AutoTheory

Harmonic Engine

by Mozaic

User Guide

Version 1.0.1

June 2013

Table of Contents

Introduction 2
- Getting Started 3
- AutoTheory Layout 4
- Signal Path 5
- Patches 5

Selecting the Key and Scale 6
- Key 6
- Scale 6

Chord Generator 7
- Chord Quality 7
- Chord Modifiers 8
- Chord Names 9
- Chord Configuration 9
  - Chord Transpose / Scale Customisation 9
  - Accidental Sliders 10
  - Voicing Sliders 10

Strummer 10
- Strum Mode 10
- Alt Reset 11
- Duration 11
- Stroke 11
- Sync Button 11
- VMod 11
- Shuffle 12
- Velocity 12
- Relative 12
- Humanise 13

Melody Lock 13
- Melody Tone Display 13
- Enable 14
- Inversions 14
- Mapping 14
- Source 15

Output Channels 16
- 1-4 Channels for Chords and Melody 16
- Octave 16
- Velocity 16
- Root Separate 16
- Mute Chords 16

Back Panel 17
- CV MIDI Inputs 17
- Strummer Inputs 17
- Chord/Melody CV Outputs 18
- Retrigger Buttons 18
- Pseudo-polyphony 18
- Keyboard Split 19
- Melody Latency 19
- CV Outputs 19

Patches 20
- AutoTheory Patches 20
- Combinator Patches 21

Demo Songs 25

Tutorial Videos 25

Appendix 26
- MIDI Control Information 26
- Remote Information 27

Acknowledgements 28

About Pitchblende 29

Introduction

AutoTheory is a Rack Extension developed for Propellerhead Reason and Reason Essentials.

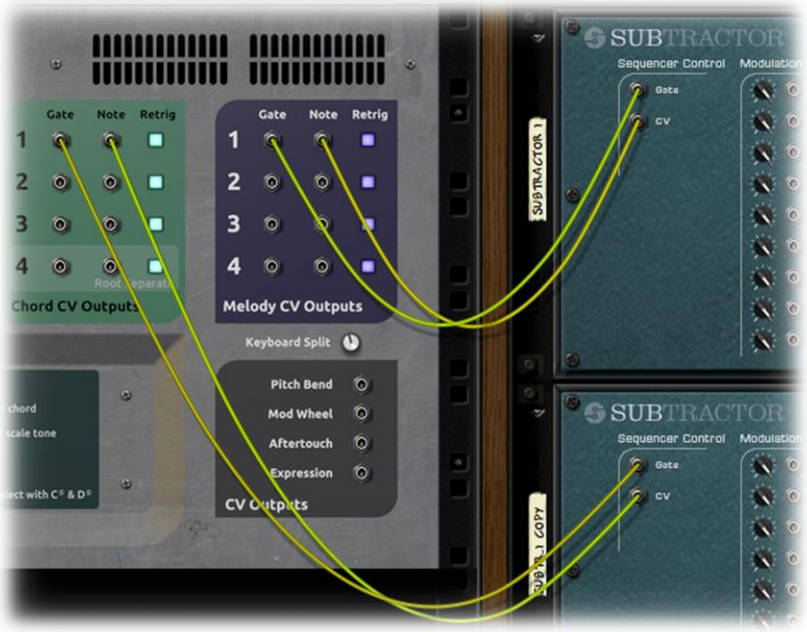
All Reason instruments can be played from your MIDI keyboard. However many Reason instruments can be controlled musically through a two-wire CV interface on their back panel. This is how the RPG8 and Matrix devices are used to control instrument devices.

AutoTheory is a smart MIDI remapping device. It takes incoming note information from your MIDI keyboard, the Reason sequencer, or other Reason devices, and then modifies this according to a set of music theory rules. The result is routed to any number of connected instruments or devices via this two-wire interface, allowing you to easily play and compose chord progressions and harmonized melodies within the framework of proper music theory. There are many ways to configure AutoTheory to help you enhance your composition and performance, regardless of your proficiency with the piano keyboard.

Getting Started

By default, AutoTheory splits your MIDI keyboard into two halves at Reason's C3 note. On most keyboards this will be right in the middle. This is called the Keyboard Split point. Notes to the left of this point are sent to the Chord Generator, which transforms them into full chords. The notes to the right of the Split point, including the Split point note itself, are sent to the Melody Lock section, which remaps these notes in various useful ways. You can change this Split point with the Keyboard Split knob on the back panel.

To get started, simply create an instance of AutoTheory and two or more Reason instruments. Turn the rack around (with the Tab key), and connect the Chord 1 **Note** and **Gate** outputs to one instrument, and the Melody 1 **Note** and **Gate** outputs to the other. Choose a patch or begin with the default configuration. Make sure AutoTheory has MIDI focus by selecting it in the Sequencer pane. Now you're ready to easily create melodies and harmonies!



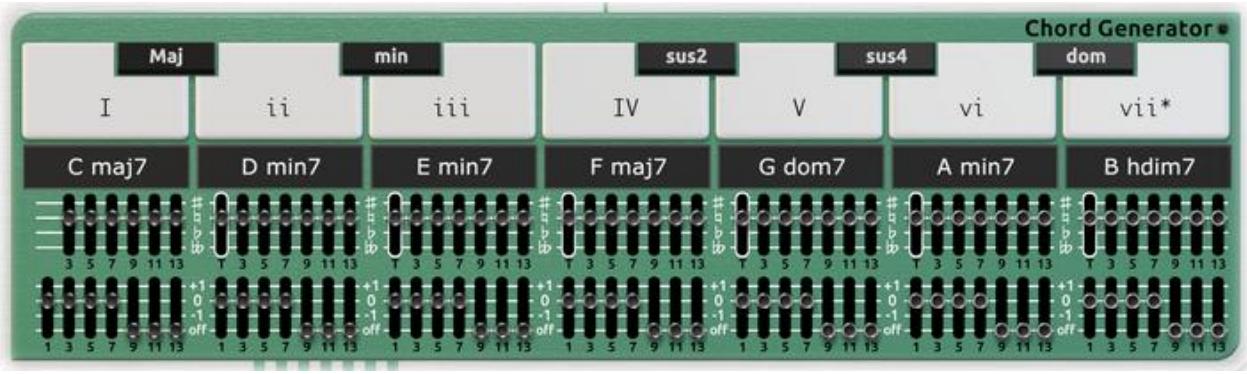
AutoTheory Layout

The AutoTheory front panel is laid out into five sections. Each section is color-coded: the green/teal colour represents chord-related functions, and the purple/plum colour represents melody-related functions.

Global Parameters: selection of scale and key.

Melody Lock: determines how AutoTheory maps notes to the current harmony.

Chord Generator: scale-based layout of fully customizable chords.



Strummer: an intricate strum function that may be applied to chords, affecting each note's timing and velocity.

Output Channels: provide control of multiple outputs for both the Chord Generator and Melody Lock processors.

Signal Path

After the scale and key are selected, the Chord Generator will configure itself appropriately with seven corresponding chords. Notes generated by the Chord Generator are routed via the Strummer to the Chord Output Channels. In some instances the Chord Generator dictates the behaviour of the Melody Lock; in other situations the Melody Lock operates independently of the Chord Generator. The Melody Lock routes notes directly to the Melody Output Channels.

Patches

AutoTheory supports patches. It includes a number of factory patches that can be used as they are or provide you with a good starting point for further tweaking. Patches use the '.repatch' file extension. Loading and saving patches is done in the same way as for other instruments and effects in Reason, using the standard patch browse and save controls at the top of the AutoTheory front panel.

Note: patches are limited to storing only the chord configuration and scale. Other settings are saved in the Song file, but not in the patch. This is to allow you to quickly browse through various patches without upsetting your instrument configuration, Melody Lock settings, or Strummer configuration. If you wish to create a patch to store these settings, place AutoTheory inside a Combinator and save a Combinator patch.

Selecting the Key and Scale

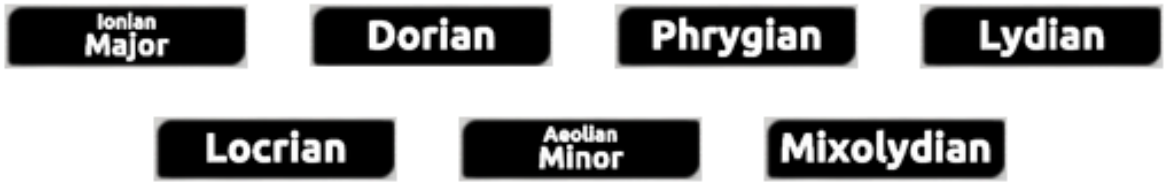
Key

AutoTheory can be set to any key. When a scale is applied to this key, it determines the root note for each chord. In the Chord Generator all notes are transposed in a manner that positions the tonic chord of the selected key into the C keyboard note position. The other six chords are mapped to the white keyboard notes above C. Some Melody Lock functions also transpose the notes in this manner.

Note: in situations where a key has two names (for example D-flat and C-sharp), the more commonly used key for each scale is provided. This only affects the note *names*, not the notes played.

Scale

There are seven *base* scales available that correspond to the modern modes in music theory and one of these is always selected with the Scale knob. Each mode provides a characteristic feeling or sound and is an excellent starting point for creating new scales.

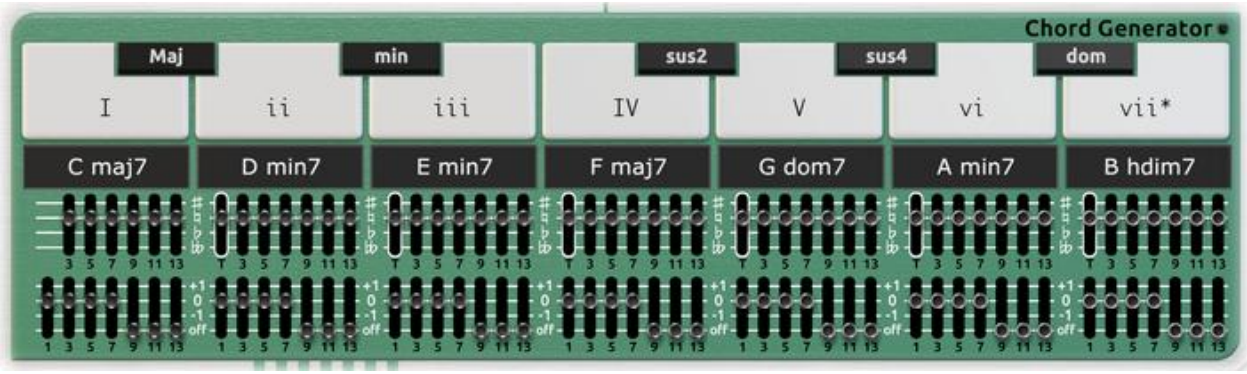


At all times, AutoTheory automatically configures itself to use the current key and scale. Therefore you can easily change key or scale and instantly hear the result of your playing or sequencer programming.

Scales can be further customised within the Chord Generator, described below. If you customise a scale, the Scale display will dim, indicating that although the selected scale is in use as the *base* scale, one or more notes in this scale have been modified so it is no longer accurate.

Chord Generator

AutoTheory features a Chord Generator engine that enables you to easily play chords from the selected key and scale with a single key. This makes it very easy to play chord progressions without any keyboard training.



Within each scale, all chords are transposed in a manner that places the I(i) chord onto the C position of all left-side octaves on your MIDI keyboard controller (see Keyboard Split). In the image above, with a Split at C3, this would map the C maj7 chord to your C2 key. Beyond the easily playable configuration of the Chord Generator, you also have control over every note within each chord. You may also spell each chord in multiple ways with multiple accidental and voicing options.

Chord Quality

The Chord Generator depicts a piano keyboard octave and shows a roman numeral on each white piano key.

Each roman numeral indicates the quality of the chord associated with the corresponding white key, *if all notes in the chord are natural* (see Accidentals below). Capital roman numerals indicate a major chord (a major third and a perfect fifth), lower case roman numerals indicate a minor chord (a minor third and a perfect fifth), lower case roman numerals with an asterisk indicate a diminished chord (a minor third and a diminished fifth) and capital roman numerals with a plus sign indicate an augmented chord (a major third and a perfect fifth). These chord distinctions are based on the first three notes in the natural chord, and can serve as a reference for building extended chords. They are not affected by accidentals.

Chord Modifiers

Also represented in the Chord Generator piano display are the Chord Modifiers. Located on the black piano keys are the abbreviated terms of Maj, min, sus2, sus4 and dom.

When the corresponding black keys of your MIDI keyboard are held down, illuminating the black key in the display, the chords associated with each white key will be modified to the respective chord type. This feature allows you to quickly add chord substitutions without reconfiguring chord accidentals.

Maj: modifies all chords to major chords by adjusting the 3rd, 5th, 7th and 9th degrees (major third, perfect fifth, major seventh, major ninth).

min: modifies all chords to minor chords by adjusting the 3rd, 5th, 7th and 9th degrees (minor third, perfect fifth, minor seventh, *major* ninth).

sus2: modifies all chords to suspended-2 chords by replacing the 3rd with a major 2nd, and adjusting the 5th and 7th degrees (perfect fifth, minor seventh).

sus4: modifies all chords to suspended-4 chords by replacing the 3rd with a perfect 4^{th}, and adjusting the 5th and 7th degrees (perfect fifth, minor seventh).

dom: modifies all 4+ note chords to dominant chords by adjusting the 3rd, 5th, 7th and 9th degrees (major third, perfect fifth, minor seventh, major ninth).

Example: while playing an F Major 7 chord, I hold down the black “min” key. This will shift the 3 and 7 positions of the chord to minor intervals, resulting in F minor 7.

A note about quantisation – if you record a chord sequence that contains these modifiers and then quantise it, the modifier notes may fall *exactly* at the same time as the chord notes. This does not give AutoTheory enough time to recognise the modifier before playing the chord, so it is likely to play back differently to how you expect. One way to fix this is to manually shift the modifier notes so that they happen just before the chord notes. Another option is to move the modifier notes to another note lane, assign a ReGroove channel and use this to shift the modifier notes a few ticks before the quantised chord notes. Lastly, consider adjusting your playing style to ensure the modifiers are active well before the chords are played.

Chord Names

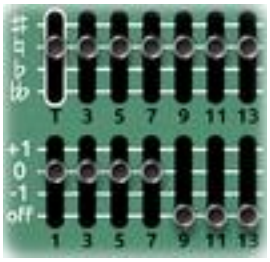
Beneath the lower piano display and above each set of Chord Sliders are seven Chord Name displays.

These displays identify the specific chord type for each individual chord, based on the key, scale and chord slider positions. The displays draw from an internal library that includes many different types of commonly used chords. This feature can be especially helpful when using intonation settings on extended chords that fall out of the scale, as it will let you know when you have achieved what you are looking for.

When you have configured a chord that does not match any in our library, it will be shown as an unrecognised chord by a dash. This does not mean that the chord is unusable or invalid; it simply isn't recognised by our library. Go ahead and use it if it sounds good!

Chord Configuration

The Chord Generator gives you control over every note in every chord. Beneath each white key on the lower piano display are two rows of sliders that allow for adjustments to the scale and to accidentals and voicings for each individual note within each individual chord.



Chord Transpose / Scale Customisation

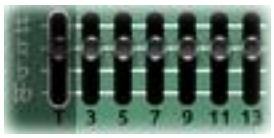
For all chords except the first (the tonic chord, which is determined in this case by the Key), it is possible to transpose the entire chord by adjusting the slider within the white outline. You can raise it by one or lower by one or two semitones.

zBecause AutoTheory always bases each chord on a scale note, this also serves to modify the entire scale! Using this feature, you can easily modify a base scale to create new scales. Changing the scale in this manner affects all chords, so you will see the names of other chords change as you transpose one chord. When the base scale is modified, the Scale display will dim as described earlier.

For example, the Flamenco scale, popular in Spanish flamenco music, is based on the Phrygian mode but often with a raised third interval. The third chord corresponds to the third interval, so to create this scale you can choose Phrygian as the base scale and then move the third chord's Transpose slider up to the *sharp* position to raise the third.

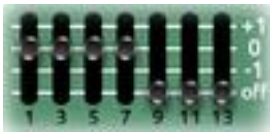
Patches may be used to save scales for future use.

Accidental Sliders



To the right of the Transpose slider, there are six sliders that allow you to adjust individual notes up one (sharp) or down one (flat) or two (double flat) semitones. This capability is very useful when constructing and customizing extended chords that often sound better when drawing from notes outside the scale. These accidental sliders can be applied to all notes up to thirteenths, excluding the root note which is determined by the scale.

Voicing Sliders



The second row of sliders allows you to move individual notes up (+1) or down (-1) an octave. This can be used to spread notes out from each other, or to create inversions. Manipulating these settings can have a significant impact on the pitch range of a given chord and its relationship to the other chords. Also present in this row of sliders is the "off" setting that mutes any note within the chord. This allows you to decide whether the chord is a basic triad or an extended chord. Keeping this setting at "0" will leave the note in its natural octave.

Strummer

The Strummer function may be applied to all chords produced by the Chord Generator. It enables you to create a wide range of strum effects, varying time and velocity of each note in the chord. Whether mathematically perfect or realistically imperfect, the Strummer function can add drama and interest to any chord.

Strum Mode

The Strum Mode setting controls the order in which the chord notes are played.

Off: no strum effect will be applied – the chord notes will be played simultaneously and no velocity effects will be applied.
Up: the chord notes will be played from the lowest note to the highest note.
Up Alt: the strum order will alternate between low to high and high to low, starting with low to high.
Down: the chord notes will be played from the highest note to lowest note.
Down Alt: the strum order will alternate between high to low and low to high, starting with high to low.
Random: the strum order is randomly determined for every chord played.

Alt Reset

This only has an effect in Up *Alt* and Down *Alt* Direction modes. When the Alt Reset button is on, the selected direction will be used each time a *new* chord is played. Playing the *same* chord repeatedly will alternate the direction. When off, the alternating strum effect will continue in a back and forth pattern through all chord changes.

Duration

The Duration knob sets the delay times between notes in the strum. The knob has a range of 0.00 to 0.50 seconds, or a set of tempo-synced values. This time interval relates to the time each note is delayed, subject to the Stroke control.

Stroke

When the Stroke button is turned on, the Duration knob will set the time between the first and last note of the chord. In effect, this sets the duration of the *entire* strum, regardless of the chord length. When turned off, the Duration knob sets the time between *each* note of the chord. Therefore the total duration of the chord will depend on the chord length and the Duration setting.

Sync Button

When the Sync button is turned on, the Duration knob selects from a set of tempo-synced values. This allows basic strum timing to be set relative to the song tempo. Note that the timing is not tempo-*locked* (quantised), so the strum can begin at any point in time.

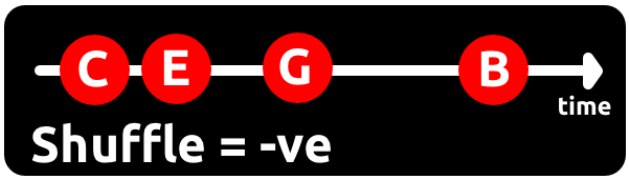
VMod

The VMod knob enables the triggering velocity to affect the duration of the strum. The base duration is set by the Duration knob. When set to a positive value, keys played with a higher velocity will produce a faster strum than those played with a lower velocity. When set to a negative value, keys played with a higher velocity will produce a slower strum than those played with a lower velocity. This setting has no effect if the Sync button is enabled.

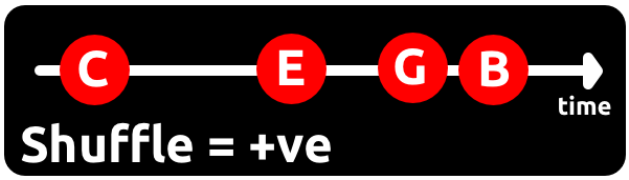
Shuffle

The Shuffle knob affects the relative timing between each note in the strum. Once the total strum time has been set by the Duration knob, Sync button and Stroke button, the Shuffle knob will determine whether delay between notes increases or decreases over the course of the strum. It does this by only adjusting the inner notes. The first and last notes do not move.

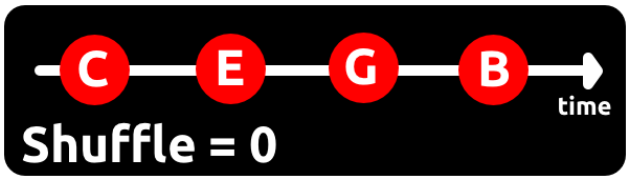
When set to a negative value, the spacing between early notes is reduced and the spacing between later notes is increased. This results in a feeling of lingering notes at the end of the strum.



When set to a positive value, the spacing between early notes is increased and the spacing between later notes is decreased. This results in a slow start feeling to the strum.



Values set close to zero will produce a more subtle shuffle effect, while greater values will produce a more drastic effect. This control does not affect the total duration of the strum.



Velocity

The Velocity knob determines the amount of velocity/gate modulation that occurs for each note in the strum. The values of the Velocity knob range from -64 to 64. This value is added to each note in the chord cumulatively. When the Velocity knob is set to a positive value, notes will increase in velocity through the strum. When the Velocity knob is set to a negative value, notes will decrease in velocity through the strum. Values set close to zero will produce a more subtle effect, while greater values will produce a more drastic effect.

For example, if a four note chord is generated with a base velocity of 100, and the Velocity knob is set to +5, then the velocity of the resulting notes will be 100 for the first note, 105 for the second, then 110 and 115 for the final two.

Relative

When the Relative button is on, the values on the Velocity knob change to percentages between 50% and 200%. Setting the value to 50% will produce a reduction by half of the previous velocity value between each note in the strum. Setting the value to 200% will result in a doubling of the previous velocity value.

For example, if a four note chord is generated with a base velocity of 100, and the Velocity knob is set to 80%, then the velocity of the resulting notes will be 100 for the first note, 80 for the second (80% of 100), 64 for the third (80% of 80), and 51 for the fourth (80% of 64).

Humanise

The Humanise knob provides a more natural and imperfect strum effect by adding shaped noise to the duration and velocity modulation. The values of this knob range from 0 to 100, with 0 resulting in no changes to the other controls and 100 resulting in an extreme random effect. Often small values can provide just enough subtle variation.

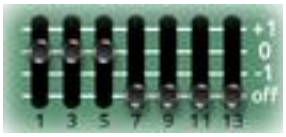
Melody Lock

Unique to AutoTheory is the Melody Lock function. While the octaves to the left of the Keyboard Split point are functioning as triggers for the Chord Generator, the right-side octaves may be remapped into more functional arrangements of scale and chord tones. This remapping process can be performed in multiple ways, geared towards a wide range of experience and skill levels. No matter what your background is with playing the piano/keyboard, there is a Melody Lock function that will enhance your compositional output and workflow.

Melody Tone Display

Much like the lower piano display, the upper piano display gives you a full visual of how tones will be assigned to each key on your MIDI keyboard. Each white key displays the tone that it will play when the corresponding MIDI keyboard note is struck. Based on the Mapping and Source settings, these displays could be changing quite rapidly every time you play a new chord.

When mapped notes are set as “off” in the current chord’s Voicing configuration, the note name will be dimmed (grey) to show that that note is not included in the current chord.



Enable

The Enable button is a basic on/off control that allows you to either work with the Melody Lock enabled, or to use the right side octaves of your MIDI keyboard in a natural manner.

Inversions

When using the Chord Tones and Dynamic Scale functions, inversions can be applied to keep all Melody Lock tones within an octave. Inversions will not change the ordering of tones on the keys however, which will sometimes lead to keys further up the scale (to the right) playing notes lower than their neighbouring keys to the left.

Mapping

The mapping functions within the Melody Lock feature dictate how the keys on the right-side octaves of your MIDI controller are organised.

Chord Tones: this setting locks chord tones into fixed positions on the white keys of right-side octaves. The C key will play the 1 of any selected chord, the D key will play the 3, the E key will play the 5, and all extended tones in the chord will follow suit. The Chord Tones setting is a dynamic function, meaning that the tones represented by each key will switch when a new chord is selected. This means you can maintain a fixed position with your fingers on chord tones during chord changes. When this mode is enabled, the Source setting takes effect.

Dynamic Scale: this setting locks the white keys of right-side octaves into the selected scale tones, with the root tone of every chord being transposed to the C key. The C key will play the 1 of any selected chord, the E key will play the 3 and the G key will play the 5. The other scale tones will fill in around the chord tones in their corresponding positions. The Dynamic Scale setting is a dynamic function, meaning that the tones represented by each key will switch when the selected chord is switched. This means you can maintain a fixed position with your fingers on chord tones during chord changes. When this mode is enabled, the Source setting takes effect.

Relative Scale: this setting locks the white keys of right-side octaves into the selected scale tones, and transposes the tonic note of the scale into the C position. The Relative Scale setting is a fixed function, meaning that the scale tones will remain on their identified key regardless of which chord is being played. Black keys are rounded to their nearest white note. The Relative Scale function disables the Source setting.

Absolute Scale: this setting maps the white keys of right-side octaves into the nearest selected scale tones, without remapping or transposing any of the notes. The Absolute Scale function is a fixed function, meaning that the scale tones will remain on their identified key regardless of which chord is being played. Black keys are rounded to their nearest white note. The Absolute Scale function disables the Source setting.

Source

The Source setting dictates which chords are mapped in the Melody Lock function. This setting only takes effect when the Mapping mode is set to “Chord Tones” or “Dynamic Scale”.

Match: in the Match setting, the tones in the Melody Lock will reflect the last chord played from the Chord Generator. In this mode, black keys are rounded to their nearest white note.

Fixed: if Fixed is selected then the tones in the Melody Lock will stay locked to the tones found within one specified chord. This setting is used in situations where you may not be using the Chord Generator at the same time as the melody lock, and you want the Melody Lock to play tones from a different chord than what you last played in the Chord Generator. Select the fixed chord within the value box above the first black key (C#) on the upper piano display, by clicking the up and down buttons. In this mode, black keys are disabled.

Alternate: in the Alternate setting, the tones in the Melody Lock alternate between the tones found within two specified chords. This setting is also used in situations where you may not be using the Chord Generator at the same time as the Melody Lock, and you want the Melody Lock to play tones from different chords than what you last played in the Chord Generator. The value boxes above the C# and D# keys allow you to select two chords from which you may draw chord tones. The C# and D# keys on your MIDI keyboard controller will act as toggles to switch back and forth between each chord. The purple indicator light shows which chord is currently selected. In this mode, black keys other than C# and D# are disabled.

Output Channels

1-4 Channels for Chords and Melody

Both the Chord Generator and Melody Lock functions have the capability to route to and control four independent device channels. This allows stacking of multiple instruments across a wide octave range to achieve rich and dynamic soundscapes.

Octave

Each of the four output channels can have their base octave adjusted to any desired position. This allows you to spread stacked sounds over a wider pitch range, creating a fuller and larger overall sound.

Velocity

Each of the four output channels also has a Velocity knob that ranges from 0% to 200%. This sets the velocity for the outgoing gate signals, and allows a specific target instrument to be driven with stronger or weaker gate values for emphasis or de-emphasis.

Root Separate

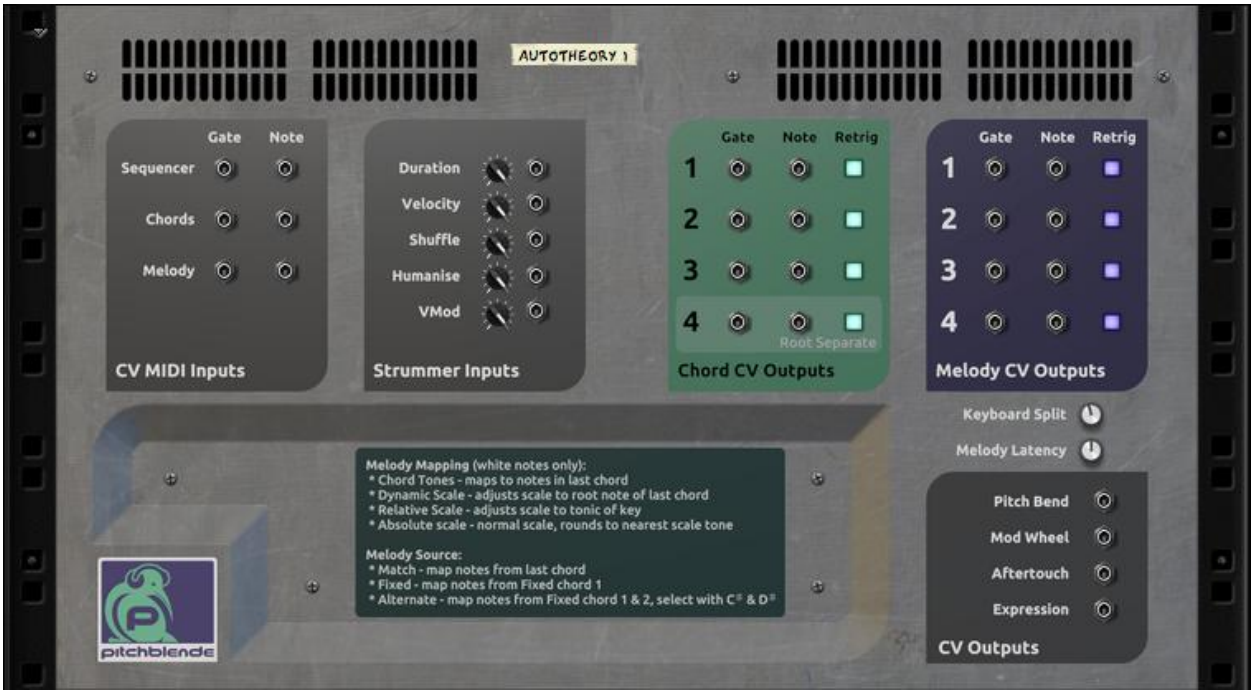
The Root Separate function allows you to route the root note of each chord to a separate channel (channel 4). The root note will also be omitted from the other channels. This is useful for routing the root tone of each chord to a bass instrument playing at a lower octave.

Mute Chords

The Mute Chords feature lets the Chord Generator perform as a reference for the Melody Lock without generating its own notes. When turned on, Chord triggers will continue to determine the notes in the Melody Lock functions of “Chord Tones” and “Dynamic Scale” without generating any note output from the Chord Generator. When turned off, the Chord Generator will generate notes as it normally does.

Back Panel

The back panel provides several sections of useful CV inputs and outputs.



CV MIDI Inputs

AutoTheory features three CV input pairs: one for the Chord Generator, one for the Melody Lock, and a dual input ("Sequencer") that controls both the Chord Generator and Melody Lock and obeys the Keyboard Split setting.

These CV inputs will provide incoming MIDI signals to AutoTheory as if played from a MIDI keyboard or Sequencer. Simply connect an external CV Note/Gate source such as RPG8 to one of these inputs. This feature is useful with pattern sequencer and arpeggiator devices.

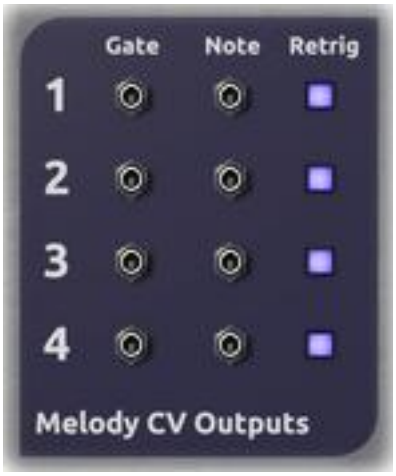
Strummer Inputs

Within the Strummer effect, certain parameters can be controlled through external CV input. These parameters include the duration, velocity, shuffle, humanise and VMod control values. Each of these inputs features an attenuator for fine-tuning the incoming level of CV.

Chord/Melody CV Outputs

Both the Chord Generator and Melody Lock functions have four individual sets of CV outputs. These can be routed multiple ways to multiple instruments.

Simply connect the Gate output to the Gate input of an instrument device, and connect the Note output to the Note or CV input of the same device.



Channel 4 on the Chord Outputs section is the channel that "Root Separate" uses. When this mode is enabled, the root note of all chords is only output on this channel, and omitted from the other channels.

Retrigger Buttons

Each CV output has an associated Retrigger button that affects the way CV signals are generated.

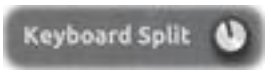
When enabled: the generation of a new note will send an automatic "note off" to silence any prior note or chord. This may be considered a *staccato*-like effect, where every note or chord is distinct and separate.

When disabled: the generation of a new note will allow prior notes to continue. This may be considered a *legato*-like effect, where there is no enforced gap between notes. Due to a limitation in the way polyphonic CV must be implemented in Reason, notes will continue to sound until the last "note off".

Pseudo-polyphony

Due to the CV note/gate system provided by Reason, true CV polyphony is not possible within a rack extension of this type. AutoTheory uses a mechanism that works within this monophonic CV framework to achieve a "pseudo-polyphonic" effect with instruments driven by the Chord Generator engine. Although it may seem like all notes are played at exactly the same time when a chord key is selected (when the Strummer is off), there is in fact a very slight inaudible delay between each note (around 1 millisecond). This delay is necessary for achieving the pseudo-polyphony effect. It is also important to note that this pseudo-polyphony mechanism requires all voices of a polyphonic instrument to be released at the same time. It is not possible to implement true polyphonic control of Reason instruments via CV at this time.

Keyboard Split



When using AutoTheory, it is important to understand that the device splits the signal from your MIDI keyboard into two different destinations - the Chord Generator and the Melody Lock. The Chord Generator is controlled by octaves on the left-hand side of your MIDI keyboard. The Melody Lock functions are controlled by octaves on the right-hand side of your MIDI keyboard. The Keyboard Split control therefore determines where the split between Chord Generator and Melody Lock occurs on your MIDI keyboard. You can adjust this up and down by single octaves to accommodate whatever setup you are working with. This setting is not automatable.

Melody Latency

When playing a new Chord at the same time as a Melody note with your keyboard, it is practically impossible to play both notes at the exact same time (unlike notes programmed in the Sequencer). Around half the time the melody note will be seen by AutoTheory first. Because the Melody Lock mapping may change on a new Chord, this can cause a melody note from the previous chord to play instead.

To help mitigate this, a configurable Melody Latency is provided. This adds an artificial delay to all right-side Melody notes, to help them fall *after* any simultaneous chord note. The default is 25 milliseconds and you can adjust this between 0ms and 50ms to suit your playing style.

This value also affects Sequencer-programmed MIDI, so you may want to set it to zero if programming notes manually. It does not affect notes triggered by CV inputs.

CV Outputs

AutoTheory captures incoming MIDI performance data from the Pitch Bend wheel, Modulation wheel, Aftertouch and Expression channels. It relays these four performance channels to a set of four CV outputs, from which you may connect these to instruments. If you need to connect to multiple instruments, consider using a Spider or Combinator to distribute the performance data to multiple devices.

Patches

Patches are included within AutoTheory and can be accessed via the Patch Browser. Under "Locations and Favorites" select "Rack Extensions", and then expand the "AutoTheory Harmonic Engine" folder in the main window.

Note: patches are limited to storing only the chord configuration and scale. Other settings are saved in the Song file, but not in the patch. This is to allow you to quickly browse through various patches without upsetting your instrument configuration, Melody Lock settings, or Strummer configuration. If you wish to create a patch to store these settings, place AutoTheory inside a Combinator and save a Combinator patch.

AutoTheory Patches

AutoTheory patches contain scale and chord configuration. As explained on page 5, sections such as the Strummer and Melody Lock are not saved in patches. This is to provide an easy way to browse through different scales without upsetting your keyboard configuration.

The **Standard** folder contains patches for each of the built-in scales, as well as Harmonic Minor and Ascending Melodic Minor scales. Patches are provided for triad (three-note) and sevenths chords, as well as inverted versions.

The **By Type** section contains a reorganisation of the **Standard** patches, sorted by type rather than scale.

The **Exotic** folder contains patches for many interesting seven-note scales, as well as shorter five- and six-note scales. Basic harmonising chords are provided. Bear in mind that there are many ways to harmonise a scale, so you should adjust the preset chords to suit your music.

The **All** folder contains a flat list of all patches.

Combinator Patches

AutoTheory includes a number of Combinator patches provided by our valued contributors.

Acoustic Guitar (Classy 6-String) – Mike Gorman (lizard3209)

Banjo – Mike Gorman (lizard3209)

Dulcimer – Mike Gorman (lizard3209)

Mandolin – Mike Gorman (lizard3209)

Sitar – Mike Gorman (lizard3209)

Wide Guitar Mute – Mike Gorman (lizard3209)

These six stringed instrument Combinator patches are designed as performance patches for simulating strummed instruments. Each Combinator patch is comprised of two AutoTheory devices and three NN-XT patches. The strumming is accomplished using AutoTheory's Strummer feature on single-note samples, instead of strummed samples. This provides a natural variance between strokes. All the samples are from the Factory Sound Bank.

Most strummed instruments are played using up and down strokes across the strings. These patches allow for this. Three ranges are created on the keyboard. Range C1-B1 is assigned to down strokes and C2-B2 is assigned to up strokes. This allows for a comfortable hand position for both switching chords and simulating strumming. From C3 and up, the keys are assigned to the melody line.

Each patch has *Rotary 1 and 2* assigned to switch key and scale. All three ranges on the keyboard are appropriately switched so that they are always working off the same scale and key.

Each patch has *Rotaries 3 & 4* assigned to EQ adjustments. Most have Lo and Hi EQ adjustments. However on some patches the Lo EQ knob has been replaced with a rotary to raise and lower the strum octaves for a greater range.

Each patch has three effect devices: chorus, reverb and delay. *Buttons 1-3* are assigned to turn these on or off. They can be quickly adjusted by opening up the Combinator. All are routed through the AUX Sends on each channel of the microMIX channels 1-3.

Button 4 selects between two strum speeds. These speeds were chosen based on how each instrument is generally performed and vary slightly between patches. These can easily be adjusted entering the Combinator programmer and changing the values for Button 4 for each AutoTheory device (Down Strum AT and Up Strum AT).

The *Pitch Wheel* is assigned to pitch bend the melody-side only. Bending the strum in performance is generally unnatural so it has been disabled. The *Mod Wheel* adjusts the release time of the instrument to help simulate an "open" string.

Dub Techno Chords via Bad Tapes – Nicholi Fernandez (nobeahmon)

This patch was inspired by some of the sounds heard in the Dub Techno genre. It was not created to be an exact copy of sounds used by artists who perform this style of music but to provide a different take on its own, while still being close as possible to sounds used for chords/stabs. It can be seen as a starting point to experiment and create sounds of your own while retaining subtle imperfections. Play/tweak the knobs to add variation of chords sounds for your Dub inspired track.

Filter knob - adjusts the cut-off frequency of the filter for Synth 1 and Synth 2. It can be automated to provide interesting variations.
Delay FBK knob - adjusts the amount of feedback of The Echo. Use this knob to drench chords in deep echoes with tape saturation.

Reverb Decay knob - controls the decay of the reverb. Use it to add deep space to chords in true Dub form.
Volume knob - controls the overall volume of the patch.

Dirty Filter Off button – enable or disable the Dirty filter, adding a slight bit of distortion and modulation of the filter on the Pulveriser.
Synth 1 Off button - mutes Synth 1.
Synth 2 Off button - mutes Synth 2.
Noise Off button - mutes the noise generator.

Run Me, Filter me, Love me – Nicholi Fernandez (nobeahmon)

This patch is designed to be run – click "Run Pattern Devices" or start playback to use the patch.

This patch was born out of experimentation. It is a performance-based patch, with various tweak-able parameters. It is a simple and fun patch as AutoTheory handles all melodic duties, triggered by the Matrix.

Filter Cut knob – adjusts the cut-off frequency of the filter and is useful with the Patterns knob.
Peak knob - adjusts peak/resonance of the filter.
Patterns knob – selects from a choice of 8 patterns. Use this knob with the Filter and Peak knobs for an expressive and evolving performance.
Gain knob - controls overall volume of patch.

Bass Mute button - mutes the Bass synth.
Lead Mute button - mutes the Lead synth.
Piano Lead button – enables the Piano lead voice.
Drum Mute – mutes the Drums.

Pitch Wheel - affects the pitch of all instruments.
Mod Wheel - controls Filter Frequency for all synths.

DNB Funk Bass [SB] – Simon Bader (sbader)

This is a synth bass patch that can be played in various ways in regards to its melodic characteristics as well as its tonal characteristics. Use C# to play in standard root mode, or use D# in conjunction with Combinator button 1 (labelled Mod Alt Chord) to have the root chord modulated. This setup can provide more interesting and unpredictable results. This bass sound can be set up to sound rich and harmonic or deep and round. Feel free to dive into the Combinator and adjust AutoTheory's 'Key' and 'Scale' rotaries to best suit the piece of music you are writing.

i Root iii knob - adjusts between the 'Root Note' being relative to the 'i note', the 'ii note', or the 'iii note'.
Mod Rate knob - adjusts the rate at which the root note gets modulated (works in conjunction with Combinator button 1 (labelled 'Mod Alt Chord').
Snappy - Sussy knob - adjusts the amplitude envelope for the Bass. Snappy means more transient, sussy means more sustain.
Feedback Freq knob - feedback frequency cutoff (which adjusts the filter on the send fx routing).

Mod Alt Chord button - modulates the root chord when D# is triggered.
Transpose a 5th button - transposes the root note by a musical 5th.
Mids button - un-mutes the mid frequencies for the bass.
Tops button - un-mutes the high frequencies for the bass.

Pitch Wheel - affects the pitch of all instruments.
Mod Wheel - modulates various parameters for each SubTractor including: FM Amt, Filter Frequency, and LFO Amt.

DNB Funk Perf 170bpm [RUN] [SB] – Simon Bader (sbader)

This patch is designed to be run – click "Run Pattern Devices" or start playback to use the patch.

This is literally a band in a box, or rather a band in a Combinator. A custom drum kit designed in Kong, accompanied by a custom Synth Bass, a Swelling Atmosphere Synth and some Wurlitzer Chord Stabs. Originally designed to be played at a tempo of 170bpm, this patch also sounds good when used at slower tempos as well. Try 140bpm or 105bpm for some 'dub'bier breakbeat sounds. Feel free to dive into the Combinator and adjust AutoTheory's 'Key' and 'Scale' rotaries, as well the chord voicing, to best suit the piece of music you are writing. You can also program your own ReDrum and Matrix patterns with the mapped banks that are available. Disengage the 'Red Pattern Button' on the 'Chords Patt' and 'Bass Patt' to play in your own progression through Reason's sequencer, or automate them as you wish.

Pattern knob - adjusts patterns for the Drum Kit and the Wurlitzer Chord Stabs.
Chord Filter Fre knob - adjusts the 'band pass gate' filter cut-off for the Wurlitzer Chord Stabs.
Trans - Sus knob - adjusts the amplitude envelope for the Wurlitzer and the Bass. Trans means more transient, Sus means more Sustain.

Feedback Filter knob – adjusts the feedback filter cut-off (which works in conjunction with the Delay On button).

Bass button - un-mutes the Bass.
Chords button - un-mutes the Wurlitzer.
Synth button - un-mutes the Swelling Atmosphere Synth.
Delay On button - sets feedback delay on (which works in conjunction with the Feedback Filter parameter mapped to the Feedback Filter knob).

Pitch Wheel - affects the pitch of all instruments.
Mod Wheel - increases Env. Amt. of the Wurlitzer's 'band pass gate'.

DNB Liquid Perf 170bpm [RUN] [SB] – Simon Bader (sbader)

This patch is designed to be run – click "Run Pattern Devices" or start playback to use the patch.

This patch is similar to 'DNB *Funk* Perf 170bpm [RUN] [SB]' and is also a band in a band in a Combinator. A similar custom drum kit designed in Kong, accompanied by a custom Synth Bass, an Atmosphere Synth and a Ploy Chord Stab. It is designed to be played at a tempo of 170bpm. This patch was designed to be played from a MIDI keyboard or from the Reason sequencer. Feel free to dive into the Combinator and adjust AutoTheory's 'Key' and 'Scale' rotaries, as well the chord voicing, to best suit the piece of music you are writing.

Velo to Env knob - adjusts Poly Chord's velocity sensitivity.
Chord Env Amt knob - adjusts the filter envelope amount for the Poly Chords.
Bass Env Amt knob - adjusts the amp envelope decay for the Bass.
Chord Attack knob - adjusts the amp attack amount for the Poly Chords.

Root Separate button - separates the root note from the Poly Chord.
Mute Chords button - mutes Poly Chords.
1 Perc Pattern 2 button - toggles between two percussion variation patterns.
Synth Atmos button - layers an Atmospheric Synth with the Poly Chords.

Pitch Wheel - affects pitch of all instruments.
Mod Wheel - introduces more decay time for the drum kit.

Demo Songs

AutoTheory includes several demo songs composed by some of our users. They provide great examples of how to use AutoTheory and the associated Combinators. Access them through the "Rack Extensions" Location in Reason's Song Browser.

All Combinators: a simple song file with all Combinator patches present. Excellent for getting a fast overview of the great Combinator patches provided with AutoTheory.

-008' – Demo 1 & 2: two great tracks by -008' (dub08) showing how AutoTheory can be used.

Mike Gorman – Acoustic Strummer Demo: an excellent demonstration of one of Mike's Strummer Combinator patches.

Zac Kinter – Tutorial Song: the song file used in the online tutorial videos.

Tutorial Videos

We have three AutoTheory tutorial videos on YouTube that may be useful to you:

AutoTheory Main Tutorial – a detailed look at how each section of AutoTheory works.

AutoTheory Strummer Tutorial – takes a closer look at the Strummer section.

AutoTheory Beginners' Guide – explains how AutoTheory works with music theory.

Appendix

MIDI Control Information

AutoTheory responds to MIDI Note-On and Note-Off messages.

The following table provides MIDI Control Change (CC) messages that AutoTheory also responds to.

Decimal	Name
1	Mod Wheel
11	Expression
12	Scale
13	Key
15	Melody Lock Enable
16	Melody Lock Inversions
17	Melody Lock Mapping
18	Melody Lock Source
19	Fixed Chord 1
20	Fixed Chord 2
21	Melody Output Channel 1 Octave
22	Melody Output Channel 2 Octave
23	Melody Output Channel 3 Octave
24	Melody Output Channel 4 Octave
25	Melody Output Channel 1 Velocity
26	Melody Output Channel 2 Velocity
27	Melody Output Channel 3 Velocity
28	Melody Output Channel 4 Velocity
29	Root Separate
30	Mute Chords
39	Chord Output Channel 1 Octave
40	Chord Output Channel 2 Octave
41	Chord Output Channel 3 Octave
42	Chord Output Channel 4 Octave
43	Chord Output Channel 1 Velocity
44	Chord Output Channel 2 Velocity
45	Chord Output Channel 3 Velocity
46	Chord Output Channel 4 Velocity
47	Strummer Mode / Direction
48	Strummer Stroke
49	Strummer Sync
50	Strummer Relative
51	Strummer Alt Reset

Decimal	Name
52	Strummer Duration
53	Strummer Tempo-Synced Duration
54	Strummer Absolute Velocity
55	Strummer Relative Velocity
56	Strummer Shuffle
57	Strummer Humanise
58	Strummer VMod
128 - 133	Chord 1 Accidentals 3,5,7,9,11,13
134 – 139	Chord 2 Accidentals 3,5,7,9,11,13
140 - 145	Chord 3 Accidentals 3,5,7,9,11,13
146 – 151	Chord 4 Accidentals 3,5,7,9,11,13
152 – 157	Chord 5 Accidentals 3,5,7,9,11,13
158 – 163	Chord 6 Accidentals 3,5,7,9,11,13
164 - 169	Chord 7 Accidentals 3,5,7,9,11,13
170 - 176	Chord 1 Voicing 1,3,5,7,9,11,13
177 – 183	Chord 2 Voicing 1,3,5,7,9,11,13
184 – 190	Chord 3 Voicing 1,3,5,7,9,11,13
191 – 197	Chord 4 Voicing 1,3,5,7,9,11,13
198 – 204	Chord 5 Voicing 1,3,5,7,9,11,13
205 – 211	Chord 6 Voicing 1,3,5,7,9,11,13
212 – 218	Chord 7 Voicing 1,3,5,7,9,11,13
220	Chord 2 Transpose
221	Chord 3 Transpose
222	Chord 4 Transpose
223	Chord 5 Transpose
224	Chord 6 Transpose
225	Chord 7 Transpose
253	Aftertouch
255	Pitch Bend

Remote Information

This table provides Remote control names.

Square brackets indicate a range of multiple Remote controls.

Name
Scale
Key
Melody Enable
Melody Inversions
Melody Mapping
Melody Source
Fixed Chord 1
Fixed Chord 2
Melody Output Octave [1-4]
Melody Output Velocity [1-4]
Chord Root Separate
Mute Chords
Chord Output Octave [1-4]
Chord Output Velocity [1-4]
Strummer Mode
Strummer Stroke
Strummer Tempo Sync
Strummer Velocity Mode
Strummer Alt Reset
Strummer Duration
Strummer Tempo-Synced Duration
Strummer Absolute Velocity
Strummer Relative Velocity
Strummer Shuffle Amount
Strummer Humanise Amount
Strummer VMod Amount
Chord [1-7] Degree [3,5,7,9,11,13] Accidental
Chord [1-7] Degree [1,3,5,7,9,11,13] Octave
Chord [2-7] Transpose

Acknowledgements

Pitchblende would like to thank the following people for their invaluable assistance in the creation of AutoTheory:

Zac Kinter (mozaic36) for his concept and invaluable input during the development process, documentation and video creation.

Simon Antliff (etchasketch) for all his development assistance and support.

Wolf Hatch of Thaumaturgy Studios for his contribution with 3D modelling and texturing.

Mike Gorman (lizard3209) for suggestions, feedback, testing, patches and Combinator backdrop design.

Simon Bader (sbader) of Massive Sound Canada for suggestions, feedback, patches, testing and a great AutoTheory demo song: Pave The Way.

Nicholi Fernandez (nobeahmon) for suggestions, feedback and testing.

Wendy Dunham (wendylou) of Galxygirl.com for Combinator backdrop design and testing.

Giles Reaves (selig) of Selig Audio for invaluable advice throughout the development process, feedback and testing.

dub08 of 008refills.com for testing and demo songs.

All our other beta testers for taking the time to try out our product and provide feedback: **EnochLight**, **klesha**, **neoverse**, **Rucafest**, **edited4tv**, **ChinoSolorzano**, **blazetrackz**, **aimonestar**.

The RE developers on the RE Dev Forum for their help and advice.

Gustav Taxén & **Mats Karlöf** at Propellerhead Software for their endless task of supporting RE developers.

Propellerhead Software for providing an excellent creative product and development platform.

About Pitchblende

Pitchblende is a small independent company based in Wellington, New Zealand. With over 15 years of commercial experience in software, hardware, electronics and DSP engineering, Pitchblende helps Reason users develop and build their Rack Extension ideas. We're also avid Reason users and love using the platform to make music and sound.

Pitchblende Limited
Wellington, New Zealand
Email: contact@pitchblende.co.nz
Web: www.pitchblende.co.nz
Twitter: @PitchblendeLtd
Facebook: PitchblendeLtd

Document version 1.0 released 10th June 2013.

v1.0.1 released 11th June 2013 – minor revisions.

AutoTheory Harmonic Engine, v1.0.0 released June 2013.