LESSON
7

Editing Sequences

After completing this lesson, you should be familiar with the following concepts:

- Most DAWs treat MIDI information just like audio information. You can copy, cut, and paste MIDI data just like audio data.
- Quantizing pulls notes closer to the beats or subdivisions of the beats based on the sequencer's metronome. Quantizing is very useful for correcting rhythmic inaccuracies in performances. Most sequencers allow you to set a tolerance so that they pull notes closer to the beats, but allow for some error and thus a human-sounding performance.
- Humanizing is the opposite of quantizing. Humanizing adds randomness to timing which brings back a human feel to an over quantized track.
- The duration of notes can be changed by adding or subtracting a set number of beats, by setting all notes to a particular length, or by scaling notes based on their original length. Scaling is the most musical way to change duration as it preserves the relationships of note durations.
- Velocity data can be changed in much the same way as duration information (setting, adding, subtracting, and scaling) but since velocity usually controls dynamic level, many sequencers offer the option to compress or limit velocity data. In addition to these methods of manipulating velocity data, data can also be smoothly changed from one value to another over time, allowing users to create very smooth crescendos and diminuendos.
- MIDI data can be transposed by any interval, and examples of intervallic pitches can be entered by playing them on a MIDI keyboard connected to the sequencer.

Glossary for this Lesson:

Add- A function found in the velocity and duration edit windows which allows you to add a certain number of beats to selected notes or add a certain amount of velocity to selected notes. In the velocity window, negative numbers can be entered to subtract velocity value.

Compress- A function which allows you to compress velocity values much the same way audio dynamic range can be compressed by an audio compressor.

Duration- A window which allows you to edit the lengths (durations) of selected notes.

Humanize- A function which adds random qualities to notes to compensate for tracks which have been overly quantized, or whose velocity values have been changed so that there is almost no change. It restores the random qualities that people associate with a human performance and can help tracks sound less robotic.

Limit- A method of editing velocity data which allows you to set a maximum velocity value which can not be exceeded.

Quantize- A very important editing function which pulls notes to the closest rhythmic division specified by the user. Quantizing has the effect of making tracks more rhythmically accurate. It is important not to quantize tracks too heavily, however, because they can lose their human qualities.

Scale- A method of editing duration and velocity data in which the notes retain their original relationships to each other. (I.e. short notes stay short while longer notes stay longer or higher velocities stay higher etc.)

Set- A method of editing duration and velocity data in which you specify the value that all selected notes will be set to.

Smooth- A method of editing velocity data in which velocities are caused to change smoothly from one value to another over time.

Subtract- A method of editing duration values in which a certain number of beats is subtracted from all selected notes.

Tolerance- A percentage of error which allowed during quantization. Setting a tolerance of a few percent can keep a track from becoming so rhythmically accurate that it sounds robotic.

Transpose- A method of editing in which notes can be shifted up or down by any given interval.

LESSON 7

Editing Sequences

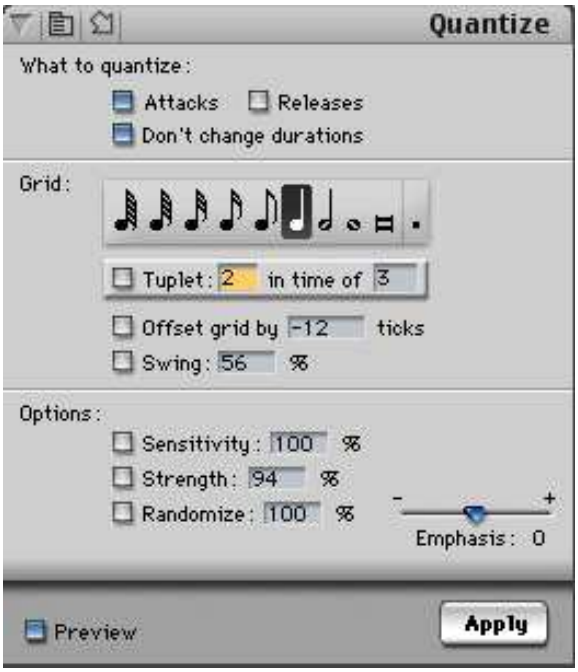
The Art Of The Edit

If we all lived in a perfect world, where we all played as accurately as could be, every moment that we touched a keyboard or other MIDI instrument, and each of us could instantly execute any musical passage any way we could think of it, there would be little use in learning about the techniques in this lesson. Unfortunately, in real life, our playing is usually less than perfect, and we will probably have to use at least a few of these techniques every time we sequence. For most people, the ability to master the techniques in this lesson make the difference between sequences which are good and those that really shine.

There are so many different ways to edit sequence data that they wouldn't all fit into this lesson, so some of them are in the next lesson as well. All of the techniques we will explore in this lesson can be accessed without ever straying far from the track overview window, which is the large window which contains all of the tracks and their data. In fact, all of the editing techniques explained here are techniques which can be used on a region of notes. Of course, you can define just about any region you wish based on what data you select in the track overview window.

Audio Vs. MIDI

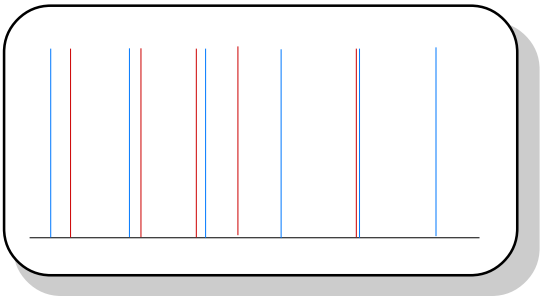
First and foremost, it is important to understand that most DAWs treat MIDI information just like audio information, so almost all of the tricks we learned back in Lesson Three will still apply here. We can select different measures of MIDI data and move them, copy them, paste them, etc. You can work on one track or many tracks at the same time. You will change whatever tracks you selected.



Being On Time

One of the biggest problems for all musicians is playing with rhythmic accuracy. Sure you might be playing the right rhythms, but are you playing them right on the beat? Unless you are a super human, chances are that you will be either a little early or a little late. It is impossible to be as accurate as a computer is. One of the most important tools while editing a sequence is the quantize window, which you can see to the left.

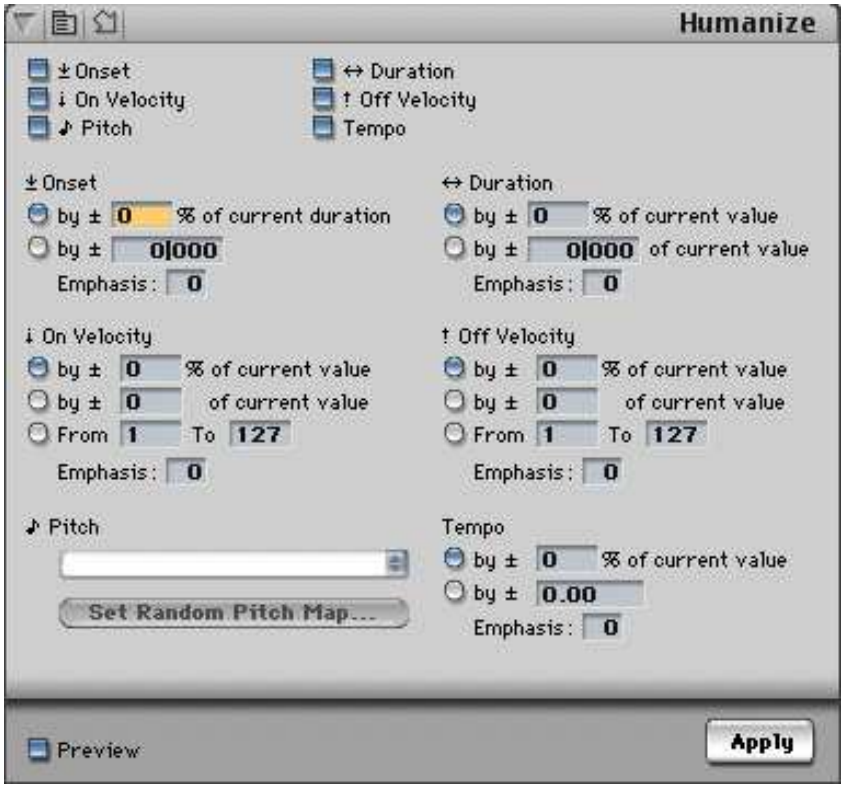
When you quantize a track (or just a part of a track) the sequencer pulls the notes to the nearest quarter note, eighth note, (or whatever other rhythm you choose) so that they are perfectly in time. The quantize window allows you to input the smallest rhythmic value which you played during the course of a piece, and then it corrects all of the rhythms based on that smallest rhythmic value. To better understand how quantizing works, let's take a look at the picture at the bottom of this page. The longest blue lines show perfectly spaced beats (quarter notes) while the red lines show the beginning points of several quarter notes which weren't played very evenly.



The first red line shows that the first note was played

too late by almost a sixteenth note. Quantizing this section would pull this note backwards in time so that it would land perfectly on the beat. It would be the same case with the second note which is also very late. Unfortunately, our hapless keyboard player seems to have realized his timing problems and attempted to get back on the beat, but over did it a little bit and ended up playing too early. This time, the note will be pushed backwards in time just enough to put the note right on the beat.

Unfortunately, sequencers aren't very smart when they quantize, and they can only tell which beat a note is closest to, and not what you meant to play. The fourth note in this example was played so early that it is just slightly more than half of a beat early. This last point is very important when thinking about quantizing, because when a note is early or late by half of the amount by which you are quantizing, the note will be pulled forward or backward incorrectly. In this case, the fourth note will be pulled ahead and will sound with the third note.



You may think to yourself that surely your playing is more accurate than this and that it won't be that much trouble for you. You may feel very differently when you are working at a rapid tempo and have to play sixteenth-note triplets accurately!

Where's The Beat?

If quantizing pulls notes to the nearest defined rhythmic division, how does the sequencer know where the beats are in the music that you are playing? The answer to this seemingly tricky question is: it doesn't. This is one of the first and foremost reasons that you must play along with a metronome as you record parts in real time. The sequencer judges your playing against its own internal metronome. It shows no mercy, and is not intelligent enough to understand what you meant to play.

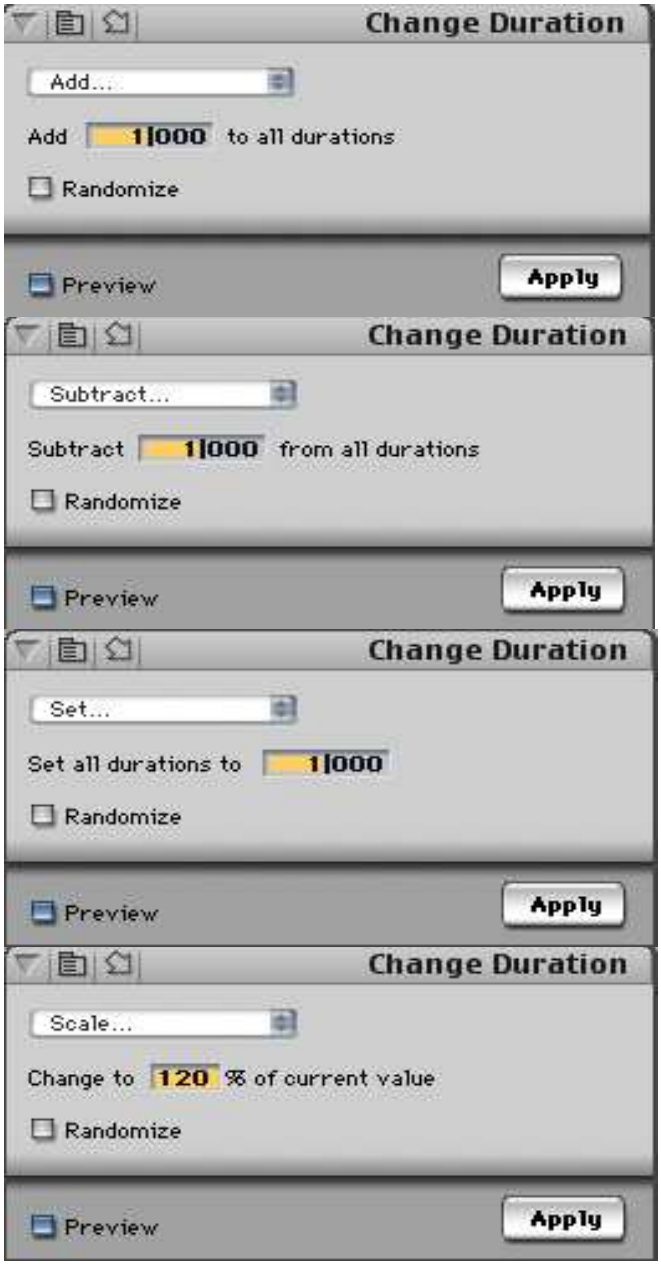
How To Quantize

Quantizing a track or tracks is a simple matter. You just have to select the region you want to quantize and select "Quantize" from the region menu. The shortcut in Digital Performer is command-zero, which is worth knowing since you will be using it frequently. After opening the quantize window (shown on page 49), you merely have to select the smallest rhythmic value within the measures you selected and click the apply button. If you are unsure of the smallest rhythmic value, you can hear the effect the quantize window is about to have. All you have to do is simply start the sequencer playing and make sure that the preview button is checked.

Quantizing Tips

There are many things to keep in mind while quantizing a track. First, if your sequencer doesn't offer a quantize preview function, you must be careful while quantizing. You could copy the material to be quantized to another track, and work on it there. You could also use the take function to duplicate the take and work on the copy that way. Also, remember

that the quantize function only works on whatever you have selected. So, it is possible to select different quantize values for different parts of the track. If you have one section which has lots of sixteenth notes, you might quantize that section separately from the rest of the track which has only eighth notes. Finally, if your sequencer has an undo function, you can quickly listen to a track after quantizing it and then undo your quantizing if the results were not what you had expected. While not as powerful as previewing, this is still a good way to work.



Another important consideration is when to quantize. Some musicians play in all of the parts and then start to quantize, but this tends to lead to more inaccurate playing because listening to your first few inaccurate tracks will almost certainly cause you to repeat these inaccuracies in following tracks. It is better to quantize each track as you complete it.

Usually, we don't want to quantize several tracks at once, since it is more difficult to remember all of the rhythmic details of all of the different tracks.

Finally, there are times when quantizing a track gives you something other than what you actually wanted. Sometimes this is bad, but take a careful listen: sometimes these 'happy accidents' are good!

Perfect or Inhuman?

Using quantizing can really make recordings sound tight and can turn a sloppy performance into a very accurate one. Quantizing can, however, take so many of the imperfections out of a performance that it sounds inhuman. Recordings can become very stiff and robotic and unpleasant to listen to.

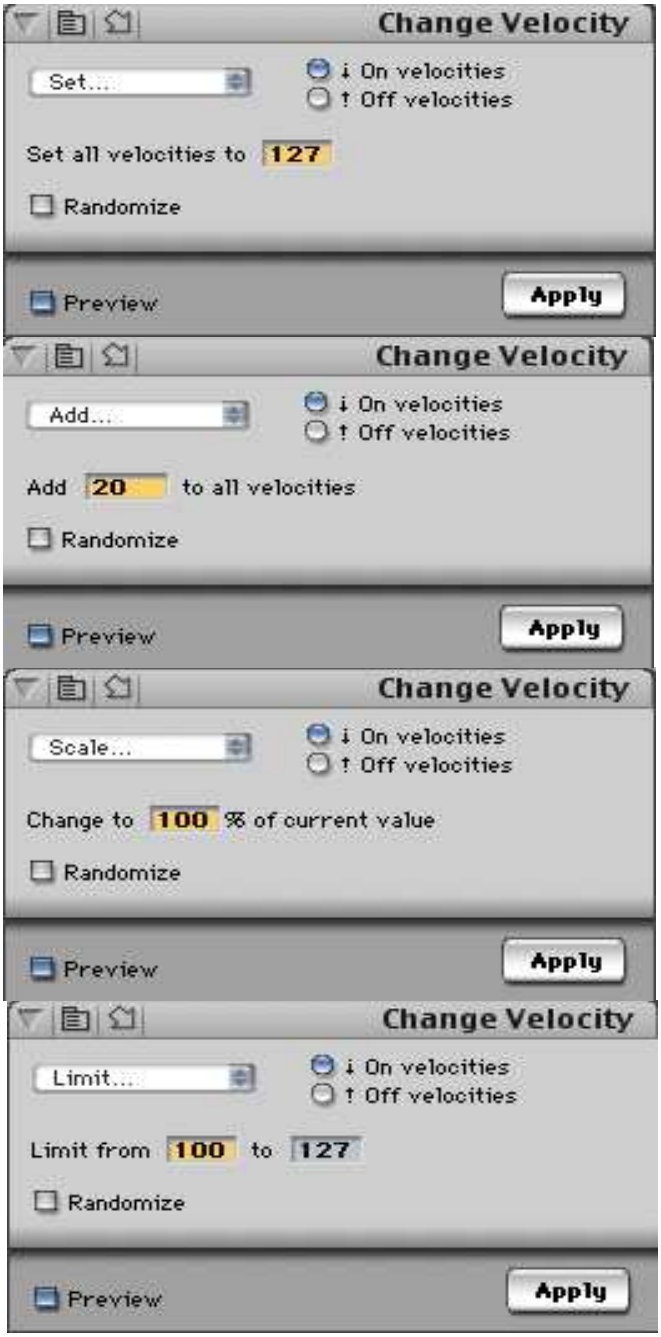
For this reason, many sequencers allow you to set a tolerance on their quantize function. When a tolerance is set, the sequencer will pull notes closer to the correct time, but only within a range set by the user. You could specify 94% tolerance, which allow notes to be off the beat by 6%, but no more. Using tolerances, you can tighten up the performance as much or as little as you wish.

If you make a mistake and quantize a track too much and it is left sounding inhuman, some sequencers offer a way out. The humanize function will randomly push notes forward or backward in time, simulating the state of your track before you quantized. Digital Performer's humanize window (shown on page 50) can even randomize note lengths and velocity messages to enhance the random effect. To humanize a section of notes, you just have to select them, select "humanize" from the region menu, set the humanizer however you please and click apply. Like the quantize window, many sequencers allow you to preview your humanizing edits before finalizing your decisions.

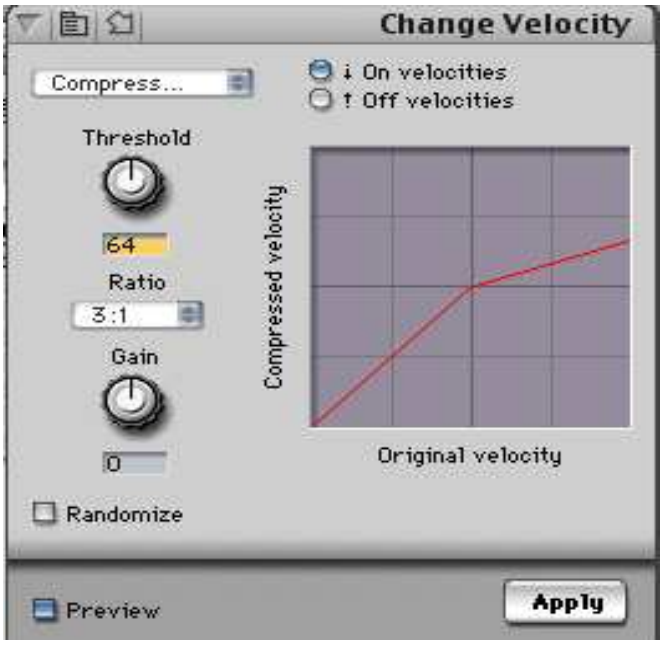
Duration Station

Most sequencers allow you to change the durations (lengths) of notes in a group. Like the quantize and humanize functions, the duration window works on groups of notes which you have selected.

Using the duration window (shown on page 51), it is possible to add or subtract a certain number of beats (or parts of beats) to all of the selected notes, set all selected notes to a particular value, or scale all of the notes by a certain percentage. The function of the duration window is determined by the white pull-down menu within it. On page 51, four different possibilities are shown. While there are other possible ways to use the duration window, these four are generally the most useful and the other three functions will be ignored until a later date.



Using the add function can turn staccato playing into legato while the subtract function does the opposite. When using the set function, all notes will be set to whatever value you enter in beats and parts of beats. The scale function is probably the most useful of all. When you use the scale function, you must input a value in percentage. Values larger than 100% make the selected notes longer while values lower than 100% will make the notes shorter. What is special about the scale function is that each note is added to or subtracted from individually. If you select 10%, a note that was originally 10 beats long will now be only 1 beat long but a note that started out 1 beat long will now be one-tenth of a beat long. Because the ten-beat note was ten times longer than the one beat note, it had ten times as much subtracted from it. This is very important because it means that short notes stay short while long notes stay long (relatively, of course). Scale is the best way to change durations in music which has many different articulations.



The Velocity I Love

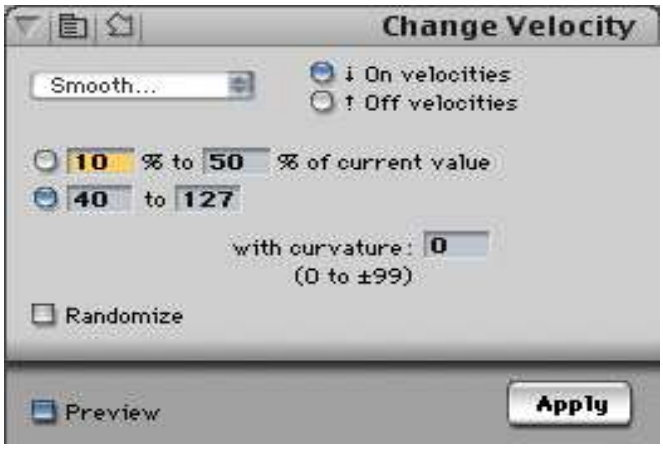
Just as you can change a passage's duration using the duration function, you can also change a passage's velocity. There are also many different functions which can be chosen from within the velocity window. In addition to the now-familiar set and add functions (shown on page 52) the velocity window also features scale, limit, and compress functions.

Using the set function, you can change all velocity values to one setting. While this is not particularly good for expressive playing, it can be very helpful for cymbal crashes, or other sounds that you want to sound very loudly.

The add function is really helpful if you played a little softer or louder than you intended to throughout a musical passage. (You can enter negative numbers into the add function and it will lighten velocities.) It is important to remember that the add function changes all of the notes in a particular selection, however. So if there are just a few notes that are too loud, this probably isn't the best way to handle them.

The scale function works like the duration window's scale function in that it impacts high velocities more and smaller velocities less. The scale function is very useful when you want to maintain the dynamic contrasts in a track that you might lose by simply adding to all of the velocities.

The limit function forces velocity values to fall within a set range. In the picture on page 52, a range of 100 to 126 has been set. All velocities softer than 100 will be pulled up to 100. So, values higher than 126 will be pulled down to 126. The limit function is useful for preventing notes from becoming too loud or soft.



The smooth function has several uses, all of which are somewhat specialized. The smooth function is involved in making large changes in dynamic level *over a period of time*. The smooth function can cause dynamics to smoothly crescendo or decrescendo. You can cause crescendos or decrescendos based on raw values or percentages. For instance, you can enter a starting velocity value and an ending velocity value, and the smooth function will cause all of the notes in between to smoothly crescendo from the lower number to the higher number over time. This is just the thing for snare drum fills and other sound effects which require many notes over the course of a measure or two.

The compress function may take you back to lesson 8 in *Basic Music Technology I*. This function allows you to set a threshold, ratio, and makeup gain. While it might seem odd to find a compressor which doesn't compress audio signals, it makes a lot of sense when you consider that velocity messages frequently change a synthesizer patch's dynamic level. Instead of measuring volume in decibels, volume is measured from 0 to 127 just as velocity is.

Transposition Disposition

The transposition window allows you to transpose any selected notes up or down by any interval you specify. You must provide an example of the transposition by entering a starting note and the note after it is transposed. For instance, if your starting note is middle c (C3) and you want to transpose your selection up one octave, you would enter C4 as your transposed value. Be careful not to transpose parts such as drum parts which will change sounds when transposed. If you have trouble remembering which notes are which on the keyboard, you can just highlight the note you want to enter (either the starting or transposed pitch) and then play the note on the keyboard. In fact, you can play notes on the keyboard to enter notes just about any place you need to enter this kind of data in Digital Performer.

Let's Review

1. In what ways do most digital audio sequencers treat MIDI data differently from audio data in terms of how data is edited?

2. What is quantizing, and how does it work? What should you be careful of whenever you quantize MIDI data? What steps must you follow when quantizing?

3. What is humanizing, and how does it work? When would you want to humanize a track, and how can you avoid this problem?

4. What are the four ways we can change duration using the duration window, and when is each method useful?

5. What are the six ways we can change velocity messages using the velocity window, and when is each function useful?

6. What is transposition, and what are some ways you can enter transposition data? What kinds of parts shouldn't be transposed?

Words To know:

Add
Compress
Duration
Humanize
Limit
Quantize
Scale
Set
Smooth
Subtract
Tolerance
Transpose

Experiments:

1. Input some MIDI performance data in real time and select it. Use the quantize window and experiment with different quantize settings. What is the effect you achieve?

2. Now try changing velocity and duration data. Be sure to experiment with each of the functions of each window.

3. Transpose your performance data up or down. Experiment with different methods of entering transposition data into the sequencer.