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tonica *fugata*

Chord theory
Music theory
Composition

Version 13.0

capella-software

tonica *fugata*, Version 13.0

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Introduction

Welcome to tonica *fugata*! The name tonica exemplifies a German tradition of computer supported chord theory, music theory and composition since 1990.

tonica *fugata* is able to read, display, play back and print all file formats of previous versions since version 3.0. MIDI and CapXML files can be read as well.

First things first

In this user guide you will find answers to almost all questions regarding the use of tonica. It is available with identical content as pdf file and as online help system (also see page 15). But how to find an answer?

This is how you find answers to questions about tonica

1. **Search the alphabetical index** at the end of this user guide for keywords that relate to your question. In the help system you will find it in the tab bar on the *Index* tab. We have taken great care to list each problem under a number of different keywords.

2. Please do not give up your search if you cannot find a specific keyword. Look for alternative keywords. You can look for:

   - *Synonyms,* that is other words for the same keyword *(e. g. ambitus* instead of *voice range),*
   - *Generic terms* (e. g. *harmony* instead of *tonic*),
   - *Technical terms/foreign words,* e. g. *tempo* instead of *speed* or *Key* instead of *change Major,*
   - *Similar terms,* that is words that do not have the same meaning but that belong to the same context *(e. g. harmony* instead of *function).*

3. If the keyword search is **still unsuccessful** you should try the content tab in the help system to find a relevant chapter.

4. You can do a full-text search in the help text. tonica's help system is organized as a single file, so you can search the whole text by typing ⌘+F in the help text window. It must have the keyboard focus, so simply click into it.

The keyword index is especially helpful when you are looking for a quick answer. When you are not working under time pressure we strongly recommend that you browse this user guide in order to learn where to find answers when you need them later.

How to find music examples mentioned in the user guide

This user guide often refers to music examples which are available in tonica as files, e. g. `12-61.tca`. You will find these examples as follows:

1. Open the start screen. If you already have files open, you must close them.
2. Click the Tab **Examples** above the area on the right side of the start screen. This opens a list of folders and files installed with tonica *fugata*.
3. Open the folder **Example**. Here you will find the file mentioned in the text, e. g. `12-61.tca`. Open it with a double-click.

What is new in tonica *fugata* 13

The most important innovation in tonica *fugata* 13 is that the software is now not only Windows software but also works on Macintosh computers with the Apple macOS operating system. This also involves a reimplementation of user interface and note display which meets every need (see page 17).

Start screen

When starting tonica a friendly start screen welcomes you with...

- **Information and news:** You will see at once when there is something new and have direct access to our website and several service offers.
- **Open file:** You select between existing files (including preview) or new score.
- In **Templates** you will find provided templates for common instrumentations as well as those you create yourself over time.
- The **Examples** are particularly relevant when you are a tonica beginner. Here there also is a preview.

Updated note display and note entry

Note display and note entry have been adapted to capella with the following advantages:

- Modern, ready to print note display
- Any number of staves, up to two voices per staff, adjustable via the SystemTemplate

- Note entry options analogous to capella with some restrictions (see page 48)
- Improved rhythmic playing in analogous to capella
- Easy exchange of notes between tonica and capella via clipboard

Enhanced composition and analysis algorithms

In previous versions tonica was restricted to four voices. With the updated note displayed algorithms have been extended as well to more than four voices. Now you can compose for example an eight-part score, a five-part fugue or a canon with six voices.

Sound fonts

You can now select the playback sound independent of your sound card. tonica supports loading of sound libraries in sf2 format which are provided partially free of charge on the Internet. Also see page 131.

Contextual presentation of composition assistant

- C**omposition and analysis preferences** are displayed depending on the selected function and can be changed directly.
- I**nput and evaluation of harmonies** is also directly possible here.

System template

Like in capella the score structure can be established in the SystemTemplate. Changes in the structure are immediately reflected in the score.

A word about copyright

During the last years the trend to complement classic desktop software such as tonica by less complex, easily available offers and apps has been reinforced. The fact that these apps are often offered at a rather low price frequently involves a drop in prices which in many cases does not meet the accomplishment of the program authors. This is especially valid for complex programs such as clever software around music notation. Thus many years of development work were invested into the fundamentally revised version tonica *fugata* 13.

capella-software always tried to offer their authors‘ products at prices that are affordable for non-professional musicians as well as acknowledge the authors‘ achievements. We intend to continue this pricing policy in the years to come. By loading a trial version you have the option to try out tonica with full functionality for a limited period of time. We ask you not to pass on your personal license number. This will enable us to continue

research and development of tonica and to maintain our affordable pricing policy in the future. Thank you!

System requirements

In order to use tonica *fugata* 13 in the Windows world you need Windows 10, 8.1 or 7. In the Macintosh world it's a Mac with macOS 10.10 (Yosemite, 2014) or younger.

Install, update, uninstall

New installation

When you have to reinstall tonica, for example because you have a new computer, your license will remain valid. Please make sure you have your serial number at hand.

Installation from DVD: Proceed as with first installation. If needed, read the installation instructions which you received together with the DVD. We recommend that you update the software directly after installation, see below.

Installation via Download: Load tonica *fugata* from our website. Pay attention to the version number: It has to fit your serial number. Should your version be outdated and you do not find it for download on our website, please contact the capella-software customer service. We will provide you with the installation package for software which is not too old.

During installation a warning message appears which you have to confirm to continue. You have the option to decide about the program directory into which tonica will be installed.

For network administrators: To install tonica in an automated process (without installer surface) see page 138.

Update tonica

In today's software world it is common to make bug fixes and program updates available via the Internet. tonica provides an automated procedure.

How to update tonica automatically

1. Select Help → Online update...
2. In the dialog box select an update interval (daily, weekly, monthly, never).
3. If you wish, press the button *Search now*.

4. Close the dialog box with OK.

You can also use tonica on a computer without Internet connection. In this case, automatic updates and more services will not be available.

Deinstallation

Simply drag the app icon from the program folder to the trash.

Demo version

In the demo version you cannot save or print files. The export functions are blocked. Composition and analysis is limited to four measures.

The help system

tonica can be largely used without user guide. However, maybe you need to look up musical terms, keyboard commands or the multiple playback options every once in a while. The help system offers three different access options:

Via Help → Content you start the help system with open **table of contents**. You find it in the tab bar in the tab *Contents*.

The alphabetical **keyword search** can be found in the *Index* tab. Via Help → Keyword search you can directly access it from the program's main menu. When you select an index entry (or click on a cross-reference) you will always get to a (blue) heading. The search term can be found in the text range between this and the next blue heading. When you are searching a less common term in the index, you may find only a synonym or generic term in the text range, e. g. „harmony" instead of „tonic".

Via Help → PDF user guide you open the **user guide** which contains the same information as the help system but can be printed as well.

When tonica is new for you

You will have the best start working through the second chapter (see page 29). Here you will be introduced to the most important elements and features of tonica while executing a specific task.

More training assistance can be found on our website.

Important terms

D^7 – T or V^7 – I or C^7 – F?

Several methods of describing chords are built into tonica *fugata*. Function Theory which is primarily used in Germany, Roman Numeral method primarily used in Great Britain and Chord Theory. Should you want to compose in Jazz style we recommend that you make tonica *fugata* display the harmonies in Jazz notation according to Berkeley standard.

This user guide also includes a basic chapter about figured bass notation (see page 139).

The structure of a tonica score

With the following terms we describe the basic structure of a tonica score (this is what we call documents written with tonica):

- A *score* consists of one or more systems which are automatically allocated to pages. Each score has one key and one time signature.
- A *system* consists of one or more staves.
- A *staff* consists of one or two independent voices. Each staff has one clef which is valid for all systems of the score.
- A *voice* is a compilation of *note objects* (notes, rests, fixed barlines). Each voice has at most one note at a time (no chords).
- The *harmony staff* below each system consists of a sequence of *harmonies* (i. e. harmony symbols in a certain chord notation, e. g. numerals in Roman numeral notation) with a fixed duration.
- Each harmony in the harmony staff refers to a key which may differ from the key signature of the score. This is called a *modulation*.
- Each score includes a *title* and *page numbers* the positioning of which can be changed.
- For each note or rest a *fermata* can be added which moves with its note when the score changes. Fermatas are used to mark important sections of the melody (so-called phrases).
- *Additional notation elements* are available: Beams, ties, triplets, various barline types and voltas.

General information for working with the program

User interface

This user guide assumes that you are basically familiar with your operating system. Therefore you will find little information about basic functions, e. g. program start, opening of a file etc. in here.

Your personal tonica folder

On the very first program start tonica will create your **personal tonica folder**. You should save your own work in this folder.

The personal tonica folder can be found in Windows 10, 8.1 and 7 as well as in OS X in the „Documents“ folder. It is named „tonica 13“ and contains several subfolders.

Works or preferences from previous program versions (e. g. „tonica 12“) can be transferred to the new tonica folder.

Please note: The folder already includes some files and folders (e. g. the folder „networks“). Do not modify them as they are used and may be adapted by tonica!

Set up tonica for several user accounts

When you log in on your computer with a different user account, another new personal folder will be created automatically on the first start of tonica.

The start screen

When you start tonica the first thing you will see is the start screen. Here you can start a new file, open an example, select a template or access information. When clicking once on a file from the „Recently opened“, „Templates“ or “Examples” list a preview will be displayed on the right side. Double-clicking opens this file.

The main window

The main window is divided into two sections. The view depends on which mode you are working in. There are two modes: Mode *Setup* and mode *Compose*. You can switch between these modes by clicking the buttons at the center of the symbol bar above.

The mode *Setup* is activated automatically when you open a new empty file or a template. Here the main window is composed of the system template on the left and the score on which you are working. In mode *Setup* you establish the score structure with the SystemTemplate and you enter the notes which will be used for your composition (e. g. a melody in the upper staff/voice).

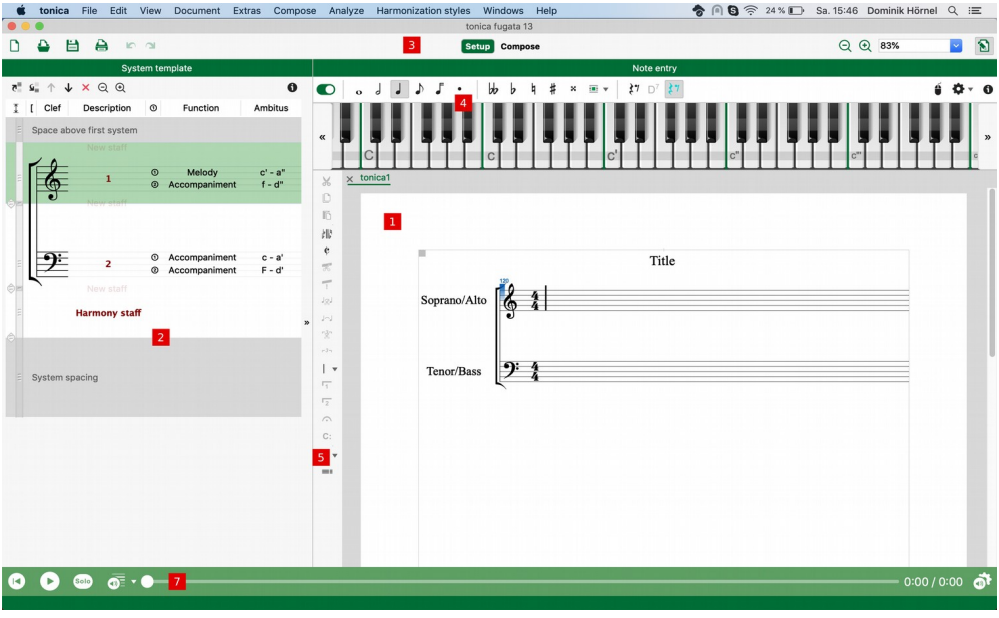
Switch to mode *Compose* when you have established the score structure and entered the notes used for composition. The mode *Compose* is activated automatically when you open an existing score or an example file. Here the main window is composed of the score and the composition assistant on the right.

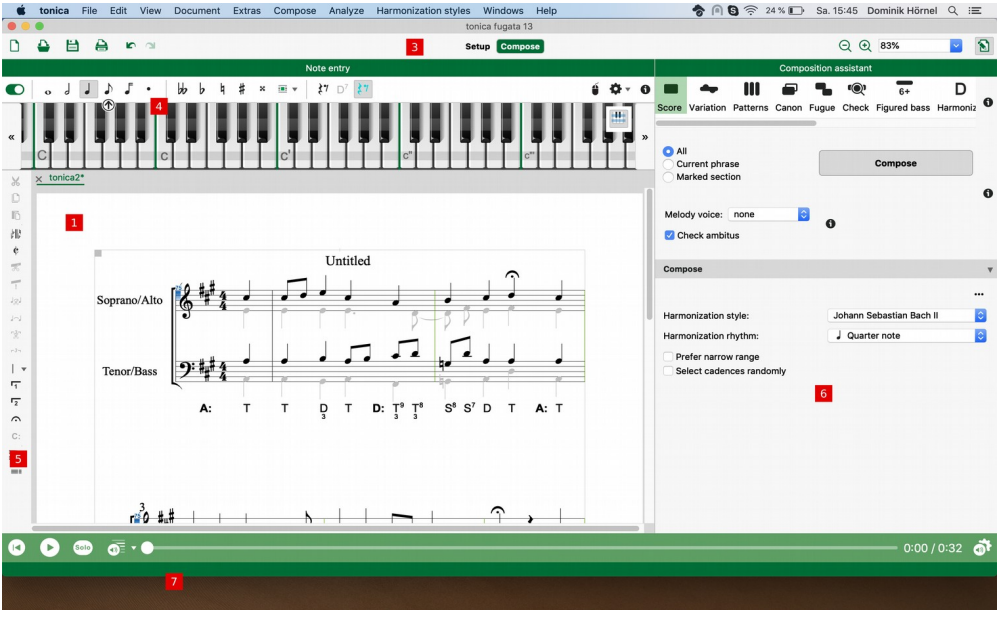
The composition assistant provides all composition and analysis functions available in tonica. In the upper area you select the desired function. The content of the lower area adapts to the selected function.

The mouse piano with all preferences for note entry is positioned above the score.

At the lower edge of the window you will find the playback bar, at the top edge menu and toolbar as usual.

Via the View menu you can open further windows in the main window or close existing ones. We have taken great care to position these windows in a way that supports your work flow. Please try it out before changing anything.





1. In score view you see your score in the desired zoom size and generally in Work mode. The blinking note cursor is positioned in front of the first note.

2. The area on the left shows the SystemTemplate.

3. The symbol bar contains only the most important standard commands and the two buttons for switching the mode. All specific commands can be found in the other areas, see below.

4. All commands for note entry are positioned in the center above the mouse piano. Here you also enter harmonies in the harmony staff with the duration of the selected note value.

5. The note editing commands are located on the left edge of the score view. Here you can also enter modulations (key changes in the harmony staff).

6. The view of the composition assistant in the area on the right changes depending on the function selected above. If the cursor of the score is located in the harmony staff, you can enter, change and evaluate harmonies in the right area.

7. The playback bar with slide control for playback position starts and stops playback and offers further preference options.

Tool bars

With the help of tool bars you can carry out important commands with one mouse click. Note entry, SystemTemplate, note editing area and composition assistant have their own symbol bar.

Tooltips

When you move the mouse over a symbol (don't click!) a text appears which explains the symbol or the alternatively applicable keyboard command. Please pay attention to these tooltips, they can be very useful.

Menus

For the sake of brevity we always state the menu command in this user guide when several methods can be applied. To make things clearer, menu commands are stated in the form Menu → Command.

Example: „Select Help → Online Update...“ means: „Open the *Help* menu and select the entry *Online Update*.

When you find that you often use a menu command, observe the following information in the menu command to shorten the process:

Symbol to the left of the menu command: You will also find this tool in the tool bar, the Edit area or playback bar. In future you can execute this command by clicking on the corresponding symbol.

When a symbol or menu command looks pale and triggers no action it is not active. As an example, this can be the case when you need to mark notes before the action can take place.

Text to the right of the menu command: In future you can simply start this action with the stated keyboard command.

The **three dots** behind the menu command tell you that this command does not start an action right away but opens a dialog box where you can provide details (or cancel).

Mouse wheel

When you use a mouse with a wheel between the buttons you can control the vertical scroll with it.

With pressed ⌘ key you can change the zoom with the mouse wheel.

Letter key combinations

Letter keys which are not used for note entry have no function (except when entering text). To facilitate use, some of these idle letter keys – similar to the Shift key – are used in combination with other keys. In this user guide this is abbreviated with a plus sign between keys just as combinations with ⇧, ⌘ or ⌥.

Example: „Press down Z+←“ means: „Keep the key Z pressed down and additionally press down the key ←“.

Dialog boxes

Hints. In some dialog boxes you will find additional information. It is hidden behind the Info symbol. It works like tooltips: Move the mouse over them, don‘t click.

Wherever you are entering **text in dialog boxes**, you can exchange these with other programs via the clipboard: Marked text ranges are copied to the clipboard with ⌘+C. With ⌘+V you paste the marking in a text editor by the clipboard content.

Undo command

You can undo and redo commands. Among other things this is useful when tonica has composed a piece (e. g. a score, a canon or a fugue) and you want to let tonica recompose the piece with different preferences in order to get a different result.

For **single commands** select Undo and Redo in the Edit menu.

When you open the Edit menu, you will see short descriptions behind the commands Undo and Redo. In an original or just opened or saved score it will read „not possible“.

The same short descriptions appear in the tooltips of these symbols in the standard symbol bar.

You can undo or redo **several commands** with Edit → Edit log... In one dialog box all possible commands are listed.

What can be undone? Actions which change the state of a score can be undone (even when they have been saved before). tonica logs your actions separately for each score. When you close a score, the protocol is deleted.

What cannot be undone? Actions which do not have an effect on the score.

Examples: You are cutting a marked area (Edit → Cut). This has two effects: The content in the clipboard will be replaced by the marking, and the marking will be deleted. As the clipboard is not part of the score, only the second part of this action can be undone. The old clipboard content is lost.

View preferences such as zoom or switching to Edit mode have no effect on the score content, therefore the undo command cannot be applied.

Open a score

You can open digital score files in the tonica format, that is .tca. Furthermore, MIDI files (.mid) can be read. More about these file types in page 135.

How to open a file

Here you have several options:

(a) Select File → Open... A standard dialog box to open a file appears..

(b) Mark the desired score in the Finder and drag it with the mouse in the main window („drag and drop“).

(c) Start tonica by double-clicking the file name in the Finder.

(d) For experts: Start tonica by handing over the file name as parameter in the command line.
Example: `open -a "tonica 13.app" example.tca` starts tonica and opens the score `example.tca`.

(e) When you often work with the same file you can create a link, for example to the desktop. When you double-click the symbol tonica will start and the file will be opened.

Save score

Please apply the commands File → Save and File → Save as... which you know from other software.

Score import and export

capella files (.capx) and MIDI files (.mid) can be imported with File → Open... and saved in the current tonica format. In addition you can import individual voices from a capella file into a tonica score template with File → Import....

In File → Export you also have the option to save the file in capella format (.capx), MusicXML format (.xml) or MIDI format (.mid).

For more information about export see page 135.

Print

After having clicked on File → Print... the print dialog box appears.

Via the switch panel bottom left you can also create a PDF file as in other software.

Score views

All scores are organized in a tab bar. For each opened score you will see a tab, so you can easily switch between different scores.

When several scores are open you can click on a score tab with the mouse and drag it to the score: Depending on the position, the right or bottom part of the window will show a color. This coloring shows you how the window will be split when you release the mouse button at this position.

In the split window you can look at both scores next to each other or one below the other. In each of these windows you can edit a score in different views and any zoom levels. Also, you can shift the dividing line between the windows and open a third or fourth one.

When you click on a score tab and shift it to another window the score will move to the background.

Zoom

You can select the scale of the screen display in the list box of the symbols list. Instead of selecting an entry in the list box you can also enter any scale from 10% to 500% in the text field above.

In the menu, select View → regular size, reduce, enlarge.

With ⌘++ and ⌘+− you can quickly change the zoom in 10% steps. This can also be done with the mouse wheel by clicking the ⌘ key.

In doing so you are *not* changing the print size of the notes.

Work mode

Normally tonica will display your score in Work mode (print will be in black unless you select a different color). In View → Work mode you can switch off Work mode. Then you will see the score exactly as it will be on paper. However:

In Work mode you will see important additional information which is not apparent from the score display. Therefore it is recommended that you always select Work mode when editing a score. The following information will be displayed in color:

- *Inactive voices:* These are displayed in a pale color. This helps to keep the overview in staves with two voices.
- *Triplets*
- *Exceeded barlines*
- *Filling rests*
- *Tempo setting*

System template

With View → System template you switch the *System template view* (see page 61) on or off. The system template is displayed in the area on the left. We recommend that you always have the system template displayed, as in there you can see and edit multiple score properties – for example spacings, names or orchestration. Several sound properties are selected here. The system template can be displayed in broad or narrow view. In narrow view not all properties can be reached and edited.

The two columns *Function* and *Ambitus* are important for composition, see page 64 and page 64.

Cursor-controlled navigation

The cursor can be easily moved with the arrow keys on the keyboard. The effect of the single cursor keys is similar to those known from word processing programs. If necessary, the displayed screen section is adapted in such a way that the cursor always remains visible.

Cursor navigation in the score

Arrow keys to the right → and left ← move the cursor to the next or previous note object of the current voice, the arrow keys down ↓ and up ↑ move the cursor to the next or previous voice. This voice can be located in the same staff or in the same system, otherwise the first voice of the following system or the last voice of the previous system will be headed for. With the ⌘+← and ⌘+→ keys you will reach the beginning or the end of the current voice. When the cursor is already positioned at the end of a voice it will be moved to the beginning of the corresponding voice in the next system with the → key. In the same way it will move to the end of the corresponding voice in the previous system when it is positioned at the beginning of a voice and the ← key is pressed.

With pressed ⌥ key the cursor will move an entire measure to the right or left, and up or down in the corresponding voice of the next or previous system. The ctrl+↖ and ctrl+↘ keys move it to the beginning or the end of the score.

In an empty staff the cursor cannot be moved to the right unless the staff is filled with invisible objects. These might, for example, be automatic filling rests. Switch on Work mode (see above) to make them visible.

The composition assistant

Composition assistant structure

Switch to mode *Compose* (button in the center of the main symbol bar) to use the composition assistant. The composition assistant will be displayed in the right area of the main window. It is composed of three areas:

- In the toolbar on top all composition and analysis functions available in tonica are displayed. The icons may be selected and scrolled horizontally. By double-clicking an icon the corresponding function is executed immediately.
- Below the toolbar there is a fixed area where you can define general preferences for composing or analyzing and start composition or analysis.

- Below there is another area which shows preferences depending on the composition or analysis function selected above. These preferences will influence the composition or analysis result. If the cursor of the score is placed in a harmony staff, this area will show properties of the harmony in front of which the cursor is located (see page 48).

How to use the composition assistant

- First enter the notes (e. g. a melody or a subject) that shall be used for composition or analysis.
- Select the desired function in the toolbar of the composition assistant.
- Check the general preferences (composition section, melody voice, check ambitus).
- Push the button *Compose* or *Analyze*. Alternatively you can start the composition or analysis directly by double-clicking the icon in the toolbar.
- Below the general preferences there are many more preferences which influence the composition or analysis result. If you have selected the composition function *Score* for instance, you can change harmonization style and harmonization rhythm. In some of the sections clicking on **...** allows you to change additional preferences in a dialog.
- After having changed the preferences you can undo the result with Edit → Undo and again push the button *Compose* or *Analyze*.

Playback

For playback the point of orientation is the note cursor (see page 25). Start playback with a click on the respective icon in the playback bar and the cursor will start to move in accordance with the playback progress through the score.

Display of temporal position

The slide control in the playback bar always shows the cursor position with regard to the entire playing time of the score, including all repetitions and repeats. To the right of the slide control, current position and entire playing time are also displayed numerically. You can move the slide control and thus indirectly move the note cursor. This way you can also follow repetitions.

Determine tempo

You can set the tempo for the active score with Document → Tempo....

Play back notes

You can play back any number of voices existing in the system template. Set the voice filter or solo button, see below.

How to play back your notes

1. Make sure that you set the correct tempo for all systems and that you have selected the correct instruments and volumes in the system template.
2. Position the cursor where you want to start playback.
3. Select the voices to be played back:
    - When you want to play back only the cursor voice, click on the *Solo* icon in the playback bar.
    - When you only want to play back selected voices, first select the voice filter in the playback bar and mark the desired voices (Here you can also deselect the cursor voice. However, with the solo button it would still be activated in this situation, and the other selected voices would be muted.).
4. Then click the play button in the playback bar.
5. End playback by clicking the stop button in the playback bar.
6. Playback will be continued in the following system as long as you do not end it.

Playback options

With Extras → Sound configuration... you can set preferences for playback and if needed you can load sound fonts.

The capella-tune dialog offers numerous options for playback. For a detailed description see page 104.

With the button *Add/Remove…* in the *Playback Devices* tab you switch to the Internet to load additional sounds.

No sound during playback?

If you hear nothing there can be different reasons. Even the volume is dependent on several different preferences. If you hear nothing or the volume is too low please verify the following:

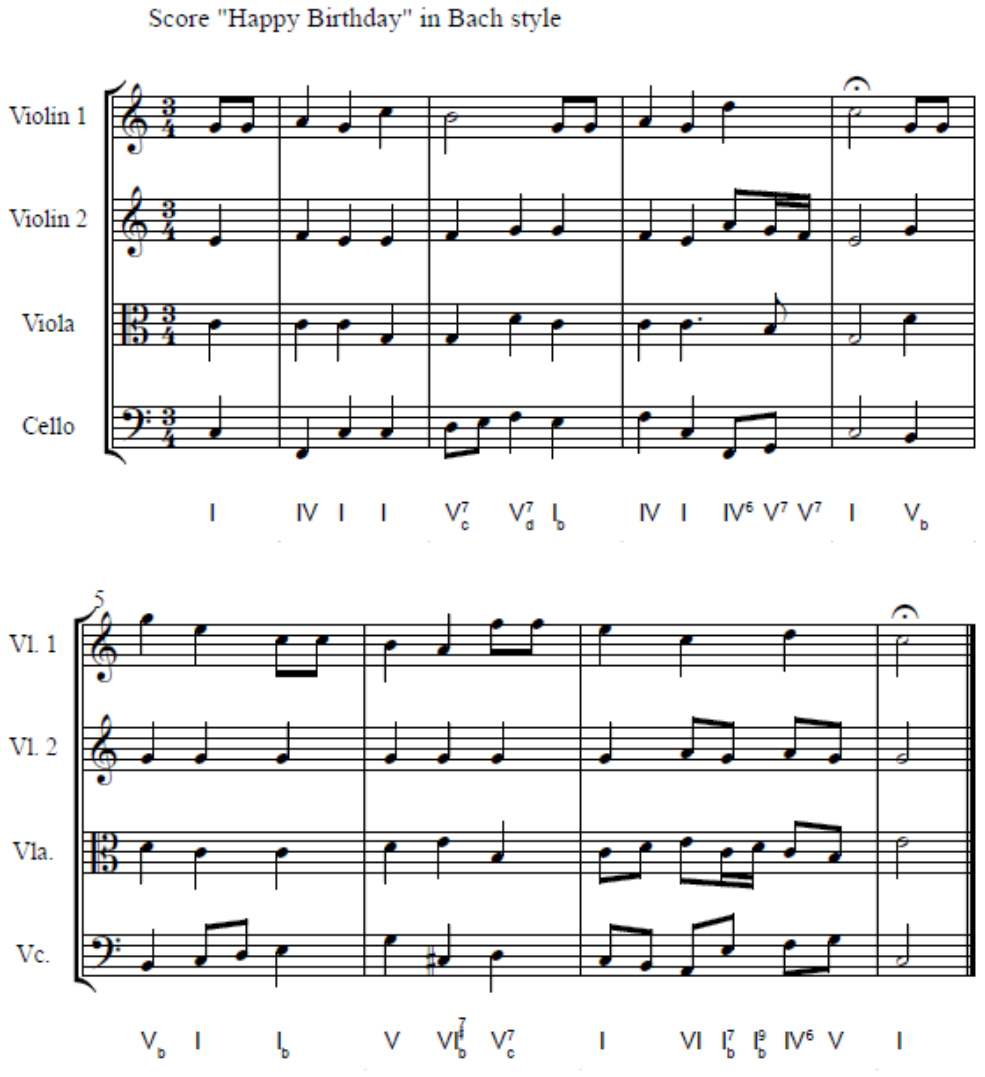
- the volume setting of your speakers (e. g. volume control on speaker),
- the sound settings of the system,
- individual instrument preferences in the system template (View → System template),

- preferences in *capella-tune* (see page 104) on the *Instruments* and *Dynamics & Rhythm* tabs.

Beginning a project

With the aid of a simple project, this chapter makes you familiar with important functions. While working through this chapter in the help menu you can easily switch between tonica and Help by clicking in the Dock. If your screen is large enough you can also align tonica and Help next to each other.

Our aim is to compose a score and a fugue on „Happy Birthday“ for string quartet.



Here you see a system consisting of four staves. All four staves contain only one voice. More explanations of the terms note, voice, staff and system can be found in chapter page 16. The melody of „Happy Birthday“ is in the top staff (violin 1). The harmony staff below the notes shows the harmonies underlying the score.

Select score template

Open tonica with the start screen. There already exists a template for string quartet which you can select in the *Templates* tab. Double-click the template `String quar-`

`tet.tca` or select the template and click the button *Use score template* to open the template.

Note entry preferences

Before starting to enter our melody we have a look at some preferences.

Please open the TONICA FUGATA menu and select the PREFERENCES... command. The dialog box will appear. In the section NOTE ENTRY click on COMPUTER KEYBOARD.

In the following we will not torment you with such long descriptions any more. Instead, we will shorten instructions like this: „Select TONICA FUGATA → PREFERENCES... → NOTE ENTRY“.

- In the section **Note values** you will find two different keyboard layouts for selection of the current note value. For this introduction „normal“ should be selected.
- In the section **Notes** you can select in the top drop down list which keys you want to use to enter the pitches. We will work with CDEFGAB.

More note entry preferences (not relevant for this project) can be found in KEYBOARD (MOUSE/MIDI).

For our project we will use note entry with the computer keyboard. We will not use note entry with the mouse. Please deactivate mouse note entry by clicking the *Mouse note entry* icon on the right side of the note entry toolbar if applicable.

If you need more information, use the index at the end of this user guide (or in the *Index* tab in the Help system).

Set key and time signature

Before starting with note entry we set key and time signature of the score. For the selected template the desired key C major is predefined. We still need to change the time signature from 4/4 to 3/4.

Open DOCUMENT → OPTIONS... → TIME SIGNATURE, select „3/4“ as time signature and confirm with OK.

Enter notes

Make sure that the cursor is positioned behind the time signature in the top staff. If it is not, simply click on the desired spot.

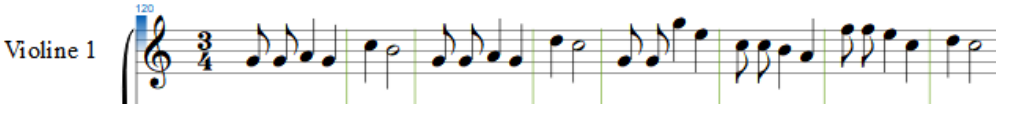
Now click on: G G A G C H G G A G D C. Position the cursor at the beginning again (mouse click or ↖) and start playback via the playback bar at the bottom margin of the window. You are now hearing the beginning of the melody „Happy Birthday“, but rhythm and octave positions are wrong.

To correct the first note value, position the cursor in front of this note and click on <. With each click on this key the note value shortens. If it is not dotted, it switches to half the value with dots. If it is dotted, then the dot will be deleted. To change the quarter note into an eighth you will have to click on < again. With > you can extend note values accordingly. Now try to correct the second note value.

Instead of correcting all note values this way, lets start again: Mark all entered notes by pressing down the left mouse button to the left of the first note (but to the right of the time signature) and dragging it behind the last note. Now click on ⌦ to delete the marked notes.

The current note value was quarter. To change it to eighth, click on 8. Now type G for the first note. The second note is also an eighth note – therefore type G again. The next notes are quarter notes. Therefore type 4 and then A G. The fifth note is an octave higher than the preceding notes. When you keep pressed ⇧ on the right notes are entered one octave higher. When you keep pressed ⇧ on the left notes are entered one octave lower – therefore type right ⇧+C. The sixth note is a half note in the original octave – type 2 B.

Now enter the remaining melody notes as follows (always use right shift): 8 G G 4 A G ⇧+D 2 ⇧+C 8 G G 4 ⇧+G ⇧+E 8 ⇧+C ⇧+C 4 B A 8 ⇧+F ⇧+F 4 ⇧+E ⇧+C ⇧+D 2 ⇧+C



Green and red barlines

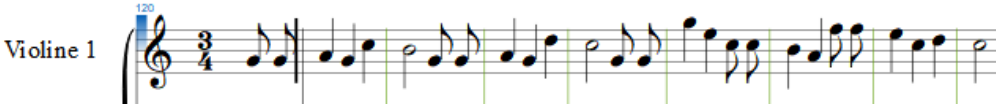
Now the melody „Happy Birthday“ is notated correctly. But you surely realized that barlines are wrongly positioned. This is because we have not considered the quarter note upbeat.

Before we start correcting this, another small experiment: Position the cursor in front ofthe first note and type 8 Space to enter an eighth rest. tonica automatically sets barlines when a measure is filled. However, we are having a problem here: There are more than four eighths in the measure. Now select View → Work mode if it is not yet active. In Work mode tonica does not display the print colors but uses signal colors to draw your attention to issues otherwise not visible. Now our barline is red. This shows that the measure is incorrectly filled.

Delete the wrong eighth rest (for example by positioning the cursor behind and typing ⌫). Now the next barline is green!

Upbeat

Instead of inserting rests in the first measure we want to notate an upbeat: Position the cursor behind the second note. Click on the arrow next to the *Barlines* icon in the note editing toolbar and select the first icon in the horizontal bar – a plain barline. Now our notes look like this:



Now move the cursor with the arrow keys through the whole voice. You will realize that the cursor stops to the left and right of the first barline but ignores the second barline while moving. The fixed, black barline is an object (such as notes) which you can for example mark and delete. The second green barline is an automatic barline and does not function as an object does.

For the upbeat change to take effect in all systems of the score, click the *Reformat score into systems* icon in the note editing toolbar or type ↵. This will trigger reformatting of the score into systems. The upbeat set in the first system is adopted in all subsequent systems.

Set fermatas

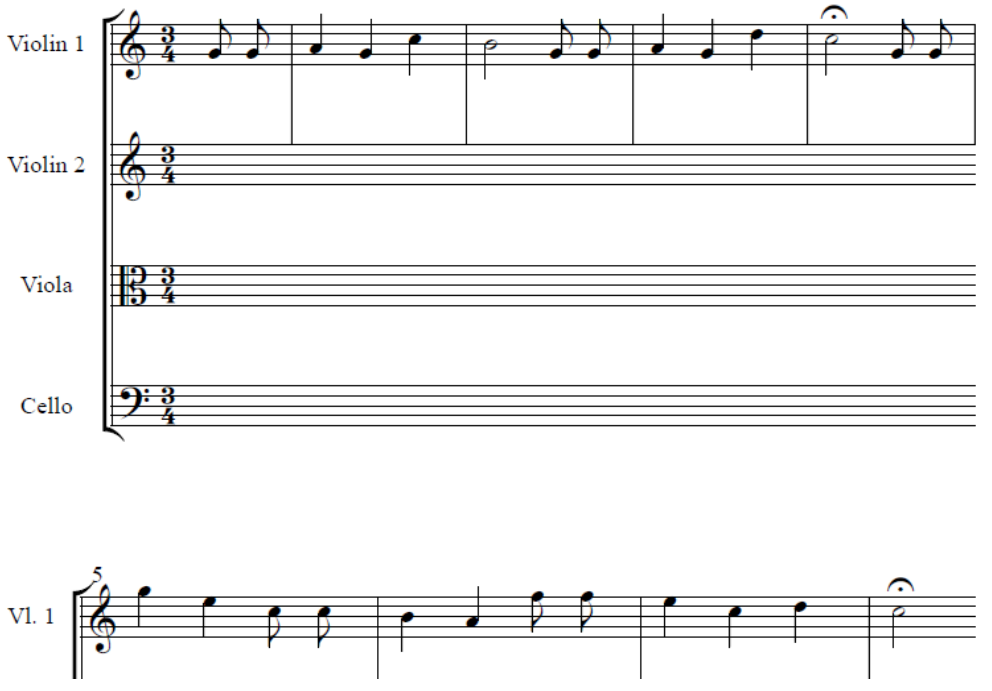
After note entry setting fermatas is an important step to mark important sections of the melody (so-called phrases). tonica considers phrasing information during automatic score composition, e. g. when adding cadences at phrase ends. You will generally get better results when setting fermatas in a sensible way.

The determination of phrases is ambiguous. If phrases are not notated in the melody there are several alternatives to divide a melody into phrases. One criterion for building phrases is the measure number – „classical“ melodies are often divided into phrases which are two or four measures long. Also long notes or rests often indicate phrase ends. As a rule of thumb: Put fermatas where you usually „take a breath“ when singing or playing the melody.

In our melody „Happy Birthday“ we set two phrases: One for the beginning of the melody (until measure 4) and one for the end (until the end of measure 8). In a slow tempo one might also divide the melody into four phrases being two measures long, but we will stick with two phrases in our example.

Place the cursor before the first note in measure 4 and click the *Fermata* icon in the note editing toolbar. A fermata is set for the note behind the cursor. To delete a fermata select it and type ⌫. Now set a fermata for the last note of the melody in measure 8.

Now notation of the melody is complete and we can start composing.



Composing

Before starting with the composition we switch to *Compose* mode by clicking the *Compose* button in the main symbol bar. The system template on the left closest, and the composition assistant appears on the right side.

Bach style score

We first let tonica compose a score for the melody in the J. S. Bach style.

Select the function *Score* in the toolbar of the composition assistant. Below the toolbar select „All“ as section to compose and click the *Compose* button next to it. It is even easier with a double-click on the *Score* icon or by typing F5.

As as result you get a complete four-part score in Bach style. Play back the result by clicking the play button in the playback bar.

The colored harmonies in the harmony staff below the systems indicate that tonica has inserted cadences at both phrase ends. If you hover your mouse over one of these harmonies, a tooltip appears displaying which composition the cadence is from and which properties it has. The cadence information will be removed when you continue editing the score. See page 102 for more information.

Now double-click the score title and change it to „Score "Happy Birthday" in Bach style“. Place the cursor behind the last note of the melody and select a *Final barline* from the *Barlines* bar in the note editing toolbar. Now you have created the music example shown at the beginning of this project.

If you want to try other cadences you can check the *Select cadences randomly* option in the *Compose* section of the composition assistant. Repeatedly press the *Compose* button. After each click a new score with different cadences is composed.

You will get access to more preferences by clicking on **…** in the right upper corner of the *Compose* section. A dialog will open showing more composition preferences.

Listen to the results and choose the version that suits you best.

Reger style score

One special feature of tonica is that the program has learned the harmonization of melodies in various styles from examples of a composer or music epoch. Select the „Max Reger“ style from the *Harmonization style* combo box in the *Compose* section. Note that this also changes the harmonization rhythm below from „Quarter note“ to „Eighth note“. The harmonization rhythm „Eighth note“ is preset for the Reger style and creates a much more complex style compared to the Bach style.

Deselect the *Select cadences randomly* option and click the *Compose* button. You will get a Reger style score.

Play back the result. If the tempo is too fast, open Document → Tempo... and set the desired tempo.

Fugue on „Happy Birthday“

In a similar way all tonica composition and analysis functions can be used. If you want to know more about a specific function, select it in the toolbar of the composition assistant and hover the mouse over the info button right next to the toolbar. Here you get information about the function and its usage as well as a link to further details in this help.

At the end of this project we will now create an instrumental fugue on the „Happy Birthday“ melody. The entire melody is a bit too long as fugue subject. We will therefore use only its first phrase for the fugue composition.

Place the cursor in front of the first note in the first staff. Then select the function *Fugue* in the composition assistant toolbar. Below select „Current phrase“. This way the first phrase of the melody is used as a fugue subject.

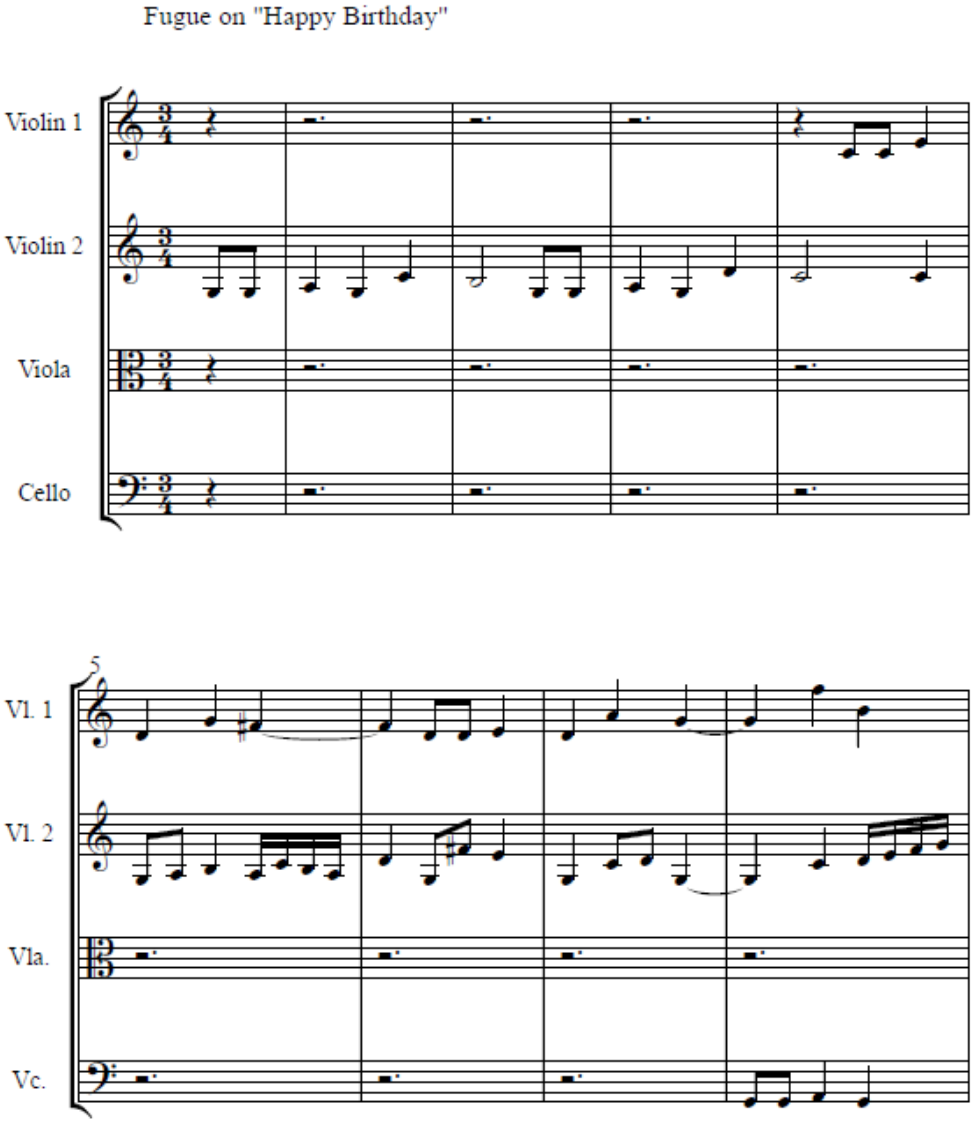
Reset all changed settings in the *Compose* section to their default values. The easiest way to do this is by clicking **…** in the right upper corner of the *Compose* section opening the *Compose options* dialog. Click *Restore Defaults* in the dialog and confirm with OK.

In order to get a slightly „denser“ fugue we also want to adjust that the subject insertions in the fugue overlap by one quarter note. In the input field *Subject overlap (in 16th)* enter the value of „4“ – four 16th notes correspond to one quarter note. Now click the *Compose* button.

After composing the fugue another window is opened showing the temporal structure of the fugue. Further information is available via the help button in the window. Switch back to the main window and inspect the composed fugue. Important sections of the fugue (e. g. Exposition, Developments, Coda) are displayed. Occurrences of the subject in the fugue are highlighted by color marking of the notes. This information which goes beyond representation of the notes serves for analysis and orientation in the fugue and is deleted with the next editing operation.

If you take a closer look at the fugue you will notice that in the voices there are occasional pitches not playable by the corresponding instrument (e. g. the pitch F# in the second violin is too low). Normally tonica only considers the voice range set in Compose → Voice range... → Canon/Fugue which can also be adjusted. However, it is easier to consider the voices ranges defined in the system template by checking the „Check ambitus“ option in the upper area of the composition assistant. Undo the fugue composition with Edit → Undo: Compose fugue. Check the „Check ambitus“ option and click the *Compose* button again. Now you get a fugue where the voice ranges defined in the system template are considered for all voices.

Finally double-click the score title and change it to „Fugue on "Happy Birthday"“. The fugue score is now complete (see the beginning):



Print or export result

Print the result with File → Print….

Further editing of the score (e. g. adding dynamics) or creating voice extractions for individual instruments can be done with capella or with another music notation program. Export the score with File → Export… and select the capella format (.capx) or the MusicXML format (.xml) for further processing in other notation programs.

What next?

Congratulations! After having worked through this short course you are a bit of a score expert already. Probably you will not have a hard time creating your own compositions with tonica.

Every once in a while problems might arise which you cannot yet solve yourself. Over time you will learn more:

To learn what can be done

Questions to the capella-software hotline show us that some users despair of problems which are in fact dealt with in this user guide. Here are some hints which will surely help:

- Every once in a while take a look at the index of this user guide. Probably you will find a solution for your pressing issue.
- When there is a problem, look at the alphabetical index at the end of the user guide and see if you can find a matching keyword. If you are then directed to an advanced chapter you might lack some skills described in earlier chapters. For example: When you read „Mark the note head and...“ and you do not know how to mark a note head, then simply go back to the index again (search for „note head, mark“ or „mark, note head“. In both cases you will find the appropriate subentry.).
- Go through the tables with keyboard shortcuts in the appendix to learn how to execute frequently needed commands.

Making the impossible possible

Many apparently insoluble problems can still be solved while creatively applying tonica’s options. Looking at some examples will make this easier.

On www.capella-software.com/us you will find several application hints. Visit our website from time to time to find surprising solutions or new ideas.

Note and harmony entry

In this chapter you will find basic information about simple note entry. You will probably understand this and the following chapters better after having worked through the „ Beginning a project“ chapter (see page 29).

When you want to write a new score you can start with an empty score which contains a four-part choir template SATB notated in two staves. The upper staff contains the soprano and alto voice with treble clef, the lower staff contains the tenor and bass voice with bass clef. The default time signature is 4/4. In the start screen, select „Open new empty score“. You can also create it via File → New → Empty score.

Score templates

When you often write scores for the same parts – for your choir, your ensemble – you will want to work with templates to facilitate your work.

tonica comes with templates for the most common instrumentations. You will find them in the *Templates* tab of the start screen.

Current note value

When you enter a note or rest it will receive the current note value. This is valid as long as you do not change the current note value.

How to set the current note value

(a) Use the number keys (do not keep them pressed down). In tonica fugata → Preferences → Note entry → computer keyboard one of these two key assignments can be selected:

Note value	1/1	1/2	1/4	1/8	1/16
normal	1	2	4	8	6
alternative („blind entry“)	1	2	3	4	5

(b) Mouse click in the symbol bar for note entry. If you do not see this symbol bar you can make it visible in View → Note entry.

Note entry with the keyboard

If you did not change the note entry preferences (TONICA FUGATA → PREFERENCES → NOTE ENTRY → COMPUTER KEYBOARD) you can enter notes with the keys C, D, E, F, G, A, B (lower cases), in treble clef in the middle octave, in alto and tenor clef in the small octave and in bass clef in the great octave. When keeping the right shift key (⇧) pressed down you can enter notes in the next octave up, with pressed down left shift key notes in the next octave down. Make sure that you do not press down the caps lock key (⇪)!

In TONICA FUGATA → PREFERENCES → NOTE ENTRY → COMPUTER KEYBOARD you can also select alternative letter keys for note entry (see page Fehler: Referenz nicht gefunden), for example German with h instead of b or Romanic with do, re, mi etc. Also you can define that the keys QWERTYU map the scale.

For notes foreign to the scale and for entering accidentals see page 45.

Rests are entered with the space key.

You need not worry about **ledger lines**. tonica will set those automatically.

Note entry with the mouse

In tonica you can click notes into the score with the mouse.

This method is very useful if you have difficulties with note names or if you need to copy notes being notated in an unusual clef.

Switch mouse entry on and off

To switch mouse entry **on or off**, click on the Mouse entry mode icon in the Note entry bar.

Always switch mouse entry mode **on** when you want to **enter notes** with the mouse. Switch it **off** when you want to **shift the cursor** or **drag a marking** with the mouse.

You can work **even faster** by using the ⌘ key – as long as you keep it pressed down you go straight into mouse entry: You can click in notes even with mouse entry mode switched off, or (the other way round) shift the cursor with mouse entry mode switched on. This saves a lot of time.

Make sure that the switch to the left of the note entry bar is switched on. If this is not the case, then **„Tinkling mode“** is active, i.e. when you click you will hear the note but it will not be entered into the score.

Enter or edit notes

When you **move the mouse over the score** with mouse entry mode switched on you will see a **blue note head** and also a **character** showing you what will happen when you click in this position:

A **(+)** shows that you will add a new note. A small **arrow** informs you that you can shift the pitch of the head.

Preselection of note value and accidentals

In the Note entry bar, select the desired **note value**, **dots** and **accidental** before clicking in a new note. Also see page 39 and page 45.

Dragging pitch

To change the pitch of an existing note head click on this head with the left mouse button, **keep** the mouse button **pressed down** and **drag** upwards or downwards.

Chromatic dragging: Dragging is done in **half step steps,** so the head will obtain differing **accidentals** during dragging.

You can specify whether a **C sharp** or a **D flat** (enharmonic change) is notated by clicking on the icon Specifications and then selecting Alterations. Also, you can temporarily overwrite this preference by selecting # or b in the Note Entry bar before dragging or by pressing + or - during dragging.

Diatonic dragging: Alternatively you can drag the head in line positions, so it will keep its accidental. To do so keep the ⌥ key pressed down.

Dragging note heads can also be done (unlike insertion and deletion) with **mouse entry mode switched off**.

Accidental for new notes by dragging

When entering new notes you can skip preselection of the desired accidental in the symbol bar: Instead, keep the mouse button **pressed down** during clicking of notes and slightly **drag** up or down. With this method you will obtain an accidental as described in the previous section.

Sound feedback during note entry

You determine whether or not you want to get an **acoustic feedback** during mouse entry by clicking on the icon Specifications in the Note entry bar and selecting Sound. The tick „mouse click“ is decisive.

Entry with several voices

In a staff with two voices mouse entry always works in the **active voice**.

To recognize the active voice, switch on **Work mode** (View → Work mode). The active voice will then be displayed in black, the others (inactive voices) in pale gray.

Entry in filling rest areas

Clicking in notes can also be done in areas with **filling rests** (see page 44). Here, the temporal insertion point will be highlighted by a system-wide shading.

Note entry with the mouse piano

The mouse piano can be **displayed and hidden** by clicking on Specifications in the Note entry bar and then switching the tick in Mouse piano. If you also want to operate the Note entry bar, do so via View → Note entry.

With the mouse piano you can enter notes as well as define and read the current note value.

Notes foreign to the scale. When you enter notes which do not exist in the current key it is not clear how they are to be notated. A keyboard cannot tell a C sharp from a D flat, for example. The notation depends on the preferences for note entry (tonica fugata → Preferences → Note entry → Keyboard (mouse/Midi)).

In the **Note entry symbol bar** you see from left to right:

- The switch „Note entry on/off“. When you switch off note entry, you can freely „tinkle“ on the piano without anything being notated.
- The icons for selection of note values (the current note value is highlighted)
- the dot icon
- the key signature icons for alteration of notes
- a drop-down icon for octave position
- an icon for entry of rests (same effect as the space key)
- an icon for switching filling rests on/off
- on the right: an icon for switching mouse note entry on/off
- Rightmost: The Specifications icon opens more options. In → Sound... you determine if you want to listen to the notes during note entry.

The **zebra stripe mode** helps to quickly enter notes with the mouse piano. In this mode all keys are provided with a colored middle section. When you click here, the note is entered in the current value. By clicking above and below you can enter double or half the note value. This allows you to quickly switch between different note values.

When you move over the mouse piano with the mouse the icon to switch on/off zebra stripe mode will appear.

You can enter **rests** by a right mouse click on the mouse piano. In zebra stripe mode you can therefore enter rests in three different note values.

When you change the height of the mouse piano, more or fewer piano keys will become visible.

Note entry with the MIDI keyboard

Before you use a MIDI keyboard for note entry you should check preferences in TONICA FUGATA → PREFERENCES → NOTE ENTRY → MIDI KEYBOARD and EXTRAS → PREFERENCES → SOUND → LISTEN.

Normal note entry (Step entry)

Normal note entry with the keyboard (step entry) is only possible when Note entry is switched on in the Note entry area.

When you switch it off you can play your keyboard without making changes to your score.

Rhythmic playing in (real time entry)

You can also enter your music in correct rhythm („real time entry“) without having to permanently change the current note value.

Before starting real time entry make sure that the keyboard is connected and recognized. To do so, click in the Note entry area on SPECIFICATIONS. In *MIDI keyboard* you will see whether or not a keyboard is connected.

Now place the cursor at the position where your playing in is to be inserted.

With EXTRAS → RHYTHMIC PLAYING IN... you start playing in. The dialog box *Rhythmic playing in* opens. Follow the instructions displayed in the Instructions tab. During playing in the notes will be marked in color. Only when you confirm your note entry with the button *Accept notes,* will notes be displayed in black and taken over into the score.

Latency of sound during rhythmic playing in

When you are rhythmically playing in it helps to get an acoustic feedback without latency.

When you use a **keyboard with integrated speaker** this is no problem as it will produce the sound precisely when you press the keys.

When you use a **keyboard without integrated speaker** tonica will have to create the sound. Tick the box *MIDI keyboard (rhythmic)* in TONICA FUGATA → PREFERENCES → SOUND → LISTEN.

Shifting the note entry range

The note entry range can be shifted by up to two octaves up or down:

F2	one octave lower than the normal note entry range
F4	one octave higher than the normal note entry range
⇧+F2	two octaves lower than the normal note entry range
⇧+F4	two octaves higher than the normal note entry range
F3	Normal note entry range

Instead of pressing the function keys you can click on the icons in the drop-down list in the Note entry symbol bar. The currently valid range will be displayed after the list is closed.

So in combination with the shift keys up to seven octaves for note entry via computer keyboard are at your disposal: From ⇧+F2 and entry with left shift key to ⇧+F4 and entry with right shift key.

To avoid too many ledger lines you can also use octave shifting clefs or octave brackets.

Rests

Rests are entered with the space key or with the icon on the Note entry symbol bar. They will be entered with the current note value.

Filling rests can also be set and deleted automatically. They have their own color (turquoise as default, and can be edited: See page 24), in normal view and print they remain invisible. Filling rests are to support you while editing polyphonic scores. They

make sure that in your score the different voices remain synchronous behind the point you are working at:

- When inserting notes in a voice, filling rests can be inserted in the parallel voices.
- When inserting notes shorter voices can be topped up with filling rests.
- When deleting, notes can be replaced with filling rests.
- When inserting new voices, filling rests can be allocated to the whole voice.

Filling rests can be automatically deleted, extended, shortened or split when notes or visible rests are entered in their place. You can turn common invisible rests into filling rests and vice versa. Also, you can delete filling rests manually when Work mode is switched on. Be aware that then the remaining voice will move up from the right so that another filling rest might take the place of the deleted one.

Cursor movement

The keyboard commands for cursor movement can be found in the appendix.

Simply click on the desired position with the mouse. For staves with two voices it is recommended to switch on Work mode (View → Work mode). In this view inactive voices are displayed in a pale color.

When mouse entry is active (see page 40), keep the ⌘ key pressed down.

Accidentals

When you enter notes with the keyboard or the mouse these will be automatically raised or lowered according to the key signature (alteration). *Example*: To enter F sharp in G Major, click on the key F (in standard preference). You need to worry about accidentals only when they deviate from the key signature.

Preselect alteration

With the following keys your notes can be raised or lowered with respect to the key signature:

+ The next note will be raised by a half step with respect to the key signature.

- The next note will be lowered by a half step with respect to the key signature.

* The next note will be raised by two half steps with respect to the key signature.

[_] The next note will be lowered by two half steps with respect to the key signature.

[0] Cancels a preselected alteration (also dots).

Alternatively you can click on the accidental in the Note entry symbol bar. Here you can also see which alteration is preselected for the next note.

The # does not necessarily mean that the next note will obtain a sharp, it only means that it will be raised by a half step. Example: When you type # and then b you will obtain a b with a natural as you raised the b flat by a half step.

The selection of an alteration is valid for the next note only (If you enter for example [+][G][G] in C Major, you will obtain a G sharp and a G). Do *not* keep the keys pressed down for the alteration.

So raising and lowering of notes correspond to the key signature valid at the cursor position. If it already has an alteration, this might lead to situations not allowed in music notation.

Example: When you click on [*] and then [G] in G Major, a G double sharp will appear. However, if you enter [*] and [F], then a „F triple sharp“ will appear. You will recognize it by the combination of sharp and double sharp. Triple flats may happen as well.

More examples

	Key signature: F Major		**Key signature: G Major**	
Entry	Visible accidental	Note	Visible accidental	Note
[F]	-	F	-	F sharp
[B]	-	B flat	-	B
[+] [F]	♯	F sharp	𝄪	F double sharp
[+] [B]	♮	B	♯	B sharp
[-] [F]	♭	F flat	♮	F
[-] [B]	𝄫	B double flat	♭	B flat
[*] [B]	♯	B sharp	𝄪	B double sharp
[_] [F]	𝄫	F double flat	♭	F flat

Dotted notes (and rests)

tonica supports only simple punctuations. The following keyboard commands have an effect only on the next (i. e. the following) note. Do *not* keep the key pressed down.

. The next note is dotted. 16ths cannot be dotted.

0 Cancels a preset dotting (also alteration).

The dotting of the next note will be displayed in the Note entry symbol bar.

Clef, key, time signature

In tonica clefs, key and time signature are valid for the entire score – it is not possible to change them during the piece.

Clef

A clef is valid for all voices of a staff.

To change a clef, open the system template (e. g. by switching to mode *Setup*). Double-click the clef of the staff you want to change and select the desired clef.

Octave shifting instruments. When selecting the clef you can set the preferred octave shifting in the dialog box. This will be indicated by a small figure 8 above or below the clef.

Key

The key is valid for the entire score. Only in the harmony staff changes of the key in the form of modulations are possible (see page 58).

To change the key, open Document → Options... → Key or click the key icon in the note editing toolbar.

Automatic transposition with key change. In the *Transposition* section of the key change dialog you can choose whether and how notes shall be transposed to the defined key.

Time signature

The time signature is valid for the entire score.

To change the time signature, open Document → Options... → Time signature or click the time signature icon in the note editing toolbar and select the desired time signature.

When inserting a 2/2 or 4/2 time signature you can select in the dialog box if this is to be indicated with the **alla breve sign**. In 4/4 time signature you can select the 𝔠 symbol.

tonica automatically sets barlines when the measure is full. For an **upbeat** (anacrusis) simply set a fixed barline using the barline icon in the note editing toolbar.

Upbeats are not included with automatic measure numbering.

Note entry restrictions

If you are used to work with capella you will notice that note entry in tonica has some restrictions compared to capella. Here are the main differences:

- There are at most two voices per staff. The stem directions are defined by the voice: For single-voice staves notes below the center line have their stems pointing upwards, otherwise they point downwards. For two-voice staves notes in the upper voice have their stems pointing upwards, notes in the lower voice have stems pointing downwards.
- All systems in the score are complete, i. e. they contain all staves defined in the system template.
- There are no manual system breaks. Systems are divided automatically or by using the *Reformat score into systems* icon in the note editing toolbar.
- There are no clef, key or time signature changes.
- There is no chord entry, i. e. each voice has at most one note at a time.
- The longest note value is a dotted whole note, the shortest a 16th note (might be a triplet).
- Only simple punctuations are supported. It is possible however to notate multiple dotted notes using ties.
- Only triplets are supported as irregular divisions.

Enter Harmonies

Entering harmonies is an important feature in tonica. Normally tonica produces harmonies on its own when creating a composition (e. g. a score). However, you can also enter harmonies yourself and have them evaluated or realize chords from them. Harmonies have different representations, some more powerful than others, which means that there are harmonies which can be notated in one representation but not in an-

other representation. See page 50 for more information about harmony representations.

Before entering harmonies in a score you should set the harmony representation.

How to set harmony representation for the active score

Select the desired representation (e. g. Roman numeral) from the Document menu for the active score.

How to insert harmonies

Harmonies are entered and displayed in their own staff without lines (harmony staff) below each system.

1. Place the cursor at the position in the harmony staff where the harmony is to start.
2. In the note entry toolbar select the note value with the desired duration of the harmony and click the *Harmony* icon to insert a harmony.
3. In the composition assistant on the right side a *Harmony* section opens for entering the harmony in the selected harmony representation. Here you can enter the harmony (e. g. the numeral I for the first degree in Roman numeral representation). Display of the harmony in the score is automatically adapted.

How to evaluate a harmony

Evaluation of a harmony means to determine which notes are part of the harmony and in which voices they occur in the score at the time of the harmony.

1. Place the cursor at the position in the harmony staff where the harmony should be evaluated.
2. Open the *Harmony evaluation* section in the composition assistant. In a tabular representation, harmony notes are displayed and their occurrence in the score. Notes foreign to harmony are displayed below the table.

How to realize a harmony as a chord

Realizing harmonies as chords means distributing the harmony notes in such a way that a harmonious score is created.

1. At the time of the harmony enter appropriate notes in the voices that are to be used for chord realization.
2. Evaluate the harmony as described above to check chord realization (e. g. to avoid notes foreign to harmony).

Note: tonica is able to realize chords automatically observing common voice-leading rules (see page 67).

Harmony representations

Harmony representations are built of combinations of letters, numbers and other characters. They are notated in the harmony staff below the system and represent the harmony of the chord in question. Harmony representations are an important feature in tonica.

Harmony representations are entered in the *Harmony* section of the composition assistant.

> Harmony entry depends on the selected representation and includes several input fields. tonica accepts only valid inputs or corrects them accordingly.

[Harmony representation:Function theory]Function theory

The harmony representation *Function theory* is mainly used in German-speaking countries. It has the following input fields:

- **Function:** The function according to function theory (e. g. dominant D for the root chord on the fifth degree of given key)
- **Added notes:** Notes added to the function, sometimes with alterations (e. g. dominant seventh ninth chord D79> = dominant with added seventh and lowered ninth)
- **Secondary dominant:** Function to which the function in input field „Function“ is referring if this function has a (sub)dominant character (e. g. secondary dominant to a tonic parallel (D)Tp)
- **Bass note:** Degree of bass note if it differs from the root of the harmony (e. g. 3 for third in the bass)
- **Rootless:** Determines whether the harmony root will be part of the chord (e. g. rootless dominant seventh ninth chord \D79> does not contain the root note)

Roman numeral

This harmony representation *Roman numeral* has the following input fields:

- **Numeral:** Is composed of three input fields. In the field on the left an optional alteration of the root can be selected. The field in the middle contains the degree of the harmony root as a roman numeral. In the field on the right an op-

tional alteration of the harmony third can be selected. Example: VI# means a major root chord on the sixth degree of given key.

- **Added notes:** Notes added to the chord, sometimes with alterations (e. g. V7 = dominant with added seventh)
- **Inversion:** Denotes the harmony inversion if it differs from root position (b = first inversion; c = second inversion; d = third inversion; e = fourth inversion)
- **Rootless:** Determines whether the harmony root will be part of the chord (e. g. rootless dominant seventh chord \V7 does not contain the root note)

Chord theory

This harmony representation *Chord theory* is less powerful than function theory. In chord theory only harmonies built on roots proper to given key can be represented. It has the following input fields:

- **Degree:** Is composed of two input fields. The field on the left includes the degree of the harmony root as a roman numeral – uppercase numeral for major chord and lowercase numeral for minor chord. In the field on the right an optional alteration of the harmony third can be selected. Example: ii means a minor root chord on the second degree of given key.
- **Added notes:** Notes added to the chord or modifying chord position, sometimes with alterations (e. g. ii6 = first inversion of minor chord on second degree)

Jazz

The harmony representation *Jazz* is based on Berkeley notation used in Jazz music. It has the following input fields:

- **Root:** Root note of harmony, sometimes with alteration (e. g. D# means a D# major chord)
- **Modifications:** One or two possible modifications to change the harmony structure. In the field on the left the chord type can be selected. In the field on the right more chord notes can be added (Example: D#m7(b5) means a minor seventh chord with lowered fifth and root note D#).
- **Bass note:** Bass note if it differs from the root of the harmony (e. g. A/C# means an A major chord with the third C# in the bass)

Edit notes and harmonies

Delete and copy notes

In tonica a staff consists of one or two voices. Each voice is a string of timed objects (notes, rests). For the sake of simplicity we call all objects that are strung along one voice *note objects.*

You can delete note objects with the following commands:

⌫ Delete single note object (if no range is marked) or marked note objects to the left of the cursor.

⌦ Delete single note object (if no range is marked) or marked note objects to the right of the cursor.

Block operations

A *Block* (*mark*) is an area of the score that is not empty. Blocks can be marked with the mouse or the computer keyboard. You see a flashing cursor when no block is marked. tonica distinguishes between different types of blocks. The following commands can be applied to all blocks:

Delete. All objects included in a block are deleted. To delete a marked block press ⌦.

Edit. Depending on the type of block, different editing options are available. They apply to all or some of the marked objects.

Blocks of note objects or system blocks can be cut/copied/inserted via the **clipboard**. To do so apply the common commands Cut, Copy and Insert in the Edit menu and the context menu. The capella-specific format used in these operations cannot be interpreted by other standard programs e. g. you can only insert blocks via the clipboard to programs understanding this format (capella, tonica).

Note: tonica supports fewer notation elements than capella (see page 48). When copying blocks of notes from capella to tonica, only notation elements known to tonica are copied. A warning will be shown if the block includes note values which can not be represented in tonica (e. g. a 32nd note).

Here are the different types of blocks.

Notes

One or more notes or rests in a voice. The block may contain modifiers.

Marking with the mouse: Drag the mouse across the notes without deviating from the voice. As usual, do this with pressed left mouse button. This will not be specified from now on.

Marking with the computer keyboard: Position the cursor in front of the first note. Keep ⇧ pressed down and move the cursor with → behind the last required note to extend the marking. Then let go of the shift key.

Copy: You can copy a marked block of notes to the clipboard with the Edit → Copy menu.

Paste: Any block of notes that has been copied to the clipboard can be inserted into the score at the current cursor position with Edit → Insert menu.

Voice

A voice in a staff.

Marking with the computer keyboard: Position the cursor anywhere in the first staff and mark it or apply Edit → Mark → Voice (⇧+⌘+D).

Staves

One or more staves in a system.

Marking with the mouse: Drag the mouse over the staves.

Marking with the computer keyboard: Position the cursor anywhere in the first staff and mark it with Edit → Mark → Voice (⇧+⌘+D). While holding down the shift key, move the cursor to the last voice of the block.

Entire system template staff

The cursor staff is marked across all systems.

Mark entire system template staff: Position the cursor anywhere in the staff and select Edit → Mark → Entire system template staff (⇧+⌘+A).

Systems

One or more systems of a score.

Mark a single system: Position the cursor anywhere in the system and select Edit → Mark → System (⌘+D).

Marking several systems with the mouse: If the entire block that you want to mark is visible on screen you can drag the mouse across the systems. If the entire block is not visible, position the cursor at the beginning of the block, make the block end visible with the scroll bar and while holding down the shift key click into the last system of the block.

Mark several systems with the Computer keyboard: Position the cursor anywhere in the first system and while holding down the shift key move the cursor to the last system of the block.

Mark the entire score: To mark all systems of the score use menu Edit → Mark → All (⌘+A).

Copy: A system block can be copied to the clipboard with Edit → Copy.

Paste: Any system block that has been copied to the clipboard can be inserted into the score at the current cursor position with menu Edit → Insert.

When you want to paste a copied system block to another tonica score you must consider the system template allocation of the single staves. tonica will try to allocate the staves in the clipboard to those staves in the target score which have the same „description". This way you can also insert score sections with fewer instruments correctly into scores with more instruments. However, if in one of the scores the same names are given in a different order, for example unnamed2, unnamed1, then this will result in a changed staff order of the inserted system in the target score. In this situation you can change the staff descriptions before copying.

System range

A chronologically limited block of note objects all voices/staves deep within a system. Starting and ending points must be synchronous across all voices in the block.

Marking with the mouse: Press ⌥ and drag the mouse over the staves.

Marking with the computer keyboard: Position the cursor in front of the first note object of a voice. Keep ⇧ pressed down and move the cursor behind the last note object of another voice of the system.

System cursor: A system range without any note objects across the entire system (s*ystem cursor*) allowing you to insert modifiers in all voices of the system.

System range

A chronologically limited range across several voices of a system. Starting and ending points must be synchronous across all voices.

Marking with the mouse: Drag the mouse from a position to the left of the first note object of a voice to behind the last note object of another voice in the system.

Note display

Note value

Change. Individual note values can be shortened or lengthened with < or >. When a range was marked the value will be halved or doubled. If the cursor is positioned in front of a note its value will be modified in smaller steps, alternating between dotted and non-dotted values.

Beams and flags

Eighths and shorter notes are displayed either with a flag or combined in **[Beam]** beamed groups. Eighth and shorter rests can be integrated in beamed groups. You can influence beaming as follows:

Local correction: Mark the relevant gaps between notes (the cursor itself marks one gap!) and select the icon *Split beam* or *Connect beams* in the note editing toolbar.

Ties

Ties connect two notes of the same pitch to a unit played back without interruption.

Ties can always be automatically created with the following note.

How to create a tie

1. Position the cursor to the right of the note (or the chord) that will be the first of the tied notes.
2. If needed select the required value of the tied note.
3. Press =. The chord will be repeated and both will be connected with ties.

This action is very fast and efficient, directly inserting ties while writing notes.

Alternatively you can mark the notes to be connected with a tie and select the *Set tie* icon in the note editing toolbar. Within the marking ties are set in all places where consecutive notes with identical pitch are positioned, even across system breaks.

How to delete a tie: Delete one of the two tied notes. The tie at the other note will be automatically deleted as long as it is positioned in the same staff.

Alternatively you can mark notes connected with a tie and select the *Remove tie* icon in the note editing toolbar. Within the marking all ties will be deleted, even across system breaks.

Ties between two systems. When you split a system between two tied notes, a tie at the end of the old and a tie at the beginning of the new system will be created.

This also means: When a tie coincides with a system break, first write beyond that point, then position the cursor between the tied notes and reformat the score into systems.

Alternatively you can later mark the notes to be connected with a tie in the relevant voices and then select the ties using the icon in the note editing toolbar.

Ties are considered during playback.

Triplets

tonica supports triplets as irregular divisions.

How to create a triplet

1. Enter the notes as usual.
2. Mark the notes of the group that will form the irregular division.
3. Click the *Create triplet* icon in the note editing toolbar.

Triplets within triplets are not possible. In Work mode (View → Work mode) irregular divisions will be shown in blue.

Cancelling irregular divisions

To cancel a triplet follow the steps above to create one, and in step 3 select *Delete triplet* in the note editing toolbar. You can also cancel multiple marked triplets this way.

Barlines

Under normal circumstances you do not need to enter barlines, as tonica will set them automatically according to the selected time signature. You just have to make sure that you fill all measures correctly: In correct music notation no note value may exceed the limits of a measure (syncopes exceeding the measure have to be separated into single notes with ties!).

If the measure is not correctly filled (the last note is too long for the measure) tonica shows this with red barlines in Work mode (View → Work mode). Correct barlines are displayed in green.

There are two exceptions where the automatic barline does not do what you want:

- A measure is not completely filled (e. g. upbeat or anacrusis).
- A special barline is required (e. g. final barline or repeated barline).

For these two cases tonica provides fixed barlines.

How to enter a fixed barline

1. Position the cursor at the point where you want to insert the barline.
2. Open the *Barlines* icon in the note editing toolbar.
3. Click on one of the available barlines. The barline will be entered only in those staves which contain notes or rests at the same position as the cursor.

Tips and tricks

Delete fixed barlines. Fixed barlines (also special shapes such as final or repeat barlines) can be deleted like notes, for example with ⌦ or ⌫.

Voltas

Voltas (repeat boxes) are used to indicate which section of a repetition is played the first time and the second time.

How to insert voltas

1. Select the section to be played the first time.
2. Click the *Repeat sign (prima volta)* icon in the note editing toolbar.
3. Repeat steps 1. and 2. for the second time with *Repeat sign (secunda volta)*.

How to delete a volta

1. Select the volta.
2. Delete the volta with ⌦ or ⌫.

Fermatas

Fermatas are used to divide a melody into sections (so-called phrases). It is recommended to mark important sections of the melody with fermatas during note entry. The phrase information will be considered during automatic score composition and generally yield better results.

Each fermata refers to a note object. When copying the note object the fermata will be copied as well.

How to add a fermata to a note object

1. Place the cursor in front of the note object to which the fermata is to be added.
2. Click the *Fermata* icon in the note editing toolbar.

How to delete a fermata

1. Select the fermata.
2. Delete the fermata with ⌦ or ⌫.

Edit harmonies

Harmonies are edited in the *Harmony* section of the composition assistant. Here you can change duration and representation of harmonies.

How to change the duration of harmonies

You can change the duration of a single harmony or of marked harmonies.

1. Place the cursor in front of the harmony or mark the harmonies.
2. Select the desired note value of the harmonies in the *Duration* input area.

How to change the harmony representation

Change the input values in the *Harmony* section according to the selected harmony representation (see page 50).

Modulations

In general a harmony in the harmony staff refers to the key of the score. Modulations are used to refer a harmony or a sequence of harmonies to a new key (which may differ from the key of the score).

A modulation is indicated by a bold pitch name followed by a colon. The pitch name stands for a modulation key, e. g. **A:** for A major or **c:** for C minor. All harmonies after the colon refer to this key.

How to insert or change a modulation key

1. Place the cursor in front of the harmony where the modulation is to be started.

2. Click the *Modulation* icon in the note editing toolbar.
3. A dialog will appear in which you can select the modulation key.
4. Select the desired key and confirm with OK.

How to delete a modulation

1. Place the cursor in front of or behind the modulation in the harmony staff.
2. Delete the modulation with ⌦ or ⌫.

Split and merge systems

[Systems:Split] Click the *Reformat score into systems* icon in the note editing toolbar or click ↵ to split the active score into systems. This reformats the score into systems with optimal filling. Place the check mark *Automatic reformatting* next to the *Reformat score into systems* icon to automatically reformat the score into systems.

In contrast to capella tonica does not support a manual system break at cursor position.

[Systems:Merge]Sometimes copying and pasting selected sections is easier when all notes are displayed in one system. Click the *Merge systems* icon in the note editing toolbar or click ⌘+⌫ to merge all notes of the active score in one system.

Text

Title and page numbers

Each score has a title and shows page numbers. Both text elements are freely placeable and are stored in the tonica document.

To change the title double-click the text or use Document → Options... → Title.

To provide space for a title access the system template and adapt the „Space above first system“.

Instrument names

Instrument names are entered in the system template. They will be displayed automatically in all relevant staves. The left margin will be adjusted automatically.

Temporary score elements

Some composition and analysis functions in tonica create explanatory texts, tooltips or marks. These score elements are only shown temporarily and will be deleted with the next editing operation. They are not stored in the tonica document.

After composing a fugue tonica displays important sections of fugue (e. g. Exposition, Developments, Coda). Occurrences of the subject in the fugue are highlighted by color marking of the notes.

After running a score check conspicuous passages (notes, harmonies) are marked in the score. Voice leading parallels are displayed by lines. Blue color indicates warnings, red color indicates errors.

How to create a score

The system template

The system template is the center for your score. It is a kind of pattern, the basic structure for your score. Many preferences which are globally valid for the entire score are set in the system template, therefore it is worth the effort to invest some time in the setup of a suitable system template.

Among other things, in the system template you determine

- who is playing – the maximum number of instruments,
- what the staves look like,
- how they are named,
- which staves are connected with brackets,
- which clefs are valid,
- which sounds are assigned and much more.

Information such as time signature and key signature cannot be found in the system template but can be changed in the document options.

While working on your score you can change the system template at any time. Please note, however, that in doing so not only the section that you are working at but the whole score changes, for example when you edit spaces in the system template. The system template only shows the basic structure.

The system template view

In View → System template you switch the system template view on and off. The system template is situated in the left area of the screen. This way both system template and score can be looked at simultaneously. By clicking on the right margin (arrows indicate it) you can fully display the system template.

Normally there is no need to switch the system template on or off as this can be better achieved by switching the mode.

In the system template you see the structure of a complete system with all staves which appear in your score.

Mark a staff by clicking with the mouse in the desired staff. The staff the cursor is positioned in will be automatically pre-marked. When you keep ⇧ pressed and click on another staff, all staves between the first and the second click will be marked.

When you keep ⌘ pressed you can mark staves not being positioned next to each other or exclude staves from the marking. One staff will always remain marked.

Contrary to what you are used to, you **cannot** mark several staves by dragging with the mouse, as this action is used in other commands (see below).

Extend or regroup – the system template icons

Extend the system template. With the icons New Staff you can extend the system template when only one staff is marked. You select whether the new staff is to appear above or below the marked one. The new staff obtains all properties of the previously marked one. When now the two staves have the same name you will see a warning (yellow triangle). You should change one of the names as otherwise problems might arise, for example when selecting the melody voice in the composition assistant.

Newly inserted staves are directly taken over to the score.

You can change the allocation of staves any time in the system template. These changes will be taken over to all systems already existing in the score.

How to shift one or more staves in the system template

1. In the system template mark the staff or staff range to be shifted
2. Click on one of the icons Shift Stave(s) upwards/downwards

Example: In a tonica score the string instruments are positioned above the wind instruments. You want to create the common order. To do so mark all string instruments in the system template and repeatedly click on the icon until they appear below the wind instruments. This order is directly changed in the score as well.

> When you shift entire instrument groups as in this example, tonica will move the system brackets accordingly. In some cases you will have to correct brackets afterwards.

The Delete Stave(s) icon deletes the marked stave(s) from the system template ***and*** from the score. Please observe the warning!

You can **leave the system template view** by clicking with the mouse in the score or pressing esc. You switch off *Setup* mode and the system template view by clicking the *Compose* button in the main symbol bar.

Formatting staves in the system template

Now lets take a look at the system template in detail: Staves are displayed schematically, as in a table. This way you can see most of them at a glance and can edit them directly. The table header contains abbreviations and symbols for the single columns (observe the tooltips) which are now explained one by one:

Column 1: Spacing

Gray beams show how much space is allocated to a staff as well as the space above the first system. Move these beams with the mouse to obtain more or less space for the staff. Exactly at the interface between two beams there is a small drag point which you can use to set additional group spacing.

To the left of this drag point between two beams there is another drag point. You use it to define how the entire spacing is divided between below and above.

A staff containing many notes with ledger lines needs more space. This space should be assigned to this staff and not to the neighboring one.

To enlarge the *space between systems,* do not enlarge the space above the first staff or below the last staff, as these spaces might be canceled. Drag the gray beam below the last staff.

Column 2: Name

This column is meant for the complete instrument name which normally appears in the first system of the score, for example „Trumpet in b flat“. When you move vertically across this column with the mouse, input fields appear. There is a field in front of each staff and one between two staves (for example for piano). Double-click the field to label it.

You can also enter these instrument names in several lines. ⌘+↵ moves the cursor to a second line.

Column 3: Abbrev = Abbreviation

This column is meant for the abbreviation which normally appears in each system of the score except the first one, for example „Tpt.“ When you move vertically across this column with the mouse, input fields appear. There is a field in front of each staff and one between two staves (for example for piano). Double-click the field to label it.

Column 4: Square bracket

Click with the mouse in this column and drag vertically, holding the mouse button down, across the staves you want to join with a brace. You can also shorten or delete existing braces, but always from the end of the brace, only. Double-clicking the brace deletes it.

You can also join staves with braces by double-clicking this column. Keep an eye on the mouse pointer which changes into a „+“ sign when you arrived at the correct position.

Column 5: Default clef

Double-click or right-mouse click the clef or its position. A dialog box opens where you select the default clef. The default clef will appear when you add the staff to the score.

Column 6: Description respectively internal description

In this field the same entry as in Name may be stated, but also a different description helping you identify this staff. This description is not editable.

Via the context menu (right mouse button) you can have the selected staff replaced by a template. The selected template changes the preference for this staff in all columns and takes it over directly to the score.

By clicking between two staves you can insert a new staff.

Column 7: Voices of staff

This column is needed for inserting a second voice into a staff or for deleting a voice in a staff. Double-click or right-mouse click the small encircled number. Then select the desired action in the context menu.

The action will automatically insert a voice into or delete a voice from the score.

Column 8: Function

This column determines which voices are used for composition and which voice is the melody voice. If you select „Not used“ as a function the corresponding voice will not be considered, i. e. it will remain unchanged during composition. Defining the melody voice is important so that tonica knows in which voice to find the source material (e. g. a melody or a subject) of the composition. There can only be one melody voice. The melody voice can be selected in the upper area of the composition assistant.

Double-click an entry in the column to change the function of the corresponding voice.

Column 9: Ambitus

In this column you can define the voice ranges of each voice. If you have activated the *Check ambitus* option in the upper area of the composition assistant tonica takes care that the voices composed will not leave their voice ranges. This will ensure that only notes are composed which can be sung by a singing voice or played by an instrument.

Double-click an entry in the column. A dialog appears in which you can set the ambitus of the corresponding voice. You can either shift the lowest or highest pitch with the mouse, or you can change the values in the input fields on the right. Keep ⌘ pressed if you want to shift the pitch diatonically instead of chromatically.

The voice range must be at least one octave.

Column 10: Device

The term device is not to be taken in the literal sense. The *device* can be your sound card, i. e. really a device you can touch, or a sound font or sound library, i. e. software.

Initially it will say „Unspecified“. Change this only when you want to apply different devices for different sounds. When the same device is to deliver the different sounds for all staves and voices, select this device in Extras → Sound configuration..., see page 104.

Column 11: Sound

Double-click or right mouse click the word in the staff. Here you select the sound with which the staff or voice is to be played back. If you are not sure that your device supports the selected sounds, select *MIDI instruments* first and then one of the 128 sounds from the list.

Column 12: Vol = Volume

Here you have the option to balance staves and voices by setting differing volumes. Double-click or right mouse click the number and change the appearing input field or the slide control. You can select from values 0-127.

Score properties

Page setup

Page orientation (portrait or landscape), page margins and page format are set in File → Page setup.

It is advisable to set these parameters before you start editing a score because these settings have a bearing on the appearance of the score, in particular on justification.

These preferences are recorded in the score and are not dependent on the printer. The score’s appearance remains unchanged if you set for example a different page size in your printer driver. The page orientation (portrait or landscape) is automatically synchronized between score and printer driver. In landscape format staff lines are vertically aligned to the printer line, in portrait format parallelly.

Composition and analysis

tonica is a computer program with the unique ability to compose and analyze music pieces. This ability was learned with the help of artificial neural networks created by tonica from music examples given to it (e. g. chorales composed by Johann Sebastian Bach). You can use this feature to playfully learn the basics of composition and music analysis and use tonica as a tool to create your own compositions.

Automatic composition

All composition functions available in tonica can be selected in the composition assistant toolbar.

Compose score

Arranges notes in a composition with several parts. The arrangement of notes for a melody results in a multi-part score.

Use case: Add voices to a given melody. tonica adds harmonies that conform to a musical style and realizes them as chords that result in a multi-part score.

How to compose a score

- Enter the melody in the arbitrary voice used for composition. Mark important sections of the melody with fermatas. You will generally get better results when setting fermatas in a sensible way (also see page 57).
- Switch to mode *Compose* and select the function *Score* in the composition assistant toolbar.
- In the area below the toolbar select the voice where you have entered the melody as melody voice.
- Click the *Compose* button.
- Listen to the composition and assess the result.
- To get a different result, first undo the result with the undo command. Then change the composition preferences (e. g. the harmonization style) and click the *Compose* button again.

If you want to change individual harmonies or chords, you can simply modify the harmonies below the system and then use the composition functions *Realize chords* and *Add passing notes*. In this way you can realize your own harmonic ideas.

Harmonize

Harmonization is the process of constructing harmony which is the simultaneous occurrence of notes in a composition.

Use case: Add harmonies to a given melody. tonica adds harmonies that conform to the selected musical style.

How to harmonize a melody

- Enter the melody in the arbitrary voice used for composition. Mark important sections of the melody with fermatas. You will generally get better results when setting fermatas in a sensible way (also see page 57).
- Switch to mode *Compose* and select the function *Harmonize* in the composition assistant toolbar.
- In the area below the toolbar select the voice where you have entered the melody as melody voice.
- Click the *Compose* button.
- Find out which notes belong to a harmony in the harmony staff by placing the cursor in front of this harmony and opening section *Harmony evaluation* in the composition assistant.
- To get a different result, first undo the result with the undo command. Then change the composition preferences (e. g. the harmonization style) and click the *Compose* button again.

Realize chords

Chord realization means the construction of chords for a harmonization.

The arrangement of chord notes in a score is subject to rules which are called voice-leading rules (see page 94).

Use case: Frequently, harmonies are already given with a melody, e. g. in a leadsheet or in figured bass. Then tonica creates chords that conform to these harmonies. tonica can also realize chords from harmonies without a given melody.

How to realize chords

- If you have a given melody: Enter the melody in the arbitrary voice used for composition. Mark important sections of the melody with fermatas. You will generally get better results when setting fermatas in a sensible way (see also page 57).
- Enter the given harmonies with their duration in the harmony staff.
- Switch to mode *Compose* and select the function *Realize chords* in the composition assistant toolbar.
- In the area below the toolbar select the voice where you have entered the melody as melody voice. If you have not entered a melody, select „none“.
- Click the *Compose* button.
- Listen to the composition and assess the result.
- To get a different result, first undo the result with the undo command. Then change the composition preferences (e. g. the harmonization style) and click the *Compose* button again.

Add passing notes

Adds passing or changing notes to a chord structure.

Use case: Add passing and changing notes to the score. tonica adds passing and changing notes in the selected musical style to create a smooth and elegant score.

How to add passing notes to a score

- Enter the score or let tonica create it. Enter the harmonies that belong to the score or let tonica analyze them using the *Harmonic analysis* function.
- Switch to mode *Compose* and select the function *Add passing notes* in the composition assistant toolbar.
- In the area below the toolbar select the voice where you have entered the melody as melody voice.
- Click the *Compose* button.
- Listen to the composition and assess the result.
- To get a different result, first undo the result with the undo command. Then change the composition preferences (e. g. the harmonization style) and click the *Compose* button again.

Variation

A variation is a part of a composition which modifies a melody or subject melodically, harmonically or rhythmically.

Use case: Create a variation of a given melody by adding simple ornamentations to the melody or to the accompanying voices.

> Examples of this type of variation can be found in baroque compositions, e. g. in partitas of Johann Pachelbel and preludes of Johann Sebastian Bach.

How to create a variation

- Enter the melody in the arbitrary voice used for composition. Mark important sections of the melody with fermatas. You will generally get better results when setting fermatas in a sensible way (see also page 57).
- Switch to mode *Compose* and select the function *Variation* in the composition assistant toolbar.
- In the area below the toolbar select the voice where you have entered the melody as melody voice.
- Click the *Compose* button.
- Listen to the composition and assess the result.
- To get a different result, first undo the result with the undo command. Then change the composition preferences (e. g. the variation style) and click the *Compose* button again.

Vary

Varying means creating a variation of a composition.

Use case: Create a variation of a score by adding simple ornamentations in the melody voice or in the accompanying voices.

How to vary a score

- Enter the score or let tonica create it. Enter the harmonies that belong to the score or let tonica analyze them using the *Harmonic analysis* function.
- Switch to mode *Compose* and select the function *Vary* in the composition assistant toolbar.
- In the area below the toolbar select the voice where you have entered the melody as melody voice.

- Click the *Compose* button.
- Listen to the composition and assess the result.
- To get a different result, first undo the result with the undo command. Then change the composition preferences (e. g. the variation style) and click the *Compose* button again.

Patterns

Accompanying patterns are repetitive rhythmic and harmonic structures typical of specific style. They are mainly used in popular music.

tonica composes patterns in various rock, pop and dance styles. This function can be used in two ways: Firstly tonica creates a pattern as a template for adding or improvising a melody. Secondly tonica creates a pattern for a given melody.

If desired tonica adapts harmonization rhythm, tempo and instrumentation of the accompanying voices to the selected style.

Use case 1: Create accompanying patterns for a harmonization (e. g. given as a leadsheet template).

How to create a pattern as a template

- Define the structure of the leadsheet template and enter the harmonies with their duration in the harmony staff.
- Switch to mode *Compose* and select the function *Patterns* in the composition assistant toolbar.
- Click the *Compose* button.
- Listen to the composition and assess the result.
- To get a different result, first undo the result with the undo command. Then change the composition preferences (e. g. the accompanying style) and click the *Compose* button again.

Use case 2: Create accompanying patterns for a given melody.

How to create patterns for a melody

- Enter the melody in the arbitrary voice used for composition. Mark important sections of the melody with fermatas. You will generally get better results when setting fermatas in a sensible way (see also page 57).
- Switch to mode *Compose* and select the function *Patterns* in the composition assistant toolbar.

- In the area below the toolbar select the voice where you have entered the melody as melody voice.
- Click the *Compose* button.
- Listen to the composition and assess the result.
- To get a different result, first undo the result with the undo command. Then change the composition preferences (e. g. the accompanying style) and click the *Compose* button again.

Canon

A canon is a polyphonic composition in which one voice follows the other. The first voice is copied by the other voices.

Circular canons are characterized by the fact that voices are repeated after a certain number of bars. This has the effect that the canon can be continued at will. You can choose a *strict* or a *free* canon. With a strict canon each entering voice in its original form is (apart from the pitch) an exact imitation of the previous voice. You will obtain a free canon if you select a subject form (rectus, inversus, retrograde and inverse retrograde) which differs from the original form for one or several entering voices. Subject form and accompaniment of the entering voices will then differ.

tonica is able to compose circular canons on any subject and for several voices and will consider the selected harmonization and variation style. You can define the entrance order of voices and whether accompanying voices are to be varied. You can even change the cue interval of the voice entrances.

Use case: Create a canon on a short subject.

How to create a canon on a subject

- Enter the subject in an arbitrary voice.
- Switch to mode *Compose* and select the function *Canon* in the composition assistant toolbar.
- In the area below the toolbar select the voice where you have entered the subject as melody voice.
- Click the *Compose* button.
- Listen to the composition and assess the result.
- To get a different result, first undo the result with the undo command. Then change the composition preferences (e. g. the harmonization style) and click the *Compose* button again.

Fugue

A fugue is a polyphonic composition built on a musical subject that is introduced at the beginning in imitation (repetition at different pitches) and which recurs frequently in the course of the composition.

tonica is able to compose fugues on any subject and for several voices and will consider the selected harmonization and variation style.

The special feature of a fugue is its complex treatment of the subject. A fugue begins with an exposition when the main theme is heard. The main theme is called the subject or Dux (Latin: leader), the transposed version is called the answer or Comes (Latin: companion). When in the key motif of the Dux the fifth note appears above the key note, then this key note will be changed to a fifth in the Comes. This is in order to ensure the identity of the key. Alternatively the subject will be transposed true to the interval. This is called a „real fugue". Further voices can be added according to this principle until the entire number of voices is reached. Further on in the fugue there will always be parts where the subject is executed in different voices. These parts are called „developments". In these developments the subject can be varied in different ways or can be combined with itself. Such combinations can be stretto (overlap of two or more entering subjects), inversions, retrogrations of the subject or augmentations (statement of a melody in longer note values). The entering subjects are connected with each other by interludes. These interludes are used for modulation and are generally composed from sequences or canons.

tonica offers several form schemes, most of them derived from the fugues of the Well-Tempered Clavier by J. S. Bach (see page 82).

When choosing a fugue subject you should pay attention to a focused melodic content. The subject should have a distinctive character. It should not fall apart into two equal halves, as many themes of the Viennese classic do. The subject should not exceed the range of an octave. It should stay in its key and may only switch to the upper dominant when being modulated.

> In tonica you will find the fugue subjects of the Well-Tempered Clavier by J. S. Bach. They are good demonstration material.

Use case: Create a fugue about a short subject. Various fugue schemes are available (e. g. from Well-Tempered Clavier).

How to create a fugue on a subject

- Enter the subject in an arbitrary voice.
- Switch to mode *Compose* and select the function *Fugue* in the composition assistant toolbar.

- In the area below the toolbar select the voice where you have entered the subject as melody voice.
- Click the *Compose* button.
- Listen to the composition and assess the result.
- To get a different result, first undo the result with the undo command. Then change the composition preferences (e. g. the fugue scheme) and click the *Compose* button again.

Form scheme representation of a composed fugue

After composing the fugue a window is opened showing the temporal structure of the fugue in a graphic.

The x axis displays the temporal structure with important sections of the fugue (e. g. Exposition, First Development etc.). The y axis displays the involved voices. The building blocks of the fugue (e. g. subject, sequence or counterpoint) are visualized with symbols (see legend below the fugue structure). The numbers in upper left corner of the blocks are measure numbers. You can also see which voices are active in which periods.

If you click on a symbol (except the counterpoint symbol), the cursor in the score jumps to the corresponding position. When clicking the play button a cursor in the graphics window follows the temporal structure of the fugue.

tonica also displays important sections of fugue (e. g. Exposition, Developments, Coda) in the score. Occurrences of the subject in the fugue are highlighted by color marking of the notes. When you hover over a colored note a tooltip provides more information about the subject properties.

Figured bass

Figured bass is a notation used in baroque music to indicate harmonies and chords in relation to bass notes.

An overview of figured bass notation in tonica can be found in chapter page 139.

Use case: Create a score from a figured bass voice.

How to realize a figured bass

- Enter the bass notes in the lowest voice used for composition. Mark important sections of the bass voice with fermatas. You will generally get better results when setting fermatas in a sensible way (see also page 57).
- Select the harmony representation *Figured bass* from the document menu and save the document. This will automatically add empty harmonies into the harmony staff.

- Switch to mode *Compose* and add figures in figured bass notation below the corresponding bass notes. The figures describe the interval distance of the chord notes to the bass note. Alterations from the given key are notated with an accidental or with „+“. Write „0“ or „-“ for bass notes in the given harmonization rhythm that should not be realized as chords or as new chords.
- Select the function *Figured bass* in the composition assistant toolbar.
- In the area below the toolbar select the figured bass voice as melody voice.
- Click the *Compose* button.
- Listen to the composition and assess the result.
- To get a different result, first undo the result with the undo command. Then change the composition preferences (e. g. the harmonization style) and click the *Compose* button again.

Double voice

Voice doubling means adding an accompanying voice to an existing melody in a specified interval distance (e. g. an octave, a third or a sixth).

The most frequent form of voice duplication is octaving: As an example the cellos in an orchestra are often duplicated by the double basses playing one octave lower. Another form of voice duplication was the parallel leading in fifths and fourths („Quartal harmony“) in medieval times. With increasing development of Major-Minor tonality, thirds and sixths prevailed against the fourth which was perceived as dissonance to be resolved. Only 20th century music liberated the use and thus the parallel leading of dissonant intervals. In today’s easy listening music which still has tonal characteristics voice duplication in thirds and sixths is often used to enrich the sound of a voice („background singing“).

tonica is able to add a parallel accompanying voice to any existing voice. Both accompanying voice and interval to be applied for duplication can be selected freely. When the main voice is to be duplicated the voice range set for the accompanying voice will be considered. Accompanying tones are octaved if necessary.

Given harmonies will also be considered for the selection of accompanying tones. These tones are always selected to go with the corresponding harmonies. The accompanying interval will be adapted if necessary: If for example the third is selected as interval, but the accompanying tone in the third interval does not go with the harmony, then the next tone going with the harmony will be selected, for example the tone in fourth interval.

Use case: Add a parallel accompanying voice to a given voice. If a harmonization is given, the accompanying voice is adapted to the harmonies.

How to double a voice

- Enter the voice to be doubled.
- If a harmonization is given: Enter the harmonies with their duration in the harmony staff.
- Switch to mode *Compose* and select the function *Double* in the composition assistant toolbar.
- Click the *Compose* button.
- Listen to the composition and assess the result.
- To get a different result, first undo the result with the undo command. Then change the composition preferences (e. g. the double voice) and click the *Compose* button again.

Automatic analysis

All analysis functions available in tonica can be selected in the composition assistant toolbar.

Check score

Checks the voices of a score for rule violations.

The arrangement of chord notes in a score is subject to rules which are called voice-leading rules (see page 94).

Use this function to check a score. Notes or harmonies colored in red or blue indicate errors or warnings.

Use case: A given score is checked for voice-leading errors.

How to check a score

- Open the score to be checked.
- If a harmonization is given, enter the harmonies with their duration in the harmony staff. Otherwise the harmonies are determined automatically.
- Switch to mode *Compose* and select the function *Check* in the composition assistant toolbar.
- Click the *Analyze* button.
- Examine markings (warnings, errors) of the analysis and assess the result.

- To get a different result, first undo the result with the undo command. Then change the composition preferences (e. g. the chord scheme) and click the *Analyze* button again.

After the examination of the composition move the mouse over a note or harmony colored in red or blue. The error or warning text will be displayed. With notes, the relevant voices will also be stated in the error or warning text. In case of a chord progression error, it will additionally be stated if the note or harmony belongs to the first or second chord of the chord progression.

How to show a voice-leading error

- Right mouse click on a colored note or harmony and select *Info* in the context menu.
- The error or warning text is displayed in a message window. Click the *Help* link to obtain details about the rules in question.

How to correct a voice-leading error

- In the upper area of the composition assistant select which section of the score shall be corrected: „All“, „Current phrase“ or „Marked section“ with the error to be corrected.
- If necessary repeat the process until all errors are corrected.

Note: The notes in the melody voice will not be altered during voice leading correction. Therefore please make sure that the correct melody voice has been selected.

Harmonic analysis

Harmonic analysis is the determination of harmonies of a composition.

Use case: A given score is analyzed harmonically.

How to analyze a score harmonically

- Open the score to be analyzed.
- Switch to mode *Compose* and select the function *Harmonic analysis* in the composition assistant toolbar.
- Click the *Analyze* button.
- Examine the analysis and assess the result.
- To get a different result, first undo the result with the undo command. Then change the composition preferences (e. g. the chord scheme) and click the *Analyze* button again.

Composition and analysis options

For the composition and analysis functions, composition options are available in the composition assistant with which the result can be influenced. Experiment with the preferences to get to know all options and to find the right values for your desired result!

The preferences are divided into sections that can be opened or closed. Only those sections that are relevant for the selected composition or analysis function are displayed.

In each section only the most important preferences are displayed. If there are more than the displayed preferences, this is indicated by dots **…** in the upper right corner of the section. Click **…** to be able to edit all preferences in a dialog.

General options

In the upper area of the composition assistant general preferences are displayed which are always visible.

Section: Select the section used for composition or analysis:

- Choose „All“ if the composition or analysis is to be created for the entire score.
- Choose „Current phrase“ if the phrase is to be composed or analyzed where the cursor is currently positioned. Phrase ends are marked by fermatas. If there is no fermata, then this corresponds with compose „All“.
- Choose „Marked section“ if you want a previously marked section to be composed or analyzed.

Melody voice: Voice in which the melody is located.

Check ambitus: When composing tonica observes the voice ranges defined in the system template for the voices involved in composition.

Section Compose

Harmonization style: Determines the harmonization style tonica uses for composition.

Harmonization rhythm: Determines the rhythm of the harmonization (such as quarter notes or dotted rhythms).

Strategy: Generally tonica will determine a composition by choosing the most likely harmony. For alternatives to this click „Permit alternative solutions“.

Prefer narrow range: tonica prefers a linear proceeding of the accompanying voices. This sometimes produces chords with notes in distant positions which are difficult to

play on a keyboard instrument. By clicking **Prefer narrow range** tonica will pick chords whose upper voices can be played with the right hand.

Insert cadences: In this field you determine if or where tonica may insert cadences. You can choose between „Everywhere“ and „At phrase ends“. Phrase ends are marked by fermatas.

Select cadences randomly: Normally the cadences determined by tonica are unambiguous. Check this option if you want to permit alternative cadences.

Section Analysis

Distance for harmonic analysis: Determines the distance of the harmonic analysis (such as quarter notes).

Chord scheme: Determines the style on which the analysis is based.

Section Variation model

Variation style: Sets the style tonica will apply to vary the phrase (e. g. Pachelbel Partita I). Each entry in the combo box has a tooltip with a short description of the variation style.

Variation rhythm: Determines the duration of a variation motif (e. g. quarter notes). Here you can set the harmonization rhythm (see page 77). You can also choose values differing from the harmonization rhythm.

Determine first motif tone: Usually each variation motif starts with the first note in the voice to be varied, so the variation follows the movement of the voice. Checking **Determine first motif tone** creates variations with the first motif note differing from the voice to be varied. This gives you a „flowing“ characteristic.

Section Varying voices

Determines which variation is to be created in which voice:

- If you wish to have the variation always in the same voice, tick „Fixed“ and enter the desired voice.
- If your variation is to be created in different voices, tick „Random alternation between“ and tick all voices which may be varied. tonica will pick a random variation motif in one of the chosen voices. If you also tick „No variation“, then it might happen that no variation motif appears at a time.
- If you want to decide yourself when a voice is to be varied, tick „Alternation pattern“ and enter the order of voices to be varied like this: „03 012“ for example means that the first variation motif is to be in the first used voice, the sec-

ond in the fourth voice, the next motif is not varied (Space), then again the first, second and third voice. This sequence will be repeated until the end of the variation.

Section Patterns

Accompanying style: Select the desired accompanying style (e. g. „Walzer" or „Slowfox").

Harmonization rhythm: When you tick the box **Adapt harmonization rhythm**, the harmonization rhythm is adapted to the accompanying style or can be adapted in the drop-down list. Otherwise the preset harmonization rhythm is applied for the selected harmonization style.

Tempo: When you tick the box **Adapt tempo (quarter notes)**, the tempo of the score will be adapted to the accompanying style or can be edited in the input field.

Accompanying instruments: When you tick the box **Adapt accompanying instruments**, the instrument of the accompanying voices is adapted to the accompanying style or can be edited via the selection button.

Section Canon

In the subsection **Canon material** you can define the setting which is to be considered for the creation of the canon's musical material (harmonization, accompaniment). Click the button **Determine rhythm settings globally** to automatically determine the settings based on the entered subject.

Vary accompaniment: Select this option if the accompanying voices of the canon shall be varied. The selected variation style will be considered when varying the accompaniment.

In the subsection **Circular canon** you can define the canon's structure. With a circular canon the voices enter one after another until the canon is repeated.

Order of entry: Defines the order in which the voices enter. In **Entrance voice** the voices used are listed in their order of entry. This order of entry can be changed by clicking **up** and **down**. Single marked voices can be deselected with **>**. To select marked voices you must mark them in the list **Unused voice** and then click **<**.

Modify subject: Additionally, you can determine a subject form for each entering voice. This can be original form (Rectus), inverted (Inversus), Retrograde or Inverse Retrograde. When all entering voices are in their original form a strict canon is created. This means that each entering voice is (except for the octave pitch) an exact imitation of the

previous voice. You can change the subject form for the marked voice via the button **Modify subject**.

Cue interval: Determines how many semitones away from the previous voice a voice shall enter. When you select an entering interval other than prime the canon will change keys with each entering voice, depending on the entering interval. This is done until the keys repeat.

Maximum length: Determines the canon's maximum duration (number of bars). Leave the predefined value unchanged if you do not want to restrict the length.

Section Fugue

In the subsection **Fugue material** you can define the preference which is to be considered for the creation of the fugue's musical material (harmonization, counterpoint). Click the button **Determine rhythm preferences globally** to automatically determine the preferences based on the entered subject.

Vary accompaniment: The counterpoint of the subject is composed from the fugue's accompanying voices. If you wish to vary these accompanying voices tick **Vary accompaniment**. The selected variation style will be considered when varying the accompaniment.

Subject overlap: Generally the fugue subject ends harmonically before the next cue (no overlap of entering subjects), however sometimes the new subject enters together with the last note of the (initial) subject. In this case please click **Subject overlap (in 16th)** where you can define the overlap duration in sixteenth notes.

In the subsection **Fugue** you can determine the fugue's structure. A fugue begins with voices entering one after another with the subject (which forms the exposition). Following this the subject will be altered in one or several sections (developments).

Form scheme: Determines the fugue's basic form, i. e. the character of exposition and developments. With **Form scheme** you also determine the order of entering voices. For example, in the standard fugue predefined by tonica the voices enter in the order [2, 1, 4, 3]: 2nd voice, 1st voice, 4th voice, 3rd voice.

Voice allocation: Determines how the voices of the selected form scheme are to be allocated to the voices of the fugue to be composed. If you choose soprano as the first voice and then alto, tenor and bass for a standard four-part fugue for mixed choir the voices will enter in that order: alto, soprano, bass, tenor. You can modify the order of entry by changing the voice allocation. For example, if you exchange alto for soprano and bass for tenor, then the order of entry will change as follows: soprano, alto, tenor, bass. You can even allocate two or more voices of the form scheme to one voice of the fugue. If you choose the soprano for all voices then you will obtain a fugue with a **four**-part structure, but for only **one** melody instrument, such as in J. S. Bach's sonata for violin solo (BWV 1001).

Section Figured bass

Early BC-Style (open position): Chords are normally realized in close position to be played with the right hand. In the early days figured bass composition was closely related to instrumental or vocal parts to be accompanied. Voices were equally distributed on both hands. Check this option if you prefer this behavior.

Section Double voice

Double voice: Voice in which the doubled accompanying tones are to be created.

Interval: Distance between the parallel accompanying voice to the melody voice.

Section Voice leading

Parallels display: Determines which parallels are considered during score check:

- Select „Do not show" if parallels should not be displayed.
- Select „Only show genuine parallels" if only genuine parallels (e. g. fifth or octave parallels) should be displayed. Genuine parallels are marked by red lines.
- Select „Show hidden parallels in outer voices" if hidden parallels between the highest and lowest voice should be displayed. Hidden parallels are characterized by two voices that proceed into the same direction and the interval in the second chord is a perfect consonance (prime, octave, fifth). Hidden parallels are marked by blue lines.
- Select „Show hidden parallels in all voices" if hidden parallels in all voices should be displayed.

Newly analyze harmonies: Check this option if you have not entered any harmonies or you do not want to use the entered harmonies for checking the score, but want the harmonies to be analyzed by tonica.

Set duration

For some input fields a duration has to be entered in 16th notes. If you click **…** next to the input field you can specify the duration in number of measures, beats (quarter notes) and additional 16th notes. Enter the appropriate values and click OK to get the total duration in 16th notes.

The fugue composition kit

With the fugue composition kit you can graphically edit and create fugue schemes (= form schemes of a fugue). Open the fugue composition kit via COMPOSE → FUGUE SCHEMA....

The dialog shows all fugue schemes in a tree structure, reflecting the hierarchic composition of the fugue:

- Level 1: Fugue scheme (for example standard fugue)
- Level 2: Form section (exposition, development or coda)
- Level 3: Form component (subject, canon interlude, sequence interlude or fermata interlude).

In levels 1 and 3 you can change properties of a fugue scheme (name, number of voices, measures and duration of subject) or of a form section.

Edit fugue schemes

Click *Export* to export fugue schemes as a file.

Click *Import* to import fugue schemes. A dialog will let you select the fugue schemes to import.

With *Restore Defaults* the predefined fugue schemes will be restored. All changed or newly set fugue schemes will be deleted.

Click *Graphic* to turn on or off a graphic description of the selected fugue scheme.

Finish with OK to save the changes you made. If you click *Cancel* all changes are canceled.

The fugue's time flow which is defined by the form scheme you chose is shown in a separate window. This is described in section page 73.

The form section you chose is outlined in black. If you click on any symbol except the counterpoint the cursor will jump to the respective form section in the tree structure.

Change a fugue scheme

Click on a tree node to edit its properties. Use the context menu (right mouse click) to edit or create new fugue schemes.

The following properties can be defined for a fugue scheme or a form section:

Properties of a fugue scheme

Description: Name of the fugue scheme

Number of voices: Number of voices of the fugue

Time signature: Time signature of the fugue

Duration of subject: The form scheme is based on this duration. Click **...** to set the duration in number of measures, beats and sixteenth notes (see page 81). If a fugue is composed whose duration does not comply with the stated duration stated all durations are adapted accordingly.

Properties of a subject

Subject voice: Voice with entering subject

Leading: Determines if the subject voice is leading. If the entering subject is leading tonica will try to maintain the initial form of the subject excluding clearly indicated changes (such as inversions). Not leading entering subjects may be adapted to leading entering subjects. If a subject enters in two or more voices at the same time the voices not leading will be harmonically adapted to the leading ones.

Mode: Mode of the entering subject can be either direct (major, minor) or related to the subject (unchanged, change between major/minor). If you enter a minor subject and then choose „Change between major/minor“ the subject will appear in the corresponding major mode.

Comes: Determines if the subject is to enter as Comes or Dux (original form).

Transposition: Determines the number of semitone steps for the transposition of the subject.

Inversion: Determines if the subject is to enter as inversion (horizontal reflection).

Change of note value: Determines if the subject is to be augmented. If it is to be augmented all note durations will be doubled in length.

Duration: Duration of the entering subject in relation to beginning or end of the subject. Click **...** to set the duration in number of measures, beats and sixteenth notes (see page 81). The duration of the entering subject can be stated in relation to the beginning of the subject (such as „eight sixteenth notes from the beginning of the subject“) or in relation to the end of the subject (such as „eight sixteenth notes until the end of the subject“). This means that the subject will be reduced by the final eight sixteenth notes.

Stretto: This means that there is a subject overlap so that the subject appears in two voices at a time. Here you set the duration of the stretto in relation to the beginning or end of the previously entering subject. If you set the stretto to start zero sixteenth

notes before end of the previously entering subject, then the subject will begin directly after the end of it (no overlap).

Position: Here you set the subject's position. Contrary to transposition this means that the subject will begin on a different interval level of the scale without being transposed into another key.

Pedal point: Semitone pitch of the pedal point, if existing. A pedal point is an extended note in the lowest voice (usually the bass voice).

Active Voices: Determines which voices are to be active for this form section.

Properties of a sequence (sequencing interlude)

In a sequencing interlude a part of the subject is repeated and it ascends or descends on different levels of the scale.

Main voice: Voice of the sequence on which the subject is based.

Mode: Mode of the sequence either direct (major, minor) or related to the subject (unchanged, change between major/minor). If you enter a minor subject and then choose „Change between major/minor" the sequence will appear in the corresponding major mode.

Comes: Determines if the sequence is to enter as Comes or Dux (original form).

Transposition: Determines the number of semitone steps for the transposition of the sequence.

Initial degree: Degree on which the sequence is to start.

Orientation: Number of ascending or descending degrees.

Number of cues: Number of sequence repetitions. If you set „1", then you will obtain a simple interlude.

Inversion: Determines if the sequence is to be based on the inverted subject (horizontal reflection).

Change of note value: Determines if the sequence is to be based on the augmented subject. Augmentation means doubling of all note lengths.

Duration: Duration of a sequence repetition relating to the beginning or end of a subject. Click **...** to set the duration in number of measures, beats and sixteenth notes (see page 81). The sequence is based either on the beginning or the end of the subject. The duration can also be set relative to the beginning of the subject (for example eight sixteenth notes after the beginning of the subject) or the end of the subject (for example starting eight sixteenth notes before the end of the subject).

Position: Position of the subject on which the sequence is based. Contrary to transposition, this means that the subject will begin on a different interval level of the scale, without being transposed into another key.

Pedal point: Semitone pitch of the pedal point, if existing. A pedal point is an extended note in the lowest voice (usually the bass voice).

Active Voices: Determines which voices are to be active for this form section.

Properties of a canon (canon interlude)

In a canon interlude a part of the subject is repeated and transposed, one after another and in different voices.

Initial voice: Starting voice based on the subject.

Mode: Mode of the canon either direct (major, minor) or related to the subject (unchanged, change between major/minor). If you enter a minor subject and then choose „Change between major/minor“ the canon will appear in the corresponding major mode.

Comes: Determines if the canon is to enter as Comes or Dux (original form).

Initial interval: Semitone starting interval of the canon.

Cue interval: Determines how the new canon entry is to be transposed. If you choose fifth, then each new entry will start a fifth up.

Number of cues: Number of cues of the canon. If you set „1“, then you will obtain a simple interlude.

Inversion: Determines if the canon is to be based on the inverted subject (horizontal reflection).

Change of note value: Determines if the canon is to be based on the augmented subject. Augmentation means doubling of all note lengths.

Duration: Duration of a canon entry relating to the beginning or end of a subject. Click **...** to set the duration in number of measures, beats and sixteenth notes (see page 81). The canon is based either on the beginning or the end of the subject. The duration can also be set relative to the beginning of the subject (for example eight sixteenth notes after the beginning of the subject) or the end of the subject (for example starting eight sixteenth notes before the end of the subject).

Position: Position of the subject on which the canon is based.

Pedal point: Semitone pitch of the pedal point, if existing. A pedal point is an extended note in the lowest voice (usually the bass voice).

Active Voices: Determines which voices are to be active for this form section.

Properties of a fermata (interlude)

Lasting chord with fermata at the end of an interlude.

Root: Root of the chord.

Mode: Mode of the chord either direct (major, minor) or related to the subject (unchanged, change between major/minor). If you enter a minor subject and then choose „Change between major/minor“ the canon will appear in the corresponding major mode.

Duration: Duration of the chord. Click **...** to set the duration in number of measures, beats and sixteenth notes (see page 81).

Set the voice ranges

tonica offers two options to influence the voice ranges in the score:

- You can set the voice range of each voice in the *Ambitus* column of the **template system** (see page 64).
- You can use Compose → Voice range... to set the voice ranges used for **composition**.

Voice ranges are set individually for each score and stored in the tonica document.

It is important to know the difference between the two options:

Normally setting voice ranges in the system template does not have an influence on composition. However if you set the *Check ambitus* option in the composition assistant, tonica will take care that the composed voices do not leave their voice ranges. Use this option to ensure that all composed notes are singable by singers or playable by instruments.

When you call Compose → Voice range... a dialog appears which lets you change the voice ranges for scores, variations and canons/fugues. This is especially useful if you want the voice ranges for a specific instrumentation (e. g. a men’s choir or a string quartet) to be completely filled.

You can achieve this by defining for the composition function in question the lowest and highest pitch of each voice in the Tabs *Score, Variation and Canon/Fugue*. Click the dots **...** next to the voice range to change it. See page 64 for more information about changing the ambitus.

When you click the *Restore Defaults* button the voice ranges are reset to their default values. tonica considers these voice ranges when composing scores, variations, canons and fugues.

Since variations are typically composed for instrumental rather than vocal ensembles, tonica uses larger voice ranges for variations by default which have the voice range of instruments.
Important: Note that changing the voice ranges for composition may have a significant effect on tonica's composition performance (especially for scores). The larger the voice ranges the longer the duration for computing all possible composition variants. Therefore do not make the voice ranges for composition too large!

Creating a harmonization style

tonica has a procedure for learning new harmonization styles. It uses a sophisticated neural network technique, but in a way that is very simple to apply. You simply provide tonica with characteristic examples of the style and the software will extract the rules behind the style. The most important job for the user is to carefully select pieces of music that are typical for the style. The more typical pieces of music are available the better the results will be.

The features

tonica provides an automatic, parametrizable system to create harmonization styles. These styles can be added to the Bach, Max Reger and Jazz styles available in tonica. To create a new style you give tonica a quantity of music examples in the form of tonica files. The program automatically analyzes the examples, using a technique called Neural Network Analysis. Creating a set of style rules this way is referred to as „training the network". Because it can take some time if you supply a lot of examples (20+) and ask for a high probability of the predicted result matching a real example when setting the learning parameters, the process runs in the background while you use tonica for something else. The trained styles are available immediately.

There is a comprehensive range of facilities to edit styles. Styles can be copied, changed, deleted, imported and exported.

There are also options that can be applied when using the harmonization style.

The Style assistant makes it simple to create and import harmonization styles.

Style production is limited to example scores that contain chords covered in tonica's analyzable chord repertoire, therefore it is not suitable for styles which use unusual harmonies. The present repertoire of approximately 50 chord types nevertheless covers a large proportion of potential harmonies.

The style assistant for harmonization styles – a brief introduction

Use HARMONIZATION STYLES → STYLE ASSISTANT... to start the style assistant which assists you in creating a new style or importing an existing style. For importing a style see page 90.

Example: Use the following example to see how you can create a new harmonization style from a simple cadence in tonica. The result may not be particularly original, but the procedure is the same as with creating a new style.

Decide on the tonica files from which a new style is to be created

This is the most important step and might require some effort and time to get it right. The sample files from which you want to create the style must be available in tonica format (examples for Bach style and Scheidt style are available in the start screen). If your source file is only available in capella format you can open or import it in tonica and then save it as a tonica file.

Preparation: In the following we are using two files: `03-11.tca` und `03-51.tca`. You will find them in the *Examples* tab of the start screen when you click the *Example* folder. Open these files and save them with the same names in your personal tonica folder before using them for style creation.

Now open file `03-11.tca` from your personal tonica folder. It contains a phrase consisting of four chords that constitute a complete cadence (tonic, subdominant, dominant, tonic). tonica will learn the harmonies upon which this score is based.

Examination of the harmonization style via harmonic analysis

This step is not essential to creating a new style, however we recommend it as a means of confirming the quality of the new style.

In our current example you will note that no harmony (or chord description) is indicated below the last chord. To find out how tonica analyzes the score you need to do a harmonic analysis (ANALYZE → HARMONIC ANALYSIS). As a result the last chord will also be shown as tonic. We can evaluate the result of harmonic analysis by realizing chords from the analyzed harmonies (COMPOSE → REALIZE CHORDS).

Selection and analysis of sample files

The first two steps were used to prepare the style creation. Now you need to start the style assistant (HARMONIZATION STYLES → STYLE ASSISTANT...) and click on **Continue**. You have now reached the first step of the actual tonica style creation. Click **Add** to select the file `03-11.tca` located in your personal folder. From the same folder add the file `03-51.tca`, click the file name and click the **Test** button (more about **Test** later). Enter a name for the style, e. g. „Cadence style". Click on **Next**. Both files will automatically be analyzed (one training file and one test file). Confirm the analysis by clicking **OK**.

Determination of the learning parameters

In step 2 of the style assistant we just use the predefined values and click **OK**. See page 91 for more information about the learning parameters.

Determination of the composition options

In step 3 of the style assistant we select the composition options which are used as default values for the harmonization style. In our case we do not modify the composition options. See page 77 for more information about the composition options.

Training of the harmonization style

Click **Finish** to leave the style assistant. This will automatically initiate the style training. Once completed the training report window will display a statistical summary of the result. The figures should be interpreted as follows: Classification grade of 100% for training indicates that all harmonies have been learned successfully. Classification grade of 75% in the test column of harmonic function indicates that only ¾ of the functions from the test sample `03-51.tca` would have been determined in the same way by the trained style.

A high classification grade for training indicates that the training data have been learned well. A high classification grade for test indicates that the learned function is capable of predicting test data that have not been learned. This means that it is not necessarily desirable to reach 100% classification grade on the training samples, but rather aim for a well balanced grade between training and test data. In our example 75% is the maximum attainable grade for the test data.

Click **Apply** to accept the result and close the training report.

Examination of the training result

Once the training of the new style has been completed successfully open file `03-11.tca`. In the composition assistant select the function *Score* and the newly created style from the *Harmonization style* drop-down list. Now click the *Compose* button for creating a score in the new style. tonica creates the learned harmonies. The chords do not correspond to the original phrase because tonica has only learned the harmonies but not the chord notes.

You can now use this newly created cadence style to generate simple phrases for new melodies. Due to the short training sample this cadence style will generate only relatively simple phrases, consisting of tonic, subdominant and dominant. To create a genuine new style you need to employ more examples, although there is no standard rule as to how many might be required. From our example you can see that even very few examples can help to create a new style. However, to create a more complex style, like Bach for example, you would have to use 10 – 20 examples, each with a duration of an average Bach chorale. The more characteristic examples you use the better the result.

Importing a harmonization style

Use HARMONIZATION STYLES → STYLE ASSISTANT... to start the style assistant which assists you in importing an existing style.

How to import a harmonization style

- Select the tonica style file which has the extension (*.tsf).
- Define the style import options. When you import tonica files (if available) you can continue working on the imported style.

Editing harmonization styles

Use HARMONIZATION STYLES → STYLE EDITOR... to open the window for editing harmonization styles. Here you can create, copy, change, delete, train, import and export styles.

The standard styles that come with tonica can not be edited. Styles for which no list of tonica files is defined (see page 91), but only have the networks for composing, can not be changed or trained.

How to create a new style

- Click the **New** button to create a new style.
- Click the **Import** button to import a style from a tonica style file.

How to edit a style selected in the style list

- Click the **Copy** button to create a new style from the one selected in the list.
- Click the **Edit** button (or double-click) to change the properties of the selected style.
- Click the **Delete** button to delete the selected style.
- Click the **Train** button to start the style training process for the selected style. Neural networks are trained that reliably mimic the harmonization style of the given example files.
- Click the **Export** button to export the selected style.
- Click the **Info** button to get information about the selected style. This includes the number of analyzed files and a training statistics which shows the classification rates of the trained networks.

Click the **Close** button to close the style editing window.

Creating, copying and changing a harmonization style

When creating, copying or changing a harmonization style, a dialog opens which lets you define properties of the harmonization style. These include

- the **Style name** of the harmonization style
- a **File list** with training and testing files used to create the style
- the **Learning parameters** (button) for training the style
- the composition **Options** (button) which are used as default values for the style.

In order to be able to define a style meaningfully you need at least 10 - 20 example files. There are buttons in the dialog box for adding and deleting files from the file list. When you have entered a style name and copied example files to the file list you have done all that is necessary to create a style.

In order to be able to better judge the results of the style training you can define some files as test files with the "Test" button. These test files are then not used for training, but only to test the results of the style production. They are examined to see how well style characteristics from the trained network compare with examples that have not been part of the training process.

Learning parameters for style training

This dialog box lets you specify the learning parameters for style training. It is advisable to train initially with the preset values. Changing the learning parameters can lead to an improvement of the learning results. This is because it is not possible to automatically determine a set of optimal learning parameters, since these are dependent on the learning example files that are used.

The following learning parameters can be set:

- **Number of learning iterations**: The number of times tonica tries new rules and compares them to the example and test files. The range is 1 to 500. The larger the number the smaller the learning error, but the longer the process.
- **Variable network size**: This can be between 0 and 100%. In the case of 0% no additional processing elements (called neurons in neural network techniques) can be added to the network by tonica (this compares to logistic regression). More neurons means that more data can be compared and more processing can be done. This can improve accuracy but will take more time.
- **Style complexity**: This can be set between (0,0) and (5,0). (0,0) tells tonica that the complexity of the harmonization is not constrained. If you go to the other

extreme of (5,0) you will get more conservative and less original harmonizations.

Automatic style analysis

Automatic style analysis is started if you change any of the files in the list of example scores or if you change any of the analysis program preferences.

During style analysis all the training and test files are analyzed harmonically and the learning patterns for training the neural networks are created. The value set for **Distance for harmonic analysis** for the harmonization style is used for the harmonic analysis.

You are informed about any errors in the analysis protocol. At the end of the process you can accept or reject the result.

Automatic style training

Automatic style training is started by the style assistant or by clicking the **Train** button in the style editing window. The training process runs in the background, allowing you to either continue using tonica for other purposes or follow the training process. During style training all neural networks of the chosen style are trained. The following pieces of information are learned by a separate network each:

- **Harmonic function:** This corresponds to the combo box „Function“ in the harmony input of the harmony representation *Function theory*.
- **Harmonic Bass note**: This corresponds to the combo box „Bass note“ in the harmony input of the harmony representation *Function theory*.
- **Harmonic additions**: This corresponds to the combo boxes „Added notes“ in the harmony input of the harmony representation *Function theory*.
- **Passing notes**: Learns the passing notes in the accompanying voices.

Different networks are used for major and minor keys, therefore each of the above have major and minor networks created if there are major and minor scores in the example score list.

Progress of training is shown in minutes and a progress bar is displayed. After the training process you will see an analysis of the results. This compares the harmonies predicted by the trained networks with the actual harmonies. 100% would mean that the actual harmonies were predicted completely accurately. The most important networks are the ones that predict the harmonic function (the first of the four groups listed above).

There is a difference in the predicted accuracy against the training scores and those scores designated by you as test scores. A high percent against the training scores means that the network has learned well from the training pieces, whilst a high percentage against the test scores means that the networks can predict well when given new pieces to harmonize. It is not effective to spend a lot of time trying to get the performance against the training scores up to 100 %. The best use of time is to get similarly high percentages against the test and training scores.

You can decide to abandon the trained networks if the results are poor.

Major and minor keys are usually left together in the examples file list. However,you can optimize the networks separately if you wish by modifying the **Learning parameters**. You will need to create two styles with separate file lists, one with major and one with minor examples, to do this.

[style-import][Style import]Importing a harmonization style

You can import existing harmonization styles from other users of tonica and previous versions of tonica. The **Import** button is available in both the style assistant dialog and the style editing window. Both of these can be found in the *Harmonization styles* menu.

Select the tonica style file which has the extension (*.tsf). In the following dialog you can select the options for importing the style.

Style import options

Select the style import options in this dialog. These are:

The **Style name** of the harmonization style to be imported.

If the tonica files for training the style are included in the style file: The **Destination folder for tonica files** to which these files should be copied. When you import tonica files (if available) you can continue working on the imported style.

Exporting a harmonization style

You can export a style so that it can be used by other tonica users or in future versions of tonica. The **Export** button is in the style editing window.

Select the name of the tonica style file to be exported. It will have the (*.tsf) extension. You have the choice of exporting the file on its own or with the associated example scores used to create it.

- Click **Yes** to copy all the example files along with the style. A future user will be able to revise the style using the example scores.

- Click **No** to export the style file on its own. This is the set of neural networks and is all that is needed to use the style to harmonize melodies. However the recipient will not be able to modify the style.

Automatic harmonic analysis

tonica can automatically create chord descriptions for notes in a score. This is a useful tool to understand what your input is and also for analyzing the great composers.

Harmonic analysis is based on the key of the score (i. e. modulations are not recognized). Using the interval structure of the notes in the score tonica recognizes five classes of chords:

- Major triads (sometimes with added seventh)
- Minor triads (sometimes with added sixth)
- Major triads with added sixth and/or minor triads with added seventh
- Diminished chords (sometimes with added ninth)
- Other chords (e. g. secondary chords)

Automatic examination of scores

The arrangement of notes in a composition is subject to rules being called composition or voice-leading rules. Respecting these rules is to ensure that a smooth composition is created which pays attention to the harmony of the voices as well as to a vocal and independent continuation of each single voice.

A distinction is made between rules for chord creation and rules for chord progression. For example, a chord should generally be made of at least three notes (root, third and fifth). The most well-known rule for chord progression is the interdiction of fifth and octave parallels i. e. the parallel voice leading of two voices in fifth or octave distance which would affect the independence of both voices. When checking a composition in tonica, fifth and octave parallels are displayed with red lines. When tonica automatically composes, it will consider the most important composition rules.

The importance of voice-leading rules in tonal music was often subject to change in music history. In this respect these rules are to be seen as recommendations and not as dogma. Nonetheless they help the student to understand why certain passages of a composition just „don’t sound well“.

tonica is able to automatically examine voice-leading rules for a composition. You can use this feature to have your own or foreign compositions controlled as to the observa-

tion of these rules. tonica will distinguish between errors when an important rule has been violated and warnings when it is merely recommended to observe a certain rule.

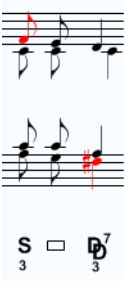
As result of the examination note heads or harmonies where errors or warnings occurred will be colored in red or blue. If you move the mouse over one of these note heads or harmonies, a tooltip will appear which displays the exact error or warning. Multiple errors or warnings per note or harmony are possible. If you wish you can have tonica correct voice-leading errors by right mouse clicking on a colored note or harmony.

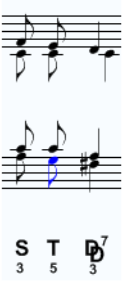
Voice-leading rules in tonica

Here you will find an overview of voice leading rules applied in tonica. They are separated into chord realization rules (apply to a single chord only) and chord progression rules (apply to the transition from one chord to the next).

Important hint: tonica will determine chords with the help of those harmonies which were identified during harmonic analysis. Erroneously or not analyzed harmonies will lead to errors in the examination of the composition. With intermediate chords which may result from passing or changing tones between two chord functions, the chord progression rules will be examined without taking these intermediate chords into consideration. This is because often, such passing or changing tones only hide but not really fix rule violations. However, in case an independent intermediate chord is created, a rule violation indicated by tonica might be invalidated. In this case it is recommended to give the intermediate chord its own harmony either by entering the respective harmony or by harmonic analysis.

The following example will explain the problem:





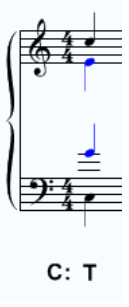
The left image shows a rule violation (chromatic cross-relation of tone F in the Soprano versus tone F sharp in the Bass). However, this is not really an error because the chord transition is bridged over with an independent intermediate chord (fourth-sixth chord) on the second eighth note. If you have this passage examined in eighth note intervals after having selected „eighth note“ as a distance for the harmonic analysis, then the re-

sult shown in the image on the right will be displayed for the same chord sequence. Here, no rule violation but merely a warning is displayed telling you that in the intermediate chord, the bass tone was not duplicated.

Chord realization rules

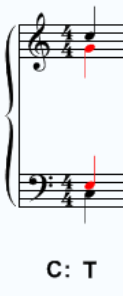
Voice crossing rule (warning): Voices are not to cross i. e. within a chord, a lower voice should not have a higher tone than in a higher voice.

Example:



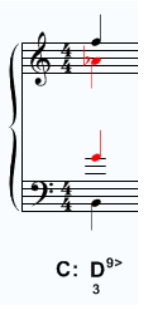
Voice distance rule (error): The distance between Soprano and Alto is not to exceed one octave. In close position the distance between Soprano and Tenor is not to exceed one octave.

Example:



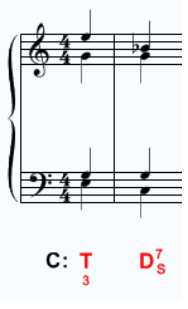
Dissonance rule (error): In neighboring voices within a a chord, tones in semitone distance are not allowed. Tones in whole tone distance should occur only once.

Example:



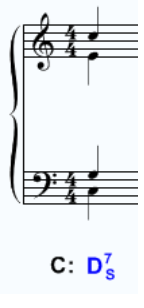
Rule: Completeness regarding chord notes (error): In three-part chords, at least root and third have to be present. In four-part chords, at least three chord notes have to be present, especially the third.

Example:



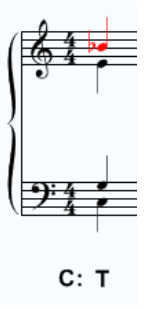
Rule: Completeness regarding chord dissonances (warning): With four-part chords, characteristic dissonances (such as the seventh with seventh chords) should be present.

Example:



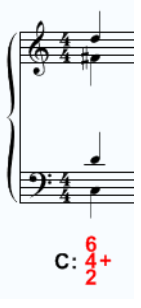
Rule correctness (error): A chord may not contain tones not belonging to the harmony (except for the characteristic dissonances specified in the harmony).

Example:



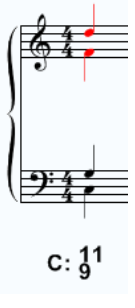
Rule: Completeness regarding figured bass (error): In figured bass chords, all chord notes must be present.

Example:



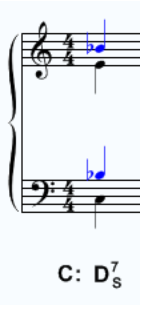
Rule: Figured bass position name (error): With figured bass chords, position names (numbers larger than 7) in the upper voices have to be considered, i. e. the added notes have to appear in the Soprano or Alto (in the correct order).

Example:



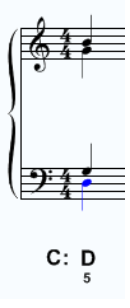
Rule: Dissonance duplication (warning): Characteristic dissonances (for example the seventh in seventh chords) should not be duplicated.

Example:



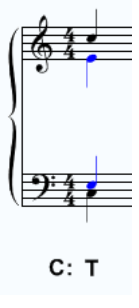
Rule: Bass note duplication (warning): In fourth-sixth chords, the bass note should be duplicated.

Example:



Rule: Third note duplication (warning): The third in the chord should not be duplicated.

Example:



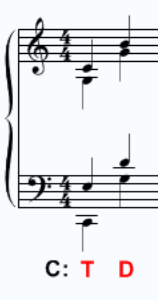
Note: In many textbooks you will find the claim not to duplicate the third (especially in sixth chords). However, Diether de la Motte shows in his textbook „Harmonielehre“ with appropriate compositions that a general interdiction to duplicate thirds is not

valid. Statistically seen it strongly depends on the style you look at whether or not third duplications are used: Samuel Scheidt rarely applies them in his chorales whereas you will find them rather often with J. S. Bach. Thus this rule is to not be seen as a command but as a suggestion to reconsider voice leading.

Chord progression rules

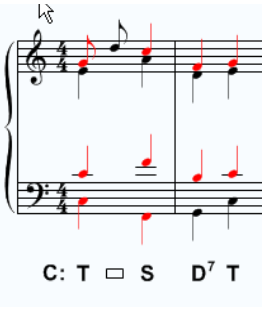
Rule: Leaps (error): In a chord transition you are not to have too many large leaps, especially within one phrase.

Example:



Rule: Parallels (error): The parallel leading of two voices in perfect fifth or octave distance is forbidden. The same applies when during opposed movement in the same interval, the distance between voices is plus or minus one octave (antiparallels). Also forbidden is the interval course from a diminished fifth to a perfect fifth. The opposite interval course is allowed.

Examples:



The first example contains several parallels:

- Fifth parallel in Soprano and Tenor
- Anti fifth parallel in Soprano and Bass

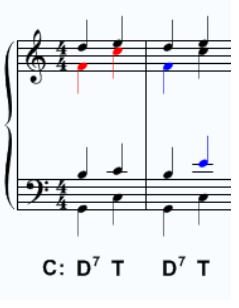
- Anti octave parallel in Tenor and Bass

Please note that the rule (same as all other chord progression rules) is **not** invalidated by intermediate notes (for example passing or changing eighth notes) even if you will not see any red lines in the composition any more (in this example due to the intermediate note D in the Soprano).

The second example contains the fifth course diminished-perfect in Soprano and Tenor.

Rule: Resolve dissonances (error or warning): Characteristic dissonances (for example the seventh in seventh chords) have to be resolved stepwise in the same voice. You will receive a warning when the dissonance is resolved in a different voice.

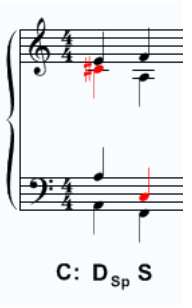
Examples:



Note: In some textbooks you will find the demand that in dominant seventh chords, the third is always to be resolved stepwise upwards and the seventh stepwise downwards. When analyzing appropriate compositions (for example Bach chorales) you will find that this demand is permanently violated and that the direction of resolution is less important than the requirement to always resolve dissonances stepwise (upwards or downwards).

Rule: Cross-relation (error): Cross-relation means a semitone or tritone interval allocated to two voices. The chromatic cross-relation is forbidden, i. e. the chromatic succession of notes of two chords in separate voices (for example when suspensions are resolved).

Example:



Automatic cadences

The tension and movement of a composition comes in large part from carefully constructed chord sequences which are called cadences. tonica will fit predefined cadences into your score if requested. These are derived from the styles libraries and therefore will allow you to benefit from cadences created by past great composers. They will be inserted at obvious phrase ends and other places tonica feels are appropriate. In this way a more flowing composition is created, and you can learn how cadences can be used as a structural element of a score.

The chord descriptions for the inserted chords of the cadence are colored and if you rest the pointer over them or right mouse click on them you will see the following information on the origin of the cadence:

- Composer
- Title of work
- Text line of the cadence
- Score line number
- Start position in **sixteenth notes**; for partial cadences this is the position of the inserted piece
- Classification Perfect or Imperfect
- Type of cadence (G = perfect cadence, HD = imperfect cadence, HDD = imperfect cadence ending on the double dominant, HS = half close on the sub-dominant, HZ = half close on the secondary dominant, T = interrupted cadence)
- Idiom (A = authentic, ADW = authentic double idiom, AE = authentic introduction, AP = authentic pendulum, APHR = authentic phrygian half conclusion, OV

= without usual preparation, P = plagal, PE = introductory plagal, PP = plagal pendulum)

- Chord immediately preceding the cadence (S = subdominant, Dd = double-dominant, Z = secondary dominant)
- Penultimate, i.e. characterisation of the next to last harmony of the cadence, i.e. the first chord of the cadence
- Editor of the cadence

Note: You will also get the cadence information if you right click one of the cadence harmonies with the mouse and then select the *Info* command from the context menu.

capella-tune

capella-tune is used by *capella* and other programs in the *capella* suite to play back *capella* scores and to convert them into MIDI files. This process takes into account numerous settings from within the *capella* file, e. g. accidentals, dynamics, piano pedal marks, trills and ornaments, repeats, swinging rhythms, historic tunings and many more. These features are configured on the various tabs of the *capella-tune* dialog.

Furthermore *capella-tune* provides an interface to Soundfonts and VST plug-ins. This interface provides you with access to the wide world of sample libraries like *capella Vienna orchestra.* Sample libraries contain the recorded sounds of genuine instruments. Soundfonts are a special type of sample libraries that can be used directly by *capella-tune*. Both methods improve the quality of playback substantially. Sample libraries also include special sounds for different performance marks, e. g. legato/staccato, sforzato, pizzicato/arco, tremolo, with/without damper, drum roll etc. *capella-tune* can evaluate the performance instructions and automatically assign the correct sounds from the library. For more details about the VST interface see page 131.

Use of *capella-tune* in the different programs

	➔ **How to open the *capella-tune* dialog**	➔ **How to select the playback device**
capella reader 8	• Extras → Sound configuration... • Keyboard shortcut: ⇧+⌘+J	• *capella-tune* dialog → Instruments → Profiles
capella 8	• Extras → Playback → Sound configuration... • Keyboard shortcut: ⇧+⌘+J	

NB: MIDI sound cards as well as VST plug-ins and Soundfonts can be selected as playback device.

NB: On the *capella-tune* tab Instruments you can assign a different playback device and sound to each instrument of your *capella* score. By selecting a device as Profile, all instruments will be set to this sound card or sample library.

➔ **How to select the playback device in *capella*:**

With *capella 7* and the *capella* file format CapXML 2.0 you can already select the device and sound for each individual voice in the System Template of the *capella* score. There you have two options:

- Set the DEVICE to UNSPECIFIED and select an instrument in SOUND. This way the *capella* score remains independent from the sound libraries and sound cards installed on a specific computer. The actual sounds during playback are taken from the INSTRUMENTS tab.
- Alternatively, select a specific device and a specific sound already in the System Template. These settings will be saved in the *capella* file. If you transfer the file to another computer the specified sounds may not be available. In this case the INSTRUMENTS tab will be searched for adequate substitutions.

Tabs of the *capella-tune* dialog and chapters of *capella-tune* user guide

- **Playback Devices:** Install and configure your VST plug-ins. See page 106.
- **Instruments:** Define which instruments have which articulations and which sounds must be used for these. For sounds you can assign those of your MIDI sound card and those from your VST plug-ins and Soundfonts. See page 110.
- **Articulations:** Define how the various articulations are represented in the score. See page 112.
- **Dynamics & Rhythm:** Define the volume for various dynamics and tone duration for various articulations. Define special rhythms e. g. swing or Viennese Waltz. See page 114.
- **Repeats:** Repeats and jumps (like da-capo) are defined directly in the score. Details are explained here: page 117. There are no further configuration options in the *capella-tune* dialog. Repeats and jumps can be turned on and off globally in the playback options of the main program.
- **Trills & Ornaments:** Define how the various trills and ornaments are to be played back. See page 121.
- **Tunings:** Activate and sample various historic tunings or switch on Hermode Tuning. The latter is a special method that automatically tunes chords for just intonation. See page 125.
- **MIDI options:** Define various parameters which are mainly relevant for the MIDI file export. See page 129.
- **VST plug-ins and Soundfonts:** Information on setting up VST libraries and Soundfonts can be found here: page 131.

Playback Devices

capella-tune dialog, Tab Playback Devices

This dialog box assists you in administering VST plug-ins and Soundfonts. In order to select any of these for playback please refer to the tab Instruments, see page 104.

MIDI Output Devices

This section lists all MIDI output devices of your PC.

State

The State column shows which devices are opened at the moment. For VST plug-ins and Soundfonts it is indicated if they are already loaded into memory. You can close the devices and free the memory by context menu.

Delay

With every MIDI or VST device there is a delay between a note being touched and the sound being played back. This delay usually amounts to only a few milliseconds and should not pose a problem. However, as soon as you use several playback devices simultaneously for separate voices of a *capella* score you may find that some voices drag behind others, if the delay of the different devices is not identical. To synchronize all devices you can modify the delay. There are no known rules to this, only trial and error will lead you to an acceptable result.

Wave Output Device for VST/SF2

Soundfonts and VST plug-ins are virtual devices that compute the sound wave. Once computed, a sound is sent to a real Wave-out device which you can select here.

CPU: The ratio between calculation time and duration of the calculated sound is indicated.

Threads: This setting determines the number of threads that are deployed to calculate a data packet. Using more than one thread allows parallel calculation of voices/instruments. This can be an advantage with multi core processors and with streaming based plug-ins that continuously load samples from the hard disk.

Blocks and Block size: The sound is calculated in blocks corresponding to a certain duration. While one block is sent to the speaker the next samples are already prepared in another block. Therefore, at least two blocks are required. The blocks should be small in order to minimize the time lag between calculation and output. On the other hand, some calculations might take a bit more time, e.g. because samples have to be loaded from the disk, and such delay can be better tolerated with larger blocks. In short, choose a block size as small as possible. If the sound is crackling select a larger block size.

VOLUME: Use this slider to control the volume of all Soundfonts and VST plug-ins, which allows in particular to adjust it to the volume of MIDI devices.

VST Plug-Ins and SF2 Soundfonts

This section lists all VST plug-ins and Soundfonts that have been registered with *capella-tune*, see below how to add and remove them.

VST Effects

VST effects are filters that can – for example – apply cathedral type acoustics to the otherwise dry studio recordings of the sample library. VST effects will always affect the overall sound, i. e. all voices of your score.

> NB: VST effects are only applied if you play back using your sample library or soundfonts. If you play back via your MIDI sound card the VST effects will not be utilized.

VST effects will be applied in the sequence in which they are listed. You can re-arrange this sequence via the context menu where you can shift the plug-ins up or down in this list.

In the STATE column of this list you can switch the plug-ins on or off.

Double click the name of an effect in the list to open the effect's own control dialog, where you can set certain parameters. If the plug-in offers a list of pre-defined settings then these can be selected from the context menu: LOAD VST PROGRAM that opens when you right-click the plug-in name in the VST Effects column.

Add / Remove...

Click ADD / REMOVE... to install new VST plug-ins, Soundfonts or Effects, and to remove existing ones. Another dialog will pop up, see page 108.

Configure...

Click here to set up a plug-in for *capella-tune*, see page 132.

Tuning Test...

Click here to analyze a plug-in's capabilities for micro tuning, see page 109.

Plug-In Dialog...

Click here to open a plug-in's own control dialog, in case the plug-in provides one.

Close All Plug-Ins

In principle, plug-ins are kept in memory after playback, so that they can be re-used immediately when the next playback starts. Click here to close them, otherwise they remain open until the program quits. To close individual plug-ins use the context menu of the State column.

Default Sound

The default sound is used for testing playback devices. It is also used on the tabs Trills & Ornaments and Tunings to try out the settings. On the tab Instruments it can be set as a universal sound for *capella* scores.

MIDI Reset: Click this button to set the playback device to its default values.

Add and Remove Plug-ins

capella-tune dialog, Tab Playback Devices → Add / Remove...

The dialog is organized in three parts:

- The list on the left side shows plug-ins found on the web that are recommended by *capella-software*. These plug-ins are products of other manufacturers and can be downloaded free of charge. The latest content of this list will be downloaded and displayed only after you have clicked Download list of plug-ins, because we want you to determine when *capella-tune* connects to the internet.
- The list in the middle shows files on your computer.
- The list on the right side shows plug-ins that are already registered with *capella-tune*.

➔ **How to register a plug-in that is already present on your computer**

1. Select a plug-in in the file list (middle list).
2. Click the blue arrow between middle and right list. The plug-in will be opened and registered. The registration won't be permanent unless you close the dialog with OK.

NB: Define your favorite folders by clicking on the yellow star button. You can recall them easily by the drop down list.

➔ **How to download and register a plug-in**

1. If necessary click Download list of plug-ins in order to fill the list on the left side.

2. Select a plug-in in the list on the left.
3. Under Folder select a destination folder on your computer.
4. Click the blue arrow between left and middle list. The plug-in will be downloaded, saved, opened and registered. The registration will not be permanent unless you close the dialog with OK.

➔ **How to deregister a plug-in**

1. Select a plug-in in the list on the right.
2. Click the red trash can above the list. The deregistration will not be permanent unless you close the dialog with OK.

Unfortunately, it is sometimes not possible to identify the sounds provided by a plug-in. It might be necessary to configure the plug-in for *capella-tune*, see page 132.

NB: The *capella Vienna orchestra* is automatically registered with *capella-tune* and is optimally configured.

Tuning Test

If you work with historic tunings or Hermode Tuning (see page 125), the pitch of each tone has to be slightly modified. Several MIDI and VST instructions are available for this purpose, but not all of them are equally supported by all devices. We therefore recommend that you test the tuning for each device so that *capella-tune* knows which options are available. You start the test from the *capella-tune* dialog, Tab Playback Devices.

The following instructions will be tested:

Pitch Bend (MIDI command E0): This instruction should be understood by all devices. The disadvantage of this instruction is that individual notes cannot be corrected. A device can only be tuned higher or lower in its entirety. Therefore a chord can only be tuned properly if each note of the chord is played back on a different device. *capella-tune* can circumvent this problem on MIDI devices by splitting the notes across separate MIDI channels.

Single Note Tuning: This option allows you to tune individual notes. Unfortunately very few devices support this instruction.

VST: This option also allows you to tune individual notes. However, this instruction is only available on VST devices, and only in the non-real-time version.

Real-Time: In this context *real-time* means that sounding notes can be retuned afterwards.

Non-Real-Time: Notes can be struck at any pitch, but cannot be retuned afterwards. This will be sufficient for historical tuning. Dynamic Hermode Tuning, however, requires real-time functionality.

Instruments

capella-tune dialog, Tab Instruments

Here you can determine how the individual *capella* instruments will sound during playback by setting the playback device (see page 111) and the sound (see page 111) for each instrument. Furthermore, you can create individual articulation entries (see page 110) for each instrument, to define which specific sounds should be used for the various articulations. In columns Vol (volume) (see page 111) and Pan (panorama) (see page Fehler: Referenz nicht gefunden) you can individually set volume and stereo position respectively.

Example: You want to play back the score of a violin sonata. In the System Template of *capella,* you have set the instrument to “violin”. This setting points to the entry “violin” in the column capella Instrument. On the same row of this instrument select a playback device and a suitable sound for the violin. You can create additional entries via the right-click context menu of the violin for special articulations, e. g. for pizzicato. This way you can select a suitable sound for the plucked violin. During playback, *capella-tune* will then automatically use the pizzicato sound whenever it encounters the relevant articulation symbol in the score. The Articulations tab (see page 112) is used to define which instruction symbol will switch on/off the pizzicato sound. You can also define completely new articulations there.

NB: You can already select specific sounds in the *capella* System Template. In this case the instrument list of *capella-tune* will be ignored unless you select Device = Unspecified in the System Template. The latter setting is recommended to make the *capella* file independent from locally installed sound cards and sound libraries.

➔ **How to mark several fields to apply a common value**

- To select several individual fields click the fields while pressing down ⌘.
- To select a continuous list click the first field and while pressing down ⇧ click the last field.

Column: capella Instrument

Then right-click an instrument name to open a context menu which offers the following options:

- Option New Articulation Entry creates an initially blank entry for the marked instrument. Right-click this new entry to select one or more articulations from the context menu. The list of available articulations can be edited on the Articulations tab (see page 112).
- You can also remove an articulation entry via the context menu.

- Option Optimize for resets all sounds and articulations for the marked instrument to the optimum value of a playback device.

NB: To optimize the entire list of instruments for a particular playback device simply select the relevant device under Profiles at the bottom of the Instruments tab (see page 112).

- At the bottom of the instruments list you find the percussion channel where the context menu offers an option to Add Percussion Sound. Here you can add your own entries for specific percussion tones to assign your own sounds to these tones. The main entry Percussion Channel determines the settings for all percussion tones that do not have their own entries.
- If View is set to Generic you can choose in the context menu of each instrument to distinguish between Solo and Ensemble sound.

Column: Extent of Notation

This is the second column, labeled by the symbol  . Use the context menu to select whether an instrument refers to an individual voice or all voices on a staff or even several staves in a *capella* score. This setting determines the scope of articulations (e.g. piano pedal) and the assignment of *capella* voices to MIDI channels and VST instances.

Column: Playback Device

Use the context menu to select the playback device for each marked entry. You can select from all MIDI devices (sound cards) and VST plug-ins and Soundfonts (see page 131) that are installed on your PC. You can register additional VST plug-ins with *capella-tune* on the Playback Devices tab (see page 106).

Column: Sound

Use the context menu to select the sound for the marked entries. For MIDI devices you have a choice of the standard MIDI sounds. For VST plug-ins and Soundfonts the choice depends on the range of options of the plug-in.

Column: Vol

Right-click the displayed value for each instrument to access a volume slider and an edit field. The volume setting in this column is a percentage of the volume setting in the *capella* System Template, i. e. you can increase or decrease the volume of individual instruments. The default value is 100%.

Same sound for all instruments

This setting will deactivate the Instruments tab. Use this setting to achieve a uniform sound for all voices without considering the different instruments and articulations. The sound to be used is the Default sound on the Playback Devices tab (see page 108).

View: MIDI / Generic

This setting determines the sorting order of the instruments displayed in the list. The MIDI view is common computer standard, but the range of instruments is limited and the sorting order is not always intuitive (e. g. kettle drum with the strings). The Generic view is based on *capella*'s score wizard. It contains more instruments and is structured in a musically more systematic way.

Preset profiles on Instruments Tab

Open the Profiles drop-down list to load one of the preset profiles.

Click Organize... to open a menu with options to create and administer your own profiles.

Click Apply to save your changes of the current tab. If you have modified a standard profile, a new profile will be created containing the addition "(modified)" in the profile name. To return to the previous state click Organize → Reset to Previous State.

Click OK to save the current settings on all tabs, or click Cancel to dismiss all changes that have not yet been saved.

Articulations

capella-tune dialog, Tab Articulations

This table shows how the different articulations are identified in the score. The identification can be achieved by note attributes, *capella* symbols or text objects.

Some articulation signs have to be anchored to each affected note, e.g. tenuto marks, while others can be set to indicate the beginning and end of a section, e.g. *pizzicato* (plucked) and *arco* (bowed).

You can define any number of identifications for each articulation. The articulation will be activated as soon one of the identifications is present in the score.

The entries in the articulation list are required for the following features:

- Distinction of articulations on Instruments tab (see page 110).
- Generation of special rhythms on the Dynamics & Rhythm tab (see page 116).

The settings for Attack Intensity and Note Shortening on the tab are not affected by the articulation list.

Column: name

Right-click any entry to open the context menu, which allows you to create, delete, rename and reorder articulations.

The sequence of articulations in this table is of relevance when no entry can be found which exactly matches the identifications presented in the score. Example: Let's assume you have created two articulation entries, pizzicato (plucked) and marcato (emphasized), for instrument violin in the list of instruments and you have assigned specific sounds to both of them. As *capella-tune* reads a *capella* score it encounters an emphasized pizzicato, but no specific sound has been defined for this combination. *capella-tune* therefore has to decide which of the two sounds to use. This is where the sequence of entries in the articulation list is of importance. In our example it is obviously preferable to use the pizzicato sound and not the marcato sound, which is only bowed. This is why the pizzicato setting must be higher up in the list than the marcato setting.

Column: articulation sign

Define the articulation sign that must be present at all relevant notes. You can define several identifications per articulation via the context menu. For each entry you can choose the type of identification marks from the context menu (see page 113).

You can also define a grouping symbol like a bracket or a wavy line. This will extend the articulation across the entire group.

The entry Bracket in the sub-menu Grouping refers to both repeat box brackets and tuplet brackets. When entering these brackets in a *capella* score you need to deactivate the number.

The context menu option Entry Defines Exception allows you to exclude specific notes within an articulation section.

Section Start and Section End

Set the beginning and end of an articulation section. You may define several entries via the context menu. For each entry you can define any of the possible entry types from the context menu (see page 113). The start and end instructions are not paired, i. e. any type of entry may start the articulation, while any non-related type may end the instruction. Simply put, any instruction in the second column will end any instruction from the first column.

Types of Articulation Marks

Text: Enter the text that you have previously inserted as a text object into a *capella* score. You may add an underscore "_" as the last character to enable finding text ob-

jects that are longer than the entry, i.e. *pizz_* will respond to text objects like *pizzicato, pizzikato, pizz*, etc.

Special Note Heads: Select rhombus heads, triangular heads, etc.

Articulation Signs: Select any of the signs from the sub-menu. These can be entered into the *capella* score either as note attributes or as music symbols.

Ornamentation Signs: Choose any symbol from the sub-menu.

All capella Symbols: For the sake of completeness we include this option, although all common symbols are included in the above options.

Tremolo Bars: Select numbers 1 to 5.

Preset Profiles on Articulations Tab

Open the Profiles drop-down list to load one of the preset profiles.

Click Organize... to open a menu with options to create and administer your own profiles. You can for example save a preset profile in a file and transfer it to another computer. Select Merge from file to load a file and integrate the articulations into the current list. Select Import from file to replace the current list.

Click Apply to save your changes of the current tab. If you have modified a standard profile a new profile will be created with the addition "(modified)" in the profile name. To return to the previous state click Organize → Reset to Previous State.

Click OK to save the current settings on all tabs, or click Cancel to dismiss all changes that have not yet been saved.

Dynamics & Rhythm

capella-tune dialog, Tab Dynamics & Rhythm

Dynamic Levels

On the left side of the dialog you can set the attack intensity for all dynamics from to  . Attack intensity will also influence tone quality, contrary to the volume will be played back as *forte* at the beginning with a subsequent decrescendo to *piano* during the first beat.

Articulation Sign

On the right side of the dialog you can set the Attack Change and Note Shortening for selected articulation signs.

The Attack Change is a relative value in percent referring to the current dynamic setting. Example:

- Set Attack Intensity on the left for piano (***p***) to 67 and for forte (***f***) to 110.
- Set Attack Change for sforzato (***sf***) to 150%
- Now a note marked sforzato will be played back with an attack intensity of 100.5 in a piano section (67 * 150% = 100.5). In a forte section the sforzato note would be played with an attack intensity of 165 = 110 * 150%. However, the latter value would be reduced to 127 as this is the maximum value.

Note Shortening can be set via its right-click context menu either as a relative value or as an absolute value. The relative value refers to the note value, while the absolute value indicates the rest in milliseconds before the next note. This is particularly useful for broad articulations like tenuto and portato.

At the end of the list you find the setting for arpeggio. An arpeggio sign means that the notes of a chord will not be played back simultaneously, but in succession. The value entered at Note Shortening indicates the time between the successive sounds. Setting the value to “0” switches the arpeggio function off.

crescendo and diminuendo (decrescendo)

Crescendo hairpins and text instructions like *cresc.* and *dim.* will be considered. You may define additional instructions with the *crescendo* and *diminuendo* entries on the Articulations tab. The length of the hairpin is irrelevant. De/crescendo will always be stretched from the start of the hairpin to the next dynamic sign or to the next reverse hairpin. In cases where no target volume is indicated in the score you can set the number of dynamic gradations required.

Changes in volume for sustained notes will be considered by *capella-tune* as far as the respective instrument is capable of doing so. Naturally, changes of volume within a sustained note are not possible for pianos, plucked instruments and percussion instruments, while string instruments and wind instruments *are* capable of changing the volume. In cases where a sustained note contains two opposing hairpins the note will be split into two tied halves.

Include dynamics during playback

This option switches the inclusion of dynamics control on or off.

Preset Profiles on Dynamics & Rhythm Tab

Open the Profiles drop-down list to load one of the preset profiles.

Click Organize... to open a menu with options to create and administer your own profiles.

Click Apply to save your changes of the current tab. If you have modified a standard profile a new profile will be created with the addition "(modified)" in the profile name. To return to the previous state click Organize → Reset to Previous State.

Click OK to save the current settings on all tabs, or click Cancel to dismiss all changes that have not yet been saved.

Special Rhythms

Distinctive rhythms like swing or Viennese Waltz are defined in this list.

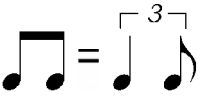
Articulation: Right-click to open the context menu and select one of the articulations (see page 112) to define how this special rhythm is indicated in the *capella* score.

Group of Notes: Define the size of the group of notes whose rhythm must be modified. Right-click the number and/or the duration of the note to pick a suitable value from the context menu.

Proportion of Note Duration: For each note of the rhythm group you find a numeric value. These values indicate the duration relationship between the individual notes, which is also indicated by the length of the green bars. The numeric values can be edited via their context menu or by pressing F2. It is irrelevant whether you specify the relationship as 2:1 or as 200:100. The sum of all numeric values does not have to amount to a specific value. If you want to compare the tone durations with their original duration we recommend that you start off with e. g. 100:100 and maintain the total sum. 120:80 would then indicate that the first note will be lengthened by 20% while the second note will be shortened by 20%.

Example: Swing Rhythms

A swing rhythm is usually notated with normal eighths, where the first eighth is played a little longer and the second eighth is played a little shorter, approximately in a ratio of 2:1.



The identification of *swing* in the *capella* score is defined on the Articulations tab. You can switch on swing rhythm with the text object *swing* and switch it off with another text object, e. g. *straight*. To interpret individual pairs of eighths as swung you might also attach a triplet bracket in the score.

NB: Do not format the eighth note as triplet, attach a triplet bracket as a graphic object to the notes. To interpret individual pairs of eighths within a swinging section as normal you can attach a duplet bracket.

The ratio of the duration of the two swinging eights is defined on the tab Dynamic & Rhythm under Special Rhythms, column Proportion of Tone Duration. Here you see two values which represent the length of each note. The default value of 125:75 is something in between triplet rhythm (133:67) and regular (100:100).

Example: Viennese Waltz

With a Viennese Waltz the second beat is a little early, while the third beat is a little late. You will get usable results with a setting of 75:130:95 or – more moderate – 85:115:100. These values have been selected to total 300. This helps to interpret each number as a percentage in relation to a uniform 3/4 time with the values 100:100:100.

There is no specific notation for the Viennese Waltz rhythm. It is usually applied intuitively, mostly in the accompaniment rather than in the melody voice. It is a lot of work to properly set up a *capella* score for this rhythm. We have defined the text objects *WrW* (derived from the Austrian *Wiener Walzer*) and *NrW* (normal Waltz) on the Articulations tab as on/off instructions. You can insert these text objects into your *capella* score. To hide them from view format them with text color white.

Include Special Rhythms During Playback

This option switches the inclusion of special rhythms on or off.

Repeats & Repetitions

All kinds of repeats and repetitions are controlled by musical instructions in the score, where the guidelines of this chapter should be taken into account. Repetitions and section repeats can be globally turned on and off in the playback options of the main program (e. g. *capella*, *capella-scan*, …).

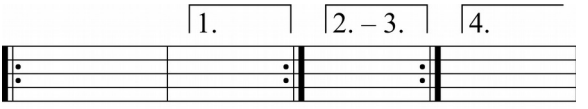
Repetitions

Repetitions are played back as usual. Nesting is possible. If the opening repeat sign 𝄆 is omitted, repetition starts at the beginning, or – if present – at the last final double barline 𝄀.

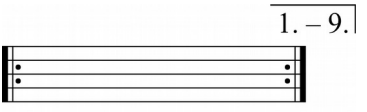
Repetitions in a da capo section are usually not repeated. If this is still required the jump instruction must be supplemented with *con rep*. This is derived from the Italian

“con repetizione” = with repetitions. Example: *da capo al fine con rep.* = repeat from the head (beginning) to the end with repetitions.

Repeat brackets are acknowledged. Multiple repeats can be realized with appropriate bracket numbering. E.g.:



In order to play back a normal repeat several times you can anchor a repeat bracket directly to the repeat measure and open the bracket on the left side. You might choose to format it invisible.



The scope of repeat brackets must be set to “Entire System” in *capella.*

If you deactivate repeats in the playback options of the main program you can decide whether the first repeat box should be skipped.

Section Repeats *(da capo* and *dal segno)*

There are repeat marks (e. g. segno) and repeat instructions (e. g. dal segno). Both are defined in text objects, either as text or using music symbols. The scope of the objects must be set to “Entire System” in *capella*, see *capella* menu Draw → Edit Object → Position → Scope. In *capella* versions older than 7 (or *capella* file formats older than capXML 2.0) the objects must be anchored to the first voice used in the current system.

Repeat Marks

The chronological position of repeat *marks* corresponds to the *beginning* of the note to which they are anchored.

The following repeat marks are available:

as text: capo segno coda fine

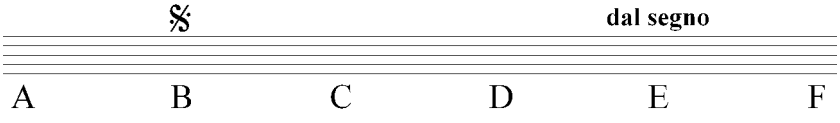
as music symbol: 𝄋 𝄊 𝄌

capo is usually defined as the beginning of the file or the movement but may be placed in a different position if so required. Any system where the automatic measure numbering is reset is considered a new movement. The text mark *segno* can basically be used for both symbols shown in the above table. If in doubt it will be identified with the first symbol.

Repeat Instructions

The chronological position of repeat *instructions* corresponds to the *end* of the note to which they are anchored. Therefore these instructions must be anchored to the last note of the old section.

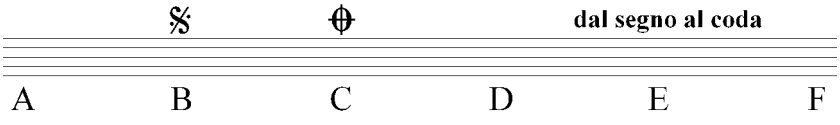
- **Repeat instruction *da <mark>:*** The section between <mark> and repeat instruction is repeated. The following example creates the sequence A-E, B-F.



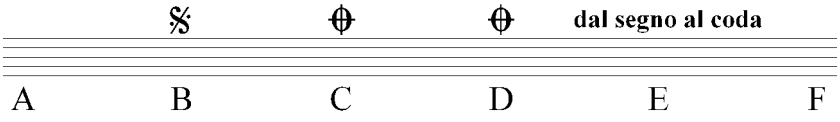
Repeat instructions can begin as follows:

as text:	*da ...* *d. ...* *dal ...*	Abbreviation for *da capo*: *d.c.*	*Abbreviation for dal segno*: *d.s.*
as music symbol:		*D.C.*	*D.S.*

- **Repeat instruction *da <mark1> al <mark2>:*** The section between <mark1> and <mark2> is repeated. Afterwards continuation begins after the repeat instruction. The following example creates the sequence A-E, B-C, E-F.



Repeating the second repeat mark will create the following sequence: A-E, B-C, D-F.



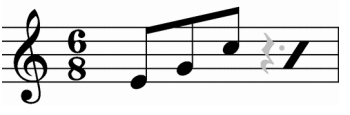
All parts of a repeat instruction *da ... al ...* must be placed inside the same text object. Concatenation of several text objects will not be recognized. Repeat instructions which are a combination of text and symbols therefore must have the form of a Freeform text.

- **Examples**: *D.C.* al 𝄋, D. 𝄋 al ⊕

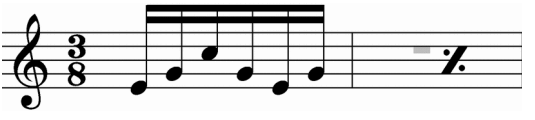
Repeat Signs

Repeat signs indicate the repetition of the last group of notes (𝄎), or last measure (𝄇), or the last two measures (𝄇𝄇). In *capella* these signs are text objects without note value. For *capella-tune* to interpret these correctly during playback they must be anchored to a rest, which is then formatted as invisible. These rests are shown in gray in the following illustrations.

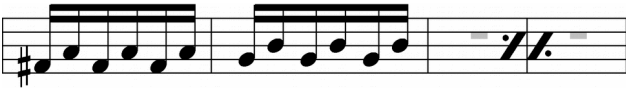
The repeat sign for the last group of notes must be attached to a rest that - through its value - indicates the length of the group.



Measure repeat signs must be attached to a whole-measure rest.

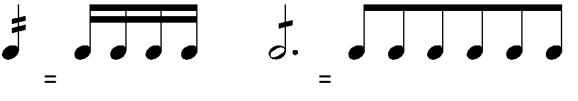


Double measure repeat signs may be attached to the first or second whole-measure rest.



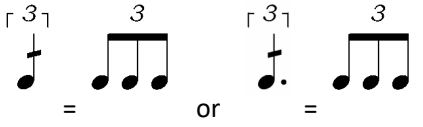
Abbreviations

Tremolo bars are used to indicate rapid repetition of notes. The number of bars indicates the note value of a single note, which will be repeated until the overall note value is reached.



Triplet note repetitions can be achieved by placing a triplet bracket above the note.

Example: A quarter with one tremolo bar and triplet bracket above will generate three triplet eighths. The quarter note itself must be either a regular quarter or a triplet quarter with a dot. It depends on the context, which notation is more suitable.

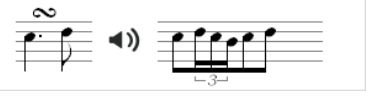


NB: Tremolo bars are also used to indicate tremolos and drum rolls, see *roll* on the Articulations tab. If the roll articulation has been assigned to an instrument on the Instruments tab (e. g. timpani for *capella Vienna orchestra*), *capella-tune* will play back a sustained note with roll sound.

Trills & Ornaments

capella-tune dialog, Tab Trills & Ornaments

These symbols belong to the group of trills and ornaments: 𝆖, 𝆖, 𝆔, 𝆕, 𝆗 as well as grace notes and passing appoggiaturas, i. e. miniature notes without value. There are certain conventions on how to play these ornaments, depending on the epoch and the composer, but ultimately taste and skill of the musician will influence the interpretation. The dialog indicates for each trill and ornament how it is played back, e. g.:



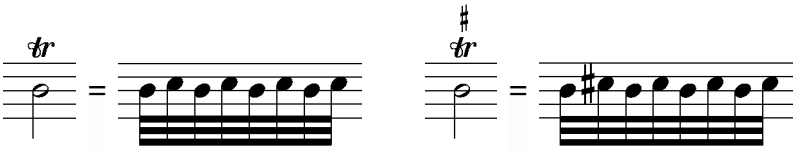
Right click the staff to select another playing variant from the drop-down list. Click the speaker symbol to play back. The default sound will be used which is set on the tab Playback Devices.

The displayed note values should not be seen as absolute values as they depend on the playback tempo. With faster tempos the note values will increase to avoid “unplayably” fast trills. The note values will be shortened only if an ornament does not fit into the value of the main note.

Tempo	indicated 16th will be played as...
quarter = 40 to 80	32nd
quarter = 81 to 160	16th
quarter = 161 to 320	eighth

Trills

Accidentals for the auxiliary note can be placed as a text symbol above the trill symbol:

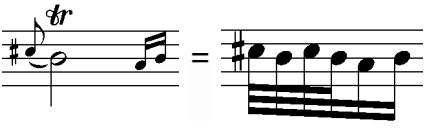


Full length trilling: *capella* allows you to indicate a trill by setting either a trill symbol or a wavy line. You can decide for both cases whether the trill should be sustained along the entire note. Otherwise only two trill beats will be played.

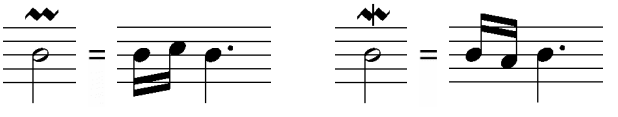
Trill from above: Here you select the cases which lead to trills beginning with the auxiliary note.

- with grace note
- preceding note is higher
- preceding note has same pitch as auxiliary note
- preceding note has same pitch as principal note
- preceding note is lower

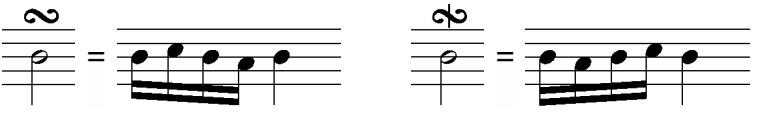
Combinations with passing appoggiaturas are also possible:



Upper mordent, mordent

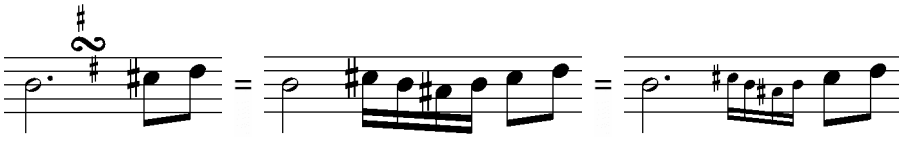


Turn, Inverted Turn



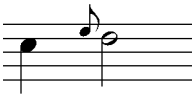
With a normal turn the ornament is first placed above and then below the principal note. The opposite applies to inverted turn. The inverted turn is either marked with a single line or a mirrored symbol.

Accidentals for the upper auxiliary note are positioned above the turn symbol, accidentals for the lower auxiliary note are placed below:

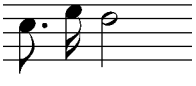


In this example the turn symbol is not positioned above the note, but above the gap to the next note. These cases are dealt with separately in the trill dialog.

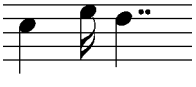
Single Grace Notes



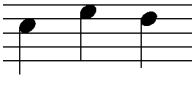
Single grace notes can have three different functions:



Acciaccatura before the beat: The preceding note is shortened. The grace note is played before the stroke.

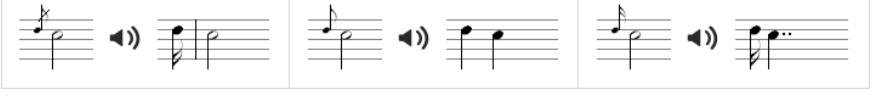


Acciaccatura on the beat: The grace note is played on the beat and the main note is shortened accordingly.

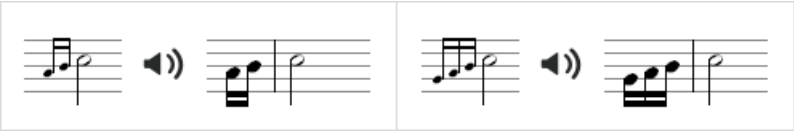


Passing appoggiatura: The grace note assumes half the value of the main note (or more if the main note is dotted).

There are no general rules as to how to notate which grace note. You may therefore set the interpretation individually for the following notations: crossed out eighth, normal eighth (or longer note values), 16th note (or shorter note values). An acciaccatura before the beat is symbolized by a barline before the main note.

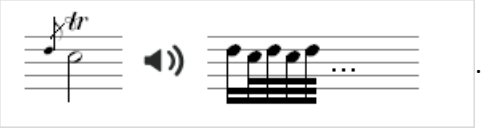


For two or more grace notes you can determine whether the notes should be played before or on the beat.



Single Grace Note Preceding a Trill

Single grace notes preceding a trilled note are merged into the trill according to the settings at



.

This setting is used for all notations of grace notes, whether crossed out or not. However, the following conditions apply:

- In the TRILLS dialog the function of this type of grace note must not be set to "passing appoggiatura", see preceding section.
- In the *capella* score the grace note has to be formatted as "appoggiatura" and not "passing appoggiatura".

Otherwise grace note and trill are interpreted separately.

Include Trills and Ornaments During Playback

This option will switch on or off the inclusion of trills and ornaments during playback.

Preset Profiles on Trills & Ornaments Tab

Open the PROFILES drop-down list to load one of the preset profiles.

Click ORGANIZE... to open a menu with options to create and administer your own profiles.

Click APPLY to save your changes of the current tab. If you have modified a standard profile, a new profile will be created with the addition “(modified)” in the profile name. To return to the previous state click ORGANIZE → RESET TO PREVIOUS STATE.

Click OK to save the current settings on all tabs, or click CANCEL to dismiss all changes that have not yet been saved.

Tunings

capella-tune dialog, Tab TUNINGS

What are Tunings?

Modern musical instruments (and computers) divide an octave into 12 equal half step steps. The advantage is that any given interval or chord will always sound alike, regardless of the starting note. The disadvantage is that except for the octave, no interval sounds perfect. Minor beatings will always be audible. This tuning is called equal temperament tuning.

When is an Interval Perfect?

All string instruments, wind instruments and the human voice have a harmonic overtone spectrum. In this case harmonic means that the frequencies of the overtones are integral multiples of the tonic. We sense an interval to be perfect when many overtones match precisely without any friction. It follows that the frequencies of the tonics or roots must also relate to each other in integral proportions.

Where is the Problem?

With equal temperament tuning the integral frequency proportions are relatively well approximated, though not exactly met. To properly tune a chord the individual pitches need to deviate slightly from the equal temperament tuning. All qualified musicians will do this automatically as far as their instrument allows. Hermode Tuning takes this into consideration (see page 128).

Historical Tunings

In the course of the history of musical instruments there were numerous attempts to improve the tuning of instruments. This tuning problem was particularly pressing with keyboard instruments as their intonation cannot be corrected during playing. Historical tunings are working from a static tuning scale where each note of the scale has a fixed pitch. There are twelve-part scales that correspond to a normal keyboard, and extended enharmonic scales that differentiate between sharps and flats. The latter can really only be accessed via the computer, although there have been instruments with split black keys in the past.

Pitch Display

Pitch can be shown in cent or as frequency ratio.

- Frequency ratios are of special interest for natural harmonic tunings, where the intervals are determined by integral ratios. The reference note is defined as 1:1,

the octave as 2:1. The higher note has double the frequency of the lower note. To add or subtract intervals you need to multiply or divide the frequencies.

- The cent display runs linear with our sense of pitch and is useful to compare different tunings or intervals. The reference note is defined as 0 and the octave as 1200. An equal-tempered half step step is equal to exactly 100 cent. To add or subtract intervals you need to add or subtract the cent values.

Conversion of a frequency ratio to per value is achieved as follows:

cent value = 1200 * log(numerator / denominator) / log(2)

Conversion of cent value to frequency ratio is achieved as follows:

frequency ratio = 2^ (cent value / 1200)

There is no explicit solution to further break apart the frequency ratio into numerator and denominator. *capella-tune* achieves the best result by trial and error.

Tone of Reference: Here you select which tone of the scale should be assigned the 1:1 or 0 cent pitch. Only the display is changed, not the tuning. This feature can help to read out certain intervals within the scale.

Tuning Scale

The display of the tuning scale offers several features:

- Each tone is represented by a blue box. The pitch is indicated both by numbers (cent or frequency ratio) and by the horizontal position of the box. In the background you see a piano keyboard for orientation.
- If flats and sharps are distinguished (depending on the mode, see below) the natural tones are displayed in the middle line, the sharps are displayed above and the flats below.
- Depending on the mode (see below) the pitch of the tones can be edited directly in the blue boxes. Simply click the numbers.
- To play back a tone click the blue box (but not the numbers). The tone will sound until you click it again. The default sound will be used which is selected on the tab Output Devices.
- You can control the display size by the zoom slider on the bottom right side.

Mode

There are different ways to define the tuning scale. The methods might be differently suited for certain tunings, although sometimes several methods lead to the same tuning.

Twelve-Part Piano Scale

There are twelve steps per octave, as on a piano keyboard. Sharps and flats are not distinguished. Each of the twelve steps can be freely edited. Under Relation to Key Signature you find the following options:

Ignore key signature: This setting corresponds to a piano. The tones have a fixed tuning, regardless of which key you play in. Therefore the different keys can acquire different characteristics depending on the tuning.

Adapt tuning to written key signature: This setting will provide the following scenario: A trumpeter plays a c-Major piece on a c-trumpet and a b-Major piece on a b-trumpet. Utilizing the natural harmonic tuning, in the first case the interval c – e will produce a pure Major third, in the second case an interval b – d.

Adapt tuning to sounding key signature: The same as above, but in case of transposing instruments the sounding key is used rather than the key signature written in the (transposed) score.

The Trial key signature is used for testing in the dialog and does not affect the tuning definition.

Examples can be found in the profiles under Twelve-Part Scales with Modified Fifths and Twelve-Part Selections.

Calculate by Accidentals

The diatonic (natural) tones can be freely edited.

Make accidental equidistant: With this options sharps and flats alter by the same amount but in opposite directions. Without this option you can specify the alteration individually for each type of accidental.

Uniform for all scale degrees: With this option the intervals c – c#, d – d#, e – e# etc. are equal. Without this option you can specify the alteration individually for each tone.

Calculate by Fifths

All tones are calculated by stacked fifths mapped back into the original octave. Only the size of the fifth can be edited, not the individual tones.

Examples can be found in the profiles under Equaltempered Scales and Just Intervals.

Hermode Tuning

The intonation of individual notes is automatically optimized to match the musical context. Therefore there is no static tuning scale and the values displayed in the scale are of no relevance. Only if you click several tones to create a chord, or if you play back a *capella* score while the *capella-tune* dialog is opened, you can watch how the individual tones are adjusted in pitch.

Hermode Tuning usually provides the best sounding results. The method fits the technique of good musicians with instruments without any intonation restrictions. You can select from the following variants:

- Strict: Thirds and fifths are dynamically tuned. The re-tuning of sustained notes may be audible.
- Classic: Thirds and fifths are dynamically tuned. The purity is reduced in case the re-tuning of sustained notes would be clearly audible.
- Baroque: Thirds and fifths are dynamically tuned. Chords near to the harmonic center will be set to a higher purity than chords with more distance to this center. Recommended for polyphonic music.
- Pop/Jazz: Thirds, fifths and natural sevenths are dynamically tuned. The re-tuning of sustained notes may be audible. The natural seventh is mainly used in Jazz. As it differs substantially from the equal tempered seventh, this tuning is less suited for polyphonic music.

A slider is provided for adjusting the Purity. 100% means full purity, 0% means equal-tempered tuning.

If Include mute voices is selected, all voices of the score form the harmonic context, even if you play back only a single voice.

Absolute Tuning

This option allows you to shift the entire scale up or down. You can either enter the frequency for concert pitch, e. g. 430Hz, or an interval that sets the tuning relative to the standard concert pitch of 440Hz.

If Tone of reference is set to current a then indeed the tone A is kept on the desired absolute pitch. Changing the A in the tuning scale will leave the A on the same absolute pitch and adjust all other tones.

If Tone of reference is set to equal tempered a the absolute tuning changes at first the origin of the tuning scale, i.e. the C. Then the A is calculated according to the tuning scale and might end up on a different pitch than specified formally as concert pitch.

Preset Profiles on Tunings Tab

Open the Profiles drop-down list to load one of the numerous preset tunings.

Click Organize... to open a menu with options to create and administer your own tunings.

Click Apply to save your changes of the current tab. If you have modified a standard tuning a new tuninge will be created with the addition “(modified)” in the name. To return to the previous state click Organize → Reset to Previous State.

Click OK to save the current settings on all tabs, or click Cancel to dismiss all changes that have not yet been saved.

MIDI Options

capella-tune dialog, Tab MIDI Options

General

Don't transpose percussion: Percussion voices are usually not transposed since the pitch has no melodic meaning but defines the percussion instrument in the MIDI percussion channel. Deactivate this option if you nevertheless want to use the transposition given in the System Template to shift the standard instrument assignment in the MIDI percussion channel. This procedure is not recommended. Better use the sound maps in the *capella* System Template.

Determine volume from: The following parameters can be taken into account for calculating the MIDI volume:

- capella basic volume: This parameter is set in the main program, e. g. in *capella* under Extras → Options → Sound → Output.
- System Template: With the volume setting in the System Template of a *capella* score you can balance the volume between voices of the score.
- Tab Instruments, Column Vol%: With this *capella-tune* setting you can globally balance the volume between certain instruments for all *capella* scores.
- Plug-in configuration file (*_captune.ini): With the volume setting in the plug-in configuration file (cf. page 132) you can balance the volume of instruments and articulation sounds within a VST sound library.

MIDI File Export

Assignment of capella voices to MIDI tracks

Combine voices of the same instrument: Some instruments need two staves in the score (e. g. piano and harp) while in other cases two instruments share the same staff (e. g.

trumpet 1 and 2). Which kind of notation is used for which instrument can be specified on the tab Instruments under Notation Range (second column), see page 110. According to these settings *capella-tune* determines which physical instruments are described by the score. MIDI channels and VST instances are allocated per physical instrument rather than per *capella* voice, ensuring optimal playback results without allocating more resources than necessary. In a similar way separate MIDI tracks are created in the MIDI file for each physical instrument. With this option and the option below you can enforce a different track allocation mode.

Separate left and right hand piano staves: If only the audible result is important, it makes sense to combine left and right hand of a piano score to a single track, cf. paragraph above. However, the information about the hand splitting is lost. Activate this option if you want to import the MIDI file e. g. into another music notation program.

Lyrics

Save lyrics: With this option you turn the lyrics export on and off.

End of word / End of syllable / Syllable continuation character: You can specify whether blank characters should be appended to word ends or whether syllables within words should be hyphenated.

Event order: You can specify whether the lyrics event precedes or succeeds the note-on event in the MIDI file. In any case they have the same temporal position.

Verse: You can select a particular lyrics verse for the MIDI export. The default setting is Next nonempty verse, meaning that the first verse is used for the first pass, the second verse for the repeat etc. Empty verses are skipped, since they are sometimes used in *capella* for alignment purposes.

Miscellaneous

Code page: MIDI files can contain only 8 bit characters. If you use foreign language text like Greek or Russian you have to specify the appropriate code page. It is used for all text elements (voice IDs, device and sound names, lyrics).

Save sound and device names: Sound and device names can be saved by the MIDI meta events 08 and 09 respectively. This way you can always check which device and instrument a MIDI track has been optimized for. Some older programs don't know these meta events and cannot deal with such files. In this case you should deactivate this option.

Note length: Notes are normally not fully sustained but shortened according to their articulation. If you re-import such MIDI files into another program, a staccato played crochet can easily be recognized as an eighth. Therefore, select Sustain in order to preserve the full note values.

Percussion pitch: Let's assume you have a triangle tone in the percussion voice of a *capella* score. In the simplest case the tone is directly written with the pitch a'' as this pitch creates the sound of a triangle in the percussion channel of a MIDI sound card. If you play back the score with a VST sound library the note-on command is not sent to the MIDI sound card but to the VST plug-in for the triangle sound. This plug-in might expect a note-on command with a different pitch. E. g. the triangle

plug-in of the *capella Vienna orchestra* requires a note-on command with the pitch c'. This is defined in the plug-in configuration file and is automatically taken into account during playback. However, in the case of MIDI file export it is up to you to decide which pitch is written into the file.

- ACCORDING TO MIDI PERCUSSION CHANNEL: The MIDI file is General MIDI compliant. In the above example the tone is saved as a'' and can still be identified as a triangle.
- ACCORDING TO PLUG-IN CONFIGURATION: The MIDI events for the percussion instruments are optimized for the VST plug-ins selected in *capella* and the file can be used in a sequencer program that uses the same plug-ins.

Preset Profiles for MIDI Options Tab

Open the PROFILES drop-down list to load one of the preset profiles.

Click ORGANIZE... to open a menu with options to create and administer your own profiles.

Click APPLY to save your changes of the current tab. If you have modified a standard profile, a new profile will be created with the addition “(modified)” in the profile name. To return to the previous state click ORGANIZE → RESET TO PREVIOUS STATE.

Click OK to save the current settings on all tabs, or click CANCEL to dismiss all changes that have not yet been saved.

VST Plug-ins and Soundfonts

capella-tune can use Soundfonts and VST plug-ins for playback. Both are denoted as “plug-ins” and count as “playback devices” equivalent to MIDI devices. They create sound waves which are played back over the wave out device of the computer. Both sound quality and the variety of instruments depend on the plug-in and are independent of the computer's MIDI synthesizer. Plug-ins can be quite demanding as CPU power, memory size and hard drive speed are concerned.

VST stands for *Virtual Studio Technology*, was developed by Steinberg® and is a registered trademark of Media Technologies GmbH. VST is a widespread standard for the creation and filtering of wave sounds. A VST system consists of a host – in our case *capella-tune* – and a number of plug-ins, for example *capella Vienna orchestra*. There are basically two different types of VST plug-ins:

- Virtual Instruments (VIs): These receive MIDI instructions from the host and supply wave sounds in return. These wave sounds can then be forwarded to the sound card or saved in a file. VIs can calculate the sound synthetically or utilize recordings of true instruments (sample libraries).
- Effects: These follow the virtual instruments and can further modify the wave sounds, e. g. add echo.

Soundfonts are sample libraries in a certain open file format (*.sf2). *capella-tune* uses the open source synthesizer *fluidsynth* to transform Soundfonts into sound.

Configure Plug-ins

capella-tune dialog, tab PLAYBACK DEVICES, button CONFIGURE...

Why configure? The extent of functionality of virtual instruments can vary considerably. Some plug-ins specialize in just one instrument while others offer a full range of instruments including articulations, like *capella Vienna orchestra* does. Unfortunately there is no common standard to describe the extent of sounds of a given plug-in. This is the reason why *capella-tune* requires a configuration file that describes which sounds can be generated and which MIDI and VST instructions are used to activate these sounds.

NB: *capella Vienna orchestra* is already fully configured for *capella-tune.*

NB: *capella-tune* can look into Soundfonts and automatically determine the names of the sounds and the required MIDI program and bank numbers to activate them. If the sounds correspond to the General MIDI instruments no further configuration is necessary. Otherwise it is recommended to structure and classify the sounds, see below.

➔ **Outline of the dialog**

DEVICE: Select the plug-in you want to configure.
SOUND: The instruments contained in the plug-in.
GENERAL SETTINGS: Various parameters which affect all sounds.
SETTINGS FOR THE SOUND ...: Various parameters for the currently selected sound.

➔ **How to structure the sounds**

- The list Sound shows all sounds in the arrangement that is used later on in the device's sound selection menu. Open the context menu (right mouse click) to rearrange elements, insert new elements and sub-elements etc.
- Each element without sub-element defines a sound. Its settings can be edited in the lower right list. The name of each sound should be unique within the device.
- If a new element is created the settings of the previously selected element will be copied into the new one. Therefore, if you create many new elements, you should at first complete the configuration of the first element and then use it as template for the other ones.
- The individual articulations of an instrument are formally independent sounds. However, *capella-tune* assumes that switching between articulation does not raise time consuming reloading of samples. Therefore the parameters PROGRAM, BANK, VST CHUNKFILE and VST PROGRAM should be the same for all articulations of an instrument.

➔ **How to edit settings**

- The list on the top right shows settings which are relevant for all sounds. The list on the bottom right shows settings for the sound that is selected in the list on the left.
- The column Parameter shows only parameters that are actually used. Open the context menu (right mouse click) and the sub-menu Add in order to see the complete list of available parameters. Some parameters can be added only once (e.g. Volume) while others can be added several times (e.g. Controller).
- The column Value shows the parameter's current value. Open the context menu (right mouse click) to change it.

➔ **How to classify the sounds**

- *capella-tune* needs to know which sound represents which instrument. Otherwise it cannot find suitable sounds for the instruments given in a *capella* score. Therefore you should set one of the two following parameters to a meaningful value.
- With Usage (MIDI) you describe the sound by specifying an instrument from the General MIDI standard. This standard contains only a limited selection of instruments and is therefore not always applicable. You can specify several instruments by adding the parameter several times.
- With Generic Sound ID you describe the sound using *capella*'s own sound classification. It is based on a tree-like scheme where all instruments can be sorted according to their sound. Using this scheme *capella-tune* can even find a good substitution in case the desired instrument is not exactly available.

All parameters are described in detail in the technical documentation `captune-VST-config.pdf`.

➔ **How to configure a plug-in that provides a control dialog**

1. Select the plug-in under Device. If it is missing in the list you have to register it first, see page 107.
2. Select Loaded Plug-ins → Open New Instance. The plug-in is loaded and its control dialog pops up.
3. Select an instrument in the plug-in's control dialog, e.g. a violin.
4. Create a new sound element for the violin as described before, see → How to structure sounds.
5. Add the parameter VST chunk file to the violin's settings, see → How to edit settings.

6. Right-click the column Value next to the parameter VST chunk file. In the context menu select Create New Chunk File. Type in a meaningful file name, e.g. "violin.chunk" and click Save. Now all settings from the control dialog have been saved to this file. Later on these settings can be reloaded automatically with no need to open the control dialog.

7. Classify the sound as described before.

8. Repeat steps 3. to 7. for all instruments of the sample library.

➔ **How to modify a chunk file**

1. Select the plug-in under Device.

2. Select Loaded Plug-Ins → Open New Instance. The plug-in is loaded and its control dialog pops up.

3. Select your sound in the dialog Configure Plug-in.

4. Right-click the column Value next to the parameter VST chunk file. In the context menu select Create new Load Chunk File into Plug-In.

5. Carry out your modifications in the plug-in dialog.

6. In the context menu just mentioned select Overwrite Load Chunk Now.

➔ **How to configure a plug-in without control dialog**

The same principles as before apply, but you cannot create your own chunk file. You require detailed documentation from the publisher about which parameters or which chunk files activate the individual sounds. Set the required parameters for each sound as described above.

Import and export data

tonica file format

The preferred file format used to save all properties of a current tonica file is tca. tonica is also able to read, play and print the older formats from version 3.0.

The current version 13 adds some extensions to the file format which are not known in older tonica versions and therefore can not be represented. If you open new files in an older tonica version they may not be represented correctly. Remember this when sharing files with other tonica users. It is best if all users exchanging scores work with the same – current – version.

capella file format

tonica imports scores in the capella file format CapXML (capx). You can either open the capx file directly or extract individual voices from the capx file into a tonica score template.

tonica exports scores in the capella file format CapXML 3.0. This way you can read tonica files in the capella reader or continue editing them in capella.

capella import

Select File → Open… to open a file in capx format. In the dialog select the file type „capella (*.capx)" to filter the view showing only capx files.

Select File → Import… to import voices from a file in capx format. In the dialog select a template into which you want to import the voices. Then assign the voices in the capella file to voices of the template. Choose „none" as a tonica voice to mark voices which you do not want to import.

capella export

To export a tonica score in capx format, activate the window of the score to be exported, select File→ Export... and choose the file type „capella (*.capx)" in the dialog.

Important: Always save your scores in tonica format! This is because of the compromises that have to be made during conversion to capXML!

MusicXML

MusicXML is an open file format for exchanging scores in modern Western music notation. During the last years it has been continuously supported as an exchange format by several well known notation programs, and also tonica constantly improves export and import. This allows you to open and edit tonica files in all notation programs supporting MusicXML.

MusicXML export

To export a tonica score in MusicXML format, activate the window of the score to be exported, select File→ Export... and choose the file type „MusicXML (*.xml)“ in the dialog.

Important: Always save your scores in tonica format! This is because of the compromises that have to be made during conversion to MusicXML!

MIDI files

MIDI (Musical Instruments Digital Interface) is a widespread communication protocol with which notes can be transferred between electronic music instruments and saved in files.

The common file ending for MIDI files is .mid. In the MIDI formats you can import notes from many notation and sequencer programs. However, all attributes of notation beyond the pure pitch information will get lost.

MIDI import

To import a file in MIDI format 1 or in MIDI format 0, select File → Open... In the dialog box you can select the preferred file format and thus filter display so that only MIDI files will be displayed.

MIDI export

To convert a tonica file to MIDI format 1, activate the window with the file to be exported and select File → Export.... Select file format: MIDI. If needed, select under which name and to which directory the file is to be saved. During export repeats and voltas are considered.

Options

Basically all options concerning playback also have an influence on sound and MIDI export. For MIDI files there are some additional options, see page 129.

With the MIDI options button you switch to *capella-tune* to determine all important properties of the MIDI file to be created:

- **Volume** and **attack intensity**: See page 110 and page 114.
- **Tone lengths**: See page 114.
- **Output device**: Some VST sample libraries (e. g. *capella Vienna orchestra*) require specific MIDI controllers and percussion sound maps in order to activate the correct sounds. These controllers and sound maps are stored with the MIDI file if you selected the sample library as output device (see **page 110**). Such MIDI files are meant to be further edited in a sequencer with the same sample library. If you want to create a MIDI file for general use you should first set the **Microsoft MIDI Mapper** as your playback device.
- **Split and join voices**:
  Open the *capella-tune* dialog box (⇧+⌘+J) and select the Instruments tab. In the column „Extent of notation“, open the context menu (right mouse button) and select which voices are to be combined in a MIDI track. You can repeat this action for each MIDI instrument separately. This allows you, for example, to split a two part trumpet staff into two separate tracks, while at the same time combining all left-hand or right-hand piano voices – or even both hands – into one track.
- **More MIDI options**: Depending on the desired use of the MIDI file more details might possibly be of interest. These can be set in the tab MIDI options, see page 129.

When you are electronically exchanging music with other musicians, please do not forget that you can always make the capella file directly available to them. With the free *capella reader* software the recipient can listen to the score and – contrary to MIDI – also view and print it!

Special functions

Automatic installation (network)

Being a network administrator you have the option to automate the installation of tonica (without installer surface). Enter the following lines in a terminal:

Windows computer:

tonica_fugata_13-un-installer.exe silent=on

Mac computer:

1. Integrate DMG:

   hdiutil attach -nobrowse tonica_fugata_13-un-installer.dmg

2. Run installer:

   open /Volumes/tonica_fugata_13-un-installer/tonica_fugata_13-un-installer.app --args silent=on

3. Remove DMG:

   hdiutil detach /Volumes/tonica_fugata_13-un-installer/

If you want to install the **CodeMeter** version of tonica state „codemeter=on“ as an addition to „silent=on“. In this case tonica will install the CodeMeter support itself; you will have to take care yourself for the installation of CodeMeter User Runtime (contrary to non silent installation). After silent installation the CodeMeter User Runtime installer will be available in the tonica installation directory (or in the Apple Bundle).

Automatic **Uninstalling** can also be done: Start the setup module in the installation directory (or in the Apple Bundle) with the parameter „action=uninstall“.

Figured bass notation

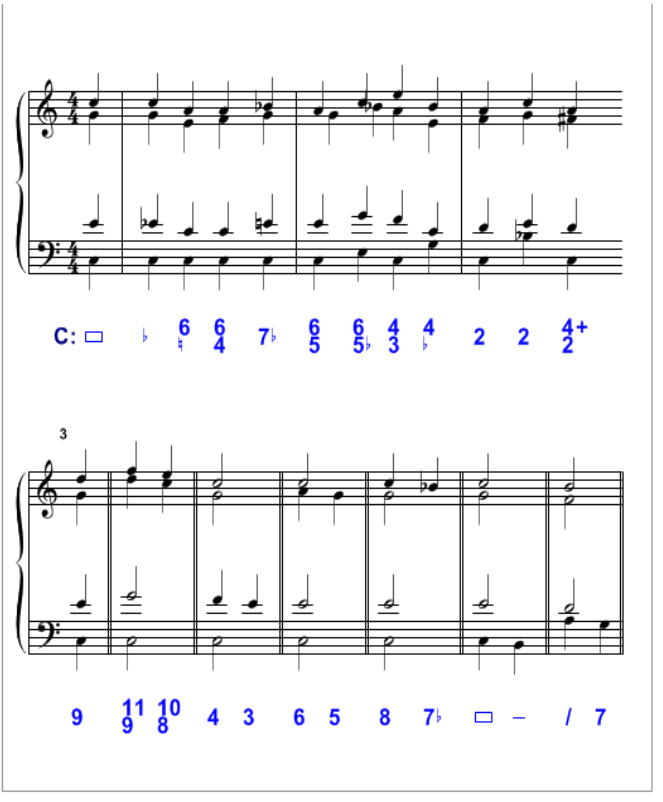
The figured bass is a musical notation that has emerged in Baroque music. A bass-line (bass voice) with added numbers is notated to which improvised chords were supplemented. Figured bass instruments were the harpsichord, organ, lute, theorbe, etc., together with a gamba, cello, double bass, bassoon or trombone playing the bass voice.

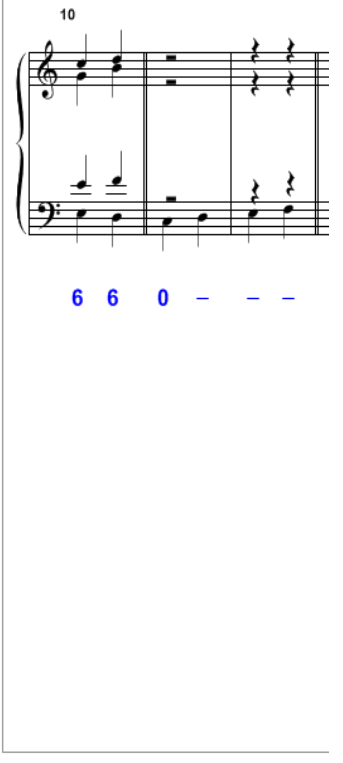
The numbers and accidentals beneath the bass voice indicate what intervals above the bass notes should be played. Above each bass note without numbers a full diatonic triad in root position is played. Chord notes can be doubled or played in another octave. Common voice-leading rules apply for realizing the chords.

tonica automatically creates full chord realizations of figured basses. Chords are generally realized in close position which allows bass notes to be played with the left hand and added chord notes with the right hand on keyboard instruments. Individually tied chord notes result in a smooth composition which can be accompanied by a melody voice.

Figured bass realization in tonica

The rules of figured bass notation have changed over the centuries. Even today different ways of writing figured basses are taught. The following figure shows some examples of figures and their realization in tonica.





The following rules apply for numberings in tonica:

- **Numbers** from 0 to 14 are allowed. Number 0 means "tasto solo" (no chord). You can enter up to 3 numbers for each chord. Third (3) and fifth (5) must not be notated but are added automatically. Example: Bass note c of first chord in the above figure is supplemented by third (e) and fifth (g). In addition the soprano voice doubles the fundamental note c.

- Numbers greater than 7 are interpreted as **chord positions**, i.e. they refer to chord notes in the upper voices (soprano and alto voice). tonica considers these chord positions during figured bass realization if they do not result in voice-leading errors. Example: The numbering (11 9) in the figure means that the added notes (eleventh f and ninth d) should appear in the soprano and alto voice respectively. In the following chord with numbering (10 8) these notes are resolved into notes e and c.

- The following **replacement rule** applies: If number 4 is notated, number 3 must be notated explicitly to be considered as a chord note. If number 6 is notated, number 5 must be notated explicitly to be considered as a chord note. Example: In the chord with numbering (6 4) number 4 replaces 3 and number 6 replaces 5. Therefore the third (e) and the fifth (g) do not appear.

- The following **completion rule** applies: If number 2 is notated, it will be automatically supplemented by numbers 4 and 6. If numbers 2 and 4 are notated, number 6 will be supplemented (third inversion). If numbers 3 and 4 are notated, number 6 will be supplemented (second inversion). Example: The first chord with number 2 includes the second (d) but also the fourth (f) and the sixth (a).

- All accidentals (bb, b, #, x, natural) and "+" are allowed to notate **alterations**. Except for natural, accidentals are interpreted **relative** to the key, e.g. they raise or lower a diatonic note by one or two semitones. Like "#", a "+" raises a diatonic note by a semitone. Example: In the chord with numbering (4+ 2), the fourth (f) is raised by a semitone (f sharp).

- If an **alteration without a number** is notated, number 3 is added. Example: In the second chord with numbering "b", the third (e) is lowered by a semitone (e flat).

- To realize a bass note with **no chord** or **no chord change**, "0" or "-" are notated. Example: In the above figure the last 4 bass notes are not supplemented by chord notes because of numbering "0" and "-".

- A "/" sign indicates a chord **anticipation** of a following bass note. Example: The chord with numbering "/" anticipates the added chord notes of the following chord (b, d, and f).

Tables and charts

Keyboard shortcuts

It is a condition for the function of the following keyboard shortcuts that they are not already reserved for a different function by the macOS system.

Some keys do not exist on some mac types and will have to be executed by replacement keyboard shortcuts.

The function keys F1, …, F12 work – depending on system setting – either directly or by additionally pressing down the fn key.

The following tables proceed from a direct operation of the function keys.

If needed, you can deactivate or redefine colliding shortcuts for system functions in the system. We recommend that you use these options cautiously.

Function keys

Depending on the setting of function keys in the system the fn key must also be pressed.

	Key only	⇧	⌘	⇧+⌘	⌥
F1					
F2	Note entry one octave lower	Note entry two octaves lower			
F3	Normal note entry				
F4	Note entry one octave higher	Note entry two octaves higher	Close window (score)		
F5	Compose score				
F6	Compose variation				
F7					
F8					
F9		Solo playback			Rhythmic playing in
F10		Join beams	Split beams		
F11			Show/hide note entry (including mouse piano)		
F12					

Letter keys

	with ⌘	with ⇧+⌘	with ⇧+⌥
A	Mark all	Mark entire system template staff	
B			
C	Copy		
D	Mark system	Mark voice	
E	Preferences		
F	Set fermata		
G			
H		Set tie	Delete tie
I	Work mode		

J		Sound configuration
K		
L	Harmony	Modulation
M	System template	Fold out system template
N	New score	
O	Open	
P	Print	
Q		
R	Create triplet	Delete triplet
S	Save	
T	Tempo	
U	Composition assistant	
V	Paste	
W	Close score	
X	Cut	
Y		
Z	Undo	Redo

Combinations with letter keys

While holding down the letter key also press down one of the keys in the second column. The shortcuts relate to the note to the right of the cursor. Pressing 0 resets to the standard attribute.

As long as you hold down the letter key all additionally pressed keys are interpreted as one single command. For example when you select Edit →Undo afterwards all partial commands will be undone in one go.

O	↑, ⇞, ↓, ⇟	Shift note/chord diatonically (single step/octave)
P	↑, ⇞, ↓, ⇟	Shift note/chord chromatically (single step/octave)

Number combinations

⌘+1	Mode Setup
⌘+2	Mode

Keyboard shortcuts for note entry

To set the **current note value** choose one of the two patterns in TONICA FUGATA → PREFERENCES... → NOTE ENTRY:

Note value	1/1	1/2	1/4	1/8	1/16
Normal	1	2	4	8	6
Alternative (useful for visually impaired users)	1	2	3	4	5

For **Note Entry** choose one of the following patterns in TONICA FUGATA → PREFERENCES... → NOTE ENTRY:

	Notes of the octave	Alternative shortcuts for .
German	C, D, E, F, G, A, H	Q, W, R, T
International	C, D, E, F, G, A, B	Q, W, R, T
Romanic	D, R, M, F, S, L, T	A, Q, Z, E
linear 1 (German)	Q, W, E, R, T, Z, U	A, S, D, F
linear 2 (English)	Q, W, E, R, T, Y, U	A, S, D, F
linear 3 (French)	A, Z, E, R, T, Y, U	Q, S, D, F
Rest	Space	

The octave in which the notes are entered depends on the clef and any deviation from the normal octave (see function keys F2 to F4). Use in combination with ⇧ to notate one octave higher or lower depending on the preferences in TONICA FUGATA → PREFERENCES... → NOTE ENTRY.

The alternative commands in the right column can be used for single-handed entry, for example during playing in from the MIDI keyboard. This enables the user to enter note values (best with the alternative pattern) and dottings with one hand without having to move the second hand from the MIDI keyboard. The meaning of these commands is explained below in the *Additional keyboard shortcuts* table.

Cursor movement and scrolling

Key	Effect
←	One note to the left
→	One note to the right
⌥+←	To next barline to the left
⌥+→	To next barline to the right
⌘+←	To beginning of staff
⌘+→	To end of staff
↑	To next voice up
↓	To next voice down
⌥+↑	To corresponding voice in neighboring system above
⌥+↓	To corresponding voice in neighboring system below
⇞	Scroll up by 3/4 window height. In mode „animated page turning“ with zoom set to “whole page” the previous full page is displayed.
⇟	Scroll down by 3/4 window height. In mode „animated page turning“ with zoom set to “whole page” the next full page is displayed.
⌘+⇞	Previous page
⌘+⇟	Next page
ctrl + ↖	Scroll to beginning of score
ctrl + ↘	Scroll to end of score

All keyboard shortcuts to scroll will reposition the cursor. Scrolling with the scrollbar does not reposition the cursor (it will therefore scroll out of the window).

Additional keyboard shortcuts

Key	Effect
⌘+?	Help
↵	Reformat score into systems

⌘+⌫	Merge systems
⌫	Delete note or marked section to left of cursor
⌦	Delete note or marked section to right of cursor
+	Increase pitch of next note
-	Decrease pitch of next note
*	Double increase pitch of next note
_	Double decrease pitch of next note
.	Next note dotted
0	Cancel alteration and dotting
/	Repeat note
=	Repeat note with tie
<	Reduce note values (marked notes or note to right of cursor)
>	Increase note values (marked notes or note to right of cursor)

Key	Effect
⌘+0	Zoom 100 %
⌘++	Enlarge zoom
⌘+-	Reduce zoom
⌥+Space	Start/Stop playback

Credits

tonica *fugata* 13 uses the following software. Thank you!

Qt

The program is based on the excellent cross-platform library Qt (www.qt.io).

Qt is under the license LGPL 2.1, see www.gnu.org/copyleft/lesser.html.

OpenSSL

For transmission of license activation data, tonica uses the OpenSSL toolkit (http://www.openssl.org/). Thank you!

```
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 ==============

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 *
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Zlib

QuaZIP

XMLParser

SingleApplication

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rtf-qt

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RtMidi

http://www.music.mcgill.ca/~gary/rtmidi

VST Plugin Technology

http://www.steinberg.net

FluidSynth

http://www.fluidsynth.org

PortAudio

PortAudio Portable Real-Time Audio Library

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LAME

http://www.lame.sourceforge.net

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