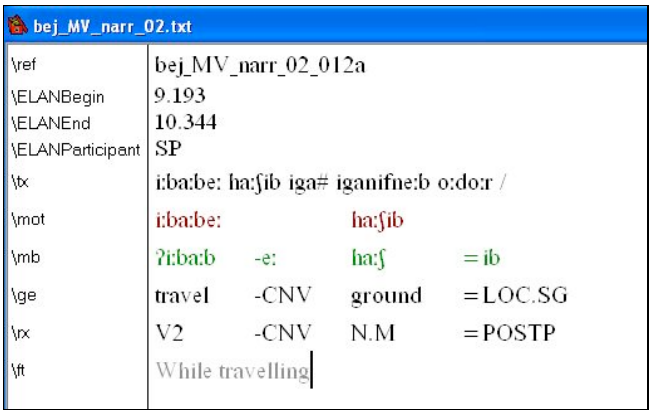
Database, Copy record

Make sure to choose the current database as destination, then click OK (the two identical records follow one another).

Rename the first record by adding an ‘a’ at the end of the reference.

Replace the end index \ELANEnd by the one you remember from Praat.

Delete the part of the text (and its annotations) corresponding to the second segment.



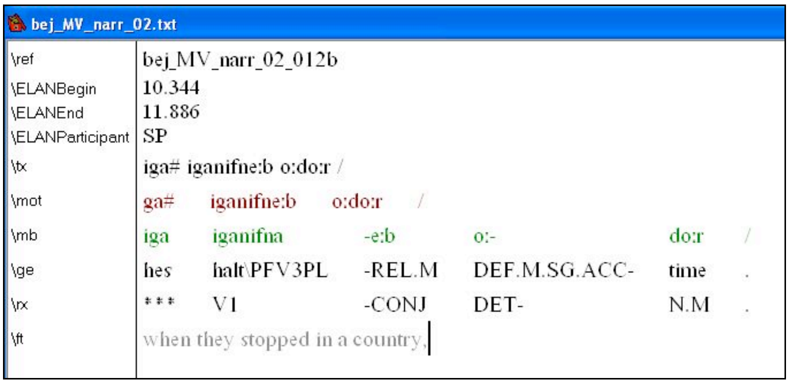
```
\ref              bej_MV_narr_02_012a
\ELANBegin        9.193
\ELANEnd          10.344
\ELANParticipant  SP
\tx               i:ba:be: ha:ʃib iga# iganifne:b o:do:r /
\mot              i:ba:be:            ha:ʃib
\mb               ?i:ba:b     -e:     ha:ʃ        =ib
\ge               travel      -CNV    ground      =LOC.SG
\rx               V2          -CNV    N.M         =POSTP
\ft               While travelling
```

Go to the next record.

Rename the record by adding a ‘b’ at the end of the reference.

Replace the begin index \ELANBegin by the one you remember from Praat.

Delete the part of the text (and its annotations) corresponding to the first segment.



```
\ref              bej_MV_narr_02_012b
\ELANBegin        10.344
\ELANEnd          11.886
\ELANParticipant  SP
\tx               iga# iganifne:b o:do:r /
\mot              ga#    iganifne:b   o:do:r    /
\mb               iga    iganifna          -e:b      o:-                do:r   /
\ge               hes    halt\PFV3PL       -REL.M    DEF.M.SG.ACC-      time   .
\rx               ***    V1                -CONJ     DET-               N.M    .
\ft               when they stopped in a country,
```

In ELAN

Once the corrected Toolbox file has been re-imported into ELAN, update and renumber the labels of the reference tier

Tier, Label and *Number Annotations*

Automatic replacements in Toolbox (only if you are 100% sure it concerns all cases, because it is difficult to undo):

Example: *Edit, Replace, Text to find*: [#]e Replace: i, Find in the Field ‘mot’, whole database (which means find ‘e’ at the beginning and replace by i).

All replacements (consonants, etc.) in the **mot** tier must be done in Toolbox, NOT in ELAN.

Re-import the toolbox annotation back into Elan

Launch ELAN

File, Import, Shoebox file

Look for the Toolbox annotated file by means of the *Browse button* <…>

Shoebox type file: Look for and select the **refCorp.typ** file (generally in Toolbox/Settings)

Check *All markers are Unicode*

OK

If the tier labels contain *@unknown*, rename these tiers. (This is due to the fact that in Toolbox, the ELANParticipant was missing).

Link the audio file to the annotated file

Edit, Linked file

Add

Look for the audio file, then *Select*

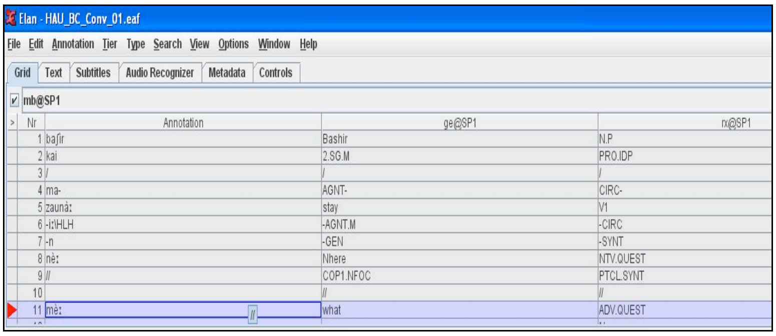
Apply, then *Cancel*

Displaying the morpheme annotations

To display the gloss *ge* and the extra annotations *rx* associated to each morpheme in an ELAN file:

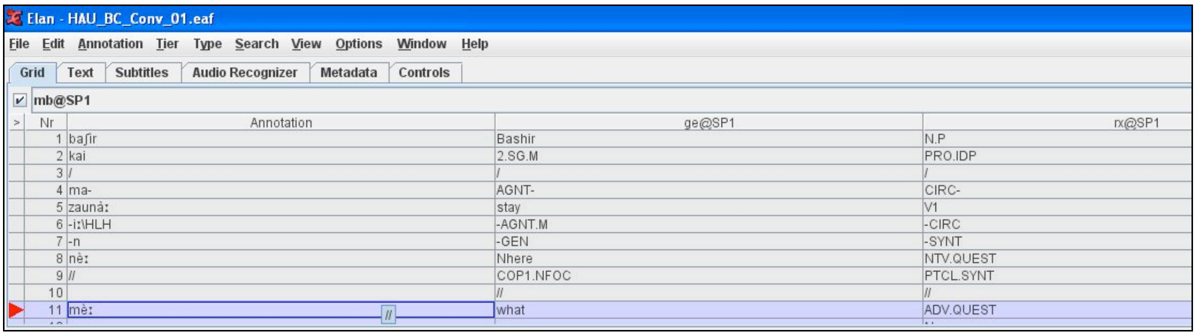
Select the *Grid* Tab

Check the *little square box* to the top left-hand side to display the corresponding tiers


Elan - HAU_BC_Conv_01.eaf
File Edit Annotation Tier Type Search View Options Window Help
Grid Text Subtitles Audio Recognizer Metadata Controls
☑ mb@SP1

Nr	Annotation	ge@SP1	rx@SP1
1	baʃir	Bashir	N.P
2	kai	2.SG.M	PRO.IDP
3	/	/	/
4	ma-	AGNT-	CIRC-
5	zaunàː	stay	V1
6	-iː\HLH	-AGNT.M	-CIRC
7	-n	-GEN	-SYNT
8	nèː	Nhere	NTV.QUEST
9	//	COP1.NFOC	PTCL.SYNT
10		//	//
11	mèː	what	ADV.QUEST

Choose the *mb@SP1* or *mb@SP2* tier instead of *Empty*


Elan - HAU_BC_Conv_01.eaf
File Edit Annotation Tier Type Search View Options Window Help
Grid Text Subtitles Audio Recognizer Metadata Controls
☑ mb@SP1

Nr	Annotation	ge@SP1	rx@SP1
1	baʃir	Bashir	N.P
2	kai	2.SG.M	PRO.IDP
3	/	/	/
4	ma-	AGNT-	CIRC-
5	zaunàː	stay	V1
6	-iː\HLH	-AGNT.M	-CIRC
7	-n	-GEN	-SYNT
8	nèː	Nhere	NTV.QUEST
9	//	COP1.NFOC	PTCL.SYNT
10		//	//
11	mèː	what	ADV.QUEST

Right-click on the grid area

Export as Tab-delimited Text

Choose the folder and filename, then save

From the Windows Explorer, look for this folder and select the file you just exported

Open the file with *Word* by right-clinking on it

Open with Word

Coded text: yes

Select the text and convert it into a table

Table, Convert to table, 5 columns

Delete the empty column if necessary

Sort the table by morphemes

Select the table

Table, Sort, Column 2, OK

33	dà	REL	CONJ/hom
61	dà	REL	CONJ/hom
64	dà	with	PREP/hom
90	dà	COP2	PTCL.SYNT/hom
153	dà	REL	CONJ.hom
189	dà	with	PREP.hom
258	dà	with	PREP.hom
270	dà	with	PREP.hom
282	dà	with	PREP.hom
376	dà	REL	CONJ.hom
381	dà	with	PREP.hom
470	dà	REL	CONJ.hom
487	dà	with	PREP.hom
533	dà	and	CONJ.hom
606	dà	and	CONJ.hom
624	dà	and	CONJ.hom

Remark: it is not possible to display the list of different tiers at the same time. If necessary, select the list of the morphemes of mb@SP2, then merge the two exported files into Word, and sort the merged table.