

ICAMPO: UN APLICACIÓN DE COLECCIÓN DE DATOS LINGÜÍSTICOS*

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Spanish Abstract - ME

English Abstract

LingSync is an OpenSource database system that allows language researchers to securely enter, store, organize, annotate, and share linguistic data. The application is accessible on any device; as it runs in a HTML5 browser, it runs on laptops (Mac 10.5 and above, Linux, Windows, ChromeBooks) as well as on mobile devices (Android and iPhone/iPad). It is suitable for both online and offline use. Furthermore, the application is created with collaborative goals in mind; data is syncable and sharable with other researchers. Researchers can form teams that contribute to a single corpus, where team members use the application to modify and discuss the data. The system also has a simple and friendly user interface, allowing users to drag and drop data (audio, video, text), or record audio/video directly into the database. In addition, the application has

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import and export capabilities for multiple file types. LingSync is designed from the ground up to conform to E-MELD and DataOne data management best practices, an important requirement for any database which will house data funded by granting agencies. Most importantly, the application is designed intuitively and theory free, so it is not necessary to be a field linguist or programmer to figure out how it works. LingSync is hosted on cloud servers so that users can use it without knowing how to set up its servers, but also has an installation guide for linguistics department server administrators so that they can set up unlimited data usage on their own department servers.

1 Introduction

1.1 Why LingSync was created

1.1.1 The need - GRETCHEN

LingSync was conceived out of the needs of language researchers doing fieldwork or other large scale data collection. Linguistic fieldwork often requires researchers to travel to places where a stable connection to the internet is not guaranteed. Also, it often involves a group of researchers contributing to building a single database. An ideal linguistic database should therefore work both online and offline as well as making it easy to share and integrate data.

1.1.2 Other programs: pros and cons - GRETCHEN

There are several existing programs used for linguistic fieldwork; however, none of them fully satisfies the needs of field linguists for robust, collaborative, multi-platform data annotation and organization, both online and offline. For example, there are web-based databases which allow collaboration, such as the Online Linguistic Database (OLD), Karuk Dictionary and Texts, and The Washo Project but they only work online, making them unusable for researchers looking to enter new data or search the database while in the field with limited or no internet access. There are also non-web-based software programs such as Toolbox and FLEx/FieldWorks, which are excellent for annotating data and organizing data into various formats (corpus, grammar or lexicon).

However, with these offline tools, researchers each enter data on a single computer, making them more vulnerable to technical difficulties, and meaning that they must use a single device for all work on the language and cannot easily combine their data with others who work on related projects. Moreover, these tools run only on a single platform (either PC or Linux, but not both and not Mac or mobile devices). Another offline tool is general purpose database software such as FileMaker Pro, which can be customized for the purpose of language research. However, this incurs the same problems as other offline tools, while additionally often requiring that a programmer be hired to customize the software for the purpose of linguistic research.

All of the linguistic database programs surveyed did not provide a good user experience. The number of clicks required and the delay between actions did not meet current software engineering best practices. In addition to core functionalities, a good user experience is necessary to ensure quality data management. LingSync grows out of discussion with a number of fieldworkers dissatisfied with currently available options.

1.1.3 Technological background: why we can make this now - GINA

1.2 Design principles - HISAKO

The principal goal of LingSync is to help language researchers collect and organize linguistic data and to facilitate collaborative research work. Main objectives are to provide:

- A self-explanatory, easy-to-use user interface so that researchers can understand and start using the application without laborious training about the software.
- Customizable data entry fields to accommodate particular requirements of a research.
- Data sharing, protection and integration functions to facilitate collaboration among researchers and between researchers and language consultants.

In addition to the objectives described above, LingSync is designed to comply with the recommendations from E-MELD Best Practices in Digital Language Documentation,¹ and DataONE Primer on Data Management.² The following section discusses the design of LingSync with respect to E-MELD and DataONE best practice recommendations.

1.2.1 E-MELD Best Practices in Digital Language Documentation

E-MELD describes seven common problems in digital language documentation identified in Bird and Simons (2003) and recommends solutions. LingSync

Content: Data is annotated and described using consistent terminology.

Terminological conventions used to annotate data are often not explicitly defined anywhere in the database. Members of a research team might use the same terms in different ways, or use different terms to mean the same thing, depending on their theoretical background or expertise in the language being documented. This may result in terminological inconsistency and ambiguity within a database, which is hard for computers to resolve. LingSync allows users to design their annotation terminology per corpus and attaches these categories to each datum of the corpus, ensuring that all data are annotated in a consistent fashion. The creation of datum also automatically inserts the gloss units into an ontology which is used for search indexes and can be human curated in Module ???. The Annotations include three types, free text, enumerated grammatical tags, and enumerated datum status (checked with a consultant, to be checked, elicitation error, deleted etc). While all data are annotated with a consistent terminology, the app is designed to adapt to a particular linguistic framework or theoretical construct, and allows researchers to choose categories for annotation.

Format: Data are intelligible regardless of the types of operating system.

The use of non-standard (non-ascii) fonts is sometime s inevitable in linguistic data, however, not all application supports non-ascii fonts. Data could also become unintelligible due to the file formats that are incompatible with other applications or operating systems. The code behind LingSync is written in Javascript and HTML5 which are 100% Unicode, hence the application supports a wider range of orthographic transcriptions as well as IPA symbols.

¹<http://emeld.org/school/what.html>

²http://www.dataone.org/sites/all/documents/DataONE_BP_Primer_020212.pdf

LingSync also exports data in a number of plain text human readable formats including .json, .tex, .txt, .csv, and .xml files, all of which are non-proprietary and compatible with applications commonly used in linguistic data collection and documentation. LingSync runs on PC, Linux and Mac OS, as well as on newer platforms such as Android and ChromeBook.

Discovery: Data are searchable and discoverable.

It is often hard to find relevant linguistic data with standard search engines such as Google and Yahoo. Inside LingSync, data are discoverable via keyword and string match search. The search module is capable of performing intersective or union search of the data using any of the annotation fields which used in the corpus. External to the application, the corpora which are public will show up in the OLAC linguistic search engine.³ Furthermore, data stored in the application, if tagged as public by the researcher, is indexable by search engines and open to public view in principle. However, authorized researchers (authors of data) have control over who can see, edit and/or export their data. The application allows two sorts of export. Export of encrypted output maintains encryption on confidential data, allowing researchers to make their public data public, without concern that confidential data or consultant information will become public. Export of decrypted output keeps the data non-proprietary and viewable outside of the app and must be protected as any other confidential data.

Access: Data are accessible.

Much of linguistic data still sit in researchers' offices in the form of notebooks or tapes, or inside a stand-alone program on their computers. As LingSync is online and hosted by reliable servers, the data is considered accessible, unlike tape-data and noted cards.

Citation: Database provide citation information.

Providing correct and up-to-date citation information is important for online resources. Data should not be associated with obsolete or inaccessible URLs. In LingSync, each corpus has a unique URL which can be used for citation. In addition, corpus administrators can add an archive URL and automate their corpus archiving by creating a "Bot" which will archive their data to one of the existing, reputable language archives of the user's choosing.⁴ Data are further citable to their primary sources in that all data points are tied to a Session which contains details of data source such as consultant, publication, web page and the time the data are elicited, as well as other metadata controlled by the researcher to ensure that data quality can be traced to its source.

Preservation: Data are archived in a way that withstands long-term preservation.⁵

Preservation of digital data is always confronted with the possibility that the data file format over time becomes obsolete and unsupported by new technology. LingSync stores data in JSON format. JSON files are light-weight text files in which data contents are easily readable by humans, hence the information content would not be lost even if the data format becomes obsolete.

³<http://linguistlist.org/olac/index.html> <http://www.language-archives.org/documents/implement.html#conventional>

⁴<http://emeld.org/school/classroom/archives/index.html>

⁵<http://emeld.org/school/classroom/archives/finding-archives.html>

Rights: Rights of authors of data and of language consultants are respected.

Corpora often contain sensitive information, consultant stories and other information which must be kept confidential. Having confidential data in plain text in a corpus forces the entire corpus to be kept confidential. With LingSync, researchers and language consultants (authors of data) have control over who can see, edit and/or export which part of their data. Data and consultant information designated as confidential are encrypted prior to storage in the database using the US Federal approved AES encryption standard. This ensures that confidential data cannot be leaked if a corpus is shared or leaked, without the consent of the corpus' author. Each database has a corpus page that includes a section for the Terms of Use of data where authors of data can specify conditions for data usage. As endangered language data may often have a condition of being kept private until its parties have passed away, should the administration member of the corpus die, a policy of obeying his/her heir's decisions with regard to the data shall be put in place and discussed in the terms and conditions.

1.2.2 DataONE Primer on Data Management

DataONE provides guidelines for data management according to 8 stages of data life cycle. Although the guidelines are primarily directed to researches in natural sciences, they are also relevant for linguistic research and language documentation.

OpenSource. Being OpenSource allows departments to install and customize the database application to tailor their specific needs without worry that the company behind the software will disappear or stop maintaining the software. In addition, OpenSourcing the software on GitHub will allow linguists with scripting or programming experience to contribute back to the software to make it more customized to their needs, language typologies, or linguistics research areas. It allows the software to continue to grow and improve without any company which seeks to profit from the software.

Plan: Plan for data management prior to data collection and revise it as necessary during the project.

LingSync can be used to plan and manage data collection process. Users can begin by adding a description to their corpus, as well as adding language consultants and collaborators. When they begin collecting data they are first prompted to enter a Session and encouraged to write the session goals. Users are even able to prepare hypotheses in the form of Data lists containing Datum "To be Checked" to prepare for their data elicitation session with their language consultant. In this way LingSync helps a researcher in their collection rationale, collection and analysis methods. When the users add fields to datum they can enter a help text which will pop-up over the datum field as users are entering if they need to know what are the conventions for that field, e.g. IPA transcription could be either phonological or phonetic, the corpus administrator can indicate the conventions using the help text.

Repository: data can be stored on cloud servers or on department's own server, or researcher's own device. In addition "Bots" have been included as a feature so that users can

automatically archive their data in existing, reputable language data archives as described by E-MELD requirements above. Multiple storage locations means less risk of losing data.

Data organization: Data are stored in a versioned document centered storage solution referred to as "NoSQL." Data is stored in JSON format (exportable to .csv, .xml, .txt, .tex). Unlike SQL databases, NoSQL databases are designed to expand limitlessly and focuses on the ability to provide powerful search of data in context.

Data management: LingSync allows a number of permissions and data administration. All data is versioned and so mistakes can be recovered easily and discussed via the datum comment feeds.

Data description: A datum is produced according to leipzig conventions as linguist examples (transcription, morphemes, gloss, translation). Additional metadata description are configured on a corpus basis by the corpus administrator. LingSync offers a list of commonly used annotation fields to researchers which is generated by the popularity of fields among app users.

Data sharing: Data may be shared with members outside of LingSync via embedding live widgets on their department or lab webpages, or WordPress blogs. Data may also be converted as LaTeX source code to be given directly to members of their data collection team who are not using LingSync. Users can schedule "Bots" to automatically release/publish their data to external web services or language archives.

Data preservation: Data are stored locally on the users' machines if they use an Android or a Chrome App. The data is also stored on a central server of their choosing, either a server hosted in the cloud, or a department server.

Budget: LingSync is free and OpenSouce, it can be installed for free on department servers, or institutional data centres, which may require hiring professionals to maintain the database and ensure that the data is properly backed up. LingSync can also run on the cloud and departments can choose to host their data on a cloud hosting provider. The costs usually range between \$1 and \$10 per month for 1-100 gigabytes of data/data transfer.

Collect: Data are collected in such a way to ensure future usability.⁶

The application provides a template for data entry which is flexible and customizable. The four core data fields (transcription, morpheme segmentation, gloss, translation) are usually required for language data and are set as defaults on the template. Researchers can add extra fields (e.g. IPA transcription, context of utterance) relevant to their research. Contents of data fields (default and additional) can be used in a fine grained way to search, and researchers can organize data using the information contained in the fields. The application is non-proprietary and data collected are exportable in various formats (.csv, .xml, .txt, and .tex) to ensure that data are sharable and usable outside the application.

When the user exports their corpus a readme.txt is generated which describes the datum annotation fields (using the conventions help text which the users can customize). In this

⁶While E-MELD recommends Unicode, DataOne recommends plain text ascii characters for variable names, file names, and data. As ascii is inappropriate for linguistic data we will be following E-MELDS recommendation to ensure that IPA, diacritics, semantic calculations and other are maintained in our users data.

way, when they share their data they can attach the readme.txt to allow others to know what their conventions were when building their corpus.

Assure: The quality of data is assured through checks and inspections.

Datum state (Checked, To be checked, Elicitation Error) and datum comment feeds enables researchers to check, discuss and inspect the data quality. Each datum is also time stamped when entered and modified so that the data history is trackable. Users may also make "Bots" which crawl their data and ensure that it is consistent.

Describe: Data are accurately and thoroughly described using the appropriate metadata standard.

Data will be described at three levels in the application:

- **Corpus:** A corpus is a dataset created for a single language/dialect and for a particular purpose. A corpus has a title and a description that will include general information about the corpus such as what the dataset is about, who contributes to the corpus and the purpose of creating the corpus.
- **Session:** Each datum in a corpus is tied to a Session which includes metadata such as language, dialect, researcher's name, consultant's code and the goal of the session (e.g. eliciting scope ambiguity).
- **Datum:** Data fields and data tags serve for parameters/categories to describe data. The application is not restricted to a particular theoretical construct so that researchers can choose and describe categories appropriate to their research.

Preserve: Data are submitted to an appropriate long-term archive.

Data and associated metadata are stored in a host server for long-term archival purposes. Confidential data and information are stored encrypted using the US Federal approved AES encryption standard to ensure that confidential data cannot be leaked if a corpus is shared or leaked, without the consent of the corpus' author. (See also Data Documentation, Items 1, 5, 6 & 7.)

Discover: Data are located and obtained.

The application is accessible through internet search, and data tagged for public view will be discoverable within the application via keyword search. Data permitted for export will be exportable to CSV, text or LaTeX formats. (See also 6.1 Data Documentation, Items 3 & 4.)

Integrate: Data from disparate sources are combined into one consistent data set.

Sync function helps integrate data collected by multiple researchers into one corpus. Import/export functions enables integration of data from Filemaker Pro (.csv) and ELAN (.xml), making data integrated with programs researchers commonly use to store their data. Data can be made consistent by the creation of "Bots" who crawl the corpus and automate changes.

Analyze: Data are analyzed.

The four core data fields include morpheme-segmentation and glossing lines, hence the data will contain primary linguistic analysis at the time of the entry to the database. Customizable

data entry fields and data tags, as well as the data list functionality allows researchers to organize data ready for further analysis.

1.2.3 User-friendly

Simple. The system will be designed to replace Word Documents or LaTeX documents which is a very common way field linguists store data because it requires no training, doesn't require a complicated set-up for data categories, and takes no time to add new categories. The application will not include categories or linguistic frameworks or theoretical constructs that must be tied to the data. The application will allow data fields and categories to develop organically as data collection proceeds, as opposed to imposing a particular construct upon entry. Researchers will be able to add and change their fields and categories for the data at any point.

Attractive. The system will have a modern design like many of the popular websites such as Google and Twitter. It's layout and background image will be customizable so that the user can change the look and feel of the application to make their eyes comfortable in bright/dark light, or adapt the layout of the widgets to their style of data entry.

Cross-Platform. The application will be available for any device that has an HTML5 compatible browser. Specifically, the application will run *offline/online* in Chrome on Mac, Linux, and Windows computers,⁷ as well as *online/online* on Android tablets and phones. The application will run *online only* in Safari and Firefox, and *online only* on iPads and iPhones.

Touch tablets are one of the easiest tools to carry and use in the field; they have a long battery life; they can play videos or show images for the consultant to elicit complicated contexts; and they permit recording audio and video without microphones or cameras which distract consultants. Mobile devices also have apps for push button publishing to YouTube or other audio/video hosting solutions which allow for private data like Google Plus. Furthermore, Android tablets are particularly easy to program and integrate the microphone/camera directly into the database (Cook, Marquis and Achim 2011).

2 What is iCampo/LingSync?

This application will be able to perform the necessary functions needed by field linguists. The dashboard will be composed of several widgets. The Data Entry widget will be the primary focus, containing four core fields customary for a gloss format (utterance, morpheme-segmentation, gloss, translation). In addition to these fields, researchers will be able to add customized fields, such as phonetic transcription or context for an utterance. Researchers can even upload audio files and link them to the appropriate data. Each data entry will be tagged with session info such as the researcher, date of elicitation, language, dialect and consultant's code.

⁷The app will also run on ChromeBooks. ChromeBooks are affordable laptops (\$299) which use the Chrome operating system created by Google. ChromeBooks are currently available in the UK and online at www.google.com/chromebook/. ChromeBooks have very long battery life and automatically backup data, which makes them good laptops for fieldwork.

This application integrates the best functions from existing fieldwork database programs, while avoiding many of the shortcomings discussed above. The core features are summarized as follows:

2.1 Current functions -GINA

LingSync's functionality can be divided into two groups, functionality for linguistic field databases, and functionality for user friendly community driven software. In this section we will place more emphasis on the linguistic field database functionality and only briefly gloss over some of the more over-arching concerns which make LingSync user friendly and a project with a high proportion of returning users.

2.1.1 Data entry and import

Data entry in LingSync goes beyond just typing or transcribing data. While simply typing in data is the most common use case, LingSync also provides the ability to add comments to any data in the system. This makes it possible to collaboratively enter data, and discuss data, without modifying or destroying information in the data itself. This means that multiple team members can suggest new segmentation, or new gloss information, qualms about translation or context and the team can reach a consensus together without blocking team members from accessing or improving data. Comments are also editable and deletable, and can be formatted using Wiki markup which essentially permits the ability to add unlimited documentation to a data record without needing to put the documentation into the record's utterance or translation lines, for example. When working as teams composed of linguists or community members who may speak different dialects, and thus have differing judgements, we believe that comments are a key way teams can provide a maximum amount of access and curation, without worrying about different team members over-writing each other's judgements.

As all documents in the system are versioned, mis-guided edits by team members can be undone and be detected via the team activity feeds §2.1.4. If a team discovers one of it's members is not following their team's data curation conventions, the permissions system allows the team to set the individual's permissions to read and comment only.

Data can be categorized by tags as well as by the status of each individual data entry. A record could have a status as simple as "Checked," or even "CheckedWithSeberina" or "ToBeCheckedWithConsultant" if the team is working with multiple consultants and/or dialects. The ability to group data into its validation status further aids organization and permits the team to gather data for future elicitation sessions, or to send data to consultants to be checked either by exporting the data and sending it by email, or by adding the consultant as a team member.

As LingSync is "skinnable" meaning each user can have a different visual representation of the data, teams can even create non-technical views of the data so that the consultants enjoy being part of the team and feel more connected to the collaborative nature of the language documentation effort.

Data entry and data curation is also fully scriptable. In our user studies we estimate that well over 50% of research time is spent cleaning and curating data, most often to revise old data to update it to what the team's evolving analysis of the data has shown. As such a fundamental part of field work is exploring and re-analyzing data, users can create bots which partly automate these tasks. Bots can even be scheduled to run periodically on the corpus, reducing the manual data entry process if the team decides all data should use the convention "ACC" should be glossed as

“CAUS” in the context of “ASP.” Bots are able to go through a corpus, and leave comments on data which should be cleaned manually, or even execute the changes after the team has reviewed the changes and approves. There are existing bots for transliteration (conversion of Inuktitut syllabics to romanization) and for duplicating morphemes fields to an allomorph fields among others. Bots help reduce the redundant tasks, freeing team members to focus on data entry and data analysis. In most teams with long standing databases it is often the custom to enforce conventions by providing users with drop-downs where they must select only from appropriate options, or go to another screen to add the new option before selecting it. Bots reduce the time dedicated to high quality validation as fields can be populated with autocomplete lists which display options, but still permit new options to be added without visiting an addition screen, and permits the validation to happen post data entry by identifying context to be combined or separated and executing the validation automatically.

Data entry expected to be grouped by elicitation session. In fact, one expected method of data entry is not data entry at all, but rather recording of an elicitation session followed by typing up the session at a later date. Longer audio files can also optionally be uploaded to the audio web-service §2.2.3 to be automatically split into utterances, reducing data entry and record creation if a team wishes to record elicitation sessions and enter the data later. We strongly recommend this approach to data entry as it permits the team dedicate 100% of their attention to the speaker, while in eliciting data, rather than dividing their attention between the speaker and the process of data entry.

One of LingSync’s founding principles is that you should only need to enter data once. Whether you enter it in an Excel Spreadsheet, in a handout, in Elan or in Flex, you should be able to import it into LingSync without needing to re-enter the data. Each record in a LingSync database can have an unlimited number of fields, with unlimited complexity, making it possible to import other formats, and be able to re-export them without losing any information (for example, timed alignments in Elan or Praat).

2.1.2 Auto-glosser

The semi-automatic glosser requires no configuration or set up to be useful. It “learns” from the data in your corpus to guess where morphemes might be segmented, or how morphemes should be glossed. The glosser is also a separate module, meaning if you have an existing glosser you can plug it in to LingSync. Glossers can also be shared. For example, if you have two Quechua corpora, you can set the glosser url to use either corpus.

The glosser is designed to make the app “smarter” and to reduce the amount of time spent entering predictable information such as glosses. The glosser can use any existing morphological analysis tool to break down the utterance/orthography line into a probable morphological segmentation using known morphemes in the lexicon, and enters a probable gloss for the morphemes in the glossing line. The glosser module is designed to reduce redundant data entry, not to provide accurate glosses. It is of course crucial that predicted morpheme segmentation and glosses be corrected by users, particularly in languages where morphemes are ambiguous, or where morphemes are short and hence there are more ambiguous morpheme segmentations for words.

The glosser uses the auto-generated lexicon to evaluate morphemes both by precedence relation and by gloss. Each corpus has its own lexicon, which is loosely modelled after a mental lexicon, as a network of morphemes, allomorphs, orthographie(s), glosses and translations. It is not a dictionary but rather a connected graph similar to theoretical models of mental lexicons (for a

dictionary see the Dictionary Module in § ??). As a connected graph it is the most useful structure to index datum and search for datum real time while data entry is happening. Currently, there is no user interface to view/edit a corpus' lexicon but if there is enough demand it will prioritized.

2.1.3 Search

LingSync was designed for powerful search. You can search your corpus, or across your corpora. Similar to ELAN (Wittenburg et.al. 2006) The results of your searches can even be saved as a Data Lists which can be sorted, saved for later exporting or curating data for a handout or language learning lesson for heritage speakers.

- (1) Search for 'yell' in an entire corpus, (to find examples in gloss and translation and comments etc)

Search can be as simple as a key word search, which will search the entire record, or search with in only one field, or for example one key word in one field or another key word in another field. For those users who like to think in Set Theory LingSync provides you with the ability to look at the Intersection of search results, or in the Union.

- (2) Search for 'nay' in the morphemes line, or 'des' in the gloss

For phonologists LingSync lets you search using regular expressions to find segments in context.

- (3) Search for 'nay[tk]' in the morphemes line to find context of allomorphy

If there is demand we can add the ability to search for minimal pairs or to search for phonological features in context using a phonology ontology (a general purpose feature geometry/articulatory feature ontology, or a customized ontology created by the users for their language of interest) where feature geometry searches could be used.

Phonological search lets the user search for potential minimal pairs or phonological features in context to verify with consultants, and/or to prepare psycholinguistic experiments.

- (4) Search for 'nay-voice' in the morphemes line to find context of surface vowels

Search has a The phonological search module shown in Table ?? is used to search for phonological features in context.

2.1.4 Sharing corpora, activity feed

Corpora in LingSync can be shared as a team, with administrators who cannot see the data, but can add new team members (eg. a project coordinator) , writers, who cannot read the data but can enter new data (eg. language consultants, or psycho-linguistic experiment participants), readers who cannot edit the data but can see the data (eg. external collaborators) and commenters who cannot edit the data but can provide feedback and offer additional information or corrections (eg. consultants and/or collaborators). Of course, most teams will choose to give all roles to all users, but these roles permit a wider inclusive data collection team than previously available in other data management tools where the permissions are simply full access or no access.

As a team, you might also want to catch up on recent activity in the corpus. If your corpus is small (only a 100 records) you could simply read each record to see what is new, but for larger corpora or where there is more activity LingSync provides team activity feeds. In the activity feed widget you can see who has modified, commented, created data, as well as recording audio, and putting records in the trash to be deleted later. Of course, there are also user activity feeds which are only presented to the user, while not particularly interesting in that they contain only activities that you have completed, they can help you remember what you were working on last time, particularly if it has been months since you last opened your corpus. Our user studies and previous experience as field workers indicate that most users visit their corpus very frequently, when building it, and the usually more sporadically as they need to return only to consult their data. The user activity feed can help you remember that you hadn't finished typing up that elicitation session three months ago before you had to go to class.

2.1.5 Custom settings

LingSync is highly customizable. It comes with the ability to choose from 5 popular dashboards, and even to create your own. Users can decide how many records to show on a page of data, which order to show the records in and many more options. For users who have limited eyesight or who are using screen readers LingSync provides a high-contrast option as well as a dark option to reduce eyestrain after hours of entering data. LingSync was designed partly by research assistants who had entered data for 40 hours a week, and so it also provides the ability for rich and visually interesting background pictures to keep entering data visually stimulating.

Each corpus is also fully customizable, team members can add new fields to the corpus, as well as edit its terms of use and other information which can become important if the team decides to share the result of their work with the outside world. We have added many other options to corpora which conform to EMELD recommendations discussed in §1.2

2.1.6 Export

As users of many other data management software, we felt it was crucial that LingSync be nonproprietary and open. One important aspect of this is the ability for teams to export their entire database in any format they choose, in its entirety or only data which are relevant to a certain export goal.

Teams can even save lists of data for dedicated export purposes, such as data for a handout, or data which they are curating to be published as stories for the language community they are working with.

LingSync is also able to export word lists, which can be used either as language learning exercises for heritage speakers or as materials for field methods courses.

It is possible to export an entire corpus either as a zip, as XML or JSON, as plain text, as LaTeX and as CSV.

Beyond export, LingSync databases are fully replicatable between servers, which means that team members can have entire copies of their database locally on their laptops, yet still remain in full sync with other team members when they go online. It also means that departments can back up their data to their own department servers with out worry for data becoming stale or out of date.

2.2 Plugging into LingSync -GINA

One of the strengths of LingSync is that is built using well-understood web technologies which permit the creation and integration of nearly any existing software as web services, and if the software provides a javascript or HTML5 library or widget, even complex user interfaces can be combined and integrated with LingSync via the NPM and Bower web module management system. In this section we will discuss some of the current web services.

2.2.1 Custom glosser

We have wrapped Benoit Farley's morphological analyzer for inuktitut into a web service using Node.js ***link?

2.2.2 Language learning module for android

A prototype for language learning was build which enables researchers and language teachers to create language learning aids from the data in existing corpora and from the data newly collected for the purpose of language learning. The learning aids aim to help heritage language learners improve their listening and speaking skills. The orthographic lines (i.e. utterance and morpheme lines) and the attached audio or video recordings of a datum are taken as materials to create a lesson.

2.2.3 Integration with ProsodyLab aligner

The phonetic aligner web service it possible to upload audio recordings and the orthographic/utterance lines of datum to create a dictionary unique to the corpus' language, and to run the ProsodyLab Aligner, a machine learning algorithm which uses Hidden Markov Models to predict boundaries between phones and creates a Praat TextGrid with estimated phone boundaries, saving hours of boundary tagging.

2.2.4 WebSpider

The Web Spider allows teams with limited access to consultants to gather data using blogs or forums or online translations of the bible. The web spider also provides an additional source of context to assist consultants in providing grammaticality judgements, as well as additional contexts where morphemes appear. For example, "ke" is largely considered a postposition by Urdu-consultants with explicit knowledge, however it is often produced as other functional morphemes in everyday spoken contexts. Blog/forum data can be used to discover these additional contexts. citation needed ***

2.3 Collaborators - GRETCHEN

3 How is iCampo/LingSync used so far?

3.1 McGill-Listuguj partnership

3.2 Field methods classes

3.3 Future users

4 Conclusion - YULIYA