Phon

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Getting Started

Introduction

Phon is a software program that supports the building of textual and phonological data corpora. While it was originally created to support the study of child language development, Phon can be used across virtually all types of corpus studies (e.g. textual, phonological, acoustic, clinical) based on child or adult language data. Among other features, Phon offers specialized support for research on phonological units (e.g. phones, phonological features, stress, tones) and includes some specialized functions for clinical speech analysis. Phon also incorporates Praat functions for acoustic data analysis.

New Features in Phon 3

Revamped query and reporting systems

Phon 3 combines brand new approaches to data query, analysis and reporting with a more uniform, streamlined interface across virtually every aspect of the application. At the level of the query and reporting system, we have continued to expand the Phonex language in ways that add both power and flexibility for data analysis. The reports generated from data queries can also be personalized using the new Report Composer, a new interface to build reports after running a query.

Built-in analyses

New within Phon 3 is a set of ready-to-use analyses geared toward clinical analyses of speech sound disorders as well as other general reports on phonological performance that can be used to obtain ready assessments of phonological performance. These analyses are intuitively grouped within the new "Analysis" menu option.

The Analysis Composer

Phon users can utilize the Analysis Composer to combine pre-defined queries and analyses and assemble uniform reports on different aspects of linguistic, phonological or acoustic patterns. Using this system, students, researchers, and clinicians can obtain ready data classifications useful both for research and for the diagnosis of speech disorders.

All results extracted from Phon queries and analyses can now be saved in print-ready HTML format, CSV, and Excel workbooks. The reports generated by Phon offer ‘hot’ links between query/analysis results and Phon data. The user can click on these links to automatically open the transcript data that correspond to these results, which greatly facilitates validation or verification tasks: each individual token reported through a data query or analysis is only a click away from each place where it appears within query and analysis reports.

Finally, Phon 3 comes with multiple improvements in the areas of workspace/project management (e.g. support for multiple workspace folders), data transcription (e.g. new IPA and transliteration dictionaries; syllabification algorithms for additional languages), improved phone alignment, more robust methods to generate, import, and edit TextGrid data, and additional functions for acoustic analysis (e.g. Spectral moments; VOT analysis).

Download Phon

Phon 3.1.3

- macOS 10.9+ (dmg)
- Windows (64-bit) (installer) | Windows (64 bit) (zip)

Phon 3.2.0-beta.4

- macOS 10.9+ (dmg)
- Windows (64-bit) (installer) | Windows (64 bit) (zip)

Other Information

- **Tutorial Videos on page ix**
- **Demo Project**
  - README for Demo Project

Citing Phon

Hedlund, Gregory & Yvan Rose. 2020. Phon 3.1 [Computer Software]. Retrieved from https://phon.ca.

Rose, Yvan & Brian MacWhinney. 2014. The PhonBank Project: Data and Software-Assisted Methods for the Study of Phonology and Phonological Development. In Jacques Durand, Ulrike Gut & Gjert Kristoffersen (eds.), *The Oxford Handbook of Corpus Phonology*. Oxford: Oxford University Press. 308-401.

Rose, Yvan, Brian MacWhinney, Rodrigue Byrne, Gregory Hedlund, Keith Maddocks, Philip O'Brien & Todd Wareham. 2006. Introducing Phon: A Software Solution for the Study of Phonological Acquisition. In David Bamman, Tatiana Magnitskaia & Colleen Zaller (eds.), *Proceedings of the 30th Annual Boston University Conference on Language Development*. Somerville, MA: Cascadilla Press. 489-500.

Discussion group & Support

We encourage you to subscribe to the discussion group for helpful information and technical support. Please click on the following link to request membership to the PhonBank (or other TalkBank-related) discussion group:

- http://talkbank.org/share/email.html
  - No Google mail (gmail) account is required to subscribe
  - Group's email address (for message posting): phon@googlegroups.com

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Dictionaries: Built-in dictionaries of pronounced forms were obtained from generous organizations and people, to whom we are indebted:

- Catalan: Universitat Politècnica de Catalunya http://www.upc.es/
- Dutch (Flemish): Fonilex Database http://bach.arts.kuleuven.be/fonilex/
- English (British): Cambridge University Engineering Department,Cambridge,UK http://svr-www.eng.cam.ac.uk/comp.speech/Section1/Lexical/beep.html
- English (North American): CMU Pronouncing Dictionary (Speech at CMU) http://www.speech.cs.cmu.edu/speech/
- French: Lexique Database http://www.lexique.org/
- German: Universität Bonn http://www.sk.uni-bonn.de/forschung/phonetik/sprachsynthese/bomp
- Icelandic: The Icelandic Centre for Language Technology http://www.tungutaekni.is/materials/e001.html

- Italian: ISTC-SPFD CNR, Istituto di Scienze e Tecnologie della Cognizione http://www2.pd.istc.cnr.it/FESTIVAL/home/default.htm
- Norwegian: Norwegian Computational Lexicon (NorKompLeks), Institutt for språk og litteratur, Norges teknisk-naturvitenskapelige universitet https://www.ntnu.no/isl
- Spanish (Spain): Universitat Politècnica de Catalunya http://www.upc.es/
- Spanish (Latin America): Scott Sadowsky http://sadowsky.cl/

Special thanks: While it is impossible to name everyone who ended up being involved in one way or another in this project, we owe special thanks to a wonderful group of early adopters and beta testers, students and researchers alike, without whom it would have been much more difficult to produce the current software program. We are also grateful to Paul Boersma for this tremendous collaboration toward the interactions between Praat and related functions within Phon 2.

Installing Phon

Phon 3.0+ requires a 64-bit operating system.

Install Required Fonts

Download required fronts from https://www.phon.ca/downloads/ipafonts.zip.

Windows

- Installer - Download and execution the newest `Phon_windows-x64_<version>.exe` installer from the releases page.
- Manual Installation - Download the `Phon_windows-x64_<version>.zip` package from the releases page.

macOS

- Download the newest `Phon_macos_<version>.dmg` file from the releases page. After opening the disk image, drag Phon into your Applications folder.

Linux

A Linux version of Phon is unavailable right now.

Tutorial Videos

Known Issues

Some common issues with Phon are listed in the table below. To report a problem goto http://github.com/phon-ca/phon/issues.

Issue	Resolution
Phon freezes when loading .wav file in session editor.	If the .wav file was taken from a digital recording device it may be missing header information. Re-encode .wav file before using in Phon (see below.)
Unable to use IPA input fields after stacking multiple combining diacritics.	No known solution at this time.

Issue	Resolution
Unable to view reports/application logs. Blank window displayed.	If running on a managed Windows system running AppLocker or other security software required binaries may be blocked from execution. Please see your system administrator.

Re-encode Audio File for Phon

Using the latest version of Audacity:

- Open your original file
- Select menu `File` > `Export as WAV`
- Choose either `WAV (Microsoft) signed 16-bit PCM format` or `WAV (Microsoft) signed 24-bit PCM format`
- Link your Phon transcript file to this newly-created WAV file

Chapter 1

User Interface

Topics:

- Welcome Window
- Preferences
- Project Manager
- Session Editor
- Tools

Welcome Window

The *Welcome* window is the first window displayed when opening *Phon*. It is divided into three sections: Actions, Workspace, and Recent Projects.

Figure 1: Welcome Window

Actions

Create Project

From the **Workspace** window:

1. Click the **Create Project** button in the **Workspace Actions** pane.

   A text field will appear in which you can enter a project name.
2. If you do not wish to create a project at this time, click **Cancel create new project/X** or press `ESC`. Otherwise, type a name for your project and click the **Create new project in workspace/+** button or press `Enter`.

   This action will save the project in your current workspace folder and open it in the **Project Manager**.

Open Project

From the **Workspace** window:

1. If the project is in your current workspace folder, click on it in the **Project List**, or right-click (`CMD/CTRL +click`) and choose **Open project** from the context menu. If the project is not in your current workspace folder, click the **Browse for Project** button in the **Other Actions** pane, locate the project using the resulting dialog and click **Open**.

   The **Project Manager** window will appear.

   Note: If the project was created using an earlier version of *Phon* (and is a *.phon* or *.zip* file), you must extract the project before you can open it (see Project File Structure on page 21 for instructions).

Other Actions

The following operations are available in the **Other Actions** pane of the **Workspace** window:

- **Browse for Project**

  Browse to open a project located outside the current workspace folder.
- **Select Media Folders**

  View and edit the list of default media folders in the **Preferences** dialogs.
- **Edit Preferences**

  View and edit *Phon* application preferences.

Workspace Folder

The *Phon* workspace is the default location for *Phon* projects. Operations which are available from the **Welcome** window (such as creating, extracting, or archiving projects) affect files in the workspace folder. The default workspace folder is `<userhome>/Documents/PhonWorkspace`.

The workspace folder may contain a folder called '*backups*'. Compressed *Phon* projects are moved to this folder when they are archived or extracted from the workspace folder.

Change Workspace Folder

From the **Workspace** window:

- Click the specified folder name in the **Workspace Folder** pane.

  A popup menu will appear. In the first section of the menu a list of previously used workspace folders is listed to assist with quickly switching workspaces.
- Other menu items allow for showing the workspace folder - in Finder (on macOS) or Explorer (Windows), selecting the workspace folder, and clearing the workspace folder history.

Figure 2: Workspace Folder

Project List

The **Project List** pane displays the projects that are located in the current workspace folder.

This pane lists expanded projects (see Project File Structure on page 21) with a folder icon next to them, and compressed projects with an orange arrow next to them.

Compressed projects may be expanded by clicking on them in the list, or by right-clicking (`CTRL+click`) and choosing **Extract project** from the context menu.

Actions

Sort Project List

Sort the **Project List** in the **Workspace** window by name, date modified, or size.

From the **Workspace** window:

1. To sort the **Project List** by name, click **Name** in the **Sort by** field of the **Project List** pane. To sort by date modified, click **Modified**. To sort projects by their size on disk, click **Size**.

   Your projects will appear in the **Project List** pane in the order specified.

   Note: When sorting by name, projects that start with uppercase letters will be sorted before ones with lowercase letters.

Show Project in File System Viewer

Show a project's location using your computer's file system viewer.

From the **Workspace** window:

1. Mouse over the project you wish to archive in the **Project List** pane.

   Two buttons will appear next to your project name; **Create .zip archive of phon project...** and **Show project in file system viewer**.
2. Click **Show project in file system viewer**. Alternately, right-click (`CTRL+click`) on your project and choose **Show project** from the context menu.

   Your computer's file system viewer will open to the folder containing your project, which will be highlighted.

Archive Project

Create a *.zip* archive of a *Phon* project in the workspace *backups* folder. This is especially useful as a method of backing up your corpus before any major change.

From the **Workspace** window:

1. Mouse over the project you wish to archive in the **Project List** pane.

   Two buttons will appear next to your project name; **Create .zip archive of phon project...** and **Show project in file system viewer**.
2. Click **Create .zip archive of phon project...**. Alternately, right-click (`CTRL+click`) on your project and choose **Archive project** from the context menu.

   A *.zip* archive of your project will be created in your workspace *backups* folder, with the current date affixed to its filename.

Extract Project

Expand an old *.phon* or *.zip* project for use with the current version of *Phon*.

From the **Workspace** window:

1. Click on a compressed project in the **Project List** pane to extract it to a directory in your workspace folder, or right-click (`CTRL+click`) on it and choose **Extract project** from the context menu.

   The project will be extracted to the workspace folder, and it will appear as an expanded (regular) project in the **Project List**. The original compressed project will be moved to the *backups* folder in your workspace.

   Note: If the compressed project is not located in your current workspace folder, click **Extract Project** in the **Workspace Actions** pane, find and select the project in the **Browse** window, and click **Open**. This will extract the compressed project to your workspace folder. Original compressed projects extracted from locations outside the workspace folder will not be moved to the *backups* folder.

Recent Projects

A second project list is displayed below the Workspace section of the *Welcome* window which displays a list of recently opened projects. A button to clear the recent project history is shown in the top-right portion of the list.

Preferences

Application preferences may be accessed using the window menu, **File** > **Edit Preferences**, or by clicking the button on the Welcome window.

General

Figure 3: General Preferences

If check for updates is enabled, Phon will automatically check for and download updates. A message will be displayed on the Welcome window if an update is available for installation.

Some messages in Phon have an 'X' in the upper-right corner allowing the messages to be dismissed. Clicking the 'Reset information messages' button will reset the visibility of these messages.

Session Editor

Figure 4: Session Editor Preferences

Change Dictionary Language

Change the default **Dictionary Language** for use within sessions.

From the **Session Editor** tab of the **Preferences** dialog:

1. Click the **Dictionary Language** combo box and select the appropriate language.

Change Syllabifier Language

Change the default **Syllabifier Language** for use within sessions.

From the **Session Editor** tab of the **Preferences** dialog:

1. Click the **Syllabifier Language** combo box and select the appropriate language.

Autosaves

To prevent loss of data in the event of an unexpected shutdown, *Phon* has the option of auto-saving sessions at regular intervals. Session autosaves are named with the '__autosave_' prefix.

If an unexpected shutdown occurs and the user was unable to save changes to a session, the next time an auto-saved session is opened *Phon* will prompt the user to open the session in either its last user-saved state, or its last auto-saved state.

To use the auto-saved session as the main session file, open it and then save it.

To change the interval between autosaves, open the **Preferences** dialog. In the **Session Editor** tab, click on the menu in the **Autosave Sessions** field and choose the desired time interval.

To de-activate the autosave option, select **Never** as the autosave interval.

Media

Figure 5: Media Preferences

Media Folders

A list of global *Media Folders* can be set using the **Media** tab of the **Preferences** dialog. *Phon* will look at each of these folders (in the order in whicy they appear) for media files.

The media folders can be internally structured to match *Phon's* project/corpus layout. *Phon* will search the following locations for media (where <media> is the media folder defined in **Preferences**, <project> is the project name, <corpus> is the corpus name, and <session> is the session name):

- <media>/<project>/<corpus>/<session>.[aif;avi;mov;mpg;mp4;wav;mp3;m4a;...]
- <media>/<project>/<session>.[...]
- <media>/<corpus>/<session>.[...]
- <media>/<session>.[...]

If the **Media** field in the **Session Information** view of the **Session Editor** has been manually changed:

- if the path is absolute (or fully-specified), the above rules are ignored and the media file is loaded from the specified path
- if the path is relative, the value of '<session>' above is replaced by the value in the media field.

Query

Figure 6: Query Preferences

History

Query parameters are saved on each query execution. By default query parameters from the last execution are loaded when the query wizard is displayed. Use the check box to change this behaviour. You can also select to have the query history cleared when closing the query wizard in this section.

Report

If available the previous query report will be loaded when opening the query wizard. To change this behaviour use the provided radio buttons.

Fonts

Figure 7: Font Preferences

Change Application Fonts

Change tier fonts and/or user interface (UI) fonts.

From the **Fonts** tab of the **Preferences** dialog:

1. Click the font listed underneath each UI element to change it.

   The **Choose font** dialog will appear.
2. Choose the desired **Font** and **Size**, select **Bold** and/or **Italic** if required, then click **Ok**.

   The font displayed in **Session Editor** will reflect your choices.
3. Adjust size for all UI fonts using the slider.

Note: To reset default options for a UI element, mouse over that element and click the **Reset to default** button which appears on the right.

IPA Fonts

On first execution Phon will assign a font for IPA display. The font will be automatically selected from the following, ordered, list:

- Charis SIL https://software.sil.org/charis/
- Charis SIL Compact https://software.sil.org/charis/
- Arial Unicode MS
- Arial
- Doulos SIL https://software.sil.org/doulos/
- Gentium https://software.sil.org/gentium/
- Lucida Grande
- Tahoma

Project Manager

The **Project Manager** window is displayed when you open a project from the **Welcome** window or by using the **File** > **Open project...** menu item.

Figure 8: Project Manager

Project File Structure

Phon projects are stored on a hard drive as directories. This folder is displayed at the top of the **Project Manager** window (clicking the folder path will open Finder (macOS) or Explorer (windows) with the project folder selected.)

The directory for each project will contain the following:

- A `project.xml` file which contains the information Phon requires for the project.
- A series of folders which correspond to each of the project's corpora (usually a collection of transcribed sessions for a specific target speaker). Project corpora are displayed in the left-hand list of the window.
    - Within each corpus folder are a series of xml files corresponding to each session. The xml files which are named beginning with '~' are session autosaves, created in order to prevent loss of data in the event of an unexpected shutdown.

The directory for each project may also contain the following:

- A project resources folder called '`__res`', which is a system directory created by Phon to contain useful components for the project. This folder may contain:
  - A media folder, which is the default location for the media for the project and may contain media segments exported from Phon.

Note: Projects created using earlier versions of Phon may exist as `.phon` files. These projects will need to be extracted (i.e. expanded to directories using the Welcome Window on page 12) to be used with the current version of Phon.

Project Media Folders

A media folder may be assigned for a project and for each individual corpus in a project. The default media folder for a corpus will be the project media folder. The search order for media files is:

1. Corpus media folder (if assigned)
2. Project media folder
3. Global media folders (see Media Folders on page 18)

To assign project media folders, select **Project** > **Select media folder...** from the **Project Manager** window. A similar menu item is available for corpus media folders under the **Corpus** submenu. Actions for controlling media folder selection are available from popup menus accessed by clicking on the media folder labels at the top of the window and in the corpus details section.

Figure 9: Media Folder Menu

Relative Paths

Absolute paths are full paths to files/folders while relative paths are portions of a full path. On macOS absolute paths begin with a forward slash and on windows absolute paths begin with the drive letter.

Using relative paths for media folders can make sharing projects easier. By specifiying a common folder setup between project files and media folders for all people - e.g., using `~/Documents/PhonWorkspace` for project files and `~/Documents/PhonMedia` for media files - other users will not need to modify their individual media folder selections.

Figure 10: Relative Media Folder Path

Project Actions

The following actions are available from the **Project** window menu when the **Project Mangaer** window is focused.

Check sessions

From the **Project Manager** window:

1. Select the **Project** > **Check sessions...** menu item.

   This will open the **Check sessions** window.

2. Select the project, corpora, or sessions whose transcriptions you wish to check, and click **Next**.

   Phon will check each selected session, and any phone transcription errors will be printed in red, with their corpus, session, record number, and tier (IPA Target or IPA Actual).

   Note: To resolve a reported error, return to the **Project Manager** window and open the session in which the error occurred, then navigate to the relevant record and visually check its IPA tiers.

Figure 11: Check Sessions

Reset Syllabification

In the event of display issues in Target Syllables or Actual Syllables in the **Syllabification & Alignment** view, it may be necessary to reset the syllabification of IPA Target and IPA Actual transcriptions.

From the **Project Manager** window:

1. Select the **Project** > **Check sessions...** menu item.

   This will open the **Check Sessions** window.
2. Select the **Reset syllabification** option.

3. Choose an appropriate syllabifier language by selecting it from the drop-down menu.
4. Select the project, or the corpora or sessions whose syllabification you wish to reset, and click **Next**.

   Phon will re-perform the syllabification for each selected session using the syllabifier language chosen in the Preferences on page 16 dialog.

   Note: After resetting syllabification or alignment, it will be necessary to visually verify these tiers.

Reset Phone Alignment

In the event of display issues in the Alignment tier of the **Syllabification & Alignment** view, it may be necessary to reset the phone alignment of IPA Target and IPA Actual transcriptions.

From the **Project Manager** window:

1. Select the **Project** > **Check sessions...** menu item.

   This will open the **Check Sessions** window.
2. Select the **Reset phone alignment** option.
3. Select the project, corpora, or sessions whose alignment you wish to reset, and click **Next**.

   Phon will re-perform the alignment for each selected session.

   Note: After resetting syllabification or alignment, it will be necessary to visually verify these tiers.

Derive Session

Derive a new session using records from existing sessions.

From the **Project Manager** window:

1. Choose the **Project** > **Derive Session...** menu item.

   A **Merge Sessions** dialog will appear.
2. Enter a **Session name** and Destination **Corpus** in the provided fields. Select one or more of the sessions for the split or merge and click **Next**.

   The second page of the **Merge Sessions** dialog will appear.

   Note: If you chose only one session, the selected records will be put into the new session. If you select more than one session, the selected records will be merged into a new session.
3. Select a session from the **Session** list at the left and choose whether to merge or split **All records**, a subset of **Specific records**, **Records for participant(s)** or **Records from Search results**. Repeat this process for all sessions in the **Session** list. Click **Next**.

   This will begin the merging of the selected records/sessions.

   Note: If you choose to merge only specific records, you will have to specify the relevant record numbers. To specify several individual records, separate them with a comma and a space. To specify a range, separate the beginning and end record numbers with two periods and a space. If you choose to merge records for specific participants, you must select the participants from the list. If you choose to merge records from search results, you must select a past search from the list.
4. The newly derived session will appear in the specified corpus in the **Project Manager**.

Refresh Project

Refresh **Project Manager** window to reflect changes.

From the **Project Manager** window:

1. Choose the **Project** > **Refresh** menu item or press `F5`.

Import from CSV file(s)

Import a folder of CSV (comma-separated values) files into Phon as sessions.

The CSV import module can import a folder of CSV files with identical column formats into Phon. Where possible, CSV column labels should match Phon default tiers. Phon can automatically extract session date information from a CSV file if its name reflects its session date, in YYYY-MM-DD format.

From the **Project Manager** window:

1. Select the **Tools** > **Import from CSV...** menu item.

   This action will generate a **CSV Import** window.
2. Click the **Browse** button to the right of the **Folder** field and locate the directory containing the CSV files for import. Also, ensure you select the proper **File encoding** option from the drop-down menu. Click the **Next** button.

   This action will prompt you to select files for import and the destination corpus.
3. Enter a corpus name in the **Destination Corpus** field and using the check boxes, select the files for import into that corpus. For each file, edit **Session Name** and **Session Date** as desired by double-clicking on either of them. Click the **Next** button.

   This will prompt you to set up the participants for that corpus: any participant information entered here will appear in all imported sessions for that corpus.
4. Click the **Add Participant/+** button at the right of the window. Enter participant name, sex, date of birth, language and other pertinent information in the appropriate fields and click **Ok**. To delete a participant from the import, highlight the participant in the table and use the `Delete/Backspace` key. Then click the **Next** button.
5. Set up column mapping such that each CSV column header has been assigned a tier name in Phon. To do this, highlight an item in the **CSV column** on the left, then use the drop down menu on the right to select the appropriate Phon **Tier** or enter a new tier into **Tier Name** field. You may also select the **Don't Import** menu item for columns that are repetitive or unnecessary. In the **Options** section, you may use the **Syllabifier** drop down menu to specify the correct syllabifier and the **Transcription filter** to convert the *IPA Target* and/or *IPA Actual* tiers from YAPA, SAMPA, IPAPhon or IPAKiel. Click the **Next** button.

   This action will activate the import.

   Note: If the column name in the CSV file is the same as a Phon default tier name, the CSV column will be automatically mapped to the appropriate tier in Phon.

   Note: If mapping a CSV column to the *Segment* tier in Phon, segments times must be listed in mmm:ss.uuu format (minutes:seconds:milliseconds).
6. Once the *Import finished* alert appears at the bottom of the **CSV Import** window, click the **Close** button.

   This action will return the user to the **Project Manager** window with the newly imported corpus. Each row from your CSV file will become one record in Phon with the tiers as specified.

After import, each CSV file should become a new session in Phon. The number of records in the session should match the number of rows in the CSV file (minus the header.) A file named `importsettings.xml` is also created in the source folder. If this file is present when the directory is selected in Step 1 the previous import settings are loaded (except for Syllabifier and Filter settings).

Export to CSV file(s)

Export Phon sessions as CSV (comma-separated values) files.

The CSV export module can export Phon sessions into a specified folder as UTF-8 encoded CSV files.

From the **Project Manager** window:

1. Select the **Tools** > **Export to CSV...** menu item.

   This action will generate a **CSV Export** window.
2. To select the destination folder for the export, click the **Browse for folder...** button to the right of the **Destination folder** field, locate the desired folder and click **Open**. Select the sessions you would like to export using the check boxes at the left of the **Sessions** list. Click the **Next** button.

   This action will prompt you to set up columns for the export.

3. To add a column to the export, type its name in the provided field and press `Enter` or click **Add column/+**. To remove a tier from the list, select it and click the **Remove Column/-** button. To export a tier which is not available in the existing list, type `Tier:<tier name>` in the provided field and click the **Add Column/+** or press `Enter`. Click on any tier name in the list and use the **up/down arrow** buttons to change the column ordering. Click the **Next** button.

   This action will activate the export.

   Note: The default column list for export includes: Session Name, Record #, and all default Phon tiers. The default can be restored by using the **Reset to default** button on the bottom right corner of the column list. This list of columns is saved after export and re-loaded the next time CSV export is opened.

   Note: To export blind user transcriptions, add the tier `IPA [Target|Actual] (<username>)` (e.g. Tier:IPA Target (JSmith)).
4. Once the *Export complete* alert appears at the bottom of the **CSV Export** window, click the **Close** button.

   Session files for all corpora in the exported project will appear in the chosen directory with the format `Corpus name-Session name.csv`.

Copy Corpus

Copy a corpus to a different project.

From **Project Manager** window, with a second **Project Manager** window open:

1. Select the corpora you wish to copy in the source **Project Manager** window.
2. Using the mouse, drag the corpora over the corpus list of the destination **Project Manager** window.

   The corpus folders will be copied into the destination project.

Copy Session

Copy a session to a different corpus.

From **Project Manager** window:

1. Select the sessions you wish to copy in the **Project Manager** window.
2. Using the mouse, drag the sessions over the name of the destination corpus in the **Project Manager** window.

   The sessions files will be copied into the destination corpus.

Corpus List

Within a project, individual transcripts (or sessions) are organized into a series of one or more corpora.

Each corpus typically contains a series of sessions relating to one specific participant in a study. The corpus may contain as many sessions as desired for that participant, spanning any length of time. This allows the user to easily search all transcripts relating to one participant, by searching within the relevant corpus.

When a corpus is selected the corpus folder and media folder for the corpus are displayed with as links below the corpus list. Clickin these links will open the respective folders in Finder (macOS) or Explorer (windows). The number of sessions and a description of that corpus is also displayed.

Figure 12: Corpus List

Corpus Actions

The following actions are availble from **Project** window menu and the corpus list contextual menu. You may access the corpus contextual menu by `right-clicking` (or `CMD+click` on macOS) inside the corpus list control or by clicking the **Corpus** title label in the **Project Manager** window.

New corpus

You may create a new corpus by clicking the '+' icon in the corpus list titlebar and typing just the name of the new corpus in the text field displayed. Menu items for creating a new corpus can be found in the **Project** window menu and corpus list context menu. Pressing `Enter` or clicking the '+' button to the right of the text field will create the new corpus. Corpus creation can be canceled by pressing `Escape` or clicking the 'X' icon in the corpus list.

Figure 13: Create Corpus (Quick)

Rename corpus

Rename a corpus in your project.

From the **Project Manager** window:

1. Select **Rename Corpus** from the contextual menu.

   The **Rename Corpus** window will appear.
2. Follow the instructions in the **Rename Corpus** window. If you are unsure whether you want to rename your corpus, click **Cancel**. To continue and rename the corpus, click **OK**.

   You will return to the **Project Manager** window and the corpus will be renamed accordingly.

Delete corpus

Delete a corpus in your project.

From the **Project Manager** window:

1. Select **Delete Corpus** from the contextual menu.

   A dialog will appear asking you to confirm whether you would like to delete this corpus and informing you that this action cannot be undone.
2. If you are unsure, click **No**. To continue and delete the corpus, click **Yes**.

   The deleted corpus will no longer appear in the **Project Manager** window.

Duplicate corpus

Dupliate a corpus folder in your project.

From the **Project Manager** window:

1. Select **Duplicate Corpus** from the contextual menu.

   The corpus folder will be duplicated with an integer suffix (e.g., '(1)') appended.

Open session template

Set default participants and tiers for all sessions to be created in a corpus.

From **Project Manager** window:

1. Select **Edit corpus template...** from the contextual menu.

   A **Session Template** window will appear for the selected corpus, showing the **Session Information** and **Tier Management** views.
2. Edit options as you see fit. Close this window when you are finished making changes.

   These settings will be applied to any sessions subsequently created within the corpus.

   Note: For further instructions on how to specify information in the **Session Information** and **Tier Management** views, consult Input Session Language on page 55, Participants on page 35, Assign media on page 40, Tier Management on page 55, and other related pages.

Session List

A session in Phon is a transcript of a portion of field data targeting one or more participants in a project.

Phon is designed to facilitate the transcription of media recordings (audio or video) taken of participants in a study. As such, a Phon session usually corresponds to one media recording and the transcript of this recording.

A session is organized into a series of records which correspond to individual utterances.

Sessions can be viewed in the **Project Manager** window. When a session is selected, the number of records in that session and the date it was last modified are displayed at the bottom of the list of sessions.

Figure 14: Session List

Session Actions

The following actions are availble from **Project** window menu and the session list contextual menu. You may access the session contextual menu by `right-clicking` (or `CMD+click` on macOS) inside the corpus list control or by clicking the **Session** title label in the **Project Manager** window.

New session

You may create a new session by clicking the '+' icon in the corpus list titlebar and typing just the name of the new session in the text field displayed. Pressing `Enter` or clicking the '+' button to the right of the text field will create the new session in the selected corpus. Session creation can be canceled by pressing `Escape` or clicking the 'X' icon in the session list.

Figure 15: Create Session (Quick)

If a `__sessiontemplate.xml` session file exists in the corpus folder new sessions will be created with the contents of the template file. To edit the session template for a corpus choose Open session template on page 30 from the corpus contextual menu.

Open session

Open a session in the default mode.

From the **Project Manager** window:

1. Ensure that the **Blind transcription** box is deselected to open a session in default mode. Click the desired corpus, and double-click on the session that you would like to open.

   The selected session will open in the **Session Editor**.

Open session as transcriber (blind mode)

Transcribe in multi-blind mode.

From the **Project Manager** window:

1. Select the **Blind transcription** check box and double-click on the session that you would like to transcribe.

   This will open a dialog prompting you to indicate whether you are a new or existing transcriber.

2.
   - If you are a new transcriber, choose the first option and enter your full name as well as a username. If you wish to use a password, select **Use password** and enter your chosen password into the two fields provided (the text in both fields must match). There is no password reminder function in Phon. Ensure that your password is memorable or store it in a safe location. Click **Ok** to continue.

- If you are a returning transcriber, choose the second option and select your username from the list. If you have chosen to use a password, you will be prompted to enter that password now. Do so and click **Ok**.

This will open the **Session Editor** window.

Note: Upon opening a session for the first time, there will be an empty record at the beginning of each session.

Rename session

Change a session name in your project.

From **Project Manager** window:

1. Right-click (`CTRL+click`) on the session you wish to rename, and choose **Rename Session** from the context menu.

   The **Rename Session** window will appear.
2. Follow the steps in the **Rename Session** window and click **OK**.

   You will be returned to the **Project Manager** window, with the session renamed.

Delete session

Remove a session from your project.

From **Project Manager** window:

1. Right-click (`CTRL+click`) on the session you wish to delete, and choose **Delete Session** from the context menu.

   A dialog will appear asking you to confirm that you would like to delete this session and informing you that this action cannot be undone.
2. If you are unsure, click **No**. To continue and delete the session, click **Yes**.

   The session will no longer appear in the **Project Manager** window.

Duplicate session

Create a copy of a session within the corpus that contains it.

From **Project Manager** window:

1. Right-click (`CTRL+click`) on the session you wish to duplicate, and choose **Duplicate Session** from the context menu.

   A duplicate of your session, with the suffix "(copy)" will appear in the **Project Manager**.

Move session

Move a session to a different corpus.

From **Project Manager** window:

1. Right-click (`CTRL+click`) on the session you wish to move, choose **Move Session To** from the context menu, and click on the corpus you wish to move your session to.

   A dialog will appear asking you to confirm that you would like to delete the session from its original location. Click **Yes**. Your session will be moved to the selected corpus.

   Note: You may move your session to a corpus within the current project, to another open project, or to any project in your workspace folder.

Session Editor

The **Session Editor** is the main UI for modifying and viewing session transcripts. As shown in the screenshot below the editor is composed of various views. Each view is responsible for providing a specific set of functions within the editor window.

Figure 16: Session Editor

Blind Transcription

Due to the subjective nature of phonetic transcription (where measurement and verification of all relevant segments may not be feasible), *Phon* has a built-in system for performing multiple-blind transcriptions.

In a multiple-blind transcription process, records are transcribed by any number of separate users, who do not see each other's transcriptions. These separate transcriptions may then be resolved by an objective party, who can choose one over the other or compare them to reach a consensus transcription.

A typical example of multiple-blind transcription in *Phon* may proceed as follows:

- Two users perform separate blind transcriptions of all records in one session (see Open session as transcriber (blind mode) on page 32 for instructions).
- A team of two different users review both sets of blind transcriptions together, while listening to each record.

- For each record, this team does one of three things:
  - chooses the best of the two transcriptions
  - combines both transcriptions to reach a consensus
  - creates an alternate transcription which they agree upon (in extreme cases in which both blind transcriptions seem to be in error).

The transcription which is settled upon is entered into the **IPA Target** or **IPA Actual** field, and can be analyzed accordingly by project researchers, who will now have access to the best and most objective transcriptions possible.

Participants

In the *Phon* **Session Editor**, the Participant(s) in a session may be specified and records may be associated with individual participants.

'Participant', in this case means a speaker in a research study. Often, only one target speaker is listed and transcribed as a participant in a session. However, there may be more than one target speaker per session, or it may be useful to have records that include the utterances of interlocutors for the purpose of establishing context for the target's utterances.

Session Editor : Anne.05-Syllabific
Record: 1 of 51
Media Player
Segmentation
Segment Window 300
Set to
Current Window 000
Mode In
Participants
Click name to create a
⌘0 <no speaker>
⌘1 Anne
⌘2 Christine
Segmentation
Session Information
Session Date 2003-02-27
Media /Users/kburkin/Gitprojects/phonbank/EnglishDemoCorp
Participants
Participant Name
Anne
Christine
Language
Record Data
Speaker: Christine
Exclude from searches
Orthography [What do you sing] [at birthday parties ?]
IPA Target [ˈwʌt ˈduː ˈjuː ˈsɪŋ] [ˈæt ˈbʌɹθˌdeɪ ˈpɑɹtiːz]
IPA Actual [ ] [ ]

Associating an utterance with a speaker allows you to:

- study intra-speaker speech patterns and changes
- compare the patterns of multiple speakers
- compile several speakers' data together to make more generalizable observations.

Since a corpus often contains data mostly relevant to a specific participant, *Phon* allows users to specify one set of participants for an entire corpus, in what is known as a corpus template. See #unique_87 for instructions.

Records

Each session consists of a series of records. A record is, in general, a single uttrance from a participant in the session.

Tiers

The following built-in tiers are available in every record:

Orthography
IPA Target
IPA Actual
Segment
Notes

Additional tiers, called user defined tiers, may be added to record data using the Session Information on page 54 view.

Orthography

The Orthography tier encodes the spoken utterance, usually in the language of the speaker.

IPA Target

The IPA Target tier encodes the phonetic transcription of the spoken utterance as expected. There should be a transcription entered for each word found in the Orthography except where an ommision was indicated.

IPA Actual

The IPA Actual tier encodes the phonetic transcription of the spoken utterance as heard. There should be a transcription for each word found in Orthography except where an ommision was indicated.

Segment

The Segment tier indicates the media start and end times for the spoken utterance.

Notes

The Notes tier allows for general note taking.

Boundaries and Pauses

There are three types of boundary markers that are supported in Orthography tier:

Table 1: Boundary Markers

Character	Name	Meaning
.	Dot	Syllable boundary
	Space	Word boundary
+	Plus	Compound word

If there is a noticeable pause in the transcribed utterance, these transcription codes are also available in the IPA Target and IPA Actual tiers:

Table 2: Pauses

Code	Meaning
(.)	Short pause between words
(..)	Medium-length pause between words
(...)	Long pause between words
^	Pause within a word

Actions

The following session-level actions are available for records. These actions can be found int the **Session** window menu and in the toolbar.

Add New Record

Add a new record to an existing session.

From the **Session Editor** window:

1. Display the record after which you would like to create a new record and click the **New record** button in the top left corner of the **Session Editor** or choose the **Session** > **New Record** (`CMD/CTRL+N`) menu item.

   This will create a new record immediately following the selected record. The new record will be visible from the **Record Data** view.

Copy Record

Copy all visible **Record Data** information to the clipboard.

From the **Session Editor** window:

1. Display the record you wish to copy and choose the **Session** > **Copy record** menu item (`Shift+CMD+C`).

   All visible tiers will be copied to the clipboard, with tier names and tier data separated by tabs. It can be pasted into the **Session Editor** as a new record, or into another window.

   Note: When pasted into a word processor, you will likely be able to automatically convert the copied record into a table. Ensure that you use tabs to separate cells.

Duplicate Record

Duplicate a record in an existing session.

From the **Session Editor** window:

1. Display the record which you would like to duplicate and click the **Duplicate record** button in the top left corner of the **Session Editor** or choose the **Session** > **Duplicate record** (`CMD/CTRL+D`) menu item.

   This will create a duplicate record immediately following the original. The duplicate record will be visible from the **Record Data** view.

Cut Record

Copy all visible **Record Data** information to the clipboard and delete current record.

From the **Session Editor** window:

1. Dispaly the record you wish to cut and choose the **Session** > **Cut record** menu item (`Shift+CMD+X`).

   All visible tiers will be copied to the clipboard, and then the record will be deleted. It can be pasted into the **Session Editor** as a new record, or into another window.

   Note: When pasted into a word processor, you will likely be able to automatically convert the copied record into a table. Ensure that you use tabs to separate cells.

Paste Record

Paste a record from the clipboard into the **Session Editor**.

From the **Session Editor** window:

1. Display the record after which you would like to paste, and choose the **Session** > **Paste record** menu item (`Shift+CMD+V`).

   The record will be created in the **Session Editor** directly after the currently visible record.

Delete Record

Delete a record from an existing session.

From the **Session Editor** window:

1. Display the record that you would like to delete and choose the **Session** > **Delete Record** (`CMD/CTRL+E`) menu item.

   A dialog will appear asking you to confirm that you would like to delete this record and informing you that this action cannot be undone.
2. If you are unsure, click **No**. To continue and delete the record, click **Yes**.

   The record will no longer appear in the **Record Data** view; the next record will be displayed.

Navigate Between Records

Navigate between records in the **Session Editor** window.

1. To go to the next record in your session, select the **Session** > **Next record** menu item or click the **right arrow** at the top of the **Session Editor**.

   Views will update to display information for the next record in your session, and the number of the currently visible record will be displayed.
2. To go to the previous record in your session, select the **Session** > **Previous record** menu item or click the **left arrow**.
3. To jump to the last record in your session, select the **Session** > **Last record** menu item or click the **right arrow with vertical line**.
4. To jump to the first record in your session, select the **Session** > **First record** menu itme or click the **left arrow with vertical line**.
5. To navigate to a specific record using its number, click on the current record number and type in the desired number.

View Record List

View a list of records in a session.

From the **Session Editor** window:

1. Click the drop down menu on the left of the **Search** bar and select **Open Record List**, or click within the empty **Search** bar and press `Enter`. Alternately, you may enter a search term in the **Search** bar and open a list of only records containing that term.

   This will open the **Record List** view, which shows a list of the records in a session with their *Record #* and all tier information.

   Note: To arrange by a column, click on its header. To reorder columns, click and drag their header to the left or right.
2. Click on any record in the list to navigate to it in the **Session Editor**.

Sort Records

Sort records in an existing session by start time.

From the **Session Editor** window:

1. Choose the **Session** > **Sort records...** menu item.

   The **Sort Records** dialog will appear.

2. Click the **Sort by:** menu and select a tier by which to sort your records. For example, you may sort your records in chronological order (by choosing **Segment**), or alphabetically by their **Orthography**.

   Note: You may choose up to three tiers by which to sort your records; they will be sorted by the first chosen tier, and then records with the same information in the first tier will be sorted by the next chosen tier, and so forth.
3. By default, records will be sorted in ascending order. To sort in descending order by any tier, select **descending**.
4. When you have finished selecting sort options, click **Ok**. If you do not wish to sort records at this time, click **Cancel**.

   The records for the current session will be sorted by the tier(s) you have chosen.

Media

Sessions in Phon usually consist of a media recording (either audio or video) coupled with transcriptions of utterances from the recording and separated into records. Each record can be associated via a process called segmentation to the time in the recording during which the utterance occurred.

To facilitate the segmentation and transcription of media files, Phon has a built-in media player. This player is available in the Media Player on page 66 view.

For accurate segment identification and playback the application requires that a wav file with the same name as the original media file exists. This file is referred to as session audio while the original media file is referred to as session media. When the session media file is already in wav format these two terms refer to the same file.

Note: Only 16-bit PCM wav files are supported for session audio.

Segment playback and export

Segment playback is available when a session audio is available or when a session media file is available and the Media Player on page 66 view is open. Segment playback actions are available from the session editor toolbar and the **Media** window menu.

The following segment playback actions are available:

- **Play segment** `CMD/CTRL+R` - play segment of currently selected record.
- **Play custom segment...** `CMD/CTRL+Alt+R` - play a custom segment.
- **Play current speech turn** `CMD/CTRL+L` - play all consequitive segments for the current speaker starting with the current record
- **Play adjacency sequence** `CMD/CTRL+Shift+R` - play all consequitive segments for the current speaker and then the next speaker

Actions to export segments (audio only) which mirror segment playback options are also available in the **Media** menu.

Segment playback from the Timeline on page 76 and Speech Analysis on page 68 views is also possible. In these views playback will be either the selected segment of the waveform or the current record segment and can be performed by pressing `space` when the view is focused.

Media Actions

The following actions are available from the **Media** window menu when the **Session Editor** is focused.

Assign media

There are several methods for assigning media to the session.

- Use the **Media** > **Assign media to session...** menu command

- Click the banner which appears in the Media Player, Timeline on page 76, or Speech Analysis on page 68 views when session media is not available

- You may also type the relative path - relative to the project, corpus or global media folders- directly in the **Media** text field in the Session Information on page 54 view.

Unassign media

This will clear media file assignment for the session. Deleting the value shown in the **Media** text field of the Session Information on page 54 view will also unassign session media.

Generate/re-encode session audio

If session media is available but a matching wav file cannot be found the following banner will be displayed in the Timeline on page 76 and Speech Analysis on page 68 views. Clicking the banner will begin the encoding process and progress will be displayed in the banner. Once the encoding process is complete the new wav file will be opened. This command is also available in the **Media** window menu.

Figure 17: Generate Session Audio Banner

Note: Phon will require write access to the media folder to generate/re-encode session audio.

If Phon detects that it is unable to read the session audio file you will be prompted to re-encode the file. If you choose to re-encode the wav file the original audio file will be renamed with a `-orig` suffix in the filename. If the prompt continues to be displayed after the re-encode process you may choose to **Do nothing** which will leave session audio unloaded.

Select media folders

This is a direct link to the Media Folders on page 18 tab in application preferences dialog.

Views

Information in each session is displayed in a series of small windows within the **Session Editor**, called views. There are several types of views:

1. Views with access/reference to the entire session:
   - Session Information on page 54
   - Tier Management on page 55
2. Views with information relating to individual records:
   - Record Data on page 60
   - Syllabification & Alignment on page 61
   - IPA Validation on page 65
3. Views with media functions:
   - Media Player on page 66
   - Speech Analysis on page 68
   - Timeline on page 76
4. Views that allow you to search for text within a session:
   - Find and Replace on page 83
5. Utility views which help with IPA transcription:
   - IPA Lookup on page 82

To open a view, select it from the **View** menu. Functions for open views are available both within the views themselves, and in the **View** menu. To close a view, click the **Close/X** in the top right corner of that viewor choose the **View** > **<view title>** > **Close** menu selection.

Not all views must be open at any given time, and views may be moved around within the **Session Editor** or "undocked" as their own separate window.

Views retain their currently defined size and position each time you exit *Phon*.

General View Actions

The following actions are available to all editor views.

Maximize View

Maximize a view within the Session Editor window.

From the **Session Editor** or an undocked view:

1. Click the maximize button near the top right corner of the view you wish to maximize, or when the view is focused, press `CTRL+M`.

   If the view was docked, it will expand to fill the **Session Editor** window. If the view was undocked, it will expand to fill your computer screen.

Session Editor : Anne.05-Syllabi
Record: 2
of
Record Data
Speaker: Anne
Exclude from searches
Orthography
[I sing] [happy birthday] [to you] [hor
IPA Target
[ˈaɪ ˈsɪŋ] [ˈhæpiː ˈbʌɹθˌdeɪ] [ˈtuː ˈjuː] [hɔɹ
IPA Actual
[ˈsɪː] [ˈhæpiː ˈbʌːˌteɪ] [ˈtuː ˈjuː] [ˈhɔː
Notes
Segment
[000:03.997-000:08.343

2. To restore the view to its previous size, click the restore button near the top right corner (this button looks like two windows), or press `CTRL+N` when the view is in focus.

   The view will return to its previous unmaximized position.

Minimize View

Minimize a view within the **Session Editor** window.

From the **Session Editor** or an undocked view:

1. Click the **minimize/_** button near the top right corner of the view.

   A small title bar for that view will appear at an edge of the **Session Editor**.

Session Editor : Anne.05-Syllabi

Record: 2 of 5

Media Player

Segmentation

Segment Window 30

Set

Current Window 00

Mode

Participants

Click name to creat

⌘0 <no speaker>

⌘1 Anne

⌘2 Christine

Record Data

Speaker: Anne

Exclude from searches

Orthography	[I sing]	[happy birthday]	[to you]	[hor
IPA Target	[ˈaɪ ˈsɪŋ]	[ˈhæpiː ˈbʌɹθˌdeɪ]	[ˈtuː ˈjuː]	[hɔɹ
IPA Actual	[ˈsɪː]	[ˈhæpiː ˈbʌːˌteɪ]	[ˈtuː ˈjuː]	[ˈhɔː
Notes				
Segment	[000:03.997-000:08.343			

Session Information

Waveform

2. To make a minimized view temporarily reappear, click on its name or icon.

   When the focus is changed to another view (i.e. another view is selected), the view will return to its minimized position.

   Note: To make the view retain its opened position when focus is lost, click the thumbtack button near the top right corner of the title bar. To deactivate this option, click the thumbtack again.

3. To restore the minimized view to a normal position within the **Session Editor** frame, click the restore button near the top right corner (this button looks like two windows), or press `CTRL+N` when the view is in focus.

   The view will return to its previous docked position in the **Session Editor**, even if it was undocked when you minimized it.

Relocate View

Move a view to a new position within the **Session Editor**.

From the **Session Editor** window:

1. Click on the view's title bar and drag it to the desired location within the **Session Editor** window.

   As you drag the view, the **Session Editor** will show the alternate position of that view. When it appears as you wish, release the mouse button.

Session Editor : Anne.05-Syllabi
Record: 1
of 5
Media Player
Waveform
Play
Refresh
000:00.008
Segmentation
Session Information
Session Date
2003-02-27
Media
/Users/kburkin/Gitprojects/phonbank/EnglishDemoCo
Participants
Participant Name
Anne
Christine
Language
Record Data
Session Information

2. Two or more views may occupy the same location in the **Session Editor**. To do so, drag and drop one view to the title bar of the other view.

   You can switch between views in the same position by selecting the appropriate tab at the bottom of either view.

Dock View

Return an undocked view to the **Session Editor** window.

From the **Session Editor** window, with a view undocked:

1. In the top right corner of the view, click the button that looks like a window with an inward arrow (on mouseover it will say **Connects this panel with the frame**). Alternately, select the title bar of the view and press `CTRL+N`.

   The view will reappear in the **Session Editor** window in its previous docked position.

   Note: You may also click and drag the view's title bar to return it to the **Session Editor** window in a different position.

Undock View

Disconnect or "undock" a view from the **Session Editor**, making it its own separate window.

From the **Session Editor** window, with the view you wish to undock open:

1. In the top right corner of the view, click the button that looks like a window with an outward arrow (on mouseover it will say **Disconnects this panel from the frame**). Alternately, select the title bar of the view and press `CTRL +E`.

Session Editor : Anne.05-Syllabi
Record: 2 of 5
Media Player
Segmentation
Segment Window
Disconnects this panel from the fram
Current Window 00
Mode
Participants
Click name to creat
⌘0 <no speaker>
⌘1 Anne
⌘2 Christine
Segmentation
Record Data
Speaker: Anne
Exclude from searches
Orthography [I sing] [happy birthday] [to you] [hor
IPA Target [ˈaɪ ˈsɪŋ] [ˈhæpiː ˈbʌɹθˌdeɪ] [ˈtuː ˈjuː] [hɔɹ
IPA Actual [ˈsɪː] [ˈhæpiː ˈbʌːˌteɪ] [ˈtuː ˈjuː] [ˈhɔː
Notes
Segment [000:03.997-000:08.343
Session Information

The view will appear as a separate window in front of the **Session Editor**.

2. To move the view while it is undocked, click and drag on the small bar centred above the title bar. To resize the view, click and drag on any other edge or corner.

   The view will retain its undocked size and position when you exit and reopen *Phon*.

Session Information

The **Session Information** view displays and modifys the session date, media file, and list of participants.

Figure 18: Session Information View

Actions

Edit Session Date

Edit a session's date to reflect the date of its associated media recording.

From the **Session Information** view:

1. Click on the existing **Session Date** and type the new date over it.

   Participants' ages will be calculated using their birthday and the session date.

Assign Media to Session

Link a media file to the corresponding session.

From the **Session Information** view:

1. Click on the **Browse** button to the right of the **Media** field.

   A **Browse** window will appear allowing you to search your file system for the desired media file.
2. Locate and select the media file and click **Open**.

   This action will return the user to the **Session Editor**, from which the **Media File** will be available.

   Note: The project resources folder is the default media location for an individual project ('*__res/media*'). Placing your media in this folder allows you to keep your project's media within the project folder, and allows *Phon* to display the media's filename in the **Session Information** view without specifying the full path to it.

   Note: You may set one or more default media folders in *Phon*. Media files stored in your default media folders can also be displayed without their full file path.

Add Participant

Add a new participant to a session.

From the **Session Information** view:

1. Click the **Add Participant** button at the right of the **Participants** field.

   The **Edit Participant** window will appear.
2. Enter the participants *Name*, *Birthday*, *Language*, *Group*, *Gender*, *Education* and *Role*. Click **Ok**.

   Note: The age for each participant is calculated automatically based on the birth date and the session date. You must enter a birthday (or a best guess) such that the application will not calculate a negative age.
3. Repeat Steps 1 and 2 for each participant.

Edit Participant

Edit a participant for a session.

From the **Session Information** view:

1. Select an existing participant's name and click the **Edit Participant** button to the right.

   The **Edit Participant** window will appear.
2. Edit the participant's **Name**, **Birthday**, **Language**, **Group**, **Gender**, **Education** and **Role** as you see fit and click **Ok**.

   Any changes to the participant's name or age will be reflected in the **Session Information** view.

Input Session Language

The main language for each session can be specified in the **Language** field in **Session Information**.

From the **Session Information** view:

1. Select the **Tools** > **ISO-639-3 Language Codes** menu item for a list of the ISO-639-3 language codes.

   This will bring up the **ISO-639-3 Language Codes** window, which displays a list of languages and language codes which you can look through.

   Note: By default, the list is organized by language code. To sort by language name, click on the **Language Name** column heading.
2. Find the desired language code. In the **Session Information** view, click in **Language** field and type language name or code.

   Note: The search field in the **ISO-639-3 Language Codes** is case-sensitive.

Tier Management

The **Tier Management** view allows for modification and locking of session tiers.

Figure 19: Tier Management View

Actions

Add Tier

Create a new user-defined tier.

From the **Tier Management** view:

1. Click on the **New tier** button in the top right corner of the view.

   This action will generate a dialog prompting you specify details about the new tier.

2. Enter a name for the new tier. If the new tier should be a group aligned tier, select the **Grouped (word-aligned)** check box. Select an appropriate font for the new tier, or click the **Use default font** button to choose the default editor font. Click **Ok**.

   The new tier will show up at the bottom of each record.

Session Editor : Anne.05-Syllabi
Record: 1 of 5
Media Player
Tier Management
Lock all tiers
Locked
Find & Replace
Record Data
Speaker: Christine
Exclude from searches
Orthography [What do you sing] [at birthday parties ?]
IPA Target [ˈwʌt ˈduː ˈjuː ˈsɪŋ] [ˈæt ˈbʌɹθˌdeɪ ˈpɑɹtiːz]
IPA Actual [ ] [ ]
Notes
Segment [000:00.508-000:02.830
User-defined tier [
Id: 2f873f07-f1d7-4a70-9c18-3fd8ef96b411

3. To edit the font for a user-defined tier, select it from the list of tiers in the **Tier Management** view and click the **Edit tier...** button at the top right corner, or right-click on a tier and choose **Edit tier <tier name>**. Select the new font options and click **Ok**.

   That tier will reflect your new font choice in the **Record Data** view.

Note: To reset the tier font to the default, right-click (`CTRL+click`) on the tier and choose **Reset font** from the context menu.

Hide Tier

Remove Tier

Remove an existing user-defined tier.

From the **Tier Management** view:

1. Select an existing user defined tier and press `Delete` or `Backspace`, or right-click on a tier and choose **Delete tier <tier name>**.

   This action will generate a dialog asking you to confirm that you would like to delete the tier and informing you that this action cannot be undone.

   Note: Default *Phon* tiers (such as *Orthography*, *IPA Target*, *Notes*, etc.) cannot be deleted. If you do not wish to use one or more of these tiers, you can make them invisible following instructions at Hide Tier on page 59.

2. If you are unsure about removing the tier, click **Cancel**. If you would like to continue and remove the tier and all its contents, click **Ok**.

   The user defined tier will no longer appear in the **Tier Management** or **Record Data** views for this session.

Edit Tier

Select which tiers are visible in **Record Data** and change the order in which they appear.

From the **Tier Management** view:

1. Click on the check box to the left of each tier, under *Show Tier*, to select or de-select the tier for visualization.

   Selected tiers will be visible in the **Record Data** view, de-selected tiers will not be visible.

   Note: To hide or show all tiers, use the **Hide all tiers**/**Show all tiers** button.

2. Select any tier which you would like to reorder and use the green up and down arrows to the right of the tier names to change its position within the list.

   The tiers will appear in the revised order in the **Record Data** view.

3. Repeat Step 2 for any tiers you would like to reorder.

Lock or Unlock Tiers

Lock or unlock tiers against editing.

From the **Tier Managment** view:

1. To lock a tier, select the check box to the left of its name under the *Locked* column. To unlock a tier, de-select the check box.

   Selected tiers will be locked against editing in the **Record Data** view.

   Note: To lock or unlock all tiers, use the **Lock all tiers**/**Unlock all tiers** button.

Record Data

The record data view displays tier data for the current record.

Figure 20: Record Data View

Actions

New Group

Add a new word group to a record.

From the **Record Data** view:

1. Position the cursor in the *Orthography* tier within a group.
2. Click the **New record after current** button in the **Record Data** view, or select the **View** > **Record Data** > **New record after current** (`CMD/CTRL+G`) menu item.

   A new group will be created after the current group.

Merge Group

Merge multiple word groups into a single word group.

From the **Record Data** view:

1. Position the cursor inside a group in the *Orthography* tier which you would like to merge with a following group.
2. Click the **Merge group with next** button in the **Record Data** view, or select the **View** > **Record Data** > **Merge group with next** (`OPT/ALT+G`) menu item.

   The adjacent groups will be merged into a single group, with a space between the original contents.

Split Group

Split the contents of a group.

From the **Record Data** view:

1. Position the cursor inside a group in the *Orthography* tier where the group should be split (at or after a space between words).
2. Click the **Split group** button in the **Record Data** view, or select the **View** > **Record Data** > **Split group** (`OPT/ALT+K`) menu item.

   The group data will be split into two separate groups. If only one word was present in the group, an empty preceding group will be created. Only data in the *Orthography* tier will be divided. Other grouped tiers may require manual editing.

Delete Group

Delete a word group.

From the **Record Data** view:

1. Position the cursor inside a group in the *Orthography* tier that you wish to delete.
2. Click the **Delete current group** button in the **Record Data** view, or select the **View** > **Record Data** > **Delete current group** (`OPT/ALT+Shift+CMD+G`) menu item.

   The selected group will be deleted, including all data in aligned groups.

Exclude Record from Queries

Exclude selected records from queries.

From the **Record Data** view, with the record you wish to exclude focused:

1. Select the check box to the right of the speaker's name.

   When running a query, this record will be excluded from the search.

   Note: To include previously excluded records in a session level query, from the **Query** view, select the **Include excluded records** check box.

Find & Replace

The Find & Replace UI can be displayed using the **Edit** > **Find & Replace** menu item of the **Session Editor** or by clicking the button in the toolbar of the **Record Data** view.

Syllabification & Alignment

In the **Syllabification & Alignment** view, the syllable position for each phone in *IPA Target* and *IPA Actual* is displayed along with the phone alignment.

Figure 21: Syllabification & Alignment View

Syllabification

A number of syllable positions are available, including appendices, onsets, nuclei and codas. Each different phone position is displayed in a distinct color.

Syllabification plays a role in *Phon* Queries; it allows a user to search for a phone in a specific syllable position. For example, phonetic or phonological processes which only occur in onsets may be observed by focusing specifically on consonants in onset positions.

Phon will automatically syllabify transcriptions in the *IPA Target* and *IPA Actual* tiers, using any one of its built-in syllable templates (based on syllable structure of the following languages):

- Berber
- Catalan
- Cree
- Dutch
- English
- French
- Gurindji
- Italian
- Portuguese (European)
- Spanish
- Vietnamese

The syllabifier language for a project can be chosen from the **Preferences** dialog. Also, the syllabifier for an individual record my be changed by right-clicking (`CTRL+click`) on that record's *Target Syllables* or *Actual Syllables* in the **Syllabification & Alignment** view and choosing **Syllabify with** > **<Language name>** (the current default syllabifier is highlighted in bold in this menu).

Note: When faced with irregular utterances or transcriptions, *Phon* may make errors in syllabification. It is important to perform a visual verification of the syllabification of transcriptions in your project in order to ensure that Queries including syllabification information will return accurate results.

Modify Syllabification

Check to ensure proper syllabification of *IPA Target* and *IPA Actual* phones.

In order for the Syllabification module to work, the *IPA Target* and/or *IPA Actual* transcriptions must be completed (verified in the case of blind transcriptions) and saved. From the **Syllabification & Alignment** view:

1. Visually observe the syllabification for each record to determine whether phones are properly syllabified in the *Target Syllables* and/or *Actual Syllables* tier(s).
2. Right click (`CTRL+click`) on any phone which appears to be improperly syllabified and select the proper syllable constituent from the context menu. Alternately, select the phone in question and type the character underlined in the list below for the proper syllable constituent.

   - Left Appendix
   - Onset
   - Nucleus
   - Coda
   - Right Appendix
   - OEHS (Onset of an Empty-Headed Syllable)
   - Ambisyllabic
   - Unknown

   Note: When a transcription contains a sequence of two or more vowels in a row, the Toggle Hiatus option becomes available. This allows the vowels to be either included in the same or separate nuclei.

Alignment

Displayed in the **Syllabification & Alignment** view, the **Alignment** tier allows a comparison to be made between target (model) forms of utterances and their actual (spoken) realizations.

Alignment is visualized in *Phon* as an arrangment of transcribed phones from *IPA Actual* lined up underneath phones from *IPA Target*. *Phon* makes a comparison between the number, order, and features of target phones and actual phones, in order to determine what phonetic information may have been lost, retained, or added in production.

Note: To include syllabification visualization in the *Alignment* tier, select **Color in alignment** in the **Syllabification & Alignment** view.

EnglishDemoCorpus : Anne.05-Syllabif

Record: 2 of 5

Record Data

Speaker	Anne
Orthography	[I sing] [happy birthday] [to you] [horsie]
IPA Target	[ˈaɪ ˈsɪŋ] [ˈhæpiː ˈbʌɹθˌdeɪ] [ˈtuː ˈjuː] [hɔɹsiː]
IPA Actual	[ˈsɪː] [ˈhæpiː ˈbʌːˌteɪ] [ˈtuː ˈjuː] [ˈhɔːsiː]
Notes	
Segment	000:03.997-000:08.343

Syllabification & Alignment

☑ Target Syllables ☑ Actual Syllables ☑ Alignment ☐ Color in alignment

Target Syllables	a ɪ	s ɪ ŋ	h æ	p iː	b ʌ ɹ θ	d e ɪ									
Actual Syllables	s ɪː	h æ	p iː	b ʌː	t e ɪ	t uː	j uː	h							
Alignment	a ɪ	s ɪ ŋ	h æ	p iː	b ʌ ɹ θ	d e ɪ									
		s ɪː	h æ	p iː	b ʌː		t e ɪ								

This comparison is important for a number of query scripts in *Phon*, such as **Phones**, **Metathesis**, and **Harmony**. These queries require information from both the *IPA Target* and *IPA Actual* tiers, and how the two tiers relate.

Note: When faced with irregular utterances or transcriptions, *Phon* may make errors in alignment. It is important to perform a visual verification of the alignment of transcriptions in your project in order to ensure that queries including alignment information will return accurate results.

Modify Alignment

Check to ensure proper alignment between *IPA Target* and *IPA Actual* phones.

In order for the Alignment module to work, the *IPA Target* and/or *IPA Actual* transcriptions must be completed (verified in the case of blind transcriptions) and saved. From the **Syllabification & Alignment** view:

1. Select any phone in the *Alignment* tier which does not appear to be properly aligned.

   An outline will appear around the phone in question.
2. Use `OPT/ALT+left/right arrows` to move the phone into proper alignment. Alternately, click and drag a phone to re-align it.
3. Use `OPT/ALT+up/down arrows` to alternate phone selection between Target phones and Actual phones. Repeat Step 2 until all phones are aligned to your satisfaction.

IPA Validation

The **IPA Validation** view allows for validating IPA transcriptions produced using Blind Transcription on page 34.

Validate Blind Transcriptions

Validate completed blind transcriptions.

From the **Project Manager**:

1. Ensure that the **Blind transcription** check box is de-selected and double-click on the session that you would like to validate.

   This will open the **Session Editor** for the specific session.
2. Select the **View** > **IPA Validation** menu item.

   The **IPA Validation** view will open, with two tiers: *IPA Target Validation* and *IPA Actual Validation*.
3. For each group in the tier(s) you are validating, select the most accurate transcription for that group and click **Set**. Alternately, select the most accurate transcription for all groups in a tier and click **Validate <tier>**.

   The chosen transcriptions will appear in the approprate tier in the **Record Data** view.
4. From the *IPA Target* and *IPA Actual* tiers, transcriptions can be further modified as the validator sees fit, by typing or by using the **IPA Map** (`CMD/CTRL+M`).
5. Repeat Steps 3 and 4 until validation has been completed for the entire session.

Auto-Validate Blind Transcriptions

Automatically validate completed blind transcriptions.

From the **Project Manager**:

1. Ensure that the **Blind transcription** check box is deselected and double-click on the session that you would like to validate.

   This will open the **Session Editor** for the specific session.
2. Open the **IPA Validation** view and click the **Auto validate** button at the top.

   This will open the **Auto-validate Session** dialog.
3. In the **Tiers** field, choose whether to **Auto-validate IPA Target** and/or **Auto-validate IPA Actual** by selecting the check boxes. Also choose whether to overwrite existing data present in the selected tiers by selecting the **Overwrite existing data** check box.

   Note: By default, auto-validation will not overwrite data already present in the selected tier(s). The purpose of this is to preserve any transcription which was entered in default mode, or chosen in earlier validations.

4. In the **IPA Selection** field, select a preferred transcriber.

   In the event that there is more than one blind transcription for the selected tier in a single record, this transcriber's input will be chosen to fill the tier.
5. In the **Record Selection** field, choose whether to validate **All records**, **Specific records**, **Records for participant(s)**, or **Records from search results**.

   Note: If you choose to validate only specific records, you will have to specify the relevant record numbers. To specify several individual record numbers, separate them with a comma and a space. To specify a range, separate the beginning and end record numbers with two periods and a space. If you choose to validate records for specific participants, you must select the participants from the list. If you choose the validate records from search results, you must select a past search from the list.

6. When you have selected the appropriate validation options, click **Ok**.

   A dialog will appear asking you confirm that you want to auto-validate the selected IPA Tiers and informing you that this action is not undoable. If you are unsure, click **Cancel**. To continue with the auto-validation, click **Ok**.

Media Player

The *Media Player* view allows for video playback of session media.

Figure 22: Media Player View

Actions

Standard media controls - play/pause, position, and volume - can be found under the video. Other actions can be accessed by clicking the menu (button with triangle) button in the video player bar. Clicking on the video surface will also perform the play/pause action.

Go to a Specific Playback Time

Jump to a specific playback time (either user-specified, at the end of segmented media, or at the end of the last segment for a certain speaker.

From the **Media Player** view:

1. Click on the context menu in the bottom right corner.
2.
   - To go to a user-specified playback time, choose **Go to...** and type over the displayed time value.
   - To go to the end of the last segment in your session, choose **Go to end of segmented media**.
   - To go to the end of the last segment for a particular speaker, choose **Go to end of last segment for <speaker name>**.

Take Snapshot of Media

Take a snapshot of linked media at the current viewpoint.

From the **Media Player** view, with media open:

1. Click on the arrow to the bottom right of your media and choose the **Take snapshot** option from the context menu.

   A **Save As** window will appear.
2. Choose a file name and destination directory for your snapshot and click **Save**.

   An image of the current frame of your media will be created in the specified location.

   Note: The image will have the same dimensions as the original video file; the size of the video in the **Media Player** view is irrelevant.

Move Media Position with Record

Choose whether the current media position should move to align with the start of each segment as you navigate between records.

From the **Media Player** view:

1. Click the context menu in the bottom right corner and select or deselect **Move media position with record**.

   When this option is selected, the position marker on the **Media Player** will jump to the beginning of each record to which you navigate in the **Session Editor**.

Play Custom Segment

Play a user-defined segment of your media file.

From the **Media Player** view:

1. Click the context menu in the bottom right corner and choose **Play custom segment**.
2. Select either **Current segment**, **Speaker turn**, **Adjacency sequence**, **Record range**, or **Specific range**. If you choose **Specific range**, type over the segment values to customize the segment. If you choose **Record range**, click and drag the arrows along the slider to specify a range of records (e.g. records 7 to 9).

   Note: It may be useful to click one of the first four segment types before selecting **Specific range**; the previously selected segment type will appear in the range window and you can adjust it from there.
3. Click **Play** to play the specified segment, or click **Close** to cancel.

Speech Analysis

The *Speech Analysis* view displays the waveform, spectrogram, and *TextGrid* for the session.

Figure 23: Speech Analysis View

Waveform Tier

Waveform Actions

Adjust Segment Start and End Times

Adjust segment start and end times to refine segments.

From the **Speech Analysis** view:

1. Click the **Play** button (`CMD/CTRL+Shift+R`).

   This action will replay the segment for the displayed record.
2. Select a portion of the waveform for your revised segment and press `Enter`. Alternately, typeover the existing time values in the **Record Data** view with revised values and click the **Refresh** button in the top left area of the **Speech Analysis** view.

   This action will adjust your segment start and end times.

   Note: To view a larger portion of the waveform, click **Show More**. This extends the displayed interval by one second on each side. To redisplay the 500ms buffer, click **Refresh**.
3. If you would like to listen to or further revise the segments, repeat steps 1 and 2.

Spectrogram Tier

The Spectrogram tier for Phon allows for visualization of the segment spectrogram, formants, pitch, and intensity from within Phon's Session Editor window. To display the Spectrogram view choose **Show Spectrogram** from the **Praat** menu in the Speech Analysis view. Options for toggling the display of formant, pitch and intensity data can also be found in the **Praat** menu.

Spectrogram Actions

List Formants

List formant values from the **Speech Analysis** view.

A listing of formants can be obtained from the **Speech Analysis** view. To print a formant listing use the following procedure.

1. (Optional) Make a selection in the **Speech Analysis** view.
2. From the **Praat** menu in the **Speech Analysis** view, select **Formant listing**.
3. **Note:** Options for formant listings can be changed through the **Formant settings** window.

   The list of formants will be displayed in a new **Buffers** window for the audio segment/selection.

List Intensity

List intensity values from the **Speech Analysis** view.

A listing of intensity values can be obtained from the **Speech Analysis** view. To print intensity values use the following procedure.

1. (Optional) Make a selection in the **Speech Analysis** view.
2. From the **Praat** menu in the **Speech Analysis** view, select **Intensity Listing**.
3. **Note:** Options for intensity listings can be changed through the **Intensity settings** window.

   The list of formants will be displayed in a new **Buffers** window for the audio segment/selection.

List Pitch

List pitch values from the **Speech Analysis** view.

A pitch listing can be obtained from the **Speech Analysis** view. To print a pitch listing use the following procedure.

1. (Optional) Make a selection in the **Speech Analysis** view.
2. From the **Praat** menu in the **Speech Analysis** view, select **Pitch listing**.
3. **Note:** Options for pitch listings can be changed through the **Pitch settings** window.

   The list of pitch values will be displayed in a new **Buffers** window for the audio segment/selection.

TextGrid Tier

The TextGrid viewer in Phon displays basic TextGrid information about the TextGrid assigned to the current session.

To display the TextGrid view, choose **Show TextGrid** from the **Praat** menu in the Speech Analysis view. You can select audio segments by clicking intevals in the displayed TextGrid.

TextGrid Actions

Generate TextGrids

Generate TextGrids from Phon records.

The following procedure outlines how to generated new TextGrids from Phon record data.

1. **Note:** You may also open the Generate TextGrids wizard from the **Session Editor** window, in which case skip step 2.

   From the **Project Manager** window choose **Plugins** > **Generate TextGrids...** from the window menu.
2. In the wizard window, select a single session for which TextGrids will be generated. Click **Next**.
3. Choose the records that will be processed. Click **Next**.
4. Select the location for generated TextGrid files. You can generated TextGrid data in the default project location (this is where Phon will look for TextGrid data for records) or into an external folder. In the same screen, choose which Phon tiers will be exported in the TextGrid. When done, click **Generate TextGrids**.

Import TextGrids

Import TextGrids as Phon records.

TextGrids created with Praat may be imported as Phon records. Data from tiers in selected TextGrids will be mapped to Phon tier data.

1. Open the Import TextGrids wizard by using the menu command **Plugins** > **Import TextGrids...** from the **Project Manager** window.
2. In the first step of the wizard, select a folder containing the TextGrids you wish to import using the browse button on the right-hand side of the text field. When you select the folder, a list of detected tier names from the TextGrids will be displayed in the table.
3. For each TextGrid tier you wish to import, type the name of the Phon tier in the column titled **PhonTier**. You may assign more than one TextGrid tier to the same Phon tier. You may also assign a group marker for each imported tier. When a TextGrid interval with this marker as it's text is encountered a new group is created in the Phon record. By default, this is set to '#' as this is how Phon will generate TextGrid files. Click next.
4. Choose which session in the project to which you wish to add the imported records or specifiy a new session name to be created. Click next.

5. The TextGrids will now be imported. If any errors are encountered they will be displayed in the text area shown in the wizard.

Open TextGrid in Praat

Open a TextGrid managed by Phon in the Praat application.

The TextGrid view in Phon does not provide editing support for TextGrids. To open TextGrids from Phon in Praat use the following procedure.

1. **Note:** You will need Praat version 5.3.85 or later. Praat must also be open.

   From the **Speech Analysis** view in the **Session Editor** window, choose **Open TextGrid in Praat...** from the Praat menu. The TextGrid in Phon will fade and a button to unlock the TextGrid will be displayed.
2. **Note:** Phon uses TextGrid tier naming to map values onto Phon tiers. Do not change the names or delete any of the tiers generated by Phon.

   In Praat, edit TextGrid intervals as you see fit. You may also add new tiers to the TextGrid.
3. When finished editing the TextGrid, you can send the data back to Phon by choosing **File** > **Send back to calling program**. The TextGrid in Phon will unlock and its contents updated.

Spectrogram Settings

Configuring the spectrogram.

Adapted from http://www.fon.hum.uva.nl/praat/manual/Intro_3_2__Configuring_the_spectrogram.html

***Max Frequency* (Hz)**	the range of frequencies to display. The standard is 0 Hz at the bottom and 5000 Hz at the top. If this maximum frequency is higher than the Nyquist frequency of the Sound (which is half its sampling frequency), some values in the spectrogram will be zero, and the higher frequencies will be drawn in white. You can see this if you record a Sound at 44100 Hz and set the view range from 0 Hz to 25000 Hz.
Window length	the duration of the analysis window. If this is 0.005 seconds (the standard), Praat uses for each frame the part of the sound that lies between 0.0025 seconds before and 0.0025 seconds after the centre of that frame (for Gaussian windows, Praat actually uses a bit more than that). The window length determines the *bandwidth* of the spectral analysis, i.e. the width of the horizontal line in the spectrogram of a pure sine wave (see below). For a Gaussian window, the -3 dB bandwidth is 2*sqrt(6*ln(2))/(π**Window length*), or 1.2982804 / *Window length*. To get a `broad-band' spectrogram (bandwidth 260 Hz), keep the standard window length of 5 ms; to get a `narrow-band' spectrogram (bandwidth 43 Hz), set it to 30 ms (0.03 seconds). The other window shapes give slightly different values.
***Dynamic range* (dB)**	All values that are more than *Dynamic range* dB below the maximum will be drawn in white. Values in-between have appropriate shades of grey. Thus, if the highest peak in the spectrogram has a height of 30 dB/Hz, and the dynamic range is 50 dB (which is the standard value), then values below -20 dB/Hz will be drawn in white, and values between -20 dB/Hz and 30 dB/Hz will be drawn in various shades of grey.

Window shape

the shape of the analysis window. To compute the spectrum at, say, 3.850 seconds, samples that lie close to 3.850 seconds are given more weight than samples further away. The relative extent to which each sample contributes to the spectrum is given by the window shape. You can choose from: Gaussian, Square (none, rectangular), Hamming (raised sine-squared), Bartlett (triangular), Welch (parabolic), and Hanning (sine-squared). The Gaussian window is superior, as it gives no *sidelobes* in your spectrogram (see below); it analyzes a factor of 2 slower than the other window shapes, because the analysis is actually performed on twice as many samples per frame.

Time step

the maximum number of points along the time window for which Praat has to compute the spectrum. If your screen is not wider than 1200 pixels, then the standard of 1000 is appropriate, since there is no point in computing more than one spectrum per one-pixel-wide vertical line. If you have a really wide screen, you may see improvement if you raise this number to 1500.

Frequency step

the maximum number of points along the frequency axis for which Praat has to compute the spectrum. If your screen is not taller than 768 pixels, then the standard of 250 is appropriate, since there is no point in computing more than one spectrum per one-pixel-height horizontal line. If you have a really tall screen, you may see improvement if you raise this number.

Window shape

the shape of the analysis window. To compute the spectrum at, say, 3.850 seconds, samples that lie close to 3.850 seconds are given more weight than samples further away. The relative extent to which each sample contributes to the spectrum is given by the window shape. You can choose from: Gaussian, Square (none, rectangular), Hamming (raised sine-squared), Bartlett (triangular), Welch (parabolic), and Hanning (sine-squared). The Gaussian window is superior, as it gives no *sidelobes* in your spectrogram (see below); it analyzes a factor of 2 slower than the other window shapes, because the analysis is actually performed on twice as many samples per frame.

***Preemphasis* (dB/octave)**

determines the steepness of a high-pass filter, i.e., how much the power of higher frequencies will be raised before drawing, as compared to lower frequencies. Since the spectral slope of human vowels is approximately -6 dB per octave, the standard value for this setting is +6 dB per octave, so that the spectrum is flattened and the higher formants look as strong as the lower ones. When you raise the preemphasis, frequency bands above 1000 Hz will become darker, those below 1000 Hz will become lighter.

Dynamic compression

determines how much stronger weak spectra should be made before drawing. Normally, this parameter is between 0 and 1. If it is 0 (the standard value), there is no

dynamic compression. If it is 1, all spectra will be drawn equally strong, i.e., all of them will contain frequencies that are drawn in black. If this parameter is 0.4 and the global maximum is at 80 dB, then a spectrum with a maximum at 20 dB (which will normally be drawn all white if the dynamic range is 50 dB), will be raised by 0.4 * (80 - 20) = 24 dB, so that its maximum will be seen at 44 dB (thus making this frame visible).

Formant Settings

Settings for Formant analysis.

Adapted from http://www.fon.hum.uva.nl/praat/manual/Sound__To_Formant__burg____.html

The **Formant settings** window can be opened by choosing **Formant settings...** from the **Praat** menu in the **Speech Analysis** view of the **Session Editor** window.

Time step (s)	the time between the centres of consecutive analysis frames. If the sound is 2 seconds long, and the time step is 0.01 seconds, there will be approximately 200 analysis frames.
Maximum number of formants	for most analyses of human speech, you will want to extract 5 formants per frame. This, in combination with the **Maximum formant** setting, is the only way in which this procedure will give you results compatible with how people tend to interpret formants for vowels, i.e. in terms of vowel height (F1) and vowel place (F2). Otherwise, the **Maximum number of formants** can be any multiple of 0.5, you can choose 4, 4.5, 5, 5.5, 6, and so on.
Maximum formant (Hz)	the ceiling of the formant search range, in hertz. It is crucial that you set this to a value suitable for your speaker. The standard value of 5500 Hz is suitable for an average adult female. For a male, use 5000 Hz; if you use 5500 Hz for an adult male, you may end up with too few formants in the low frequency region, e.g. analysing an [u] as having a single formant near 500 Hz whereas you want two formants at 300 and 600 Hz. For a young child, use a value much higher than 5500 Hz, for instance 8000 Hz (experiment with it on steady vowels).
Window length (s)	the effective duration of the analysis window, in seconds. The actual length is twice this value, because Praat uses a Gaussian-like analysis window with sidelobes below -120 dB. For instance, if the **Window length** is 0.025 seconds, the actual Gaussian window duration is 0.050 seconds. This window has values below 4% outside the central 0.025 seconds, and its frequency resolution (-3 dB point) is 1.298 / (0.025 s) = 51.9 Hz, as computed with the formula given at Sound: To Spectrogram.... This is comparable to the bandwidth of a Hamming window of 0.025 seconds, which is 1.303 / (0.025 s) = 52.1 Hz, but that window (which is the window most often used in other analysis programs) has three spectral lobes of about -42 dB on each side.
Pre-emphasis from (Hz)	the +3 dB point for an inverted low-pass filter with a slope of +6 dB/octave. If this value is 50 Hz, then frequencies below 50 Hz are not enhanced, frequencies

	around 100 Hz are amplified by 6 dB, frequencies around 200 Hz are amplified by 12 dB, and so forth. The point of this is that vowel spectra tend to fall by 6 dB per octave; the pre-emphasis creates a flatter spectrum, which is better for formant analysis because we want our formants to match the local peaks, not the global spectral slope.
Dot size	Size of formant dots in the display. Use increments of .5 (e.g., 1.5, 2, 2.5, etc.).

Settings for formant listings:

Include num formants	Include number of formants column
Include intensity	Include intensity column
Include bandwidths	Include a bandwidth column for each formant

Intensity Settings

Configuring the intensity contour

Adapted from http://www.fon.hum.uva.nl/praat/manual/Sound_To_Intensity___.html

Minimum pitch (Hz)	the minimum periodicity frequency in your signal. If you set it too high, you will end up with a pitch-synchronous intensity modulation. If you set it too low, your intensity contour may appear smeared, so you should set it as high as allowed by the signal if you want a sharp contour.
Time step (s)	the time step of the resulting intensity contour. If you set it to zero, the time step is computed as one quarter of the effective window length, i.e. as 0.8 / (*minimum_pitch*).
Subtract mean	Modify the intensity value at a time point is computed by subtracting the mean pressure around this point, and then applying the Gaussian window.

Pitch Settings

Configuring the pitch contour.

Adapted from http://www.fon.hum.uva.nl/praat/manual/Sound__To_Pitch__ac____.html and http://www.fon.hum.uva.nl/praat/manual/Sound__To_Pitch__cc____.html

The **Pitch settings** window can be opened by choosing **Pitch settings...** from the **Praat** menu in the **Speech Analysis** view of the **Session Editor** window. The behaviour of the *Time step* and *Pitch floor* parameters differ depending on the choice of Auto-correlation or Cross-correlation.

Sound to Pitch (Auto-correlate)

Time step (s) (standard value: 0.0)	the measurement interval (frame duration), in seconds. If you supply 0, Praat will use a time step of 0.75 / (*pitch floor*), e.g. 0.01 seconds if the pitch floor is 75 Hz; in this example, Praat computes 100 pitch values per second.
Pitch floor (Hz) (standard value: 75 Hz)	candidates below this frequency will not be recruited. This parameter determines the effective length of the analysis window: it will be 3 longest periods long, i.e., if the pitch floor is 75 Hz, the window will be effectively 3/75 = 0.04 seconds long.

Sound to Pich (Cross-correlate)

Time step (s) (standard value: 0.0)	the measurement interval (frame duration), in seconds. If you supply 0, Praat will use a time step of 0.25 / (*pitch floor*), e.g. 0.00333333 seconds if the pitch floor is 75 Hz; in this example, Praat computes 300 pitch values per second.
Pitch floor (Hz) (standard value: 75 Hz)	candidates below this frequency will not be recruited. This parameter determines the length of the analysis window: it will be 1 longest period long, i.e., if the pitch floor is 75 Hz, the window will be 1/75 = 0.01333333 seconds long.

Note: Note that if you set the time step to zero, the analysis windows for consecutive measurements will overlap appreciably: Praat will always compute 4 pitch values within one window length, i.e., the degree of *oversampling* is 4.

Very accurate (standard value: *off*)	if *off*, the window is a Hanning window with a physical length of 3 / (*pitch floor*). If *on*, the window is a Gaussian window with a physical length of 6 / (*pitch floor*), i.e. twice the effective length.

A post-processing algorithm seeks the cheapest path through the candidates. The settings that determine the cheapest path are:

Pitch ceiling (Hz) (standard value: 600 Hz)	candidates above this frequency will be ignored.
Silence threshold (standard value: 0.03)	frames that do not contain amplitudes above this threshold (relative to the global maximum amplitude), are probably silent.
Voicing threshold (standard value: 0.45)	the strength of the unvoiced candidate, relative to the maximum possible autocorrelation. To increase the number of unvoiced decisions, increase this value.
Octave cost (standard value: 0.01 per octave)	degree of favouring of high-frequency candidates, relative to the maximum possible autocorrelation. This is necessary because even (or: especially) in the case of a perfectly periodic signal, all undertones of *F*0 are equally strong candidates as *F*0 itself. To more strongly favour recruitment of high-frequency candidates, increase this value.
Octave-jump cost (standard value: 0.35)	degree of disfavouring of pitch changes, relative to the maximum possible autocorrelation. To decrease the number of large frequency jumps, increase this value. In contrast with what is described in the article, this value will be corrected for the time step: multiply by 0.01 s / *TimeStep* to get the value in the way it is used in the formulas in the article.
Voiced / unvoiced cost (standard value: 0.14)	degree of disfavouring of voiced/unvoiced transitions, relative to the maximum possible autocorrelation. To decrease the number of voiced/unvoiced transitions, increase this value. In contrast with what is described in the article, this value will be corrected for the time step: multiply by 0.01 s / *TimeStep* to get the value in the way it is used in the formulas in the article.

Display settings:

Dot size	Size of pitch dots in display.

Timeline

The **Timeline** view displays the waveform for the session audio (when the audio file is available) as well as associated record data for each selected participant along a horizontal timeline. The primary purpose of the **Timeline** view is to aid with segmentation and alterations of existing record segments.

Figure 24: Timeline Editor View

The **Timeline** view has three main components:

1. The **timebar**

   The timebar is displayed at the top of the **Timeline** view and extends across the entire width of the view panel. Ticks are drawn every 10px with a major tick at every 100px. Time values are printed at every 2nd major tick.
2. The **waveform**

   The waveform is displayed if session audio is available. If session audio is not available, a prompt to address the issue is displayed at the bottom of the view.
3. The **record grid**

   Records are displayed in dedicated rows for each speaker selected (from the **Participants** menu of the toolbar); for each record, the data tiers selected (from the **Tiers** menu) are visible. The current record is highlighted with a blue border, also with the record number printed in black. Record segments may be adjusted via mouse interaction by either dragging the record segment along the timeline; or by adjusting the start/end values using displayed markers (dotted lines). Records for any given participant can also be assigned to different participants by dragging the relevant record to a different row.

Actions

Play segment

To play the segment of the current record or selection press `space` (when not in segmentation mode) or use the menu in the toolbar or contextual menu.

Adjust segment times

Segment start and end times may be adjusted individually using the boundary markers (dotted lines) corresponding to the beginning and end of records. The start and end markers are always visible for the current record and are displayed when hovering over the end points of other record segments. Records may also be dragged horizontally along the timeline to adjust both start and end times simultaneously.

Delete record

To delete the current record select **Delete record** from the contextual menu or press `Delete` on the keyboard (after selecting the record to be deleted.)

Media Player Position

If the **Media Player** view is open, playback position can be changed by clicking on the waveform tier. If `CMD/CTRL` is held when clicking, playback will begin at the position marked by the click (if the media is not playing already).

Participants

Record data is printed by participant in rows. By default all participants plus a row for Unidentified records are visible.

Hide/Show Participant

Participant visiblity can be toggled using the **Participants** menu in the toolbar or option within the contextual menu.

Add Participant

To add a new participant to the session, click **Add Participant** in the **Participants** menu or select **Participants** > **Add Participant** within the contextual menu.

Change Participant

Participant assignment for a record may be altered using the mouse by dragging the record segment up and down across the different rows of the record grid. You may also use `CMD/CTRL + 1..9` to assign a different participant using the keyboard. Participant number is determined by position in the list of currently visible participants. `CMD/CTRL + 0`will set the record participant as Unidentified.

Hide/Show Tier

By default the *Orthography* and *Segment* tiers are shown in the record grid. Tier visibility may be toggled using the *Tiers* menu or similar option in the contextual menu.

Zoom Out/In

The zoom out/in actions will decrease/increase the horizontal resolution of the waveform within the timeline. These actions are available in the toolbar and contextual menus.

Special Modes

Segmentation

Segmentation is the process of assigning segment times for records using the keyboard, usually while media is playing. To enter the Segmentation Mode, click the *Start Segmentation* button in the toolbar. Before segmentation begins, a dialog is displayed with options for media playback and segmentation behaviour. The **Media Player** view must be loaded within the Session Editor's interface.

Figure 25: Segmentation Dialog

If session media is loaded the following media playback options are available:

1. Play media from beginning.
2. Play media from current position (in media player view.) This is the default option.
3. Play media from end of last record (by media time.)
4. Play media from end of last record for participant (with participant selection.)

Playback start position will determine where segmentation begins in the **Timeline**. If no media is available segmentation will always begin at `000:00.000`.

There are two modes available for segmentation:

1. Insert new record at end of session

   Use this option when segmenting a new media file or continuing segmentation.

2. Replace segment for current record

   Use this option when re-segmenting an already-segmented record or set of records. Uopn user action (e.g. typing a given participant number or `1`, the current record is assigned the new segment time and participant (when relevant). Once all records segments have been overwritten using this mode, new records will be inserted at end of the session.

Segmentation Window

While segmentation mode is active, a yellow segment will be painted in the **Timeline** view. When a new record is identified using the `Space` or `1...9` or `Numpad 1...Numpad 9` keys the segment identified by yellow will become the media segment for the new record.

If *Use segmentation window* is not selected, segments will have no set limit in length; the beginning time of the segment is constrained by the end time of the preceding segment. If *Use segmentation window* is selected, segment duration will be limited to a time value indicated in milliseconds (default is 3000ms or 3 seconds.)

Figure 26: Segmentation Window

Segmentation Controls

During segmentation mode all keyboard input for the application will be blocked except the following keystrokes:

Action	Keystroke(s)
Stop segmentation	`Esc`
Break (e.g., silence, noise, etc.)	`b` or `Numpad decimal`
New segment (unidentified)	`Space` or `0` or `Numpad 0`
New segment (participant 1...9)	`1...9` or `Numpad 1...Numpad 9`
Toggle segmentation window	`W`
Increase segmentation window (100ms)	`Up`
Decrease segmentation window (1000ms)	`Down`

Media Controls

The following keystrokes for controlling media playback are avavilable when in segmentation mode:

Action	Keystroke(s)
Volume up	`Shift+Up` or `Numpad multiply`
Volume down	`Shift+Down` or `Numpad divide`
Go back 1s	`Left` or `Numpad subtract`
Go forward 1s	`Right` or `Numpad add`
Go back 5s	`Shift+Left` or `Shift+Numpad subtract`
Go forward 5s	`Shift+Right` or `Shift+Numpad add`

Split Record

Records segments may be split using the record grid. To enter split mode, select the segment to ne split, press the `S` key, press the "Split Record" button in the toolbar, or select *Split record* from the contextual menu. A new marker will appear in the middle of the current record segment. This new marker can be dragged to adjust the position of the record split. Press `Enter` to accept the record split as shown and create the new record. Split mode can be exited using the `Escape` key and will also exit if the current editor record is switched or the current record segment is modified.

Figure 27: Split Record

Record data may be split by word group number by using the `0...9` keys on the keyboard. `0` will move all record data into the new record while `1...9` will split data after group 1, 2, etc,. Split position can be set using the context menu as well.

Warnings

The following warnings will be indicated in the **Timeline** view:

1. Overlaping segments
2. Segments exceeding media time

Warnings are indicated by a red flag shown next to the record numbers where warnings exist. Details about the warning will be shown in a tooltip displayed when hovering over the flag icon.

Figure 28: Overlapping Segments

IPA Lookup

Figure 29: IPA Lookup View

Auto Transcribe Session

Automatically transcribe a session using an available built-in dictionary.

The *Orthography* tier must be filled in with words that are valid in the target language.

From the **IPA Lookup** view:

1. Select the appropriate dictionary language in the **IPA Dictionary** field.

   IPA transcriptions filled in through automatic transcription will be selected from this dictionary.
2. Click the **Auto-transcribe Session** button.

   This will open the **Automatic Transcription** dialog.
3. In the **Tier Options** field, choose whether to overwrite existing transcriptions by selecting **Overwrite**. Select whether to transcribe the **IPA Target** tier and/or the **IPA Actual** tier, and choose a **Syllabifier** language.

   Note: The **Syllabifier** language may differ from the chosen **Dictionary** language. Choosing a **Syllabifier** language allows *Phon* to draw syllabification information in the **Syllabification & Alignment** view.
4. In the **Record Selection** tier, choose whether to transcribe **All records**, **Specific records**, **Records for participant(s)**, or **Records from search results**.

   Note: If you choose to transcribe only specific records, you will have to specify the relevant record numbers. To specify several individual record numbers, separate them with a comma and a space. To specify a range, separate the beginning and end record numbers with two periods and a space. If you choose to transcribe records for specific participants, you must select the participants from the list. If you choose the transcribe records from search results, you must select a past search from the list.

5. If you are unsure, click **Close**. Otherwise, click **Ok** to perform the automatic transcription.

   The selected tier will be filled in with entries from the chosen built-in dictionary.

IPA Lookup Console

The IPA Lookup Console is a function which allows users to lookup transcriptions, and to create and edit IPA dictionaries in *Phon*. The window can be opened by clicking the menu entry **View** > **IPA Lookup**, and then clicking the **Console** tab. Commands can be entered into the text field located at the bottom of the window, use `Enter` to run the command.

The following commands can be performed on dictionary files (include any quotation marks):

- **use <dictionary>**

  Switch to the specified dictionary. This can also be done using the combo box at the top of the window.
- **create <dictionary>**

  Create a new dictionary with the given name. You may choose to name your dictionary using an *ISO-639-3 Language Code*; for a list of these, see the **ISO-639-3 Language Codes** window.
- **drop <dictionary>**

  Delete a user-created dictionary which you no longer wish to use.
- **list**

  List the available dictionaries.
- **import "</full path/file>"**

  Import entries from the given file into the current dictionary. The specified file should be in UTF-8 encoding with one entry per line in the format "<orthography><tab><ipa>". Alternately, click the **Import IPA** button at the top of the **IPA Lookup** view, locate and select the file for import, and click **Open**.
- **export "</full path/file>"**

  Export user-defined entries in the current dictionary to a UTF-8 encoded text file. Alternately, click the **Export IPA** button at the top of the **IPA Lookup** view, choose a filename and location for export, and click **Save**.

The following commands can be performed on entries (include any quotation marks):

- **add "<orthography>"="<ipa>"**

  Add an entry into the IPA database for the currently selected dictionary.

  Note: Characters in <orthography> should be in lower-case.
- **lookup "<orthography>"**

  Look up the IPA transcription for the given orthography. The command can also be executed by entering only the orthography (without quotes) in the command field.
- **remove "<orthography>"="<ipa>"**

  Remove the IPA transcription for a user-added entry in the currently selected dictionary.
- **remove all**

  Remove the IPA transcriptions for all user-added entries in the currently selected dictionary.

Other commands:

- **help**

  List all available **Console** commands.

Find and Replace

The **Find & Replace** view allows for advance find and replace actions within record tiers.

Session Editor : Catoo

Record: 1 of 116

Find & Replace

Any tier	[ ]	Case sensitive	Plain text
Orthography	[ ]	Case sensitive	Plain text
IPA Target	[ ]	Case sensitive	Phonex
IPA Actual	[ ]	Case sensitive	Phonex
Replace	[ ]		

Find & Replace | Tier Management

Record Data

Speaker: Catootje — Exclude from searches

Orthography	[paard]
IPA Target	[ˈpaɹt]
IPA Actual	[ˈpaːɪt̚]

Id: 9debe58c-c9e4-4b4d-8970-66a232468dab

Using Find & Replace

From **Session Editor** window:

1. Select the **View** > **Find & Replace** menu item.

   The **Find & Replace** view will appear in the **Session Editor**.

   Note: The **Find & Replace** view will only show tiers visible in **Record Data**. To change tier visibility options, use the **Tier Management** view (see Tier Management on page 55 for more information).
2. Using the keyboard or the **IPA Map**, enter a search term within the square brackets in the *Any tier* field or in any visible tier. You may enter search terms in multiple tiers at once.
3. If your search term is in plain text or a regular expression, you may specify whether the search should be **Case sensitive** by using the check box. Use the drop-down menu to select whether the search should use **Plain text**, **Regular expression**, or **Phonex**.
4. Enter a replacement term in the *Replace* field if desired.
5. Click **Find next** to find the next occurrence of the search term(s) in the session, or **Find previous** to find the previous occurrence.

   If the term is found in a record, that record will appear in the **Record Data** view with the term highlighted.

   Note: You may also select whether your search should **Wrap** by using the check box, and you may choose whether to **Search Fowards** or **Search Backwards**.
6. Click **Replace** to replace the highlighted string with the specified replacement.

   The highlighted string will be replaced in the **Record Data** view. Repeat Steps 5 and 6 until all occurrences of the string have been replaced.

   Note: Alternately, click **Replace & Find** to replace the string highlighted in the current record and navigate to the next occurrence of the term. To replace all occurrences of the term in the session at once, click **Replace all**. You will be asked to confirm that you want to **Replace all**. If you are unsure, click **No**. To continue, click **Yes**; this will generate a dialog informing you of the number of times the string occured and was replaced.

Editor Layouts

The **Session Editor** has several built-in view layouts to assist users in session-related tasks.

The following layouts are available:

- **Default**

  The default layout when you first open a session, corresponds to the **Segmentation** layout.
- **Find & Replace**

  This layout facilitates searching and replacing terms across multiple records in a session. It includes the **Media Player**, **Find & Replace**, **Tier Management**, and **Record Data** views.
- **Segmentation**

  Designed to facilitate media linkage and segmentation and other tasks in new sessions, this layout includes the **Media Player**, **Timeline**, **Record Data**, and **Session Information** views.
- **Syllabification & Alignment**

  This layout facilitates manual verification of syllabification and alignment data in a session. It includes the **Record Data**, **Syllabification & Alignment**, and **Speech Analysis** views.
- **Transcription**

  This layout is designed to facilitate the transcription of records. It includes the **Media Player**, **Waveform**, and **Record Data** views; the **IPA Lookup** view is also included to streamline or automatize the transcription process.
- **Validation**

  The **Validation** layout is designed for validating blind transcriptions. It includes the **Media Player**, **IPA Validation**, and **Record Data** views, with **IPA Lookup** and **Waveform** minimized at the bottom. Note that

the **IPA Validation** view will not display blind transcriptions when in *Blind mode*, so that one user's blind transcriptions will not influence the other's.

- *User-defined layouts*

  Any layouts which have created and saved by the user will be available at the bottom of the list of views.
- **Previous**

  The previous user-defined layout is available here. User-defined layouts are automatically saved to **Previous** when the **Session Editor** window is closed.

Actions

The following actions are availble from the **View** menu

Save Current Layout

Save currently visible **Session Editor** layout for future use.

From the **Session Editor** window, with views arranged in desired format:

1. Click the **Select layout** button at the top left corner of the **Session Editor** window and choose **Save current layout...**, or select the **View** > **Save current layout...** menu item.

   A window will appear prompting you to give the layout a name.
2. Enter a name for the layout (usually reflective of the task you would use that layout to perform). Click **OK**, or click **Cancel** if you are unsure.

   The new layout will now be available in layout menus.

Delete Saved Layout

Delete a user-created **Session Editor** layout.

From the **Session Editor** window:

1. Click the **Select layout** button at the top left of the **Session Editor** window and go to the **Delete layout** menu item, or go to the **View** > **Delete layout** menu, and select the layout you wish to delete.

   A confirmation dialog will appear, asking whether you wish to delete the layout.
2. If you are unsure whether you'd like to delete this layout, click **No**. Otherwise, click **Yes** to continue.

   The user-created layout will no longer appear in layout menus.

Search

Run a quick search within your session and navigate to records containing results.

From the **Session Editor** window:

1. The **Search** bar is located in the top right portion of the **Session Editor** window. Click the drop down arrow on the left of the **Search** bar to choose options for your search, such as whether to **Include excluded records**, or **Case sensitive**.
2. Enter your search term in the **Search** bar.

   A list of all records containing your search term in the specified search tiers will be displayed, showing the record numbers and tier data. If there are no results, this list will be empty.

   Note: To view a **Record List** generated from your search results, either press enter with results visible, or click the drop down arrow on the left of the **Search** bar and select **Open Record List**. This will open a list of the search results in a new, undocked view. If no search terms have been entered, the **Record List** will contain all records in the session.
3. Click on a row in the search results or **Record List** to navigate to that record.

   The **Session Editor** will navigate to the chosen record, and the list of search results will remain open.
4. To hide the list of search results, press `Esc`, and continue to use the **Session Editor** as per normal. To show the list again, click on the **Search** bar.

5. To clear the **Search** bar, click **Clear field/X**.

> **Note:** Any **Search** options specified in *Step 1* will remain in place until they are manually changed or the session is closed.

Syntax

In this type of search field, the following syntax is accepted:

```
[<column>(,<column>)*:]<expr>(;[<column>(,<column>)*:]<expr>)*
```

Possible elements:

- `<column>`

  The name of a column in the displayed table.
- `<expr>`

  Either a regular expression (regex), a phone sequence expression (phonex) or plain text.

Some example expressions:

Table 3:

Expression	Matches
b	Any row with a column that contains 'b'
Speaker:Anne; b	Any row where column 'Speaker' is 'Anne' and any other column contains 'b'
IPA Target:b{v}	Any row where the IPA Target column contains 'b' followed by a vowel
IPA Target,IPA Actual:k{v}	Any row where either the IPA Target or the IPA Actual column contains 'k' followed by a vowel
Orthography:c; IPA Target:{c}{g}	Any row where the Orthography column contains 'c' and IPA Target contains a consonant followed by a glide.

Keyboard Shortcuts

Global Keystrokes

The following table outlines editor keystrokes which are globally available.

Command	Mac	Windows	Notes
Save	`CMD+S`	`CTRL+S`	
New Record	`CMD+N`	`CTRL+N`	The new record will be added after the current record in the session.
Cut Record	`Shift+CMD+X`	`Shift+CRTL+X`	The current record will be deleted and its contents will be copied to your system's clipboard.
Copy Record	`Shift+CMD+C`	`Shift+CTRL+C`	All tiers and and tier content visible in **Record Data** will be copied to your system's clipboard.
Paste Record	`Shift+CMD+V`	`Shift+CTRL+V`	The most recently copied or cut record will appear as

Command	Mac	Windows	Notes
			a new record at the current position in **Record Data**.
Next Record	`CMD+]`	`CTRL+]`	
Previous Record	`CMD+[`	`CTRL+[`	
Last Record	`CTRL+SHIFT+N`	`ALT+SHIFT+N`	
First Record	`CTRL+SHIFT+P`	`ALT+SHIFT+P`	
Play Segment (Media Player)	`CMD+R`	`CTRL+R`	Only available when the external media player is open.
Play Segment/Selection (Speech Analysis)	`Shift+CMD+R`	`Shift+CTRL+R`	Only available when the waveform is displayed.
View IPA Chart	`CMD+M`	`CTRL+M`	

The following keystrokes are available when a tier is focused:

Command	Mac	Windows	Notes
Next Group/Tier	`Tab`	`Tab`	Will move the caret to the beginning of the next group or the next tier.
Previous Group/Tier	`Shift+Tab`	`Shift+Tab`	Will move the caret to the beginning of the previous group or previous tier.
New Group	`CMD+G`	`CTRL+G`	Creates a new group after the current (or end if no current group is focused.)
Merge Group	`CTRL+ALT+G`	`CTRL+ALT+G`	Merges the current group with the next group.
Split/New Group	`CTRL+ALT+K`	`CTRL+ALT+K`	Creates a new group at the caret position. Creates a new group at the beginning of the record if caret is at beginning of first group.
Delete Group	`CMD+ALT+Shift+G`	`CTRL+ALT+Shift+G`	Delete the current group.

Tools

IPA Map

About the **IPA Map** in *Phon*.

Phon's **IPA Map** provides an easy-to-use interface for composing phonetic transcriptions. There are eight sections in the window, each with a layout which aids in the lookup of phones and diacritics. These sections may be collapsed or expanded by clicking on the appropriate title bar.

IPA Map sections:

- Consonants

- Clicks and Implosives
- Vowels
- Suprasegmentals
- Contours
- Diacritics
- Tones
- ExtIPA

Not all characters in the **IPA Map** are meant to be the base glyph in a phone (e.g. suprasegmentals, word boundaries, diacritics). Often, a dependent character is displayed in the **IPA Map** with a circle to represent its relation to the base glyph.

To view the *Name*, *Unicode* value, and *Features* of a character in the **IPA Map**, mouse over the character and a **Tooltip** window will appear.

Figure 31: IPA Map

Actions

Input Text with IPA Map

Create or modify phonetic transcriptions using the **IPA Map**.

The **IPA Map** can be used in any text-input field in *Phon*.

1. Place the cursor in a text-input field and select the **Tools** > **IPA Map** (`CMD/CTRL+M`) menu item.

   This will generate a window containing the **IPA Map**.
2. Click on the buttons in the **IPA Map** which correspond to the characters you would like to enter into the text-input field.

   The data in the text-input field will reflect your selections.

   Note: While the **IPA Map** is open, you may still proceed to type normally.
3. To close the **IPA Map**, select the **Tools** > **IPA Map** (`CMD/CTRL+M`) menu item.

Copy Character

Copy a character to your computer's clipboard.

From the **IPA Map** window:

1. Right-click (`CTRL+click`) on any character in the **IPA Map**. From the context menu, select either **Copy character** to copy as a plain text string, **Copy as HTML** to copy as an HTML code, or **Copy as Unicode HEX** to copy the unicode number.

   The character will be copied to your computer's clipboard in the chosen format and can then be pasted into text fields both within *Phon* and in other programs.

Add Character to Favorites

Add and remove characters from **Favorites** in the **IPA Map**.

From the **IPA Map** window:

1. Right-click (`CTRL+click`) on any character in the **IPA Map** and select **Add to favorites** from the context menu.

   The selected character will appear at the top of the **IPA Map** window in the **Favorites** section. The character will remain in this section until it you remove it.
2. To remove a character from the **Favorites** section, right-click (`CTRL+click`) on it either in the **Favorites** section or in its original section, and select **Remove from favourites** from the context menu.

Resize Font and Window

Change the font display size and window size of the **IPA Map**.

From the **IPA Map** window:

1. Right-click (`CTRL+click`) within any section in the **IPA Map** and move the **Font size** slider to the preferred font size.

   The characters in the **IPA Map** will be displayed in the selected font size; the window will resize itself accordingly.

   Note: The font display size in the **IPA Map** will not affect the size of characters when input into text fields.

Highlight Recently Used Characters

Highlight recently used characters in the **IPA Map**.

From the **IPA Map** window:

1. Right-click (`CTRL+click`) within any section of the **IPA Map** and select **Highlight recently used** from the context menu.

   The last twenty characters entered with the **IPA Map** will be highlighted in yellow; the most recently used characters will be the brightest.

2. To turn off this feature, right-click (`CTRL+click`) within any section of the **IPA Map** and deselect **Highlight recently used** from the context menu.

Search Characters

Search for characters in the **IPA Map** by glyph name or features.

From the **IPA Map** window:

1. Click inside the search bar in the top right corner of the window, and type a glyph name, feature, or feature shorthand. Alternately, click on the down arrow in the search bar to select either **Glyphs** or **Features** search, and then input the search term.

   A set of **Search Results** will be displayed at the top of the **IPA Map** window.

   Note: Although **Glyphs** search is the default search type, if the text input exactly matches a feature name or a 3-character feature shorthand, the **IPA Map** will display search results for that feature. However, this does not happen automatically when searching for single-character feature shorthands (e.g. "c" for consonant or "v" for vowel).

   Note: See Listing of phonetic features for a list of all features and shorthands used in *Phon*.

2. When finished with your character search, click the **Clear field/X** button to the right of the search bar.

PhonShell

PhonShell is a plug-in introduced with *Phon 2.0* which provides a scripting environment for *Phon*. *PhonShell* is available from the *Tools* windows menu. The *PhonShell* console is associated to the window from which it was opened and will be closed when the parent window is closed.

Usage

When opening *PhonShell*, you will be presented with a prompt such as:

```
js $
```

The first part of the prompt `js` indicates the language being processed (in this case it's JavaScript.) *PhonShell* can execute statments in any scripting language available to the running Java virtual machine. By default, *PhonShell* supports JavaScript and Groovy.

Built-in Commands

`::langs`

Print a list of available languages.

```
js $ ::langs
ECMAScript 1.8:Mozilla Rhino 1.7 release 3 PRERELEASE
Groovy 2.2.1:Groovy Scripting Engine 2.0
```

`::lang <lang>`

Switch to the specified language. Excluding `<lang>` will print the current language setting.

```
js $ ::lang Groovy
Groovy 2.2.1:Groovy Scripting Engine 2.0
groovy $
```

Notice how the prompt has changed to indicate the new language setting.

`::exec <script>`

Execute the specified script. The script may be a file on disk, or any readable URL.

```
js $ ::exec "C:\Users\Me\MyPhonScripts\SomeScript.js"
...
```

`clear`

Clears the screen.

```
js $ clear
```

`reset`

Reset the scripting environment, discarding all variables in the current context.

```
js $ reset
```

`> <buffer>`

Output from statements/scripts is output to the console by default. To re-direct the output to a *Phon* buffer window, terminate your statement with `> <buffer>`, where `<buffer>` is the name of a new *Phon* buffer. If a buffer with the given name already exists, it is overwritten.

```
js $ println("Hello World!");
Hello World!
js $ println("Hello World!"); > out
js $
```

After executing the second statement, "Hello World!" will be printed in a new *Phon* buffer named 'out'.

`>> <buffer>`

Data may also be appended to currently a existing buffer by using the >> operator. If the named buffer does not exist it will be created.

```
js $ println("Hello World..."); >> out
js $ println("goodbye sanity!"); >> out
js $
```

In the first statement, 'Hello World...' is printed in a new Phon buffer named 'out'. In the second statement 'goodbye sanity!' is appended to the same buffer.

Built-in Variables

`window`

Provides a reference to the window from which the *PhonShell* console was opened. For the Project Manager this will be an instance of `ca.phon.app.project.ProjectWindow` and for the Session Editor this will be an instance of `ca.phon.app.session.SessionEditor`. References to the current project and session can be obtained using the window variable.

```
js $ window.project
ca.phon.project.LocalProject@2d014748
js $ window.project.name
MyProject
js $ window.session.name
MySession
js $ window.session.recordCount
45
```

`__last`

The last value returned by executing a statement.

```
js $ x = 1+4;
5.0
js $ __last
5.0
js $ __last + 1
6.0
```

ISO Language Codes

Chapter 2

IPA Transcription

Topics:

- Parsing IPA Transcriptions
- Listing of IPA Characters
- Listing of phonetic features

Parsing IPA Transcriptions

Phonetic transcriptions - data entered into IPA Targetr and IPA Actual tiers - are parsed into discreet units, or IPA elements. Each IPA element constitutes either a timing unit or annotation within the transcription. The following IPA Elements are identified by Phon. All characters available in Phon may be accessed using the IPA Map on page 88.

IPA Elements

Phone

Phones are the main unit of an IPA transcription. They are composed of a vowel or consonant (or *base glyph*) along with optional diacritics. Diacritics are of the following types: prefix (e.g., pre-nasalization), combining (e.g., devoicing), length, suffix (e.g., aspiration), and tone. The following sections outline each part of a single Phone.

Prefix Diacritic

A prefix diacritic must appear before the base glyph. A phone may have multiple prefix diacritics.

Base Glyph

The base glyph can be any IPA vowel or consonant.

Combining Diacritic

Combining diacritics must appear directly after the base glyph; any number of combining diacritics may be used. Combining diacritics may also be added to prefix and suffix diacritics.

Note: Some combining diacritic options may cause rendering issues depending on the selected IPA font.

Length

Phone length is indicated using character 0x02D0 (long) and 0x02D1 (half-long.) Length diacritics must appear after the phone to which they belong.

Suffix Diacritic

A suffix diacritic must appear after the base glyph. A phone may have multiple suffix diacritics.

Tone Number

Tone number is specified using superscript numbers and must appear as the last element in a phone. Tone number applies to all elements inside of a syllable unit and may be appear on any element within the syllable. (If tone number diacritics appear on more than one element the numbers are concatonated.)

ba^{214} has tone number '214'

$b^{2}a^{14}$ has tone number '214'

Related reference

Listing of IPA Characters on page 99

Compound Phone

Compound phones are the combination of two phones using a ligature symbol (either character 0x0361 or 0x035c) between them. Each of the two phones may include prefix, combining, suffix, length, or tone diacritics.

Some Possible Compound Phones	Description
b͡ð	Combined production of [b] and [ð]
a͡ʊː	Diphthong [a͡ʊ] with second component sound lengthened

Stress Marker

Prosodically prominant syllables may be coded for primary or secondary stress. Primary stress is transcribed using a superior vertical stroke (0x2C8) preceding the syllable. Secondary stress is transcribed using an inferior vertical stroke (0x2CC) preceding the syllable.

Table 4: Some Examples

Orthography	Transcription
cake	ˈkeɪk
revoke	ɹəˈvoʊk
epiglottis	ˈɛpɪˌglɑɾɪs

Syllable Boundary

In cases where syllable boundaries may not be obvious, they can be transcribed with a period between syllables.

Table 5: Some Examples

Orthography	Transcription
re-enter	ˈɹiː.ˌɛntəɹ
sighing	ˈsaɪ.ɪŋ

Word Boundary

Boundaries between words are indicated via a space.

Table 6: Some Examples

Orthography	Transcription
ten cats	ˈtʰɛn ˈkæts
on the roof	ˈan ðə ˈɹuːf

Pause (Intra-word)

Intra-word pauses are transcribed using a '^' symbol.

Table 7: Intra-word pauses

Orthography	Transcription
ca^che	ˈkæ^s

Pause (Inter-word)

Inter-word pauses in speech may be transcribed in one of three ways, depending on their length.

Table 8: Inter-word pauses

Code	Meaning
(.)	Short pause
(..)	Medium-length pause
(...)	Long pause

Table 9: Example

Orthography	Transcription
cache (.) cache	ˈkaʃ (.) ˈkaʃ

Other Transcription Items

Intonation Group

Intonation groups are prosodic domains or units which include complete intonational contours. Intonation groups can be minor (e.g. corresponding to noun, verb, or prepositional phrases) or major (e.g. corresponding to entire sentences). Minor groups are separated by a single pipe symbol (0x1C0), and major groups are separated by a double pipe symbol (0x1C1).

Table 10: Some Example Intonation Groups

Minor	Major
the dog ǀ jumped ǀ over the fence	It's twelve o'clock ǁ It's time for lunch
the cold wind ǀ gusted strongly	I'm tired ǁ Let's go inside

Compound Word

Compound words are transcribed using a plus sign between each word.

Table 11: Some Possible Compound Words

Orthography	Transcription
dog+house	ˈdag+haʊs
picture+frame	ˈpɪkʧə+fɹeːm

Sandhi

Description of sandhi.

Linkers are symbols to express a phonological relation between two words, for example in the case of external sandhi phenomenon. For example, while 'an' and 'apple' for two separate words, the final 'n' of the determiner is syllabified within the onset of the following syllable. We represent this relations as 'an‿apple' [əˈnæpəl].

Contraction

A contraction is a combination of two words within a phrase, involving the reduction of one of the words. In Phon, contractions may be transcribed using the overtie character, `0x2040`.

Contraction

```
Orthography: [l'ami]
                          IPA Actual:  [l⁀ami]
```

Linkers (including Liaison)

Linkers are transcribed using the undertie character `0x203f`.

Liaison

```
Orthography: [les‿ami]
                          IPA Target:  [le‿zami]
```

Listing of IPA Characters

The following is a lising of all supported IPA characters along with the glyph unicode value, name, token type and feature set.

Table 12: Supported IPA Characters

Glyph	Unicode Value	Name	Type	Features
∅	0x2205	Empty Set	cover symbol	
	0x20	Space	space	
$	0x24	Dollar Sign	dollar sign	
{	0x7B	Open Brace	open brace	
}	0x7D	Close Brace	close brace	
:	0x3A	Colon	colon	
0	0x30	Zero	digit	
1	0x31	One	digit	
2	0x32	Two	digit	
3	0x33	Three	digit	
4	0x34	Four	digit	
5	0x35	Five	digit	
6	0x36	Six	digit	
7	0x37	Seven	digit	
8	0x38	Eight	digit	
9	0x39	Nine	digit	
^	0x5E	Caret	intra word pause	
↔	0x2194	Left Right Arrow	alignment	
!	0x1C3	Latin Letter Retroflex Click	consonant	
(	0x28	Left Parenthesis	open paren	
)	0x29	Right Parenthesis	close paren	
*	0x2A	Asterisk	cover symbol	
+	0x2B	Plus sign	plus	

Glyph	Unicode Value	Name	Type	Features
.	0x2E	Full Stop	period	
A	0x41	Latin Capital Letter A	cover symbol	
B	0x42	Latin Capital Letter B	cover symbol	
C	0x43	Latin Capital Letter C	cover symbol	
D	0x44	Latin Capital Letter D	cover symbol	
E	0x45	Latin Capital Letter E	cover symbol	
F	0x46	Latin Capital Letter F	cover symbol	
G	0x47	Latin Capital Letter G	cover symbol	
H	0x48	Latin Capital Letter H	cover symbol	
I	0x49	Latin Capital Letter I	cover symbol	
J	0x4A	Latin Capital Letter J	cover symbol	
K	0x4B	Latin Capital Letter K	cover symbol	
L	0x4C	Latin Capital Letter L	cover symbol	
M	0x4D	Latin Capital Letter M	cover symbol	
N	0x4E	Latin Capital Letter N	cover symbol	
O	0x4F	Latin Capital Letter O	cover symbol	
P	0x50	Latin Capital Letter P	cover symbol	
Q	0x51	Latin Capital Letter Q	cover symbol	
R	0x52	Latin Capital Letter R	cover symbol	
S	0x53	Latin Capital Letter S	cover symbol	
T	0x54	Latin Capital Letter T	cover symbol	

Glyph	Unicode Value	Name	Type	Features
U	0x55	Latin Capital Letter U	cover symbol	
V	0x56	Latin Capital Letter V	cover symbol	
W	0x57	Latin Capital Letter W	cover symbol	
X	0x58	Latin Capital Letter X	cover symbol	
Y	0x59	Latin Capital Letter Y	cover symbol	
Z	0x5A	Latin Capital Letter Z	cover symbol	
>	0x3E	Greater-than Sign	glide	
a	0x61	Latin Letter Small A	vowel	
b	0x62	Latin Letter Small B	consonant	
c	0x63	Latin Letter Small C	consonant	
d	0x64	Latin Letter Small D	consonant	
e	0x65	Latin Letter Small E	vowel	
f	0x66	Latin Letter Small F	consonant	
g	0x67	Latin Letter Small G	consonant	
h	0x68	Latin Letter Small H	consonant	
i	0x69	Latin Letter Small I	vowel	
j	0x6A	Latin Letter Small J	glide	
k	0x6B	Latin Letter Small K	consonant	
l	0x6C	Latin Letter Small L	consonant	
m	0x6D	Latin Letter Small M	consonant	
n	0x6E	Latin Letter Small N	consonant	

Glyph	Unicode Value	Name	Type	Features
o	0x6F	Latin Letter Small O	vowel	
p	0x70	Latin Letter Small P	consonant	
q	0x71	Latin Letter Small Q	consonant	
r	0x72	Latin Letter Small R	consonant	
s	0x73	Latin Letter Small S	consonant	
t	0x74	Latin Letter Small T	consonant	
u	0x75	Latin Letter Small U	vowel	
v	0x76	Latin Letter Small V	consonant	
w	0x77	Latin Letter Small W	glide	
x	0x78	Latin Letter Small X	consonant	
y	0x79	Latin Letter Small Y	vowel	
z	0x7A	Latin Letter Small Z	consonant	
¡	0xA1	Inverted Exclamation Mark	consonant	
¹	0xB9	Superscript One (Number 1)	tone	
²	0xB2	Superscript Two (Number 2)	tone	
³	0xB3	Superscript Three (Number 3)	tone	
⁴	0x2074	Superscript Four (Number 4)	tone	
⁵	0x2075	Superscript Five (Number 5)	tone	
⁶	0x2076	Superscript Six (Number 6)	tone	

Glyph	Unicode Value	Name	Type	Features
⁷	0x2077	Superscript Seven (Number 7)	tone	
⁸	0x2078	Superscript Eight (Number 8)	tone	
⁹	0x2079	Superscript Nine (Number 9)	tone	
æ	0xE6	Latin Letter Small AE	vowel	
ç	0xE7	Latin Letter Small C with cedilla	consonant	
ð	0xF0	Latin Letter Small Eth	consonant	
ø	0xF8	Latin Letter Small O with Stroke	vowel	
ħ	0x127	Latin Letter Small H with Stroke	consonant	
ŋ	0x14B	Latin Letter Small Eng	consonant	
œ	0x153	Latin Small Ligature OE	vowel	
ƀ	0x180	Latin Letter Small B with Stroke	consonant	
ƈ	0x188	Latin Letter Small C with Hook	consonant	
ƙ	0x199	Latin Letter Small K with Hook	consonant	
ƛ	0x19B	Latin Letter Small Lamda with Stroke	consonant	
ɳ	0x19E	Latin Letter Small N with Long Right Leg	consonant	
ƥ	0x1A5	Latin Letter Small P with Hook	consonant	

Glyph	Unicode Value	Name	Type	Features
ʮ	0x1AB	Latin Letter Small T with Palatal Hook	consonant	
ƹ	0x1B9	Latin Letter Small Ezh Reversed	consonant	
ƺ	0x1BA	Latin Letter Small Ezh with Tail	consonant	
ǀ	0x1C0	Latin Letter Dental Click	consonant	
ǁ	0x1C1	Latin Letter Lateral Click	consonant	
ǂ	0x1C2	Latin Letter Alveopalatal Click	consonant	
ȴ	0x234	Latin Letter Small L with Curl	consonant	
ȵ	0x235	Latin Letter Small N with Curl	consonant	
ȶ	0x236	Latin Letter Small T with Curl	consonant	
ɐ	0x250	Latin Letter Small Turned A	vowel	
ɑ	0x251	Latin Letter Small Alpha	vowel	
ɒ	0x252	Latin Letter Small Turned Alpha	vowel	
ɓ	0x253	Latin Letter Small B with Hook	consonant	
ɔ	0x254	Latin Letter Small Open O	vowel	
ɕ	0x255	Latin Letter Small C with Curl	consonant	
ɖ	0x256	Latin Letter Small D with Tail	consonant	

Glyph	Unicode Value	Name	Type	Features
ɗ	0x257	Latin Letter Small D with Hook	consonant	
ɘ	0x258	Latin Letter Small Reversed E	vowel	
ə	0x259	Latin Letter Small Schwa	vowel	
ɚ	0x25A	Latin Letter Small Schwa with Hook	vowel	
ɛ	0x25B	Latin Letter Small Open E	vowel	
ɜ	0x25C	Latin Letter Small Reversed Open E	vowel	
ɝ	0x25D	Latin Letter Small Reversed Open E with Hook	vowel	
ɞ	0x25E	Latin Letter Small Closed Reversed Open E	vowel	
ɟ	0x25F	Latin Letter Small Dotless J with Stroke	consonant	
ɠ	0x260	Latin Letter Small G with Hook	consonant	
ɡ	0x261	Latin Letter Small Script G	consonant	
ɢ	0x262	Latin Letter Small Capital G	consonant	
ɣ	0x263	Latin Letter Small Gamma	consonant	
ɤ	0x264	Latin Letter Small Ram's Horns	vowel	
ɥ	0x265	Latin Letter Small Turned H	glide	
ɦ	0x266	Latin Letter Small H with Hook	consonant	

Glyph	Unicode Value	Name	Type	Features
ɧ	0x267	Latin Letter Small Heng with Hook	consonant	
ɨ	0x268	Latin Letter Small I with Stroke	vowel	
ɩ	0x269	Latin Letter Small Iota	vowel	
ɪ	0x26A	Latin Letter Small Capital I	vowel	
ɫ	0x26B	Latin Letter Small L with middle Tilde	consonant	
ɬ	0x26C	Latin Letter Small L with Belt	consonant	
ɭ	0x26D	Latin Letter Small L with Retroflex Hook	consonant	
ɮ	0x26E	Latin Letter Small LEzh	consonant	
ɯ	0x26F	Latin Letter Small Turned M	vowel	
ɰ	0x270	Latin Letter Small Turned M with Long Leg	glide	
ɱ	0x271	Latin Letter Small M with Hook	consonant	
ɲ	0x272	Latin Letter Small N with Left Hook	consonant	
ɳ	0x273	Latin Letter Small N with Retroflex Hook	consonant	
ɴ	0x274	Latin Letter Small Capital N	consonant	
ɵ	0x275	Latin Letter Small Barred O	vowel	
ɶ	0x276	Latin Letter Small Capital OE	vowel	
ɷ	0x277	Latin Letter Small Closed Omega	vowel	

Glyph	Unicode Value	Name	Type	Features
ɸ	0x278	Latin Letter Small Phi	consonant	
ɹ	0x279	Latin Letter Small Turned R	consonant	
ɺ	0x27A	Latin Letter Small Turned R with Long Leg	consonant	
ɻ	0x27B	Latin Letter Small Turned R with Hook	consonant	
ɽ	0x27C	Latin Letter Small R with Long Leg	consonant	
ɾ	0x27D	Latin Letter Small R with Tail	consonant	
ɿ	0x27E	Latin Letter Small R with Fish Hook	consonant	
ʀ	0x280	Latin Letter Small Capital R	consonant	
ʁ	0x281	Latin Letter Small Capital Inverted R	consonant	
ʂ	0x282	Latin Letter Small S with Hook	consonant	
ʃ	0x283	Latin Letter Small Esh	consonant	
ʄ	0x284	Latin Letter Small Dotless J with Stroke and Hook	consonant	
ʆ	0x286	Latin Letter Small Esh with Curl	consonant	
ʇ	0x287	Latin Letter Small Turned T	consonant	
ʈ	0x288	Latin Letter Small T with Retroflex Hook	consonant	
ʉ	0x289	Latin Letter Small U Bar	vowel	
ʊ	0x28A	Latin Letter Small Upsilon	vowel	

Glyph	Unicode Value	Name	Type	Features
ʋ	0x28B	Latin Letter Small V with Hook	consonant	
ʌ	0x28C	Latin Letter Small Turned V	vowel	
ʍ	0x28D	Latin Letter Small Turned W	consonant	
ʎ	0x28E	Latin Letter Small Turned Y	consonant	
ʏ	0x28F	Latin Letter Small Capital Y	vowel	
ʐ	0x290	Latin Letter Small Z with Retroflex Hook	consonant	
ʑ	0x291	Latin Letter Small Z with Curl	consonant	
ʒ	0x292	Latin Letter Small Ezh	consonant	
ʓ	0x293	Latin Letter Small Ezh with Curl	consonant	
ʔ	0x294	Latin Letter Glottal Stop	consonant	
ʕ	0x295	Latin Letter Pharyngeal Voiced Fricative	consonant	
ʖ	0x296	Latin Letter Inverted Glottal Stop	consonant	
ʗ	0x297	Latin Letter Stretched C	consonant	
ʘ	0x298	Latin Letter Bilabial Click	consonant	
ʙ	0x299	Latin Letter Small Capital B	consonant	
ɵ	0x29A	Latin Letter Small Closed Open E	vowel	
ɢ	0x29B	Latin Letter Small Capital G with Hook	consonant	
ʜ	0x29C	Latin Letter Small Capital H	consonant	

Glyph	Unicode Value	Name	Type	Features
ʝ	0x29D	Latin Letter Small J with Crossed-Tail	consonant	
ꞁ	0x29E	Latin Letter Small Turned K	consonant	
ʟ	0x29F	Latin Letter Small Capital L	consonant	
ɋ	0x2A0	Latin Letter Small Q with Hook	consonant	
ʡ	0x2A1	Latin Letter Glottal Stop with Stroke	consonant	
ʢ	0x2A2	Latin Letter Reversed Glottal Stop with Stroke	consonant	
ʤ	0x2A3	Latin Letter Small DZ Digraph	consonant	
ʤ	0x2A4	Latin Letter Small DEzh Digraph	consonant	
ʥ	0x2A5	Latin Letter Small DZ Digraph with Curl	consonant	
ʦ	0x2A6	Latin Letter Small TS Digraph	consonant	
ʧ	0x2A7	Latin Letter Small TEsh Digraph	consonant	
ʨ	0x2A8	Latin Letter Small TC Digraph with Curl	consonant	
ʩ	0x2A9	Latin Letter Small FEng Digraph	consonant	
ʪ	0x2AA	Latin Letter Small LS Digraph	consonant	
ʫ	0x2AB	Latin Letter Small LZ Digraph	consonant	

Glyph	Unicode Value	Name	Type	Features
ⱱ	0x2AC	Latin Letter Bilabial Percussive	consonant	
ⱴ	0x2AD	Latin Letter Bidental Percussive	consonant	
ʮ	0x2AE	Latin Letter Small Turned H with Fish Hook	vowel	
ʰ	0x2B0	Modifier Letter Small H	suffix diacritic	
ʱ	0x2B1	Modifier Letter Small H with Hook	suffix diacritic	
ʲ	0x2B2	Modifier Letter Small J	suffix diacritic	
ʳ	0x2B3	Modifier Letter Small R	suffix diacritic	
ʴ	0x2B4	Modifier Letter Small Turned R	suffix diacritic	
ʵ	0x2B5	Modifier Letter Small Turned R with Hook	suffix diacritic	
ʶ	0x2B6	Modifier Letter Small Capital Inverted R	suffix diacritic	
ʷ	0x2B7	Modifier Letter Small W	suffix diacritic	
ʸ	0x2B8	Modifier Letter Small Y	suffix diacritic	
ʻ	0x2BB	Modifier Letter Turned Comma	suffix diacritic	
ʼ	0x2BC	Modifier Letter Apostrophe	suffix diacritic	
ʽ	0x2BD	Modifier Letter Reversed Comma	suffix diacritic	
ʾ	0x2BE	Modifier Letter Right Half Ring	suffix diacritic	
ʿ	0x2BF	Modifier Letter Left Half Ring	suffix diacritic	
ˀ	0x2C0	Modifier Letter Glottal Stop	suffix diacritic	

Glyph	Unicode Value	Name	Type	Features
ˀ	0x2C1	Modifier Letter Reversed Glottal Stop	suffix diacritic	
ˈ	0x2C8	Modifier Letter Vertical Line	primary stress	
ˌ	0x2CC	Modifier Letter Low Vertical Line	secondary stress	
ː	0x2D0	Modifier Letter Triangular Colon	long	
ˑ	0x2D1	Modifier Letter Half Triangular Colon	half long	
˞	0x2DE	Modifier Letter Rhotic Hook	suffix diacritic	
ˠ	0x2E0	Modifier Letter Small Gamma	suffix diacritic	
ˡ	0x2E1	Modifier Letter Small L	suffix diacritic	
˥	0x2E5	Modifier Letter Extra-High Tone Bar	suffix diacritic	
˦	0x2E6	Modifier Letter High Tone Bar	suffix diacritic	
˧	0x2E7	Modifier Letter Mid Tone Bar	suffix diacritic	
˨	0x2E8	Modifier Letter Low Tone Bar	suffix diacritic	
˩	0x2E9	Modifier Letter Extra-Low Tone Bar	suffix diacritic	
ˬ	0x2EC	Modifier Letter Voicing	suffix diacritic	
˭	0x2ED	Modifier Letter Unaspirated	suffix diacritic	
◌̀	0x300	Combining Grave Accent	combining diacritic	
◌́	0x301	Combining Acute Accent	combining diacritic	
◌̂	0x302	Combining Circumflex Accent	combining diacritic	

Glyph	Unicode Value	Name	Type	Features
◌̃	0x303	Combining Tilde	combining diacritic	
◌̄	0x304	Combining Macron	combining diacritic	
◌̆	0x306	Combining Breve	combining diacritic	
◌̇	0x307	Combining Dot Above	combining diacritic	
◌̈	0x308	Combining Diaeresis	combining diacritic	
◌̊	0x30A	Combining Ring Above	combining diacritic	
◌̋	0x30B	Combining Double Acute Accent	combining diacritic	
◌̌	0x30C	Combining Caron	combining diacritic	
◌̏	0x30F	Combining Double Grave Accent	combining diacritic	
◌̑	0x311	Combining Inverted Breve	combining diacritic	
◌̘	0x318	Combining Left Tack Below	combining diacritic	
◌̙	0x319	Combining Right Tack Below	combining diacritic	
◌̚	0x31A	Combining Left Angle Above	combining diacritic	
◌̜	0x31C	Combining Left Half Ring Below	combining diacritic	
◌̝	0x31D	Combining Up Tack Below	combining diacritic	
◌̞	0x31E	Combining Down Tack Below	combining diacritic	
◌̟	0x31F	Combining Plus Sign Below	combining diacritic	
◌̠	0x320	Combining Minus Sign Below	combining diacritic	

Glyph	Unicode Value	Name	Type	Features
◌̡	0x321	Combining Palatalized Hook Below	combining diacritic	
◌̢	0x322	Combining Retroflex Hook Below	combining diacritic	
◌̣	0x323	Combining Dot Below	combining diacritic	
◌̤	0x324	Combining Diaeresis Below	combining diacritic	
◌̥	0x325	Combining Ring Below	combining diacritic	
◌̩	0x329	Combining Vertical Line Below	combining diacritic	
◌̪	0x32A	Combining Bridge Below	combining diacritic	
◌̬	0x32C	Combining Caron Below	combining diacritic	
◌̮	0x32F	Combining Inverted Breve Below	combining diacritic	
◌̰	0x330	Combining Tilde Below	combining diacritic	
◌̴	0x334	Combining Tilde Overlay	combining diacritic	
◌̹	0x339	Combining Right Half Ring Below	combining diacritic	
◌̺	0x33A	Combining Inverted Bridge Below	combining diacritic	
◌̻	0x33B	Combining Square Below	combining diacritic	
◌̼	0x33C	Combining Seagull Below	combining diacritic	
◌̽	0x33D	Combining X Above	combining diacritic	
◌͆	0x346	Combining Bridge Above	combining diacritic	
◌͇	0x347	Combining Equal Sign Below	combining diacritic	

Glyph	Unicode Value	Name	Type	Features
◌ᵢ	0x348	Combining Double Vertical Line Below	combining diacritic	
◌ᵣ	0x349	Combining Left Angle Below	combining diacritic	
◌̽	0x34A	Combining Not Tilde Above	combining diacritic	
◌̾	0x34B	Combining Homothetic Above	combining diacritic	
◌̿	0x34C	Combining Almost Equal To Above	combining diacritic	
◌ₔ	0x34D	Combining Left Right Arrow Below	combining diacritic	
◌ᵣ	0x34E	Combining Upwards Arrow Below	combining diacritic	
◌ₓ	0x354	Combining Left Arrow Head Below	combining diacritic	
◌ᵧ	0x355	Combining Right Arrow Head Below	combining diacritic	
◌͇	0x35C	Combining Double Breve Below	ligature	
◌͈	0x361	Combining Double Inverted Breve	ligature	
◌͉	0x362	Combining Double Rightwards Arrow Below	ligature	
α	0x3B1	Greek Small Letter Alpha	vowel	
β	0x3B2	Greek Small Letter Beta	consonant	
δ	0x3B4	Greek Small Letter Delta	consonant	
θ	0x3B8	Greek Small Letter Theta	consonant	
λ	0x3BB	Greek Small Letter Lamda	consonant	

Glyph	Unicode Value	Name	Type	Features
π	0x3C0	Greek Small Letter Pi	consonant	
χ	0x3C7	Greek Small Letter Chi	consonant	
ᵊ	0x1D4A	Modifier Letter Small Schwa	suffix diacritic	
ᵐ	0x1D50	Modifier Letter Small M	prefix diacritic	
ᵑ	0x1D51	Modifier Letter Small Eng	prefix diacritic	
ⁿ	0x207F	Modifier Letter Small N	prefix diacritic	
ᶬ	0x1DAC	Modifier Letter Small M with Hook	prefix diacritic	
ᶮ	0x1DAE	Modifier Letter Small N with Left Hook	prefix diacritic	
ᶯ	0x1DAF	Modifier Letter Small N with Retroflex Hook	prefix diacritic	
ᴺ	0x1DB0	Modifier Letter Small Capital N	prefix diacritic	
ᶑ	0x1D91	Latin Letter Small D with Hook and Tail	consonant	
‖	0x2016	Double Vertical Line	major group	
|	0x7C	Vertical Line	minor group	
↑	0x2191	Upwards Arrow	tone	
↓	0x2193	Downwards Arrow	tone	
↗	0x2197	Northeast Arrow	tone	
↘	0x2198	Southeast Arrow	tone	
#	0xA71B	Up Arrow	tone	
#	0xA71C	Down Arrow	tone	
̵	0x335	Combining Short Stroke Overlay - Affix Diacritic Role Switcher	role reversal	

Glyph	Unicode Value	Name	Type	Features
ƒ	0x192	Latin Letter Small F with Hook	consonant	
‿	0x203F	Undertie	sandhi	
⁀	0x2040	Overtie	sandhi	
ɮ	0x1AA	Latin Letter Reversed Esh with Loop	consonant	
ƭ	0x1AD	Latin Letter Small T with Hook	consonant	
ɥ	0x265	Latin Letter Small Turned H	consonant	
ɰ	0x270	Latin Letter Small Turned M with Long Leg	consonant	
ɪ	0x131	Latin Letter Small Dotless I	vowel	
◌᷄	0x1DC4	Combining Macron-Acute	combining diacritic	
◌᷅	0x1DC5	Combining Grave-Macron	combining diacritic	
◌᷆	0x1DC6	Combining Macron-Grave	combining diacritic	
◌᷇	0x1DC7	Combining Acute-Macron	combining diacritic	
◌᷈	0x1DC8	Combining Grave-Acute-Grave	combining diacritic	
↑	0x2191	Upwards Arrow	tone	
↓	0x2193	Downwards Arrow	tone	
↗	0x2197	North-East arrow	tone	
↘	0x2198	South-East Arrow	tone	
#	0xA71B	Modifier Letter Raised Up Arrow	tone	
#	0xA71C	Modifier Letter Raised Down Arrow	tone	

Glyph	Unicode Value	Name	Type	Features
˂	0x2C2	Modifier Letter Left Arrowhead	suffix diacritic	
˃	0x2C3	Modifier Letter Right Arrowhead	suffix diacritic	
˄	0x2C4	Modifier Letter Up Arrowhead	suffix diacritic	
˅	0x2C5	Modifier Letter Down Arrowhead	suffix diacritic	
ˆ	0x2C6	Modifier Letter Circumflex Accent	tone	
ˇ	0x2C7	Caron	tone	
ˉ	0x2C9	Modifier Letter Macron	tone	
ˊ	0x2CA	Modifier Letter Acute Accent	tone	
ˋ	0x2CB	Modifier Letter Grave Accent	tone	
˥	0x2D4	Modifier Letter Up Tack	tone	
˩	0x2D5	Modifier Letter Down Tack	tone	
˖	0x2D6	Modifier Letter Plus Sign	suffix diacritic	
˗	0x2D7	Modifier Letter Minus Sign	suffix diacritic	
˜	0x2DC	Small Tilde	suffix diacritic	
ˢ	0x2E2	Modifier Letter Small S	suffix diacritic	
ˣ	0x2E3	Modifier Letter Small X	suffix diacritic	
ˤ	0x2E4	Modifier Letter Small Reversed Glottal Stop	suffix diacritic	
˯	0x2EF	Modifier Letter Low Down Arrowhead	suffix diacritic	
˰	0x2F0	Modifier Letter Low Up Arrowhead	suffix diacritic	

Glyph	Unicode Value	Name	Type	Features
˱	0x2F1	Modifier Letter Low Left Arrowhead	suffix diacritic	
˲	0x2F2	Modifier Letter Low Right Arrowhead	suffix diacritic	
˵	0x2F5	Modifier Letter Middle Double Grave Accent	tone	
˶	0x2F6	Modifier Letter Middle Double Acute Accent	tone	
˸	0x2F8	Modifier Letter Raised Colon	tone	
˹	0x2F9	Modifier Letter Begin High Tone	tone	
˺	0x2FA	Modifier Letter End High Tone	tone	
˻	0x2FB	Modifier Letter Begin Low Tone	tone	
˼	0x2FC	Modifier Letter End Low Tone	tone	
˽	0x2FD	Modifier Letter Shelf	tone	
˾	0x2FE	Modifier Letter Open Shelf	tone	
˿	0x2FF	Modifier Letter Low Left Arrow	tone	
ᶻ	0x1DBB	Modifier Letter Small Z	suffix diacritic	
ᶴ	0x1DB4	Modifier Letter Small Esh	suffix diacritic	
ᶾ	0x1DBE	Modifier Letter Small Ezh	suffix diacritic	
ᶿ	0x1DBF	Modifier Letter Small Theta	suffix diacritic	
ᵖ	0x1D56	Modifier Letter Small P	suffix diacritic	
ᵗ	0x1D57	Modifier Letter Small T	suffix diacritic	
ᵏ	0x1D4F	Modifier Letter Small K	suffix diacritic	

Glyph	Unicode Value	Name	Type	Features
ᵇ	0x1D47	Modifier Letter Smalll B	suffix diacritic	
ᵈ	0x1D48	Modifier Letter Small D	suffix diacritic	
ᵍ	0x1D4D	Modifier Letter Small G	suffix diacritic	
⁼	0x207C	Superscript Equals Sign	suffix diacritic	
◌̉	0x309	Combining Hook Above	combining diacritic	
◌̐	0x310	Combining Candrabindu	combining diacritic	
◌̒	0x312	Combining Turned Comma Above	combining diacritic	
◌̔	0x314	Combining Reversed Comma Above	combining diacritic	
◌̖	0x316	Combining Grave Accent Below	combining diacritic	
◌̪	0x32B	Combining Inverted Double Arch Below	combining diacritic	
◌̮	0x32E	Combining Breve Below	combining diacritic	
◌̱	0x331	Combining Macron Below	combining diacritic	
◌̲	0x332	Combining Low Line	combining diacritic	
◌̳	0x333	Combining Double Low Line	combining diacritic	
◌̾	0x33E	Combining Vertical Tilde	combining diacritic	
◌̿	0x33F	Combining Double Overline	combining diacritic	
◌͐	0x350	Combining Right Arrowhead Above	combining diacritic	

Glyph	Unicode Value	Name	Type	Features
◌ʿ	0x351	Combining Left Half Ring Above	combining diacritic	
◌ʾ	0x352	Combining Fermata	combining diacritic	
◌ˣ	0x353	Combining X Below	combining diacritic	
◌ˢ	0x356	Combining Right Arrowhead and Up Arrowhead Below	combining diacritic	
◌ʾ	0x357	Combining Right Half Ring Above	combining diacritic	
◌͝	0x35D	Combining Double Breve	combining diacritic	
◌͞	0x35E	Combining Double Macron	combining diacritic	
◌͟	0x35F	Combining Double Macron Below	combining diacritic	
◌͠	0x360	Combining Double Tilde	combining diacritic	
◌ᵃ	0x363	Combining Latin Letter Small A	combining diacritic	
◌ᵉ	0x364	Combining Latin Letter Small E	combining diacritic	
◌ⁱ	0x365	Combining Latin Letter Small I	combining diacritic	
◌ᵒ	0x366	Combining Latin Letter Small O	combining diacritic	
◌ᵘ	0x367	Combining Latin Letter Small U	combining diacritic	
◌ᶜ	0x368	Combining Latin Letter Small C	combining diacritic	
◌ᵈ	0x369	Combining Latin Letter Small D	combining diacritic	

Glyph	Unicode Value	Name	Type	Features
◌ʰ	0x36A	Combining Latin Letter Small H	combining diacritic	
◌ᵐ	0x36B	Combining Latin Letter Small M	combining diacritic	
◌ʳ	0x36C	Combining Latin Letter Small R	combining diacritic	
◌ᵗ	0x36D	Combining Latin Letter Small T	combining diacritic	
◌ᵛ	0x36E	Combining Latin Letter Small V	combining diacritic	
◌ˣ	0x36F	Combining Latin Letter Small X	combining diacritic	
·	0x387	Greek Ano Teleia	suffix diacritic	
◌᷾	0x1DC9	Falling Rising Tone	combining diacritic	
#	0x2C71	Latin Letter Small V with Right Hook	consonant	
#	0xA71D	MODIFIER LETTER AFRICANIST DOWNSTEP	suffix diacritic	
#	0xA71E	MODIFIER LETTER AFRICANIST UPSTEP	suffix diacritic	
ᴵ	0x1DA6	MODIFIER LETTER SMALL CAPITAL I	suffix diacritic	
ᶹ	0x1DB7	MODIFIER LETTER SMALL UPSILON	suffix diacritic	

Listing of phonetic features

The following is a listing of all the supported phonetic features.

Table 13: Features

Name	Synonyms	Primary Family	Secondary Family
null			
diacritic			
unintelligible			
unreleased		diacritic	
consonant	c		
vowel	v		
glide	g		
cover			
schwa	sch		
labial	lab	place	labial
bilabial	bil	place	labial
rounded	round	place	labial
unrounded		place	labial
palatal	pal	place	dorsal
dorsal	dor	place	dorsal
velar	vel	place	dorsal
uvular	uvu	place	dorsal
guttural	gut	place	guttural
pharyngeal	pha	place	guttural
laryngeal	lar glottal	place	guttural
epiglottal	epi	place	guttural
dental	den	place	coronal
labiodental		place	coronal
interdental		place	coronal
apical	api	place	coronal
laminal	lam	place	coronal
coronal	cor	place	coronal
lingual	lin	place	
anterior	ant	place	coronal
posterior	pos	place	coronal
alveolar	alv	place	coronal
alveopalatal	alp postalveolar	place	coronal
retroflex		place	coronal
distributed	dis	place	coronal
grooved	gro	place	coronal

Name	Synonyms	Primary Family	Secondary Family
voiceless	vcl	voicing	voicing
voiced	vcd	voicing	voicing
aspirated		voicing	voicing
plain		voicing	voicing
weaklyaspirated		voicing	voicing
unaspirated		voicing	voicing
approximant	app	manner	continuancy
liquid	liq	manner	continuancy
lateral	lat	manner	continuancy
rhotic	rho	manner	continuancy
stop	plosive	manner	continuancy
continuant	cnt	manner	continuancy
obstruent	obs	manner	continuancy
sonorant	son	manner	continuancy
fricative	fri	manner	continuancy
affricate	aff delayedrelease	manner	continuancy
click		manner	continuancy
implosive		manner	continuancy
flap	tap	manner	continuancy
trill		manner	continuancy
ejective		manner	continuancy
nasal	nas	manner	nasality
oral		manner	nasality
prenasalized		manner	nasality
strident	str	manner	stridency
low		height	
mid		height	
high		height	
tense		tongue root	
atr		tongue root	
rtr		tongue root	
lax		tongue root	
front		backness	
central		backness	
back		backness	
derhoticized		diacritic	

Name	Synonyms	Primary Family	Secondary Family
syllabic	syl	diacritic	
nonsyllabic		diacritic	
advanced		diacritic	
retracted		diacritic	
lowered		diacritic	
raised		diacritic	
fronted		diacritic	
backed		diacritic	
morerounded		diacritic	
lessrounded		diacritic	
long		diacritic	
halflong		diacritic	
extrashort		diacritic	
breathyvoiced		diacritic	
creakyvoiced		diacritic	
prstress	1	diacritic	
secstress	2	diacritic	
toneglobalrise		diacritic	
tonedownstep		diacritic	
tonefalling		diacritic	
tonerisingfalling		diacritic	
tonefallingrising		diacritic	
tonelowrising		diacritic	
tonehighrising		diacritic	
tonerising		diacritic	
tonehigh		diacritic	
tonemid		diacritic	
toneglobalfall		diacritic	
toneextrahigh		diacritic	
tonelow		diacritic	
toneupstep		diacritic	
toneextralow		diacritic	
tone1		diacritic	
tone2		diacritic	
tone3		diacritic	
tone4		diacritic	

Name	Synonyms	Primary Family	Secondary Family
tone5		diacritic	
tone6		diacritic	
tone7		diacritic	
tone8		diacritic	
tone9		diacritic	
pause		diacritic	
denasalized		diacritic	nasality
egressive		diacritic	manner
ingressive		diacritic	manner
labialspread		diacritic	labial
lowerdental		diacritic	place
narealfricative		nasality	manner
percussive		manner	
sliding		diacritic	manner
strongarticulation		diacritic	manner
weakarticulation		diacritic	manner
distorted		diacritic	
subapical		place	coronal
velopharyngeal		place	
velopharyngealfricative		diacritic	manner
whistled		diacritic	manner
lenis		diacritic	manner
sandhi		diacritic	
quasiresonant		place	
semiresonant		place	
raspberry		place	
transition		place	
spirant	spi	diacritic	

Chapter 3

Phonex

Topics:

- Introduction
- Language Reference
- Examples

Introduction

Phonex is a pattern matching language for IPA transcriptions. *Phonex* is used to query IPA transcriptions for sequences of phones based on both segmental and prosodic criteria.

Features include:

- Query based on features. E.g., `{fricative}`
- Custom phone classes. E.g., `\c`, `\v`, `\w` (consonants, vowels, consonant or vowel respectively.)
- Query based on constituent type. E.g., `{fricative}:C` (fricative codas)
- Query based on stress. E.g., `\c!1` (stressed consonants)

> Note: *regular expressions* are a powerful text searching tool that are available in many applications. An understanding of *regular expressions* (or *regex*) is useful for understanding *phonex*. *Regular expression* guides can be found here.

Language Reference

Phone Matchers

Various methods of matching phones using phonex 2.0.

As outlined in the Phonex Constructs section, there are several methods for matching phones in phonex. This section describes these methods in more detail.

Character matchers

Character matchers are defined by simply typing the character for the desired phone. Character matchers will match any phone with the specified *base-character* - regardless of attached diacritics. Characters may also be written using their unicode values.

Table 14: Character matcher examples

Expression	Matches
`a`	The vowel a
`ba`	The consonant b followed by the vowel a
`\u0068`	The consonant h

Feature set matchers

Every IPA character can be described using a set of phonetic features. Feature set matchers are denoted by enclosing a list of feature names inside braces. Features contained within a phonex feature set matcher can be required (default) or unwanted (prefixed by − (minus)). Feature names are case-insensitive and can be written using the full feature name or shorthand equivalent (e.g., `{consonant}` is the same as `{c}`.)

Table 15: Feature set matcher examples

Expression	Matches
`{consonant, coronal}`	All coronal consonants
`{c, -coronal}`	All non-coronal consonants
`{}`	Anything

Regex matchers

Since IPA transcriptions are composed of unicode strings, regular expressions can also be used to match phones. To use a regex matcher, place the desired regular expression inside single quote characters.

Table 16: Regex matcher examples

Expression	Matches
`'a'`	The vowel a. Unlike the un-quoted version, 'a' will not match cases that have attached diacritics.
`'[e-i]'`	Characters in the range 'e' to 'i'.

Phone class matchers

Phone class matchers combine several phone matchers into a 'class.' Phone classes are denoted by enclosing a set of phone matchers inside brackets. The phone class will match if any of the inner-matchers match. If the phone class starts with a − (minus) symbol, then the class will match any phone *not* matched by the inner-matchers.

Table 17: Phone class examples

Expression	Matches
`[{glide}\v]`	Any glide or vowel.
`[^{c,labial}\v]`	Anything not a labial consonant or a vowel.

Compound phone matchers

Compound phones are composed of two single-phones bi-sected by a ligature. To match compound phones in phonex, connect two phone matchers using a _ (underscore) character.

Table 18: Compound phone matcher examples

Expression	Matches
`t_{fricative}`	Any compound phone starting with the consonant 't' and ending with a fricative.
`._.`	Any compound phone.

Boundaries

Description of special boundary markers.

Boundary markers perform special operations. Since they have the ability to match nothing, quantifiers and plug-in matchers cannot be applied to boundary matchers.

Beginning/End of Input

The beginning and end of input characters ('^' and '$' respectively) match exactly what their names imply and should only appear at the beginning/end of a phonex expression.

Word Boundaries

Word boundaries detect and match the edges of words in the given input. Words boundaries are detected at the beginning/end of input as well as whitespace.

Syllable Boundaries

Syllable boundaries detect and match the edges of syllables in the given input. Syllable boundaries are detected at the beginning/end of input, whitespace, ipa punctuation (stress, pauses, periods, etc.), and - if available - using syllabification information. When reading an input string from left to right, if a space and stress marker are adjacent then the syllable boundary will match *once* (i.e., only one syllable boundary is detected - not two.)

Quantifiers

Description of phonex quantifiers.

Quantifiers modify the number of times a phone matcher or group can be repeated. Quantifiers are always applied to the preceeding matcher or group. There are three types of quantifiers in phonex: *greedy*, *reluctant*, and *possessive*.

Greedy quantifiers are such called because they attempt to match the entire input on first match. If the match fails, the matcher backs off one phone at a time until a match is obtained or until the number of choices has been exhausted.

Reluctant quantifiers do the opposite; they will reluctantly process phones, only attempting a full input match as a last resort.

Possessive quantifiers never back off; they will always process as many phones as possible, never attempting to backtrack - even if doing so would allow the match to succeed.

To illustrate the difference between different quantifiers, considier the following examples using the input string: hello.

Table 19: Greedy vs. Reluctant Quantifiers

Expression	Finds
`.*\v` *(greedy)*	1 occurrences - hello
`.*?\v` *(reluctant)*	2 occurrences - he, llo
`.*+\v` *(possessive)*	0 occurrences since '.*+' initially matches the final 'o' in the input and will not backtrack

Groups

Phonex allows defining groups by placing any subpattern between the parenthesis - `(` and `)` - metacharacters.

Some reasons to use groups:

- Repeating subpatterns
- Extract information for furthur processing
- Exclude part of the pattern from the final match
- Denote different possible subpatterns

Capture Group

Capture groups are used to extract portions of matches for furthur processing. In Phon this is often used to create a new column in query result listings containing the data matched by the group subpattern.

For example, say you were searching for any CV pattern (e.g., `\c\v`) but you wanted the consonant and vowel in their own separate columns in a Phon query report. You would place each phone matcher into a group using parenthesis. (It's also required to 'name' the group in this situation, see 'Group Names' below.)

E.g.

```
(\c)(\v)
```

Capture groups may be quantified. The following expression will match a consonant followed by a vowel repeatedly:

```
(\c\v)+
```

Lookahead and Lookbehind Groups

Lookahead and lookbehind groups allow matching subpatterns around a pattern without including the content matched by the lookahead or lookbehind group. These groups are considered to be zero-width assertions (i.e., the length of matched content is zero) like the start-of-input `^` and end-of-input `$` boundary matchers.

Lookahead patterns are contained within parenthesis like regular groups with the special prefix `?>`. An example of using a lookahead group would be to search for all consonants `\c` which are followed by a high vowel `{v, high}`.

```
\c(?>{v, high})
```

Lookbehind patterns are specified by the group prefix `?<`. They behave in the same manner as lookahead groups, but look backwards in the input rather than forwards. An example would be to search for all vowels `\v` which are preceeded by a `b`.

```
(?<b)\v
```

Lookahead and lookbehind groups can be used together in the same pattern.

Conditional Groups

Conditional groups allow for choices within patterns. To specify choices, subpatterns in a group are spearated by the logical-or (or pipe) `|` metacharacter. The following example will match the sequence `bab` as well as `dib`.

```
(ba|di)b
```

Conditional groups may be quantified.

Group Numbers

Groups in a phonex pattern are numbered left to right. Each open parenthesis `(` metacharacter will increment the group index by 1 unless the group is 'non-capturing' such as for lookbehind and lookahead groups. The following example pattern has two groups, the first group includes both the consonant `\c` and vowel `\v` matchers; the second group includes only the vowel `\v` matcher:

```
(\c(\v))
```

The next example also has two groups as the lookbehind group is not included in group indexing:

```
(?<^\s)(\c(\v))
```

Phonex includes syntax to exclude a group from indexing (the group's content will not be stored.) These groups are called non-capturing or organizational groups. To exclude a group from indexing the group content must start with `?=`. The following phonex pattern has two capturing groups: group 1 includes a syllable boundary `\S`, consonant `\c`, and vowel `\v` matcher; group 2 includes just the vowel `\v` matcher. There is one non-capturing group containing the consonant `\c` matcher.

```
(\S(?=\c)(\v))
```

Note that while the consonant is considered part of a non-capturing group it will still be included in the enclosing group's matched data.

Group Names

Capturing groups may also be named. To name a group the group content should start with the desired group name followed by an equals = metacharacter. The group name must start with a letter and consist of only letters, numbers, and underscore _. The following expression has two named groups; the first group name is 'onset' and will match

a consonant in the onset position `\c:O`; the second group name is 'nucleus' and will match a vowel in the nucleus position `\v:N`.

```
(onset=\c:O)(nucleus=\v:N)
```

When used in Phon queries named groups will be added to result listings in a new column with a title matching the phonex group name. The group name `X` is reserved in Phon queries to mark the portion of the phonex pattern to be used as the query result.

Back References

Back references are used to match a subpattern previously matched by a capture group. Back references can be specified using either the group number or group name. For a numbered back reference enter a backslash `\` metacharacter followed by the group number. The following pattern will match a consonant, store the value of the matched consonant in group number 1, and then match the value of group 1 again (i.e., it will match repeated consonants.)

```
(\c)\1
```

To use a named group reference enter a backslash `\` metacharacter followed by the group name enclosed in braces - `{` and `}`. The following pattern will match a consonant, store the value of the matched consonant in a group named `C1`, and then match the sequence stored in group `C1`.

```
(C1=\c)\{C1}
```

Group names are case sensitive, so in the above example `{c1}` would result in an error as there is no group named `c1` with a lower-case C. Another caveat is that the `{C1}` back reference will *not* match syllable position information (e.g., `:O`) or other supplementary matchers specified in the capture group. Quantifiers may be applied to back references but supplementary matchers are not allowed.

Comments

Comments may be inserted in phonex expression using c-style comment syntax. There are two types of comments:

1. General Comment `/* ... */`
2. End of Line Comment `// ...`

General Comments

General comments start with the `/*` token and end with `*/`. They can be found anywhere in the expression and may span multiple lines.

E.g.,

```
/*
 * This is a comment
 */
\c\v
```

```
\c /* This is also a comment */ \v
```

End of Line Comment

End of line comments begin with the `//` token and include the remainder of the current line.

E.g.,

```
// This is a comment
```

```
\c\v
```

```
\c // Everything after the first '//' is a comment
\v
```

Phonex Constructs

A summary of all possible phonex constructs.

Table 20: Phone matchers

Construct	Matches
x	The phone *x*. Matches regardless of diacritics.
x_y	The compound phone consisting of phones matched by *x* and *y*.
\u*nnnn*	The phone with unicode value *nnnn* as a hexadecimal number.
*	The * cover symbol.
\.	The . syllable boundary marker.
\+	The + compound word marker.
\^	The ^ intra-word pause maker.
'*s*'	The phone with text that matches the regular expression *s*
$\{f_0, f_1 ..., f_n\}$	The phone with features $f_0 ... f_n$

Table 21: Grouping

Construct	Matches
(*X*)	*X*, as a *capturing* group
(*X*|*Y*)	*X* or Y, as a *capturing* group
(?=*X*)	*X*, as a *non-capturing* group
(*name*=*X*)	*X*, as a *named, capturing* group. *name* may consist of letters and numbers, but must start with a letter.
n	The content matched by group *n*
(?<*X*)	Look behind and match *X* as a non-capturing group
(?>*X*)	Look ahead and match *X* as a non-capturing group

Table 22: Phone classes

Construct	Matches
[*xyz*]	*x*, *y*, or *z*
[^*xyz*]	Not *x*, *y*, or *z*

Table 23: Predefined phone classes

Construct	Matches
.	Anything
\c	Any consonant

Construct	Matches
\g	Any glide
\v	Any vowel
\p	Any intra-word pause (i.e., ^)
\P	Any inter-word pause (e.g., (.), (..), …)
\w	Any consonant or vowel.
\W	Any non-word character (i.e., any character not matched by \w, e.g., same as [^\w])
\s	Any stress marker

Table 24: Boundary matchers

Construct	Matches
^	Beginning of input
$	End of input
\b	A word boundary including beginning of input, end of input, and whitespace.
\S	A syllable boundary including 'forced' syllable boundaries such as beginning of input, end of input, and whitespace; and, if syllable constituent types are available, 'soft' syllable boundaries detected at syllable edges.

Table 25: Plug-ins

Construct	Matches
x:*plugin*('*s*')	*x* if, and only if, the plug-in matcher identified by *plugin* matches with expression *s*
x&*y*	*x* if, and only if, a diacritic attached to *x* matches the expression *y*. (e.g., *h&{aspirated}*will match all 'h's with aspirated diacritics.)
x:	Same as *x&{long}*.
x!*s*	*x* if, and only if, the syllable stress of the phone matches *s*.

Table 26: Quantifiers (greedy)

Construct	Matches
X?	*X*, once or not at all
*X**	*X*, zero or more times
X+	*X*, one or more times
X<*n*>	*X*, exactly *n* times
X<*n*,>	*X*, at least *n* times
X<,*n*>	*X*, zero to *n* times
X<*n*,*m*>	*X*, at least *n* but not more than *m* times

Table 27: Quantifiers (reluctant)

Construct	Matches
X??	*X*, once or not at all

Construct	Matches
*X**?	*X*, zero or more times
X+?	*X*, one or more times
X<*n*>?	*X*, exactly *n* times
X<*n*,>?	*X*, at least *n* times
X<,*n*>?	*X*, zero to *n* times
X<*n*,*m*>?	*X*, at least *n* but not more than *m* times

Table 28: Quantifiers (possessive)

Construct	Matches
X?+	*X*, once or not at all
*X**+	*X*, zero or more times
X++	*X*, one or more times
X<*n*>+	*X*, exactly *n* times
X<*n*,>+	*X*, at least *n* times
X<,*n*>+	*X*, zero to *n* times
X<*n*,*m*>+	*X*, at least *n* but not more than *m* times

Supplementary Matchers

Overview

Supplementary matchers in phonex 2.0.

One or more supplementary matchers can be attached to a phone matcher, separated by a `:` (colon). Each supplementary matcher may take zero or more arguments, defined by the supplementary matcher. The following sections describe the supplementary matchers provided with Phon.

stress

Description of the phonex `stress` supplementary matcher.

The `stress` supplementary matcher will query the detected syllable stress of a phone. The argument given to the plug-in must be one of the following characters:

- `1` - primary stress
- `2` - secondary stress
- `A` - any stress
- `U` - unstressed

The `stress` matcher has a short-hand withing phonex. The stress type may be specified after a `!` character after a phone matcher.

Onsets of primary stress syllables

```
.:sctype("Onset"):stress("1")
```

or

```
.:O!1
```

sctype

Description of the phonex `sctype` supplementary matcher.

The `sctype` supplementary matcher queries the syllable constituent type of a phone. The expression given to the matcher must be a list of syllable constituent types from the following list, separated by a `|` (pipe.)

- `LeftAppendix` or `L`
- `Onset` or `O`
- `Nucleus` or `N`
- `Coda` or `C`
- `RightAppendix` or `R`
- `Ambisyllabic` or `A`
- `OEHS` or `E`
- `SyllableStress` or `S`
- `SyllableBoundary` or `B`
- `WordBoundary` or `W`
- `Unknown` or `U`

All constituent types are case-insensitive. Constituent types can also be prefixed by a `-` (minus) to indicate the constituent type is not-allowed.

The `sctype` matcher also has a shorthand within phonex. A single consitutuent type may be queried on a phone matcher by specifying one of the single-character codes shown above prefixed by a `:`.

Both of these expressions will search for 'b' in the onset position:

```
b:sctype("Onset")
```

or

```
b:O
```

diacritic

Description of the phonex `diacritic` supplementary matcher.

The `diacritic` supplementary matcher queries the diacritic sections of a phone. It accepts a single parameter which can be either:

- A single character
- A feature set matcher
- A phone class matcher

The matcher will match if any of the diacritics of the phone match the provide argument. This matcher also has a short-hand within phonex, the argument provided may be specified by using the `&` character after a phone matcher.

Search for any phone that has a diacritic.

```
.:diacritic("{}")
```

or

```
.&.
```

Both of these expressions will search for any phone with the diacritics which add the `{labial}` or `{aspirated}` features.

```
.:diacritic("[{aspirated}{labial}]")
```

or

```
.&[{aspirated}{labial}]
```

prefix

Description of the `prefix` supplementary matcher.

The `prefix` supplementary matcher queries the prefix section of a phone. It accepts a single parameter which can be either:

- A single character
- A feature set matcher
- A phone class matcher

The matcher will match if any of the diacritics of the phone match the provide argument.

Search for a phone with the prefix diacritic `\u02b0`

```
.:prefix("\u1d50")
```

suffix

Description of the `suffix` supplementary matcher.

The `prefix` supplementary matcher queries the prefix section of a phone. It accepts a single parameter which can be either:

- A single character
- A feature set matcher
- A phone class matcher

The matcher will match if any of the diacritics of the phone match the provide argument.

Search for a phone with the suffix diacritic `\u02b0`

```
.:suffix("\u02b0\")
```

comb

Description of the `comb` supplementary matcher.

The `comb` supplementary matcher queries the combining diacritic section of a phone. It accepts a single parameter which can be either:

- A single character
- A feature set matcher
- A phone class matcher

The matcher will match if any of the combining diacritics of the phone match the given argument.

Search for a phone that has the combining diacritic `\u0300`

```
.:comb("\u0300")
```

tn (tone number)

Description of the `tn` supplementary matcher.

The `tn` supplementary matcher queries the tone number of the phone. One argument is accepted denoting the allowed tones accepted, with multiple allowed values separated by a '|'. The numbers 0-9 are used to indicate tone number. If the list of tone numbers is preceeded by the word 'not' then the meaning is negated.

Search for a vowel with tone 214

```
\v:tone("214")
```

Search for vowels which do not have tone number 214 or 51

```
\v:tone("not 214|51")
```

Related information

Tone Number on page 96

Examples

Basic Phone Matching

Characters Matchers

Query for consonants using the base glyph.

Examples:

Phonex	Meaning
`b`	Any consonant with 'b' as the base glyph
`d`	Any consonant with 'd' as the base glyph

Feature Set Matchers

Query using feature names. Features names are placed between braces (i.e., '{', "}').

Examples:

Phonex	Meaning
`{consonant}`	Any consonant
`{fricative}`	Any fricative

Multiple feature name may be provided, separated by commas. If a paticular feature is to be excluded from the query it should be prefixed by a minus sign.

Examples:

Phonex	Meaning
`{fricative, voiced}`	Voiced fricatives
`{consonant, -stop}`	All consonants which are not stops

Many feature names also have shorthand equivalents. A listing of all feature names supported by phone along with their synomyms can be found here.

Examples:

| Phonex | Meaning | |--|--| | `{c}` | Any consonant | | `{fri}` | Any fricative |

Example Phones Queries

The following examples are available in Phon from the *Phones* query window as *named queries*.

Standalone Consonants

```
// Look-behind '(?<' and match beginning of input '^'
// followed by an optional stress marker '\s?'
(?<^\s?)
// Match a consonant '(\c)' followed by end of input '$'
(\c)$
```

Initial Singleton Consonants

```
// Look-behind '(?<' and match beginning of input '^'
// followed by an optional stress marker '\s?'
(?<^\s?)
// Match a consonant (\c)
(\c)
// Look-ahead '(?>' and match a vowel
(?>\v)
```

Medial Singleton Consonants

```
// Look-behind '(?<' and match a vowel '\v'
// followed by an optional stress marker '\s?'
(?<\v\s?)
// Match a consonant
(\c)
// Look-ahead '(?>' and match an optional stress maker and vowel
(?>\s?\v)
```

Final Singleton Consonants

```
// Look-behind '(?<' and match a vowel '\v'
(?<\v)
// Match a consonant '(\c)' followed by end of input '$'
(\c)$
```

Singleton Consonants

```
// The double pipe operator will combine results of independent expressions
// Standalone Consonants
(?<^\s?)(\c)$ ||
// Initial Consonants
(?<^\s?)(\c)(?>\v) ||
// Medial Consonants
(?<\v\s?)(\c)(?>\s?\v) ||
// Final Consonants
(?<\v)(\c)$
```

Singleton Onsets

```
// The double pipe operator will combine results of independent expressions
// Standalone Onsets
(?<^\s?)(\c:O:E)$ ||
// All other Singleton Onsets
(?<\S)(\c:O)(?>.N)
```

Singleton Codas

```
// The double pipe operator will combine results of independent expressions
// Medial Singleton Codas
```

```
(?<.:N)(\c:C)(?>\s? (\c:O | .:N)) ||
// Final Singleton Codas
(?<.:N)(\c:C)$
```

Initial Consonant Clusters

```
// Look-behind '(?<' and match beginning of input '^'
// followed by an optional stress marker '\s?'
(?<^\s?)
// Match a 2 or more consonants '(\c<2,>)'
(\c<2,>)
// Look-ahead '(?>' and match an optional stress marker '\s?' and vowel '\v'
(?>\s?\v)
```

Medial Consonant Clusters

```
// Look-behind '(?<' and match a vowel '\v'
// followed by an optional stress marker '\s?'
(?<\v\s?)
// Match a 2 or more consonants '(\c<2,>)'
(\c<2,>)
// Look-ahead '(?>' and match an optional stress marker '\s?' and vowel '\v'
(?>\s?\v)
```

Final Consonant Clusters

```
// Look-behind '(?<' and match a vowel '\v'
// followed by an optional stress marker '\s?'
(?<\v\s?)
// Match a 2 or more consonants '(\c<2,>)'
// followed by end of input '$'
(\c<2,>)$
```

Heterosyllabic Consonant Clusters

```
// match one or more consonants '\c+'
\c+
// followed by a syllable boundary '\S' (includes implicit boundaries)
\S
// followed by one or more consonants '\c+'
\c+
```

Consonant Clusters

```
// The double pipe operator will combine results of independent expressions
// Initial/medial Consonant Clusters
(\c<2,>)(?>\s?\v) ||
// Final Consonant Clusters
(\c<2,>)$ ||
// Heterosyllabic Clusters
(\c+[\s\.]\c+)
```

Syllable-initial Clusters

```
// Includes left appendices ':L', onsets ':O' and OEHS ':E'
(?<^\s?)(\c:L:O:E<2,>) ||
(?<\v\s?)(\c:L:O:E<2,>)
```

Syllable-final Clusters

```
// Includes right appendices ':R' and codas ':C'
(\c:C:R<2,>)$ ||
(\c:C:R<2,>)(?>\s?\c:O)
```

Tautosyllabic Consonant Clusters

```
^(\c:L:O:E<2,>) ||
(?<\v\s?)(\c:L:O:E<2,>) ||
(\c:C:R<2,>)$ ||
(\c:C:R<2,>)(?>\s?\c:O)
```

Syllables (short)

```
// Query all syllables, store each section in a named group
// Stress
(S=\s)?
// Onset
(O=\c:L:O<,5>)
// Rhyme
(R=
 // Nucleus
 (N=.:D<2> | .:N)
 // Coda
 (C=\c:C:R<,5>)
)
```

Syllables (expanded)

```
// Query all syllables, store each constituent in a named group
// Stress
(S=\s)?
// Onset
(O=
 (O1=\c:L:O)(O2=\c:L:O)(O3=\c:L:O)(O4=\c:O)(O5=\c:O)
 | (\c:L:O)(\c:L:O)(\c:O)(\c:O)
 | (\c:L:O)(\c:O)(\c:O)
 | (\c:O)(\c:O)
 | (\c:O:E)
)?
// Rhyme
(R=
 // Nucleus
 (N=
  (N1=.:D)(N2=.:D) | (.:N)
 )
 // Coda
 (C=
  (C1=\c:C)(C2=\c:C)(C3=\c:C:R)(C4=\c:C:R)(C5=\c:C:R)
  | (\c:C)(\c:C)(\c:C:R)(\c:C:R)
  | (\c:C)(\c:C)(\c:C:R)
  | (\c:C)(\c:C)
  | (\c:C)
 )?
)
```

Chapter 4

Queries

Topics:

- Query and Report Wizard
- Query Types
- Stock Reports

Phon includes 3 different queries types available from the window menu under **Query**:

1. Data Tiers on page 156

   The Data Tiers query will query any tier as well as include aligned data to the target query
2. Phones on page 158

   The Phones query will look for a query the IPA Target or IPA Actual tier for a sequence of phones and return the sequence along with the aligned phones from the other tier. Deletion and Epenthesis - also available from the **Query** menu are canned versions the Phones query.
3. Segmental Relations on page 160

   Query different types Segmental Relations found in aligned data between IPA Target and IPA Actual.

Once a query has been completed the results may be reviewed in the application or turned into a report. See the Query and Report Wizard on page 144 section and the Tutorial Videos on page ix page for demonstrations of using query forms and creating reports.

Query and Report Wizard

The query and report wizard is displayed when executing any query. The wizard has three main steps:

1. Query - enter query settings and execute query.
2. Report Composer - choose and configure report sections.
3. Report - Generate and view report.

Step 1: Query

The first step of the query wizard is to select sessions enter query parameters. Once query paremeters have been entered, click the 'Run Query' button (shortcut `F7`) to execute the query. After a query has completed you may open individual session results or continue to Step 2: Report Composer.

Named Queries

Named queries are available via a combo-box menu in the top-right portion of the query parameters section. To save the current set of parameters as a new named query using the save button and the end of the toolbar and choose 'Name Query' from the drop down menu.

Query History

The parameters of each executed query are saved in a query history unique to each query type (e.g., Phones, Data Tiers, etc.) When opening the Query and Report wizard the most recent entry (i.e., the previously executed query) in the query history is loaded. Query history can be viewed using the 'Query history' button in the toolbar of the query form. Double-clicking an item in the displayed popup

Query Results

Queries are executed by clicking the 'Run Query' button. Result sets are displayed in a table on the bottom-left portion of the wizard (under the session selector) in a view named 'Query Results.' Queries can be executed more than once, the results of each execution will be titled 'Query 1', 'Query 2', 'etc.' You can select the active result set using the combo-box in the top-right corner of the Query Results view. Result sets may be discarded by clicking the '-' button in the top-right corner of the Query Results view (or by using the 'Query' window menu.)

Only the active result set will be used in the report steps of the wizard. The active result set is indicated in the title of the window.

Results from executed queries are shown in the session selector tree to allow comparisons between executed queries for individual sessions. Result sets may be viewed by double-clicking the result set in the tree or in the Query Results view. Results will be displayed in a table along with the associated session. For more information see View Result Set.

Step 2: Report Composer

The Report Composer step allows configuration of the generated report. The composer has three main views: Reports - a list of all available report sections; Report List - a list of report sections which have been added to the report configuration; and a Settings view in the bottom-right which allows configuration of report sections highlighted in the Report List view.

When opened, the Report Composer will load the previous report configuration for the query. If no previous configuration was found a default report consisting of the sections Query Information, Aggregate, and Listing by Session is loaded.

Save/Load Report Configuration

Report configuration can be saved and loaded from disk using the save/browse buttons in the Report List toolbar.

Add Section to Report

To add a report section to the current report configuration do one of:

1. Highlight the report section in the 'Reports' view and click the '+' button in the 'Report List' view
2. Double click the report section in the 'Reports' view
3. Drag the report section from the 'Reports' view into the 'Report List' view

Remove Section from Report

To remove a report section from the current report configuration:

1. Highlight the report section in the Report List view
2. Click the '-' button in the Report List toolbar

Reorder Report Sections

To reorder report sections do one of:

1. Highlight the section in the Report List view and use the up/down buttons in the toolbar
2. Use the mouse to drag and drop report sections in the Report List view

Global Report Options

Three global report options are available:

1. case sensitive
2. ignore diacritics
3. inventory grouping

Case sensitive

Modify case sensitivity where applicable. The options are:

1. default - use settings as defined in report section settings
2. yes - override report section settings and turn on case sensitivity where applicable
3. no - override report section settings and turn off case sensitivity where applicable

Ignore diacritics

Modify ignore diacritics settings where application. The options are:

1. default - use settings as defined in report section settings
2. yes - override report section settings and turn on ignore diacritics where applicable
3. no - override report section settings and turn off ignore diacritics where applicable

Inventory Grouping

Choose longnitudinal grouping column for aggregate inventories:

1. default - use settings as defined in report section settings

2. session - use session name as longnitudinal grouping column
3. age - use age as longnitudinal grouping column

Report Section Settings

To modify settings for a report section:

1. Highlight the report section in the Report List view
2. Use the bottom-right view to modify settings for the report section.

Step 3: Report

The HTML report is generated based on the report configuration when the Report step is initiated. Report generation may take several minutes - especially for reports with large amounts of data. Once the report is generated it will be displayed in the wizard.

Save HTML Report

To save a copy of the HTML report click the 'Save...' button in the toolbar.

If 'Open after saving' is selected the Report will be opened in the system default browser.

Export tables

To export report tables to CSV/Excel formats, use the 'Export tables...' button in the toolbar. There are three options:

1. Export tables to single Excel workbook
2. Export tables to folder (XLS) - export tables one per file in Excel format to specified folder
3. Export tables to folder (CSV) - export tables one per file in CSV format to specified folder

If 'Open after saving' is selected the Excel file or export folder will be displayed after export.

View Result Set

View a *Result Set* from a query.

From a **Results** tab in the **Query Project** window or from the **Query History** window with a query selected:

1. Double-click on a result set.

   The **Results** window will open alongside the session in which the results were found. Each result will be displayed with its **Record #**, **Speaker**, **Result**, and any associated metadata.

   Note: To open only the **Results** window, deselect **Open session with result set** before opening a result set.

   Note: To arrange results by a certain column, click on its header. To reorder columns, click and drag their header to the left or right. To further change column view options, click on the icon to the right of the column headers.
2. To view a result in the **Session Editor**, click on it in the **Results** window.

   The record in which the result was found will be displayed, with the result highlighted in the **Record Data** view.
3. To exclude an extraneous result from the list, select it and choose the **Results** > **Toggle result excluded** menu item or press `Delete/Backspace`. You can show or hide excluded results by selecting or deselecting **Show excluded results**.
4. To save any changes to a result set, click **Save**.

Result Set Actions

Save Table as CSV

Save the table visible in the **Results** window as a CSV file.

From the **Results** window:

1. Click **Save table as CSV...**.

   A browse window will appear, prompting you to choose a file name and directory in which to save the table.
2. Choose a file name and directory for your table and click **Save**.

   The table in the **Results** window will be saved as a CSV file in the chosen directory.

   Note: If excluded records are currently visible, they will be included in the CSV file.

Filter Results

Search within the results table.

From the **Results** window:

1. Enter your search term in the **Filter results** bar.

   A list of all results containing your search term will be displayed, showing their **Record #**, **Speaker**, and **Result**. If there are no results, this list will be empty.

   Note: To search within a specific column (or multiple columns), click the drop down arrow to the left of the search bar and select it in the list. Options are also available to allow you to **Use regular expression** or to make your search **Case sensitive**.
2. To clear the **Search** bar, click **Clear field/X**.

Edit Table Columns

Add, remove, edit, or reorder columns currently visible in the **Results** window.

From the **Results** window:

1. Click the **Edit table columns...** button or choose the **Results** > **Edit table columns...** menu item.

   This will open the **Edit Columns** dialog, which shows the current columns of the table and their options.
2. To add a column to the table, click **Add field.../+** and select a field name from the list. Alternatively, you may select **Custom** from the list to create a custom field.

   Note: Creating a custom field may require some familiarity with Javascript.
3. To remove a column from the table, select it and click **Remove selected field/-** or press `Delete/Backspace`.
4. To re-order a column, select it and use the **up/down arrows** to move it higher or lower in the outline.

Query Types

Data Tiers

The Data Tiers query allows searching within any record tier.

Figure 32: Data Tiers Query

Parameters

1. Enter the name of the tier in which you would like to search in the **Tier name** field.
2. Choose an **Expression Type** using the context menu.
3. Enter the expression you would like to search for in the **Expression** field.
4. Choose whether or not your query should be **Case sensitive** and/or an **Exact match** using the check boxes.

Note: **Case sensitive** is not applicable to **Phonex**, **Stress pattern**, or **CGV pattern** expressions.

Other Parameters

- Group Options on page 161
- Aligned Group Filter on page 162
- Word Options on page 163
- Aligned Word Filter on page 164

- Additional Tier Data on page 166
- Participant Filter on page 167

Phones

The **Phones** query is used to identify sequences of phones within either the IPA Target or IPA Actual tier. By default the phones query will include the phones which are aligned with the target sequence in the result.

Figure 33: Phones Query

When opening the query window, the last query options will automatically be loaded. (This behaviour may be changed in application preference - see Query Preferences.) If no query history is available, the 'Any phones' query (as shown above) is loaded. Pre-defined query parameters can be found in the **Query name** combo box in the top-right corner of the query form (see Named Queries on page 145.)

Deletions and Epenthesis are canned versions of the Phones query and can also be found in the **Query** menu.

Parameters

- Search Tier: IPA Target or IPA Actual.
- Search by: Group, Word and optionally by syllable. This options defines the search domain for the query.
- Expression type: Plain text, Regular Expression, Phonex, Stress Pattern, CGV Pattern
- Expression: query expression
  - Case sensitive (not applicable for phonex expressions)
  - Exact match

Aligned Phones

The phones aligned with the queried phones can be added to query results. If **Include aligned phones** is selected the aligned results may also be filtered using the **IPA Target Matcher** and **IPA Actual Matcher** expressions.

Other Parameters

- Group Options on page 161
- Aligned Group Filter on page 162

- Word Options on page 163
- Aligned Word Filter on page 164
- Syllable Options on page 165
- Additional Tier Data on page 166
- Participant Filter on page 167

Segmental Relations

Look for segmental relations within phone alignment.

Figure 34: Segmental Relations Query

Other Parameters

- Group Options on page 161
- Aligned Group Filter on page 162
- Word Options on page 163

- Aligned Word Filter on page 164
- Syllable Options on page 165
- Additional Tier Data on page 166
- Participant Filter on page 167

Common Query Parameters

These query parameters can be found in most query forms. Query parameters are organized into collapsible sections inside query forms. To expand/collapse a section click the dark-grey section header.

Group Options

Limit the results based on position or an expression defining the word group.

1. Open the **Group Filter** panel by clicking on its title bar.
2. To filter by group position, select the group positions you would like to search (i.e. singleton, initial, medial and/or final groups).
3. To filter by content, choose an **Expression Type** using the context menu.

4. Enter the expression you would like to search for in the **Expression** field.

Note: A filter can be used to *exclude* results based on an expression defining the word group, depending on the filter expression. For example, you can use the following regular expression (where `PATTERN` is the pattern you wish to exclude):

```
^(?:(?!PATTERN).)*$
```

5. Choose whether or not your query should be **Case sensitive** and/or an **Exact match** using the check boxes.

Note: **Case sensitive** is not applicable to **Phonex**, **Stress pattern**, or **CGV pattern** expressions.

Aligned Group Filter

You may also limit the results based on an expression defining an aligned word group in another tier.

From the **Aligned Group Filter** section of **Group Options**:

1. Enter the name of the filter tier in the **Tier name** field.
2. Choose an **Expression Type** using the context menu.

3. Enter the expression you would like to filter with in the **Expression** field.
4. Choose whether or not your query should be **Case sensitive** and/or an **Exact match** using the check boxes.

Note: Case sensitive is not applicable to **Phonex**, **Stress pattern**, or **CGV pattern** expressions.

Word Options

Limit the results based on position or an expression defining the word.

1. Open the **Word Filter** panel by clicking on its title bar.
2. Select the **Search by word** check box.
3. To filter by word position, select the word positions you would like to search (i.e. singleton words; or initial, medial and/or final words in groups with multiple words).
4. To filter by content, choose an **Expression Type** using the context menu.

5. Enter the expression you would like to search for in the **Expression** field.

Note: A filter can be used to *exclude* results based on an expression defining the word group, depending on the filter expression. For example, you can use the following regular expression (where `PATTERN` is the pattern you wish to exclude):

```
^(?:(?!PATTERN).)*$
```

6. Choose whether or not your query should be **Case sensitive** and/or an **Exact match** using the check boxes.

Note: **Case sensitive** is not applicable to **Phonex**, **Stress pattern**, or **CGV pattern** expressions.

Aligned Word Filter

You may also limit the results based on an expression defining an aligned word in another tier.

From the **Aligned Word Filter** section of the **Word Options**:

1. Enter the name of the filter tier in the **Tier name** field.
2. Choose an **Expression Type** using the context menu.

3. Enter the expression you would like to filter with in the **Expression** field.
4. Choose whether or not your query should be **Case sensitive** and/or an **Exact match** using the check boxes.

Note: **Case sensitive** is not applicable to **Phonex**, **Stress pattern**, or **CGV pattern** expressions.

Syllable Options

Limit the results based on position or an expression defining the syllable.

1. Open the **Syllable Filter** panel by clicking on its title bar.
2. Select the **Search by syllable** check box.
3. Choose whether to **Ignore results from truncated syllables** by selecting or deselecting the check box.
4. To filter by syllable position, select the syllable positions you would like to search (i.e. singleton syllables; or initial, medial and/or final syllables in words with multiple syllables).
5. To filter by syllable stress type, select the stress types you would like to search (i.e. primary stress, secondary stress, or unstressed syllables).
6. To filter by content, choose an **Expression Type** using the context menu.

7. Enter the expression you would like to search for in the **Expression** field.

Note: A filter can be used to *exclude* results based on an expression defining the word group, depending on the filter expression. For example, you can use the following regular expression (where `PATTERN` is the pattern you wish to exclude):

```
^(?:(?!PATTERN).)*$
```

8. Choose whether or not your query should be **Case sensitive** and/or an **Exact match** using the check boxes.

Note: **Case sensitive** is not applicable to **Phonex**, **Stress pattern**, or **CGV pattern** expressions.

Additional Tier Data

Include data from additional tiers with the result.

Data in tiers aligned with the primary query object may be included with the result. Use the provided checkboxes to include data from default tiers or use the text field to provide a comma-separated list of user-defined tiers. When **Group** is selected under the **Search By** options, use the **Add aligned groups** section, when **Word** is selected the **Add**

aligned words section will also be available. The selected tier data will be displayed as either 'Tier Name (Group)' or 'Tier Name (Word)' in report tables.

Several 'derived' tiers based on IPA data may be include using the text field.

- `Target Syllabification` - IPA Target including syllable constituent labels (e.g., c:O for a c which is an onset)
- `Actual Syllabification` - IPA Actual including syllable constituent labels
- `Target CV`- IPA Target covered using C for consonants and V for vowels
- `Actual CV` - IPA Actual covered using C for consonants and V for vowels
- `Target Stress` - IPA Target syllables covered using 1 for primary stress, 2 for secondary stress and U for unstressed
- `Actual Stress` - IPA Actual syllables covered using 1 for primary stress, 2 for secondary stress and U for unstressed

Participant Filter

Limit the results based on participant information.

1.
   - To filter by participant names, enter one or more names in the **Participant names** field, separated by comma if applicable.
   - To filter by age, use the context menu to select equal to, less than, or greater than and enter a name in the first **Age** field (using the format yy;mm.dd).
   - To filter using an age range, select an operator using the context menu, and specify the relevant options and age in the second **Age** field.

Stock Reports

Query Information

Display query name and parameters.

Settings

Figure 35: Query Information Settings

Use the Includes/Excludes fields for fine control of query parameters output - one per line. Prefix section names with an '@' to control the output of entire sections. Use the checkbox to only print values which have changed from their default values.

Aggregate

Create an aggregate inventory of results.

Settings

Figure 36: Aggregate Settings

Figure 37: Aggregate Sort Settings

Example

Each session sampled in the query will have a column in the inventory table.

Orthography	**Catootje.1_11_09**	**Catootje.2_00_19**
aan	0	1
aap	1	0
aardbei	1	2
allebei	1	0
ander	2	0
andere	1	0
appel	3	0
auto	0	2
baby	1	4
bal	1	0
ballon	1	0
banaan	1	0
bed	0	2
beertje	1	0
beestje	4	0
beker	1	0
bij	1	0
billen	0	1
bloem	0	1
bloemen	1	0
blokken	1	0
boek	5	0
boekje	1	0
boodschappen	0	1
boom	2	1
borstelen	0	1
boven	0	3
bril	1	0
brommer	0	1
de	0	5
deze	1	0
donker	0	4
doos	1	0
druif	1	0
een	2	12
eend	1	0

Orthography	Catootje.1_11_09	Catootje.2_00_19
eens	2	0
ei	1	0
eieren	1	0
emmer	2	0
er	0	2
fiets	1	1
geplakt	0	1
giraffe	2	0
gitaar	1	0
grond	0	1
haan	1	1
haar	0	3
hand	1	1
hap	0	1
hert	1	0
het	0	1
hier	1	0
hij	0	1
hond	1	4
hoofd	0	2
huis	1	1
ijskoud	0	1
in	0	2
is	0	12
jas	0	1

Inventory by Session

Display an inventory of results for each sampled session. A separate table is displayed for each session.

Settings

Figure 38: Inventory by Session Settings

Figure 39: Inventory by Session Sort Settings

Example

Orthography	Catootje.1_11_09
aap	1

Orthography	**Catootje.1_11_09**
aardbei	1
allebei	1
ander	2
andere	1
appel	3
baby	1
bal	1
ballon	1
banaan	1
beertje	1
beestje	4
beker	1
bij	1
bloemen	1
blokken	1
boek	5
boekje	1
boom	2
bril	1
deze	1
doos	1
druif	1
een	2
eend	1
eens	2
ei	1
eieren	1
emmer	2
fiets	1
giraffe	2
gitaar	1
haan	1
hand	1
hert	1
hier	1
hond	1

Orthography	Catootje.1_11_09
huis	1
jongen	1
kaas	1
kapot	1
kijk	3
kikker	1
knijper	1
koe	1
konijn	4
kopje	1
krant	1
laarzen	2
leeuw	3
lepel	1
lezen	1
lieveheersbeestje	1
meer	1
melk	1
mond	1
mooi	1
muis	2

Inventory by Participant

Display an inventory of results for each sampled session. A separate table is displayed for each participant.

Settings

Figure 40: Inventory by Participant Settings

Figure 41: Inventory by Participant Sort Settings

Table (all results in one table)

Print all results - one result per row - from all session in one table. Any tiers specified in the 'Aligned Group', 'Aligned Word', 'Add aligned group', and 'Add aligned word' fields of the query will also be listed in the table.

Settings

Figure 42: Table Settings

Table by Session

This report will list each query result in a table. A separate table will be displayed for each sampled session. Any tiers specified in the 'Aligned Group', 'Aligned Word', 'Add aligned group', and 'Add aligned word' fields of the query will also be listed in the table.

Settings

Figure 43: Table by Session Settings

Example

Columns included in the output table:

- Speaker
- Record #
- Result
- Any other tiers specified in the query

Session	Speaker	Record #	IPA Target	IPA Actual	Alignment
Catootje.1_11_09	Catootje	1	ən	nː	ə↔∅,n↔nː
Catootje.1_11_09	Catootje	1	ɦœys	ɦæis	ɦ↔ɦ,œ↔æ,y↔i,s↔s
Catootje.1_11_09	Catootje	2	ən	mː	ə↔∅,n↔mː
Catootje.1_11_09	Catootje	2	beʃə	beːɕa	b↔b,e↔eː,ʃ↔ɕ,ə↔a
Catootje.1_11_09	Catootje	3	beʃə	beːɕə	b↔b,e↔eː,ʃ↔ɕ,ə↔ə
Catootje.1_11_09	Catootje	3	buk	buk	b↔b,u↔u,k↔k
Catootje.1_11_09	Catootje	4	buk	puk	b↔p,u↔u,k↔k
Catootje.1_11_09	Catootje	5	pup	pup	p↔p,u↔u,p↔p
Catootje.1_11_09	Catootje	6	fits	ɦitɕ	f↔ɦ,i↔i,t↔t,s↔ɕ
Catootje.1_11_09	Catootje	7	kɛik	keːʈ	k↔k,ɛ↔∅,i↔eː,k↔ʈ
Catootje.1_11_09	Catootje	7	oli	o̞ːm	o↔o̞ː,l↔m,i↔∅
Catootje.1_11_09	Catootje	7	fɑnt	a	f↔∅,ɑ↔a,n↔∅,t↔∅
Catootje.1_11_09	Catootje	8	œyl	au	œ↔a,y↔u,l↔∅

Session	Speaker	Record #	IPA Target	IPA Actual	Alignment
Catootje.1_11_09	Catootje	9	knɛipəɹ	ɦɛip	k↔∅,n↔ɦ,ɛ↔ɛ,i↔i,p↔p,ə↔∅,ɹ↔
Catootje.1_11_09	Catootje	10	oli	o̝ːm	o↔o̝ˑ,l↔m,i↔∅
Catootje.1_11_09	Catootje	10	fɑnt	aː	f↔∅,ɑ↔aː,n↔∅,t↔∅
Catootje.1_11_09	Catootje	11	ko	ko̝	k↔k,o↔o̝
Catootje.1_11_09	Catootje	11	nɛin	ne̝in	n↔n,ɛ↔e̝,i↔i,n↔n
Catootje.1_11_09	Catootje	12	ɑndəɹ	ɑ̝nə	ɑ↔ɑ̝,n↔∅,d↔n,ə↔ə,ɹ↔∅
Catootje.1_11_09	Catootje	12	ko	ko̝ˑ	k↔k,o↔o̝ˑ
Catootje.1_11_09	Catootje	12	nɛin	n̝ɛˑĭn	n↔n,ɛ↔̝ɛˑ,i↔ĭ,n↔n
Catootje.1_11_09	Catootje	13	pɑkə	bɑːkə	p↔b,ɑ↔ɑː,k↔k,ə↔ə
Catootje.1_11_09	Catootje	13	buk	buk	b↔b,u↔u,k↔k
Catootje.1_11_09	Catootje	14	ɑlə	∅	ɑ↔∅,l↔∅,ə↔∅
Catootje.1_11_09	Catootje	14	bɛi	bæi	b↔b,ɛ↔æ,i↔i
Catootje.1_11_09	Catootje	15	paɹt	paːt	p↔p,a↔aː,ɹ↔∅,t↔t
Catootje.1_11_09	Catootje	16	kɑ	paː	k↔p,ɑ↔aː
Catootje.1_11_09	Catootje	16	pɔt	pu̟t̪	p↔p,ɔ↔u,t↔t̪
Catootje.1_11_09	Catootje	17	mɛlk	mɑuwk	m↔m,∅↔ɑ,ɛ↔u,l↔w,k↔k
Catootje.1_11_09	Catootje	18	kɛi	keː	k↔k,ɛ↔∅,i↔eː
Catootje.1_11_09	Catootje	18	kəns	t̪ɛːi̪s̪	k↔t,ə↔ɛ̝ː,∅↔i,n↔∅,s↔s̪
Catootje.1_11_09	Catootje	19	moi	mːo̝i	m↔mː,o↔o̝,i↔i
Catootje.1_11_09	Catootje	20	pɑnda	pɑmɪ	p↔p,ɑ↔ɑ,n↔∅,d↔m,a↔ɪ
Catootje.1_11_09	Catootje	20	bebi	peːpi	b↔p,e↔eː,b↔p,i↔i
Catootje.1_11_09	Catootje	21	leu	leˑlə	l↔l,e↔eˑ,∅↔l,u↔ə
Catootje.1_11_09	Catootje	21	pɑpa	pɑpaˑ	p↔p,ɑ↔ɑ,p↔p,a↔aˑ
Catootje.1_11_09	Catootje	22	bebi	bibi	b↔b,e↔i,b↔b,i↔i
Catootje.1_11_09	Catootje	22	leu	leˑloŭ	l↔l,e↔eˑ,∅↔l,∅↔o̯,u↔ŭ
Catootje.1_11_09	Catootje	23	pɑnda	pɑma	p↔p,ɑ↔ɑ,n↔∅,d↔m,a↔a
Catootje.1_11_09	Catootje	23	bebi	bibi	b↔b,e↔i,b↔b,i↔i
Catootje.1_11_09	Catootje	24	pɑnda	pɑmˑa	p↔p,ɑ↔ɑ,n↔∅,d↔mˑ,a↔a
Catootje.1_11_09	Catootje	25	ap	aːp	a↔aː,p↔p
Catootje.1_11_09	Catootje	26	sina	jaˑpi	s↔j,i↔aˑ,n↔p,a↔i
Catootje.1_11_09	Catootje	26	sɑpəl	s̪ɛn̪t̪i̪s̪	s↔s̪,ɑ↔ɛ,∅↔n̪,p↔t̪,ə↔i,l↔s̪
Catootje.1_11_09	Catootje	27	ʒi	uː	ʒ↔∅,i↔uː
Catootje.1_11_09	Catootje	27	ʁɑf	ɑχ	ʁ↔∅,ɑ↔ɑ̝,f↔χ
Catootje.1_11_09	Catootje	28	ʒi	uː	ʒ↔∅,i↔uː
Catootje.1_11_09	Catootje	28	ʁɑf	aχ	ʁ↔∅,ɑ↔a,f↔χ
Catootje.1_11_09	Catootje	29	nɛil	j͡æaː	n↔j,ɛ↔æ͡aː,i↔∅,l↔∅

Session	Speaker	Record #	IPA Target	IPA Actual	Alignment
Catootje.1_11_09	Catootje	29	paɹt	paːt	p↔p,a↔aː,ɹ↔∅,t↔t
Catootje.1_11_09	Catootje	30	ko	k̃ɔː	k↔k,o↔ɔ̃ː

Table by Participant

This report will list each query result in a table. A separate table will be displayed for each sampled participant. Any tiers specified in the 'Aligned Group', 'Aligned Word', 'Add aligned group', and 'Add aligned word' fields of the query will also be listed in the table.

Settings

Figure 44: Table by Session Settings

Listing by Session (with optional tier data)

Similar to Table by Session, except each result is expanded into individual tables with one tier or metadata value per row.

Settings

Figure 45: Listing by Session Settings

Phones

Phone Accuracy

Phone Similarity

Phone similarity measures how similar two phones or strings of phones are within a target-actual aligned pair based on the number of descriptive phonological matchings divided by the maximal number of potential matches.

Calculation

Given a pair of aligned phones, simlarity is calculated as:

```
# of matched features
----------------------------------------  * 100
max(# target features, # actual features)
```

Parameters

The number of features considered in the calculation depends on the dimensions selected during execution of the analysis. The dimensions available for consonants are:

- Place
- Manner
- Voicing

and for vowels:

- Height
- Backness

- Tenseness
- Rounding

Example

The table produced by this report will have the following columns:

- Session
- Speaker
- Record #
- IPA Target
- IPA Actual
- #Fs Place/Manner/...
- #Sim Place/Manner/...
- Total Fs
- Similarity

Session	Speaker	Age	Record #	IPA Target	IPA Actual	#Fs Place	Sim Place	#Fs Manner	Sim Manner	#Fs Voicing	Sim Voicing	#Fs Height	Sim Height	#Fs Backness	Sim Backness	#Fs Tenseness	Sim Tenseness	#Fs Rounding	Sim Rounding	#Fs	Sim
Catocta_01	Catocta_01c	10	109	ə	∅	0	0	1	0	0	0	1	0	1	0	1	0	0	0	4	0
Catocta_01	Catocta_01c	10	109	n	nː	3	100	4	100	1	100	0	0	0	0	0	0	0	0	8	100
Catocta_01	Catocta_01c	10	109	ɦ	ɦ	2	100	4	100	1	100	0	0	0	0	0	0	0	0	7	100
Catocta_01	Catocta_01c	10	109	œ	æ	0	0	1	100	0	0	1	0	1	100	1	100	1	0	5	60
Catocta_01	Catocta_01c	10	109	y	i	0	0	1	100	0	0	1	100	1	100	1	100	1	0	5	80
Catocta_01	Catocta_01c	10	109	s	s	3	100	4	100	1	100	0	0	0	0	0	0	0	0	8	100
Catocta_01	Catocta_01c	10	109	ə	∅	0	0	1	0	0	0	1	0	1	0	1	0	0	0	4	0
Catocta_01	Catocta_01c	10	109	n	mː	3	0	4	100	1	100	0	0	0	0	0	0	0	0	8	62.5
Catocta_01	Catocta_01c	10	109	b	b	2	100	4	100	1	100	0	0	0	0	0	0	0	0	7	100
Catocta_01	Catocta_01c	10	109	e	eː	0	0	1	100	0	0	1	100	1	100	1	100	0	0	4	100
Catocta_01	Catocta_01c	10	109	ʃ	s̪	3	33.333	4	100	1	100	0	0	0	0	0	0	0	0	8	75
Catocta_01	Catocta_01c	10	109	ə	a	0	0	1	100	0	0	1	0	1	100	1	100	0	0	4	75
Catocta_01	Catocta_01c	10	109	b	b	2	100	4	100	1	100	0	0	0	0	0	0	0	0	7	100
Catocta_01	Catocta_01c	10	109	e	eː	0	0	1	100	0	0	1	100	1	100	1	100	0	0	4	100
Catocta_01	Catocta_01c	10	109	ʃ	s̪	3	33.333	4	100	1	100	0	0	0	0	0	0	0	0	8	75
Catocta_01	Catocta_01c	10	109	ə	ə	0	0	1	100	0	0	1	100	1	100	1	100	0	0	4	100
Catocta_01	Catocta_01c	10	109	b	b	2	100	4	100	1	100	0	0	0	0	0	0	0	0	7	100
Catocta_01	Catocta_01c	10	109	u	u	0	0	1	100	0	0	1	100	1	100	1	100	1	100	5	100
Catocta_01	Catocta_01c	10	109	k	k	2	100	4	100	1	100	0	0	0	0	0	0	0	0	7	100
Catocta_01	Catocta_01c	10	109	b	p	2	100	4	100	1	0	0	0	0	0	0	0	0	0	7	85.714
Catocta_01	Catocta_01c	10	109	u	u	0	0	1	100	0	0	1	100	1	100	1	100	1	100	5	100
Catocta_01	Catocta_01c	10	109	k	k	2	100	4	100	1	100	0	0	0	0	0	0	0	0	7	100
Catocta_01	Catocta_01c	10	109	p	p	2	100	4	100	1	100	0	0	0	0	0	0	0	0	7	100
Catocta_01	Catocta_01c	10	109	u	u	0	0	1	100	0	0	1	100	1	100	1	100	1	100	5	100

Transcript Variability Example

Session	# Repeated IPA Target	# All Correct	# One or More Correct	# Same Error	# Different Errors	Avg Distance
Catootje.1_11_09	36	2	5	8	26	2.11
Catootje.2_00_19	35	7	7	16	12	1.16

Acoustic Data Reports

Acoustic data reports print acoustic information for each query result.

All acoustic data reports require identification of one or more intervals in the audio for analysis. Intervals are selected using one of the following methods:

- The full segment for the record of the query result
- Intervals from a specific TextGrid tier
  - When using this option, a result line will be printed for each interval of the specified TextGrid tier which is included in the full record segement
  - TextGrid intervals may be filtered by their label using a regular expression
- Intervals from a result column in the query result (typically a tier name)
  - TextGrid mappings must exist between the specified tier and a TextGrid tier
  - This is the default option with the tier name set as `IPA Actual`

If an interval cannot be selected for a query result, no information will be printed in the report.

Duration

Print duration of each selected TextGrid interval.

Example

Report table will have the following columns:

- Session
- Speaker
- Age
- Record #
- Result/Tier Name
- Additional tiers added to query results
- Start Time (s)
- End Time (s)
- Duration (s)

Session	Speaker	Age	Record #	IPA Actual	Start Time	End Time	Duration
Anne.Session	Anne	02;01.17	2	ɪː	4.34	4.583	0.242
Anne.Session	Anne	02;01.17	2	æ	4.686	4.844	0.158
Anne.Session	Anne	02;01.17	2	iː	4.937	5.106	0.169
Anne.Session	Anne	02;01.17	2	ʌː	5.202	5.664	0.462
Anne.Session	Anne	02;01.17	2	eɹ͡	5.864	6.157	0.292
Anne.Session	Anne	02;01.17	2	uː	6.653	7.026	0.373
Anne.Session	Anne	02;01.17	2	uː	7.088	7.307	0.219
Anne.Session	Anne	02;01.17	2	ɔː	7.388	7.665	0.277
Anne.Session	Anne	02;01.17	2	iː	7.723	7.927	0.204
Anne.Session	Anne	02;01.17	4	ɛ	10.127	10.297	0.17
Anne.Session	Anne	02;01.17	7	uː	12.91	13.097	0.187
Anne.Session	Anne	02;01.17	9	ɛ	14.487	14.76	0.273
Anne.Session	Anne	02;01.17	9	ʊː	14.76	15.027	0.267
Anne.Session	Anne	02;01.17	9	iː	15.137	15.413	0.276
Anne.Session	Anne	02;01.17	9	ɪː	16.63	16.945	0.316
Anne.Session	Anne	02;01.17	9	ɪ	16.991	17.209	0.218
Anne.Session	Anne	02;01.17	9	ʌ	17.384	17.54	0.156
Anne.Session	Anne	02;01.17	11	æ	19.761	19.976	0.215
Anne.Session	Anne	02;01.17	14	æ	23.602	23.86	0.257
Anne.Session	Anne	02;01.17	17	ə	28.728	28.862	0.134
Anne.Session	Anne	02;01.17	17	ʌ	28.974	29.167	0.193
Anne.Session	Anne	02;01.17	17	e	29.242	29.402	0.16
Anne.Session	Anne	02;01.17	17	e	29.536	29.593	0.056
Anne.Session	Anne	02;01.17	17	ɪ	29.593	29.81	0.218
Anne.Session	Anne	02;01.17	19	æ	31.4	31.506	0.106
Anne.Session	Anne	02;01.17	19	ɵ	31.935	32.067	0.132
Anne.Session	Anne	02;01.17	19	ɜ	32.283	32.449	0.165

Intensity

Display intensity values (dB) at various positions within each selected TextGrid interval.

Example

Session	Speaker	Age	Record #	IPA Actual	Start Time	End Time	I10(dB)	I20(dB)	I30(dB)	I40(dB)	I50(dB)	I60(dB)	I70(dB)	I80(dB)	I90(dB)
Anne.Session	Anne	02;01.17	2	ɪː	4.34	4.583	60.745	62.156	62.484	63.695	63.626	62.393	60.15	58.353	56.463
Anne.Session	Anne	02;01.17	2	æ	4.686	4.844	60.567	60.442	60.428	60.987	60.96	59.793	57.735	55.284	53.054
Anne.Session	Anne	02;01.17	2	iː	4.937	5.106	63.364	63.297	62.637	61.333	60.283	60.714	61.54	60.767	58.045
Anne.Session	Anne	02;01.17	2	ʌː	5.202	5.664	66.393	70.023	62.748	64.455	64.446	62.874	63.091	63.901	61.823

Session	Speaker	Age	Record #	IPA Actual	Start Time	End Time	I10(dB)	I20(dB)	I30(dB)	I40(dB)	I50(dB)	I60(dB)	I70(dB)	I80(dB)	I90(dB)
Anne.Session	Anne	02;01.12	7	eɹ͡	5.864	6.157	64.792	65.866	65.147	63.502	63.362	63.638	62.236	61	57.523
Anne.Session	Anne	02;01.12	7	uː	6.653	7.026	66.454	67.411	67.364	66.98	66.952	67.043	67.722	67.913	68.082
Anne.Session	Anne	02;01.12	7	uː	7.088	7.307	67.317	67.123	65.597	64.088	63.694	63.769	64.436	64.845	64.344
Anne.Session	Anne	02;01.12	7	ɔː	7.388	7.665	65.222	66.007	68.489	70.049	71.553	71.858	70.29	68.394	65.103
Anne.Session	Anne	02;01.12	7	iː	7.723	7.927	65.13	67.242	66.51	65.112	64.792	63.773	61.201	58.318	55.958
Anne.Session	Anne	02;01.14	7	ɛ	10.127	10.297	74.999	76.375	75.949	73.95	72.293	71.273	69.319	66.366	62.963
Anne.Session	Anne	02;01.17	7	uː	12.91	13.097	76.291	78.069	78.294	76.964	74.177	71.324	69.289	67.371	65.002
Anne.Session	Anne	02;01.19	7	ɛ	14.487	14.76	65.494	66.102	67.014	67.864	66.471	64.601	61.421	60.186	60.085
Anne.Session	Anne	02;01.19	7	ʊː	14.76	15.027	61.785	62.759	65.698	68.385	70.927	74.017	73.971	74.705	74.063
Anne.Session	Anne	02;01.19	7	iː	15.137	15.413	67.705	64.305	63.102	62.286	62.846	63.514	63.527	62.969	61.666
Anne.Session	Anne	02;01.19	7	ɪː	16.63	16.945	62.651	66.723	72.093	74.658	75.5	73.683	65.884	58.552	57.609
Anne.Session	Anne	02;01.19	7	ɪ	16.991	17.209	71.811	72.619	72.358	70.862	68.603	68.409	68.85	66.217	62.191
Anne.Session	Anne	02;01.19	7	ʌ	17.384	17.54	73.151	72.328	72.247	73.317	74.945	75.958	75.782	74.513	72.655
Anne.Session	Anne	02;01.17	71	æ	19.761	19.976	64.005	62.914	61.494	58.945	56.938	57.797	58.589	58.281	55.869
Anne.Session	Anne	02;01.17	74	æ	23.602	23.86	71.694	68.252	64.78	63.167	63.851	64.14	64.058	64.803	65.418
Anne.Session	Anne	02;01.17	77	ə	28.728	28.862	62.919	62.721	61.951	60.857	60.261	60.364	60.846	60.979	59.805
Anne.Session	Anne	02;01.17	77	ʌ	28.974	29.167	71.863	73.78	75.681	76.297	75.072	72.511	68.056	63.121	57.609
Anne.Session	Anne	02;01.17	77	e	29.242	29.402	71.697	74.041	74.045	72.151	68.74	64.464	60.999	58.829	56.939
Anne.Session	Anne	02;01.17	77	e	29.536	29.593	69.114	69.946	70.778	70.983	71.17	71.312	71.167	71.022	70.867
Anne.Session	Anne	02;01.17	77	ɪ	29.593	29.81	70.285	70.034	69.353	68.876	68.444	65.691	61.502	57.997	55.179
Anne.Session	Anne	02;01.17	79	æ	31.4	31.506	71.454	71.97	71.072	69.41	67.074	64.132	61.577	59.391	58.137
Anne.Session	Anne	02;01.17	79	ɵ	31.935	32.067	71.524	72.568	72.208	70.953	69.545	68.64	68.221	67.178	65.001
Anne.Session	Anne	02;01.17	79	ɜ	32.283	32.449	63.387	65.234	64.164	61.07	59.864	60.753	61.436	61.311	60.458

Pitch

Display pitch values at various points within each selected TextGrid interval.

Example

Session	Speaker	Age	Record #	IPA Actual	Start Time	End Time	P10(Hz)	P20(Hz)	P30(Hz)	P40(Hz)	P50(Hz)	P60(Hz)	P70(Hz)	P80(Hz)	P90(Hz)
Anne.Session	Anne	02;01.12	7	ɪː	4.34	4.583	∞	242.403	237.035	242.745	244.767	242.737	236.656	∞	∞
Anne.Session	Anne	02;01.12	7	æ	4.686	4.844	∞	∞	∞	∞	∞	∞	∞	∞	∞
Anne.Session	Anne	02;01.12	7	iː	4.937	5.106	∞	234.748	233.909	232.869	231.273	231.934	230.622	∞	∞
Anne.Session	Anne	02;01.12	7	ʌː	5.202	5.664	286.767	285.603	281.561	283.846	280.916	271.002	263.854	262.561	271.262
Anne.Session	Anne	02;01.12	7	eɹ͡	5.864	6.157	260.008	251.495	248.09	244.458	237.14	235.859	236.082	239.188	∞
Anne.Session	Anne	02;01.12	7	uː	6.653	7.026	300.323	304.551	304.285	303.553	296.813	294.123	293.074	293.277	294.112
Anne.Session	Anne	02;01.12	7	uː	7.088	7.307	286.439	288.248	288.476	285.593	284.72	283.433	286.752	287.802	291.105

Session	Speaker	Age	Record #	IPA Actual	Start Time	End Time	P10(Hz)	P20(Hz)	P30(Hz)	P40(Hz)	P50(Hz)	P60(Hz)	P70(Hz)	P80(Hz)	P90(Hz)
Anne.Session	Anne	02;01.12	7	ɔː	7.388	7.665	306.835	310.075	312.615	315.767	319.30	322.094	326.774	329.555	326.01
Anne.Session	Anne	02;01.12	7	iː	7.723	7.927	331.586	324.264	314.244	293.548	∞	∞	∞	∞	∞
Anne.Session	Anne	02;01.14	7	ɛ	10.127	10.297	424.778	451.51	460.543	459.61	448.939	429.619	404.132	∞	∞
Anne.Session	Anne	02;01.17	7	uː	12.91	13.097	487.848	481.392	459.798	436.793	402.743	∞	∞	∞	∞
Anne.Session	Anne	02;01.19	7	ɛ	14.487	14.76	316.08	315.308	306.784	301.576	291.683	278.672	∞	∞	∞
Anne.Session	Anne	02;01.19	7	ʊː	14.76	15.027	277.027	286.976	296.695	309.735	324.41	334.238	345.2	351.839	354.972
Anne.Session	Anne	02;01.19	7	iː	15.137	15.413	321.238	316.382	317.062	318.806	322.937	321.172	321.238	312.042	304.234
Anne.Session	Anne	02;01.19	7	ɪː	16.63	16.945	∞	∞	343.074	356.51	361.91	353.115	341.755	335.262	320.329
Anne.Session	Anne	02;01.19	7	ɪ	16.991	17.209	334.05	329.544	325.4	318.38	312.395	308.466	305.477	300.772	∞
Anne.Session	Anne	02;01.19	7	ʌ	17.384	17.54	347.25	348.86	351.187	351.284	345.195	336.926	328.964	318.043	308.223
Anne.Session	Anne	02;01.17	1	æ	19.761	19.976	278.214	280.014	280.361	283.308	∞	∞	∞	∞	∞
Anne.Session	Anne	02;01.17	4	æ	23.602	23.86	309.804	∞	∞	∞	∞	∞	∞	∞	356.51
Anne.Session	Anne	02;01.17	7	ə	28.728	28.862	286.676	282.448	281.975	283.819	286.202	284.147	281.204	277.749	280.465
Anne.Session	Anne	02;01.17	7	ʌ	28.974	29.167	370.575	378.015	388.574	396.85	406.444	404.324	401.774	401.154	∞
Anne.Session	Anne	02;01.17	7	e	29.242	29.402	334.228	328.69	321.716	308.25	301.276	∞	∞	∞	∞
Anne.Session	Anne	02;01.17	7	e	29.536	29.593	377.755	376.749	376.453	376.204	375.2	374.466	374.327	374.144	373.924
Anne.Session	Anne	02;01.17	7	ɪ	29.593	29.81	374.424	373.852	373.715	374.828	375.634	370.947	372.055	373.033	373.334
Anne.Session	Anne	02;01.17	9	æ	31.4	31.506	316.646	318.419	319.242	318.97	319.307	319.339	322.54	326.51	329.298
Anne.Session	Anne	02;01.17	9	ɵ	31.935	32.067	328.652	330.756	333.077	336.068	339.26	343.07	343.858	340.629	337.617
Anne.Session	Anne	02;01.17	9	ɜ	32.283	32.449	∞	272.587	269.471	262.499	261.493	265.886	272.949	278.326	288.85

Formants

Display formant values at various points within each selected TextGrid interval.

Example

Session	Speaker	Age	Record #	IPA Actual	Start Time	End Time	P10(Hz)	P20(Hz)	P30(Hz)	P40(Hz)	P50(Hz)	P60(Hz)	P70(Hz)	P80(Hz)	P90(Hz)
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Session	Speaker	Age	Record #	IPA Actual	Start Time(s)	End Time(s)	Center of Gravity	Standard Deviation	Kurtosis	Skewness
Anne.Session	Anne	02;01.17	2	ɪ:	4.34	4.583	6,426.133	3,724.252	-0.677	0.789
Anne.Session	Anne	02;01.17	2	æ	4.686	4.844	6,655.038	4,173.061	-1.172	0.556
Anne.Session	Anne	02;01.17	2	i:	4.937	5.106	8,627.853	3,991.902	-1.526	-0.027
Anne.Session	Anne	02;01.17	2	ʌ:	5.202	5.664	6,570.421	3,927.165	-0.914	0.66
Anne.Session	Anne	02;01.17	2	eɪ͡	5.864	6.157	5,330.386	3,441.805	0.744	1.381
Anne.Session	Anne	02;01.17	2	u:	6.653	7.026	5,164.374	3,390.609	1.211	1.616
Anne.Session	Anne	02;01.17	2	u:	7.088	7.307	5,028.66	3,431.747	1.13	1.51
Anne.Session	Anne	02;01.17	2	ɔ:	7.388	7.665	4,627.188	3,172.849	2.205	1.761
Anne.Session	Anne	02;01.17	2	i:	7.723	7.927	6,287.743	3,715.269	-0.518	0.981
Anne.Session	Anne	02;01.17	4	ɛ	10.127	10.297	3,914.8	2,518.136	5.174	2.296
Anne.Session	Anne	02;01.17	7	u:	12.91	13.097	4,587.086	2,732.02	3.513	1.842
Anne.Session	Anne	02;01.17	9	ɛ	14.487	14.76	8,183.253	4,231.057	-1.361	-0.18
Anne.Session	Anne	02;01.17	9	ʊ:	14.76	15.027	9,051.553	3,655.238	-1.055	-0.195

Spectral Moments

Display Center of Gravity, Standard Deviation, Kurtosis, Skewness for each selected TextGrid interval.

Example

Session	Speaker	Age	Record #	IPA Actual	Start Time(s)	End Time(s)	Center of Gravity	Standard Deviation	Kurtosis	Skewness
Anne.Session	Anne	02;01.17	9	iː	15.137	15.413	6,986.172	4,101.892	-1.199	0.627
Anne.Session	Anne	02;01.17	9	ɪː	16.63	16.945	4,706.716	2,680.662	4.496	2.304
Anne.Session	Anne	02;01.17	9	ɪ	16.991	17.209	5,038.952	2,696.526	3.589	2.113
Anne.Session	Anne	02;01.17	9	ʌ	17.384	17.54	3,997.534	2,311.282	6.543	2.344
Anne.Session	Anne	02;01.17	11	æ	19.761	19.976	9,203.167	3,990.843	-1.194	-0.362
Anne.Session	Anne	02;01.17	14	æ	23.602	23.86	4,743.614	3,322.655	1.127	1.501
Anne.Session	Anne	02;01.17	17	ə	28.728	28.862	8,774.132	4,591.709	-1.452	-0.351
Anne.Session	Anne	02;01.17	17	ʌ	28.974	29.167	5,551.587	4,408.839	-0.807	0.913
Anne.Session	Anne	02;01.17	17	e	29.242	29.402	6,865.394	4,248.568	-1.325	0.515
Anne.Session	Anne	02;01.17	17	e	29.536	29.593	5,801.437	3,312.533	-0.06	1.105
Anne.Session	Anne	02;01.17	17	ɪ	29.593	29.81	5,667.334	3,688.539	-0.023	1.186
Anne.Session	Anne	02;01.17	19	æ	31.4	31.506	7,551.871	4,308.768	-1.474	0.219
Anne.Session	Anne	02;01.17	19	ɵ	31.935	32.067	8,346.506	4,189.694	-1.432	-0.062
Anne.Session	Anne	02;01.17	19	ɜ	32.283	32.449	7,689.832	4,135.812	-1.42	0.253

Voice Onset Time (VOT)

The Voice Onset Time (VOT) report calculates VOT for each query result. Under the setup described below:

- Segment duration for stops is calculated from stop closure to stop release. While closure is often difficult to pinpoint in a regular spectrogram, this is inconsequential to VOT calculation given that it is based on stop release and the Voicing point tier marker:
- Voicing is marked independently of the closure-release cycle, so that negative, null, and positive VOT values can be computed based on the time value of the onset of voicing minus the time value of consonant release.

Parameters

- Duration of the closure-release cycle for the stop indicated through the regular segment boundaries within the *IPA Actual: Phone* tier.
- *Voicing* tier required in TextGrid to indicate voicing. This tier must be a point tier (default name: 'Voicing').

Data preparation

A TextGrid must be assigned to the session and tier mappings setup for the Phon tier (default 'IPA Actual') used in the query. A point tier (default name 'Voicing') must exist, with a point for each interval for which VOT calculation will be performed. The point should be have the same label as the interval to which it is related not including stress markers.

Example:

VOT Calculation

Given a TextGrid interval "T" and a TextGrid point (i.e., voicing) "P", VOT is calculated as:

- `VOT = P - T.end`

In the example above, `k` has a positive VOT (onset of voicing after release), while `b` has a negative VOT (onset of voicing before release).

Example

The table produced will have the following columns:

- Session
- Speaker
- Age
- Record #
- ***Orthography***
- ***IPA Target***
- ***IPA Actual***
- Result/Tier name(s)
- Start Time(s)
- End Time(s)
- Release(s)
- ***Dur + VOT(s)***
- VOT(s)

Session	**Speaker**	**Age**	**Record #**	**IPA Actual**	**Start Time(s)**	**End Time(s)**	**Release(s)**	**Dur + VOT(s)**	**VOT(s)**
Anne.Session	Anne	02;01.17	1	ɡ	6.422	6.568	6.543	0.121	-0.025
Anne.Session	Anne	02;01.17	1	d	6.764	6.882	6.915	0.151	0.033
Anne.Session	Anne	02;01.17	2	ŋ	10.752	10.898	10.925	0.173	0.027
Anne.Session	Anne	02;01.17	2	ŋ	10.898	11.057	10.996	0.098	-0.061
Anne.Session	Anne	02;01.17	3	t^h	15.2	15.398	15.272	0.072	-0.126
Anne.Session	Anne	02;01.17	3	t^h	15.816	16.067	15.914	0.099	-0.152
Anne.Session	Anne	02;01.17	4	t^h	24	24.22	24.07	0.071	-0.149

Chapter 5

Analyses

Topics:

- Built-in Analyses
- Consonants
- Percent Diacritics Correct (PDC)
- Percent Phones Correct (PPC)
- Percent Number Tones Correct (PNTC)
- Phone Inventory
- Phonological Mean Length of Utterance (PMLU)
- Phonological Processes
- Word Inventory
- Specialized
- Using the Analysis Composer

Built-in Analyses

https://www.youtube.com/embed/mRUs4TMwVnk

Analyses built into Phon offer ready access to general results about different aspects of phonological behaviours at a click. Currently-supported analyses include:

- Consonants: a series of analyses on phonological patterns affecting consonants and consonant clusters within words, based on systematic comparisons between IPA Target and IPA Actual pairs of transcribed forms.
- Percent Phones Correct (PPC): Series of algorithms to extract percentages of consonants and vowels correct (e.g. Shriberg et al., 1997; Shriberg & Kwiatkowski, 1982), including at the level of consonant clusters.
- Phone Inventory: List of phones in IPA Target and IPA Actual tiers with their frequency counts
- PMLU (Phonological Mean Length of Utterance): Algorithm to calculate phonological complexity originally developed by Ingram (2002), with an alternate version proposed by Arias & Lleó (2013).
- Word Inventory: List of words in the Orthography tier with their frequency counts
- Phonological processes: Algorithms to detect general phonological processes such as velar fronting, fricative stopping, liquid gliding, or consonant deletion.
- Specialized analyses: More narrowly specialized analyses of multisyllabic word productions (Multisyllabic Non-linear Analysis, Mason 2015; Word-level Analysis of Polysyllables, Masso 2016), the Word Match analysis (Bernhardt XXXX) and the Vocalization analysis (Velleman XXXX).

The key difference between the query and reporting methods described in Query & Report wizard and built-in analyses is that the latter combine analysis methods and reports at once. Running an analysis follows a three-step logic, as Phon guides the user through the steps laid out in the breadcrumb on top of the interface.

As with query and reporting, the user can save the report as a standalone HTML file or exported them in text-only (CSV) and Excel formats.

Example (PPC analysis)

1. Select Sessions and Participants

Figure 46: Select Sessions and Participants

2. Analysis Parameters

Figure 47: Analysis Parameters

3. Analysis Results

Speaker	Role	# Target	# Correct	# Substituted	# Deleted	# Epenthesized	PPC
116MPA	Target Child	123	72	33	18	6	55.814
117EP	Target Child	108	71	29	8	5	62.832

Figure 48: Analysis Results

Consonants

The Consonants analysis consists of a series of algorithms to determine the accuracy of consonants in singleton and complex syllable onsets and codas as well as in heterosyllabic clusters. Options also include the selection of OEHSs (onsets of empty-headed syllables) as well as syllable appendices, which serve to identify particular syllabification patterns in languages like French or Dutch (among others).

Parameters

Figure 49: Consonants Parameters

For each participant, and for each context selected in the options illustrated in Figure X, Phon provides a series of reports, as follows (example uses selection as show above):

Consonants across all positions

- Global Accuracy: List and frequency counts of all of the consonants, each identified by syllable position (e.g. O2 = second position of syllable onset) and marked for their behaviours as Accurate, or undergoing Substitutions, Deletions, or Epenthesis. Sums and percentages are reported for each behaviour.

IPA Target	Phone	Position	Count	Accurate	Substitutions	Deletions
p	p	C1	1	1	0	0
t	t	C1	1	0	1	0
d	d	C1	1	0	1	0
k	k	C1	2	0	2	0
v	v	C1	1	0	1	0
s	s	C1	3	3	0	0
z	z	C1	3	0	2	1
n	n	C1	9	8	0	1
ŋ	ŋ	C1	1	1	0	0
l	l	C1	5	2	1	2
ɹ	ɹ	C1	5	2	2	1
			32	17	10	5
				53.125	31.25	15.625

Figure 50: Consonants across all positions

- Syllable-initial Accuracy: as per above, for syllable-initial consonants and clusters.
- Syllable-final Accuracy: as per above, for syllable-initial consonants and clusters.

Consonants in singleton onsets and codas

- Singletons Accuracy: List and frequency counts of all of the consonants in singleton onsets and codas, each identified by syllable position (e.g. O1 = syllable onset) and marked for their behaviours as Accurate, or undergoing Substitutions, Deletions, or Epenthesis. Sums and percentages are reported for each behaviour.
- Syllable-initial Accuracy: as per above, for syllable-initial consonants and clusters.
- Syllable-final Accuracy: as per above, for syllable-initial consonants and clusters.
- Accuracy report for each consonant type, by syllable position, alongside descriptive behaviours, sums and percentage:

IPA Target	Phone	Position	Count	Accurate	Substitutions	Deletions
ɹ	ɹ	O1	1	0	1	0
ɹ	ɹ	C1	5	2	2	1
			6	2	3	1
				33.333	50	16.667

- Listing of each token in context, including corpus/session, the word containing the consonant (in Orthography, IPA Target, IPA Actual) and the context within which the token was found. Within the Phon report preview, the user can click on each individual result to visualize it within its corresponding data record.

Session	Age	Record #	IPA Target	IPA Actual	Orthography (Wo
NWR.123PS	06;06.24	1	ɹ	w	very
NWR.123PS	06;06.24	4	ɹ	ɹ	pair
NWR.123PS	06;06.24	6	ɹ	ɹ	are
NWR.123PS	06;06.24	7	ɹ		father

Consonant clusters

The reports for consonant clusters are formatted as above, where the behaviour of each consonant is listed individually. Additional consonants or vowels produced which break up target clusters (e.g. blue produced as /bilu/) are also reported, with the "+" diacritic to indicate their status as epenthetic.

Report Outline

An example table of contents is displayed below. Bold level elements are section headers while italic items are tables. Click here to see an example report.

- **Consonants**
  - **Parameters**
  - **Participant 1**
    - *Global Accuracy*
    - *Syllable-initial Accuracy*

      Syllable-final Accuracy
    - **Singletons**
      - *Singleton Accuracy*
      - *Syllable-initial Accuracy*
      - *Syllable-final Accuracy*
      - **/c1/**
        - *Listing*
      - **/c2/**
        - *Listing*
      - … (for each singleton consonant)
    - **Clusters**
      - *Cluster Accuracy*
      - *Syllable-initial Accuracy*
      - *Syllable-final Accuracy*
      - **/c1/**
        - *Listing*
      - **/c2/**
        - *Listing*
      - … (for each consonant cluster)
  - … (for each selected participant)

Percent Diacritics Correct (PDC)

The PDC analysis will calculate the percentage of actual phones with correct diacritics.

Data Preparation

Session data is queried by word for each IPA Target and IPA Actual tuple. Proper syllabification and phone alignment is required for accurate results. All participants should have unique names/identification numbers and a speaker should be assigned to all records.

Parameters

Figure 51: Percent Diacritics Correct Parameters

The PPC report can be restricted to different sets of phones. The following pre-defined report types are available

1. All phones

2. Consonants
3. Vowels
4. Other (custom)

When 'Other (custom)' is selected a custom Phonex expression may be entered to create a custom phone set. See Example Phones Queries for some useful examples.

Other parameters:

1. Ignore diacritics - ignore diacritics when comparing phones (default: no)
2. Group Options on page 161
3. Word Options on page 163
4. Syllable Options on page 165

PDC Calculation

PDC is calculated using the following equation:

$$\begin{aligned} PDC &= \frac{correct}{(correct + incorrect)} \times 100 \\ &= \frac{correct}{(correct + deletions + substitutions + epenthesis)} \times 100 \end{aligned}$$

Report Outline

An example table of contents is displayed below. Bold level elements are section headers while italic items are tables. Click here to see an example report.

- **Percent Diacritics Correct (PDC)**
  - **Summary**
    - *All Participants*
    - *IPA Patterns*
  - **Participant 1**
    - *Summary*
    - *IPA Patterns*
  - … (for each selected participant)
  - **Listing (All Results)**

Percent Phones Correct (PPC)

The PPC analysis will calculate the percent phones/consonants/vowels correct in the sampled data.

Data Preparation

Session data is queried by word for each IPA Target and IPA Actual tuple. Proper syllabification and phone alignment is required for accurate results. All participants should have unique names/identification numbers and a speaker should be assigned to all records.

Parameters

Figure 52: Percent Phones Correct Parameters

The PPC report can be restricted to different sets of phones. Several pre-defined sets have been defined and are available by using the radio buttons displayed in the PPC form (see below.) The following pre-defined report types are available:

1. Percent phones correct - all phones.
2. Percent consonants correct - all consonants (i.e., PCC)
3. Percent vowels correct
4. Percent singleton consonants correct - singleton consonants.
5. Percent cluster consonants correct - cluster consonants. There are three report sub-types available when this option is selected:
   a. All clusters
   b. Tautosyllabic clusters
   c. Heterosyllabic clusters

6. Percent onset consonants correct. There are three report sub-types available when this option is selected:
   a. All onsets
   b. Singleton onsets
   c. Cluster onsets
7. Percent coda consonants correct. There are three report sub-types available when this option is selected:
   a. All codas
   b. Singleton codas
   c. Cluster codas
8. Percent nucleus phones correct. There are three report sub-types available when this option is selected:
   a. All nuclei
   b. Monophthongs
   c. Complex vocoids
9. Percent correct (custom)

When 'Percent correct (custom)' is selected a custom Phonex expression may be entered to create a custom phone set. See Example Phones Queries for some useful examples.

Other parameters:

1. PPC-r - phones marked with the distorted diacritic will be considered correct (default: no)
2. Ignore diacritics - ignore diacritics when comparing phones (default: no)
3. Include PPC w/o epenthesis 'PPC (NoEpen)' (see below)
4. Group Options on page 161
5. Word Options on page 163
6. Syllable Options on page 165

PPC Calculation

PPC is calculated using the following equation:

$$\begin{aligned} PPC &= \frac{correct}{(correct + incorrect)} \times 100 \\ &= \frac{correct}{(correct + deletions + substitutions + epenthesis)} \times 100 \end{aligned}$$

If requested a second PPC column which does not include epenthesis may be added to the report. The column will be named 'PPC (NoEpen)'.

$$\begin{aligned} PPC_{\text{NoEpen}} &= \frac{correct}{(correct + incorrect)} \times 100 \\ &= \frac{correct}{(correct + deletions + substitutions)} \times 100 \end{aligned}$$

Report Outline

An example table of contents is displayed below. Bold level elements are section headers while italic items are tables. Click here to see an example report.

- **Percent Phones Correct (PPC)**
  - **Summary**
    - *All Participants*
    - *IPA Patterns*
  - **Participant 1**
    - *Summary*
    - *IPA Patterns*
  - … (for each selected participant)
  - **Listing (All Results)**

Percent Number Tones Correct (PNTC)

The Percent Nubmer Tones Correct (PNTC) analysis will calculate the percentage of syllables with correctly produced tones in the sampled data. To review how tone numbers are specified in Phon please see Tone Number on page 96.

Data Preparation

Session data is queried by word for each IPA Target and IPA Actual tuple. Proper syllabification and phone alignment is required for accurate results. All participants should have unique names/identification numbers and a speaker should be assigned to all records.

Parameters

Figure 53: Percent Number Tones Correct Parameters

1. Group Options on page 161
2. Word Options on page 163
3. Syllable Options on page 165

PNTC Calculation

PNTC is calculated using the following equation:

$$
\begin{aligned}
PNTC &= \frac{correct}{(correct + incorrect)} \times 100 \\
&= \frac{correct}{(correct + deletions + substitutions)} \times 100
\end{aligned}
$$

Report Outline

An example table of contents is displayed below. Bold level elements are section headers while italic items are tables. Click here to see an example report.

- **Percent Number Tones Correct (PNTC)**
  - **Summary**
    - *All Participants*
    - *Tonal Patterns*
    - *IPA Patterns*
  - **Participant 1**
    - *Summary*
    - *Tonal Patterns*
    - *IPA Patterns*
  - … (for each selected participant)
  - **Listing (All Results)**

Phone Inventory

The Phone Inventory analysis will provide a inventory of phones used in both the IPA Target and IPA Actual tiers for the selected sessions and participants.

Data Preparation

Session data is queried by word for each IPA Target and IPA Actual word. Tiers are queried independently and alignment information is not used for this analysis.

Parameters

Figure 54: Phone Inventory Parameters

1. Group Options on page 161
2. Word Options on page 163
3. Syllable Options on page 165

Report Outline

An example table of contents is displayed below. Bold level elements are section headers while italic items are tables. Click here to see an example report.

- **Phone Inventory**
  - **Parameters**
  - **Summary**
    - *Participant 1*
    - … (for each selected participant)
  - **Aggregate**
    - **Participant 1**
      - *IPA Target*
      - *IPA Actual*
    - … (for each selected participant)
  - **Breakdown**
    - **Participant 1**
      - *IPA Target*
      - *IPA Actual*
    - … (for each selected participant)

Phonological Mean Length of Utterance (PMLU)

The PMLU analysis calculates:

1. Phonlogical Mean Length of Utterance (PMLU) (Ingram 2002)
2. Expanded Phonological Mean Length of Utterance (ePMLU) (Arias & Lleó 2013)

Data Preparation

Session data is queried by word for each IPA Target and IPA Actual tuple. Proper syllabification and phone alignment is required for accurate results. All participants should have unique names/identification numbers and a speaker should be assigned to all records.

Parameters

Figure 55: PMLU Parameters

Inclusion of the PMLU/ePMLU calclations can be controlled using the checkboxes displayed in the parameters. By default all truncated words are ignored. The closed syllable bonus is used in the ePMLUSyllables on page 207 calculation and may be adjusted using the provided field.

Other parameters:

1. Aligned Phones on page 159
2. Group Options on page 161
3. Word Options on page 163
4. Syllable Options on page 165

Calculations

PMLU

$PMLU_{Target}$ is calculated as the number of consonants in the target transcript. $PMLU_{Actual}$ is calculated as the number of segments in the actual transcript plus the number of target-like consonants produced. In this case target-like will ignore diacritics between compared phones. PWP is defined as the ratio of $PMLU_{Actual}$ to $PMLU_{Target}$.

$$PMLU_{Target} = \sum_{t \in targetIPA} \begin{cases} 0 & t \text{ is a vowel} \\ 1 & t \text{ is a consonant} \end{cases}$$

$$PMLU_{Actual} = |actualIPA| + \sum_{t,a \in targetIPA, actualIPA} \begin{cases} 0 & t \text{ is} \\ (stripdiacritics(t) = stripdiacritics(a)) & t \text{ is a co} \end{cases}$$

$$PWP = \frac{PMLU_{Actual}}{PMLU_{Target}}$$

$ePMLU_{Features}$

$ePMLU_{TargetFeatures}$ is calculated as three times the number of consonants in the target transcript (one for each of 'manner', 'place' and 'voicing'.) $ePMLU_{ActualFeatures}$ is calculated as the sum of the number of correctly produced place, manner, and voicing features for each target consonant. $ePWP_{Features}$ is defined as the ratio of $ePMLU_{ActualFeatures}$ to $ePMLU_{TargetFeatures}$.

$$ePMLU_{TargetFeatures} = \sum_{t \in targetIPA} \begin{cases} 0 & t \text{ is a vowel} \\ 3 & t \text{ is a consonant} \end{cases}$$

$$ePMLU_{ActualFeatures} = \sum_{t,a \in targetIPA, actualIPA} \begin{cases} (manner(t) = manner(a)) + (place(t) = place(a)) + (voi \end{cases}$$

$$ePWP_{Features} = \frac{ePMLU_{ActualFeatures}}{ePMLU_{TargetFeatures}}$$

$ePMLU_{Syllables}$

$ePMLU_{TargetSyllables}$ is calculated as two times the number of syllables in the target transcript plus the closed syllable bonus for each closed syllable. $ePMLU_{ActualSyllables}$ is calculated in the same manner. $ePWP_{Syllables}$ is defined as the ratio of $ePMLU_{ActualSyllables}$ to $ePMLU_{TargetSyllables}$.

$$ePMLU_{TargetSyllables} = \sum_{\sigma \in targetIPA} \begin{cases} 2 & \sigma \text{ is open} \\ 2 + closedSyllBonus & \sigma \text{ is closed} \end{cases}$$

$$ePMLU_{ActualSyllables} = \sum_{\sigma \in actualIPA} \begin{cases} 2 & \sigma \text{ is open} \\ 2 + closedSyllBonus & \sigma \text{ is closed} \end{cases}$$

$$ePWP_{\text{Syllables}} = \frac{ePMLU_{ActualSyllables}}{ePMLU_{TargetSyllables}}$$

ePMLU

$ePMLU_{Target}$ is calculated as $ePMLU_{TargetFeatures}$ plus $ePMLU_{TargetSyllables}$. $ePMLU_{Actual}$ is calculated in the same manner. ePWP is defined as the ratio of $ePMLU_{Actual}$ to $ePMLU_{Target}$.

$$ePMLU_{Target} = ePMLU_{TargetFeatures} + ePMLU_{TargetSyllables}$$
$$ePMLU_{Actual} = ePMLU_{ActualFeatures} + ePMLU_{ActualSyllables}$$
$$ePWP = \frac{ePMLU_{Actual}}{ePMLU_{Target}}$$

Report Outline

An example table of contents is displayed below. Bold level elements are section headers while italic items are tables. Click here to see an example report.

- **Phonological Mean Length of Utterance (PMLU)**
  - Parameters
  - **Summary**
    - *All Participants*
    - *Participant 1*
    - … for(each selected participant)
  - ***Listing*** (All results with PMLU/ePMLU calcations for each aligned pair)

Phonological Processes

The Phonological Processes analyses will query and report on pre-defined and custom IPA Target ↔ IPA Actual processes. These processes are typicalled defined using phonex expressions. Each pre-defined process is available as a named analyis under the **Phonological Processes** submenu.

Parameters

Figure 56: Phonological Process Parameters

Phonological processes are defined using a pair of IPA Target/Actual expressions. Custom processes may be defined by entering the appropriate IPA Target/Actual expression in the form under **IPA Target/Actual Options** as shown above.

Several pre-defined phonological processes have been defined and are accessible by name under the **Analysis** > **Phonological Process** menu. The list of pre-defined processes is also availble in the **Process** combo box at the top of the analysis form. The list of pre-defined processes is:

- Coronal Backing

  IPA Target expression: `{coronal}`

  IPA Actual expression: `{dorsal}` (exact match)

- Deaffrication

  IPA Target expression: `{affricate}`

  IPA Actual expression: `{-affricate}` (exact match)
- Deletion

  IPA Target expression: `\w`

  IPA Actual expression: `^$` (exact match)
- Devoicing

  IPA Target expression: `{voiced}`

  IPA Actual expression: `{voiceless}` (exact match)
- Liquid Gliding & Vocalization

  IPA Target expression: `{liquid}`

  IPA Actual expression: `[\g\v]` (exact match)
- Glottalization

  IPA Target expression: `{-glottal}`

  IPA Actual expression: `{glottal}` (exact match)
- Lateralization

  IPA Target expression: `{-lateral}`

  IPA Actual expression: `{lateral}` (exact match)
- Fricative Stopping

  IPA Target expression: `{fricative}`

  IPA Actual expression: `{stop}` (exact match)
- Velar Fronting

  IPA Target expression: `{velar}`

  IPA Actual expression: `{coronal}` (exact match)
- Voicing

  IPA Target expression: `{voiceless}`

  IPA Actual expression: `{voiced}` (exact match)
- Epenthesis

  IPA Target expression: `^$` (exact match)

  IPA Actual expression: `\w`

Note: Unlike the other processes IPA Actual is queried before IPA Target during the analysis. Likewise the 'count' shown in tables of this analysis is the number of elements found in IPA Actual. Epenthesis is not displayed in the drop-down menu but you can find the epenthesis analysis under the **Analysis** > **Phonlogical Process** menu.

Other parameters:

1. Aligned Phones on page 159
2. Group Options on page 161
3. Word Options on page 163
4. Syllable Options on page 165

Report Outline

An example table of contents is displayed below. Bold level elements are section headers while italic items are tables. Click here to see an example report.

- **Phonological Process**
  - **Parameters**
  - **Summary**
    - *All Participants*
    - *Participant 1*
    - … (for each selected participant)
  - **Aggregate**
    - *All Participants* (if more than one participant)
    - *Participant 1*
    - … (for each selected participant)
  - ***Listing*** (All results)

Word Inventory

The Word Inventory analysis calculates a word inventory and token summary for each selected participant.

Parameters

Figure 57: Word Inventory Parameters

By default, the word inventory analysis will create an inventory of words in the Orthogrpahy tier. You may change this using the form shown above. To add additional tiers, use the **Add Aligned Words** field under Word Options on page 163.

Other parameters:

1. Ignore diacritics - ignore diacritics when comparing phones (default: no)
2. Group Options on page 161
3. Word Options on page 163

Report Outline

An example table of contents is displayed below. Bold level elements are section headers while italic items are tables. Click here to see an example report.

- **Word Inventory**
  - **Parameters**
  - **Summary**
    - *Participant 1*
    - … (for each selected participant)
  - **Aggregate**
    - *Participant 1*
    - … (for each selected participant)
  - ***Listing*** (All results)

Specialized

Word Match

Multisyllabic Nonlinear Analysis

This document describes the Multisyllabic Nonlinear Analysis (MNA) report in Phon.

Information

TODO - Information about analysis and citations which will be included at the top of the report

Organization

The report will consist of two types of tables:

- MNA Production - breakdown of each word sampled
- MNA Summary - summary of all words sampled

An example tables of contents is displayed below. Bold level elements are section headers, italic items are one of the tables listed above. Other headings are standard Phon report elements or text blocks.

- **Multisyllabic Nonlinear Analysis**
  - Information
  - Parameters
  - **Summary**
    - *MNA Summary*
  - **Breakdown**
    - **Word /IPA Target/** (Word 1)
      - *MNA Production* (Production 1)
      - *MNA Production* (Production 2)
      - ...
    - **Word /IPA Target/** (Word 2)
    - ...

Data Preparation

Session data is queried by word and a WAP Table is produced for each Orthography, IPA Target, and IPA Actual triad. Proper syllabification and phone alignment is required for accurate results. All participants should have unique names/identification numbers and a speaker should be assigned to all records.

Parameters

Parameters for the initial *Data Tiers* query will be available. The user may modify the query parameters to adjust the set of words sampled.

MNA Production Table

The *MNA Production* tables provide details for each word sampled. The table has four main categories: *Stress*, *Syllable*, *Phone/Timing Unit*, and *Feature*. Caption for the table will be "/IPA Actual/".

Example

/ˌkʰæːʃˈwɛʒəʃʊː/

Category	Description	Value	Total
Stress	PrimaryStress mis-match	1	
	SecondaryStress mis-match	1	
	Word stress mis-match: 12UU ↔ 21UU	1	
	Stress subtotal		3
Syllable	Syllable subtotal		0
Phone/Timing Unit	Phone 9 deleted: t ↔ ∅	1	
	Phone/Timing Unit subtotal		1
Feature	Place substitution {alveolar} ↔ {labial, -dental}: ɹ ↔ w	1	
	Manner substitution {rhotic} ↔ {glide}: ɹ ↔ w	1	
	Manner substitution {affricate} ↔ {fricative}: ʤ ↔ ʒ	1	
	Height substitution {high} ↔ {mid}: ɪ ↔ ə	1	
	Backness substitution {front} ↔ {central}: ɪ ↔ ə	1	
	Place substitution {alveolar} ↔ {alveopalatal}: s ↔ ʃ	1	
	Height substitution {mid} ↔ {high}: ɚ ↔ ʊː	1	
	Backness substitution {central} ↔ {back}: ɚ ↔ ʊː	1	
	…ʃ…ʤ… → …ʃ…ʒ… Progressive Harmony Manner	1	
	Feature subtotal		9
Total			13

Stress

The *Stress* category includes three checks, 1 point is added for each check that fails.

1. Primary Stress match
2. Secondary Stress match
3. Stress pattern match (full-word)

Syllable

The *Syllable* category will add a point for each deleted or inserted syllable.

Phone/Timing Unit

The *Phone/Timing Unit* category will add a point for each delete or inserted phone.

Feature

The *Feature* category will displays substitutions found in the phone alignment. A point is added for substituted dimension found. Consonant dimensions include: place, manner, voicing. Vowel dimensions included: height, backness, tenseness (rounding is included for schwa.) Deleted/inserted phones are not included.

Any *Segmental Relations* (e.g., haromny/metathesis) detected will be also be displayed in this category. The value added for any segmental relation will be the number of dimensions (i.e., place/manner/voicing) involved in the relation.

MNA Summary Table

The *MNA Summary* table displays totals for each word sampled.

Example

Word	Productions	Stress Subtotal	Syllable Subtotal	Phone/Timing Unit Subtotal	Feature Subtotal	Total
alligator	2	0.0	0.0	0.5	3.0	3.5
animal	2	0.5	0.5	1.5	4.5	7.0
balloons	2	1.0	0.5	0.5	3.0	5.0
cashregister	4	1.0	0.25	1.25	7.0	9.5
computer	2	0.0	0.0	0.5	3.0	3.5
electric	4	0.5	0.0	0.5	4.75	5.75
explodes	3	0.0	0.0	1.67	4.33	6.0
giraffe	2	2.0	1.0	1.5	2.0	6.5
gorilla	2	1.5	0.5	0.5	3.5	6.0
guitar	2	1.0	0.0	0.5	5.0	6.5
hippopotamus	2	1.0	0.0	0.5	3.5	5.0
hospital	2	0.0	0.0	0.5	7.0	7.5
invitation	3	1.0	0.33	1.67	5.0	8.0
magician	2	1.0	0.0	0.5	8.0	9.5
mosquito	2	0.0	0.0	1.0	4.0	5.0
skeleton	2	0.5	0.5	0.5	4.0	5.5
thermometer	3	0.33	0.33	1.33	4.67	6.67
umbrella	2	0.0	0.0	0.0	1.5	1.5

Word	Productions	Stress Subtotal	Syllable Subtotal	Phone/Timing Unit Subtotal	Feature Subtotal	Total
vegetable	3	0.0	0.0	1.0	6.33	7.33
watermelon	3	0.67	0.67	1.0	4.33	6.67

Vocalization

Word-level Analysis of Polysyllables (WAP)

This document outlines the Word-level Analysis of Polysyllables (WAP) report in Phon.

Information

The WAP (Masso, 2016) was developed in 2016 and originally published as a supplementary appendix to Masso, McLeod, Baker, McCormack (2016). The published, manual version of the WAP included seven error categories: (1) Substitution of consonants or vowels, (2) Deletion of syllables, consonants or vowels, (3) Distortion of consonants or vowels, (4) Addition of consonants or vowels, (5) Alteration of phonotactics, (6) Alteration of timing and (7) Assimilation and/or alteration of sequence. Categories 1, 2, 3 and 4 were based on the SODA analysis (substitution, omission, distortion, addition) by van Riper (1939) and categories 1, 2, 5, 6 and 7 were informed by James' (2006) work on polysyllable acquisition. Through the development of the WAP within Phon, the categories have been re-defined and embedded into the WAP analysis available in Phon.

Citations:

- Masso, S. (2016). Word-Level Analysis of Polysyllables. Sydney, Australia: Author.
- Masso, S., McLeod, S., Baker, E., & McCormack, J. (2016). Polysyllable productions in preschool children with speech sound disorders: Error categories and the Framework of Polysyllable Maturity. International Journal of Speech-Language Pathology, 18(3), 272-287. doi:10.3109/17549507.2016.1168483

Outline

The report will be composed of the following tables types:

- Word Level Stress Inventory
- Word Level Accuracy
- Prosodic Level CGV Inventory
- Prosodic Level Stress Inventory
- Prosodic Level Breakdown
- Segmental Level Inventory
- Segmental Level Breakdown
- WAP Tables (Word/Prosodic/Segmental Level breakdown for each word in sample)

An example tables of contents is displayed below. Bold level elements are section headers, italic items are one of the tables listed above. Other headings are standard Phon report elements or text blocks.

- **Word-level Analysis of Polysyllables**
- Information
- *Word Level Stress Inventory* (All Participants)
- *Word Level Accuracy* (All Participants)
- *Prosodic Level CGV Inventory* (All Participants)
- *Prosodic Level Stress Inventory* (All Participants)
- *Prosodic Level Breakdown* (All Participants)
- *Segmental Level Inventory* (All Participants)
- *Segmental Level Breakdown* (All Participants)

- **Participant**
  - *Word Level Stress Inventory* (Participant)
  - *Word Level Accuracy* (Participant)
  - *Prosodic Level CGV Inventory* (Participant)
  - *Prosodic Level Stress Inventory* (Participant)
  - *Prosodic Level Breakdown* (Participant)
  - *Segmental Level Inventory* (Participant)
  - *Segmental Level Breakdown* (Participant)
  - **Session 1**
    - *Word Level Stress Inventory* (Participant)
    - *Word Level Accuracy* (Participant)
    - *Prosodic Level CGV Inventory* (Participant)
    - *Prosodic Level Stress Inventory* (Participant)
    - *Prosodic Level Breakdown* (Participant)
    - *Segmental Level Inventory* (Participant)
    - *Segmental Level Breakdown* (Participant)
    - **Word 1 /IPA Target/ -> /IPA Actual/**
      - *Word Level*
      - *Prosodic Level*
      - *Segmental Level*
    - ...
  - ...
- ...

Data Preparation

Session data is queried by word and a WAP Table is produced for each Orthography, IPA Target, and IPA Actual triad. Proper syllabification and phone alignment is required for accurate results. All participants should have unique names/identification numbers and a speaker should be assigned to all records.

Word Level Inventory and Accuracy Tables

The *Word Level Stress Inventory* tables displays counts of the whole word stress productions (Target→Actual) in the sample.

Example:

IPA Target	IPA Actual	Count
1U2	1U2	4
1U2U	12U	1
1U2U	1U2U	4
1U2U	U1U	1
1UU	1UU	5
2U1	2U1	1
2U1U	2U1U	1
2U1UU	2U1UU	1
U12	12	2
U1U	1U	3

IPA Target	IPA Actual	Count
U1U	U1U	5
U1UU	U1UU	1
UUU1U	UU1U	1

The *Word Level Accuracy* table displays counts of whole word analyses in the five dimensions listed below. Caption for the table will be “Word Level Accuracy” followed by either “(Session)” or “(Participant)” or “(All Participants)”.

Word Level Accuracy dimensions and definitions:

- **Word** (whole word accuracy). The total number of words that were produced correctly, incorrectly, and the percentage of words produced correctly.
- **# Syllables** (word length correct - correct number of syllables). The total number of words that were produced with the correct number of syllables; an incorrect number of syllables; and the percentage of words with correct length.
- **Stress** (lexical stress correct). The total number of words that were produced with the correct lexical stress (all syllables produced with the correct stress); number produced with incorrect lexical stress; and the percentage of words with the correct lexical stress.
- **CGV Shape** (target and actual CV shape with syllable stress, boundaries, and length included). The total number of words that were produced with the correct CGV shape (regardless of the accuracy of the segments); number produced with incorrect CGV shape; and the percentage of words with correct CGV shape.
- **# Transitions** (syllable transitions correct): The total number of syllable transitions produced in the sample (total number of syllables – 1 for each word produced); the total number of segregated syllable transitions (number of intra-word pauses in target and actual); and the percentage of correct syllable transitions (correct transitions / segregated transitions + correct transitions*100).

Example:

Category	Correct	Incorrect	% Correct
Word	2	28	6.67
# Syllables	22	8	73.33
Stress	22	8	73.33
CGV Shape	5	25	16.67
# Transitions	63	9	87.5

Prosodic Level Inventories and Breakdown Tables

The prosodic level inventories and breakdown tables display prosodic level information from the sampled words. The *Prosodic Level Stress Inventory* and *Prosodic Level CGV Inventory* count the stress and CGV productions (Target→Actual) for each syllable in the sample. The *Prosodic Level Breakdown* table counts the accuracy and errors within stressed and unstressed syllables in 11 dimensions listed below. Captions for the tables will be "Prosodic Level Breakdown” followed by either “(Session)” or “(Participant)” or “(All Participants)”.

Prosodic Level Breakdown dimensions and defintions:

- **Stress correct** The number of syllables produced with correct stress in each word position.
- **Stress incorrect** The number of syllables produced with incorrect stress in each word position.
- **Full syllable addition** The number of syllables that were added.
- **Full syllable deletion** The number of syllables that were deleted in entirety (nucleus and all onset and/or coda consonants associated with the nucleus).
- **Partial syllable deletion (onset)** The number of syllables in which the onset was deleted but the nucleus of the syllable is realised.

- **Partial syllable deletion (nucleus)** The number of syllables in which the nucleus vowel was deleted (but onset/coda consonants of the syllable were realised)
- **Partial syllable deletion (coda)** The number of syllables in which the coda was deleted but the nucleus of the syllable is realised.
- **Syllable expansion (onset)** The number of syllables in which an onset consonant was added to a syllable.
- **Syllable expansion (coda)** The number of syllables in which a coda consonant was added to a syllable.
- **CGV Shape correct** The number of syllables produced with correct CGV shape (regardless of accuracy).
- **CGV Shape incorrect** The number of syllables produced with incorrect CGV shape (regardless of accuracy).

Example, *Prosodic Level Stress Inventory*

IPA Target	IPA Actual	Count
1	1	29
1	∅	1
2	1	1
2	2	14
U	U	50
U	∅	7

Example, *Prosodic Level CGV Inventory*

IPA Target	IPA Actual	Count
CCV	CV	2
CCVV	CVV	2
CGV	CV	4
CV	CC	1
CV	CVC	1
CV	∅	7
CVC	CV	4
CVV	GVV	2
GV	V	1
V	V	4
VC	V	1
VC	VC	2

Example, *Prosodic Level Breakdown*

Dimension	Un'Str Initial	Un'Str Medial	Un'Str Final	Un'Str Total	Str Initial	Str Medial	Str Final	Str Total	Total	%
Stress correct	6	21	23	50	17	19	7	43	93	91.18
Stress incorrect	6	1	0	7	1	1	0	2	9	8.82

Dimension	Un'Str Initial	Un'Str Medial	Un'Str Final	Un'Str Total	Str Initial	Str Medial	Str Final	Str Total	Total	%
Full syllable addition	0	0	0	0	0	0	0	0	0	0.0
Full syllable deletion	6	1	0	7	1	0	0	1	8	7.84
Syllable expansion (O)	0	0	0	0	0	0	0	0	0	0.0
Syllable expansion (C)	1	0	1	2	0	0	0	0	2	1.96
Syllable reduction (O)	3	3	0	6	0	3	1	4	10	9.8
Syllable reduction (C)	0	0	1	1	4	1	1	6	7	6.86
CGV shape correct	3	15	17	35	13	13	1	27	62	60.78
CGV shape incorrect	9	7	6	22	5	7	6	18	40	39.22

Segmental Level Inventory and Breakdown Tables

The Segmental Level Inventory and Breakdown table displays segmental level information from the sampled words. The Segmental Level Inventory counts the segmental productions (Target→Actual) in the sample. The Segmental Level Breakdown counts the accuracy and errors within onset, nucleus and coda word positions in six dimensions listed below. Percentage accuracy measures will also be displayed for consonants (onset (PCC-O), coda (PCC-C), and total consonants (PCC)), vowels (PVC) and total phones (PPC). Caption for the table will be “Segmental Level Breakdown” followed by either “(Session)” or “(Participant)” or “(All Participants)”.

Segmental Level Breakdown dimensions and definitions:

- **# Target** The number of target phones in each word position (O/N/C) as well as total target consonants and total target phones (total consonants + total vowels)
- **# Correct** The number of phones correct in each word position (O/N/C) as well as total correct consonants and total correct phones (total consonants + total vowels)
- **# Substitutions** The number of phones substituted in each word position (O/N/C) as well as total substituted consonants and total substituted phones (total consonants + total vowels)
- **# Distortions** The number of distorted phones in each word position (O/N/C) as well as total distorted consonants and total distorted phones (total consonants + total vowels)
- **# Epenthesis** The number of added phones in each word position (O/N/C) as well as total added consonants and total added phones (total consonants + total vowels)
- **# Deletions** The number of deleted phones in each word position (O/N/C) as well as total deleted consonants and total deleted phones (total consonants + total vowels)
- **% Correct** The percentage of correct consonants (onset, coda, and total), vowels, and phones.

Example, *Segmental Level Inventory*

IPA Target	IPA Actual	Count
p	p	5
p	b	1
p	f	1
p	∅	2
b	b	6
b	∅	1
t	p	1
t	t	8
t	∅	4
d	d	2
k	s	1
ɡ	ɡ	1
f	f	3
s	∅	2
h	h	2
ʤ	∅	1
m	m	10
m	n	2
n	n	10
l	l	3
l	∅	6
ɹ	ɹ	1
ɹ	w	3
ɹ	∅	1
j	h	1
j	j	1
j	∅	2
i	i	3
u	u	2
ɪ	ɪ	8
ʊ	ʊ	3
ʊ	ʊː	1
ə	i	1
ə	u	2
ə	ə	37
ə	ʌ	2

IPA Target	IPA Actual	Count
ə	æ	1
ə	∅	9
ɛ	ə	1
ɛ	ɛ	8
ʌ	ʌ	2
ɔ	ɔ	2
æ	æ	7
æ	æː	1
æ	∅	1
a	a	9
ɒ	ɒ	4
∅	t	1
∅	r	1
∅	i	1

Example, *Segmental Level Breakdown*

	Onset	Nucleus	Coda	Total Consonants (O +C)	Total Phones
# Target	93	105	25	118	223
# Correct	57	92	17	74	166
# Substitutions	27	9	1	28	37
# Deletions	9	4	7	16	20
# Distortions	0	0	0	0	0
# Epenthesis	0	1	2	2	3
% Correct	61.29	86.79	62.96	61.67	73.45

WAP Tables

WAP Tables are produced for each production and contains information supporting the Word, Prosodic and Segmental Level Breakdown tables. Information is printed horizontally in a table with four columns for each table level: (1) Word Level, (2) Prosodic Level, and (3) Segmental Level. Table headings for each will be: (1) Whole Word Measure, Target, Actual, Match (i.e., are Target and Actual identical according to each word level measure. If so, True; if not, False), (2) Prosodic Alignment, Target, Position, and Description, and (3) Segmental Alignment, Target, Position, and Description. Caption for the table will be “Orthography /IPA Target/ ↔ /IPA Actual/”.

Word Level

Word Level Breakdown categories:

- **Word** (whole word accuracy). Did the Actual IPA match the Target IPA?
- **# Syllables** (word length correct - correct number of syllables). Did the Actual number of syllables match the Target number of syllables?
- **Stress** (lexical stress correct). Did the Actual stress pattern match the Target stress pattern?

- **CGV Shape** (target and actual CV shape with syllable stress, boundaries, and length included). Did the Actual CGV shape match the Target CGV shape?
- **# Transitions** (syllable transitions correct). Did the Actual number of transitions (total number of syllables – 1) match the target number of transitions?
- **Segregated Transitions** No syllable segregations (intra-word pauses in target and actual) should be present in the Target IPA. Does the Actual number of syllable segregations match the target number of transitions (Target = 0)? If false, syllable segregation is present.

Example:

Category	Target	Actual	Match
Word	ˈbʌtəˌflaɪ	ˈbʌɾəˌfaɪ	false
# Syllables	3	3	true
Stress	1U2	1U2	true
CGV Shape	ˈCV.CVˌCCVV	ˈCV.CVˌCVV	false
# Transitions	2	2	true
Segregated Transitions	0	0	true

Prosodic Level

- **Category** Stress/CGV Pattern
- **IPA Target** IPA Target value
- **IPA Actual** IPA Actual value
- **Position** Initial/Medial/Final (syllable position within word)
- **Description**
  - **Correct** The dimension (Target stress or CGV shape) was correct.
  - **Full syllable addition** A full syllable was added.
  - **Full syllable deletion** A full syllable was deleted (including the nucleus and all onset and/or coda consonants associated with the nucleus).
  - **Syllable reduction (onset)** The onset (or at least one consonant of the onset) was deleted but the nucleus of the syllable was realised.
  - **Syllable reduction (nucleus)** The nucleus vowel was deleted (but onset/coda consonants of the syllable were realised).
  - **Syllable reduction (coda)** The coda (or at least one consonant of the coda) was deleted but the nucleus of the syllable was realised.
  - **Syllable expansion (onset)** A consonant was added to the onset of a syllable.
  - **Syllable expansion (coda)** A consonant was added to the coda of a syllable.

Example:

Category	IPA Target	IPA Actual	Position	Description
Stress	1	1	Initial	Correct
	U	U	Medial	Correct
	2	2	Final	Correct
CGV Pattern	CV	CV	Initial	Correct
	CV	CV	Medial	Correct
	CCVV	CVV	Final	Incorrect

Segmental Level

- **IPA Target** IPA Target value
- **IPA Actual** IPA Actual value
- **Position** Onset/Nucleus/Coda
- **Description**
  - **Correct** The phone was correct (IPA Target matched IPA Actual for target phone).
  - **Substitution** The phone was substituted (IPA Target did not match IPA actual; target phone was substituted for a different phone in IPA Actual).
  - **Distortion** The phone was distorted (IPA Target did not match IPA actual; diacritic/ did not match between IPA Target and IPA Actual).
  - **Epenthesis** The phone was added (IPA Target did not match IPA actual; phone in IPA Actual was added to an empty word position '∅' of IPA Target).
  - **Deletion** The phone was deleted (IPA Target did not match IPA actual; phone in IPA Target deleted in IPA Actual creating an empty segment in IPA Actual '∅').

Example:

IPA Target	IPA Actual	Position	Description
b	b	ONSET	Correct
ʌ	ʌ	NUCLEUS	Correct
t	ɾ	ONSET	Substitution
ə	ə	NUCLEUS	Correct
f	f	ONSET	Correct
l	∅	ONSET	Deletion
a	a	NUCLEUS	Correct
ɪ	ɪ	NUCLEUS	Correct

Using the Analysis Composer

The **Analysis Composer** may be accessed from the window menu under **Analysis** > **Analysis Composer**. The composer allows for setup of canned anlyses using a combination of built-in analyses and queries available in the application. View the video below for an example using the **Analysis Composer**.

https://www.youtube.com/embed/VPBeItHbQKg

Chapter 6

CHAT Support

Topics:

- PhonTalk
- Import Project
- Export Project
- CHAT Main Line

PhonTalk

PhonTalk is a plug-in for the Phon application. As of Phon 3.1.4, PhonTalk is included with Phon and includes the following features:

- Import Project on page 226 wizard
- Export Project on page 231 wizard
- Ability to open CHAT (.cha) and TalkBank (.xml) files as Phon sessions. CHAT and TalkBank files may be included in Phon corpus folders without need for conversion. When saving the session an option will be presented to the user to save in Phon format or in the original format.
- Abililty to save Phon sessions as CHAT (.cha) or TalkBank (.xml) files using the **File** > **Save as** menu in the session editor.

Source code can be found at https://github.com/phon-ca/phontalk.

To report an issue, please go to https://github.com/phon-ca/phontalk/issues.

Import Project

Create a new Phon project from a folder of CHAT (.cha) or TalkBank (.xml) files.

Corpora in CHAT format may be downloaded from:

- Index to PhonBank corpora
- Index to CHILDES corpora

The **Import Project** wizard is available from the **File** menu in Phon.

Example

For this example we will import the CLPF corpus availabale at https://phonbank.talkbank.org/access/Dutch/CLPF.html as a new Phon project. Begin by clicking the CHAT data link and then extract the .zip file after downloading. For our example we will extract the downloaded CLPF.zip file into a folder named `/Volumes/Data/PhonBank-CHAT`.

Open Phon, choose **File** > **Import Project** from the window menu:

Select files

Enter the folder for import in the first field - you may type the filename or use the browse button. The folder name will be `/Volumes/Data/PhonBank-CHAT/CLPF` in our example. After selecting the import folder the **Project name** field will automatically be filled using the name of the selected import folder. A list of available files for import will be displayed in the file selection tree.

Enter the folder where the new project will be created in the export folder field. By default this will be set to your workspace folder. In the example below we use the folder `/Volumes/Data/PhonBank`. The project folder will include the project name, so the project folder in our example will be `/Volumes/Data/PhonBank/CLPF`.

Select files for import using the checkboxes in the file selection tree. Be default all files will be selected and any CHAT (.cha) or TalkBank (.xml) files will be detected and selected for conversion. All other files will be copied into the project folder.

Options

Click the **Next** button at the top of the wizard to view the Options step. In this step you may choose to syllabifiy and align any phonetic transcriptions found in the CHAT files for import.

Import

Click the **Next** button again to move to the import step. All selected files will appear in the table on the left and a log will appear on the right side of the window. The import process may take some time. The import may be canceled at any time using the **Stop** button at the top of the window.

When the import has been completed options to **Open project**, **Run again** and **Close window** are displayed.

To export this project back to CHAT or TalkBank format follow the instructions at Export Project on page 231.

Export Project

Export a Phon project to a folder of CHAT (.cha) or TalkBank (.xml) files.

The **Export Project** wizard is available from the **File** menu in Phon.

Example

For this example we will export the CLPF Project created using the steps found at Import Project on page 226.

Open Phon, choose **File** > **Export Project** from the window menu:

Select files

Select the project folder for export in the first field - you may type the filename or use the browse button. If the project is open, this will already be selected. The folder name will be `/Volumes/PhonBank/CLPF` in our example. After selecting the project folder a list of available files for export will be displayed in the file selection tree.

Enter the folder where the project will be exported in the output folder field. In the example below we use the folder `/Volumes/Data/PhonBank-CHAT Export`. The project name will be included as the first item in the export path for all files.

Select files for export using the checkboxes in the file selection tree. Be default all files will be selected and all Phon session files will be detected and selected for conversion. All other files will be copied into the export folder.

Options

Click the **Next** button at the top of the wizard to view the Options step. In this step you may choose to export Phon sessions as CHAT (.cha) or TalkBank (.xml) format.

Export

Click the **Next** button again to move to the export step. All selected files will appear in the table on the left and a log will appear on the right side of the window. The export process may take some time. The export may be canceled at any time using the **Stop** button at the top of the window.

When the export has been completed options to **Open folder**, **Run again** and **Close window** are displayed.

CHAT Main Line

The CHAT main line codes the basic transcription of what a speaker said. The main line includes both pronounced forms and markers. In CHAT the main line starts with an asterisk followed by the speaker ID, a colon and a tab; the remainder of the line is the orthographic transcription. More information about the CHAT main line can be found at https://talkbank.org/manuals/CHAT.html#_Toc486414395.

E.g.,

```
*CHI:   hello world!
```

In Phon, the main line is mapped to the Orthography tier. Each main line in a CHAT document cooresponds to a single record in a Phon session. Phon supports many of the same coding standards as CHAT. See https://talkbank.org/manuals/CHAT.html#_Toc486414395 for complete documentation.

Special Form Markers

The following special form markers are available in Phon. For more information about special form markers see https://talkbank.org/manuals/CHAT.html#_Toc486414397.

Letters	Category	Example	Meaning
`@a`	addition	`xxx@a`	unintelligible
`@b`	babbling	`abame@b`	

Letters	Category	Example	Meaning
`@c`	child-invented form	`gumma@c`	sticky
`@d`	dialect form	`younz@d`	you
`@e`	echolalia, repetition	`want@e more@e`	want more
`@f`	family-specific form	`bunko@f`	broken
`@fs`	filled-syllable	`uh@fs`	
`@fp`	filled-pause	`xxx@fp`	
`@g`	general special form	`gonga@g`	
`@i`	interjection, interaction	`uhhuh@i`	
`@k`	multiple letters	`ka@k`	Japanese "ka"
`@l`	letter	`b@l`	letter 'b'
`@n`	neologism	`broked@b`	broken
`@si`	singing	`lalala@si`	singing
`@sl`	signed language	`apple@sl`	apple
`@sas`	sign & speech	`apple@sas`	apple
`@t`	test word	`wut@t`	what
`@u`	unibet transcription	`binga@u`	
`@wp`	word play	`goobarumba@wp`	
`@x`	excluded words	`stuff@x`	excluded
`@z:*`	user-defined code	`word@z:rtfd`	any user code