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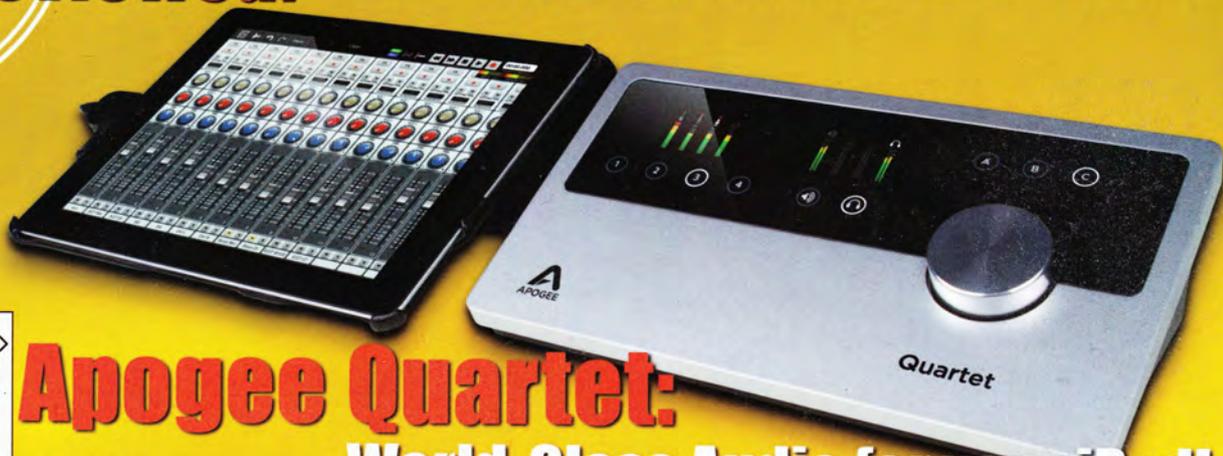
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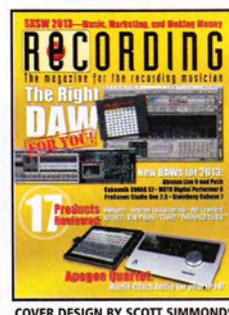
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COVER DESIGN BY SCOTT SIMMONDS

Mock-Up Magic



By Yuval Shrem

Advanced techniques for creating realistic MIDI orchestrations



Often people ask me what makes a MIDI mock-up work. What creates that magic that turns multi-sample libraries and multi-sample based virtual instruments into seemingly living and breathing musical creatures, filled with emotional expression? What separates those who “get it” from those who don’t? Why do some people’s mock-ups sound near-perfect and others’ sound like mechanical toys? In this article I’ll try to answer those questions the best I can, and offer pointers and guidelines to expressive, hyper-realistic multi-sample-based mock-ups.

I’m going to deliberately avoid library specific techniques and mixing techniques, and focus on principles and concepts that can improve your MIDI mock-ups, no matter which virtual instruments you use. Also, there are mock-ups that are made only to pitch an arrangement, which is intended to eventually be performed by live players, and mock-ups that are meant to be used as a final product. This article is aimed at the latter. I’ve provided some web links below, and a few examples that you can find at www.recordingmag.com/resources/resourceDetail/397.html

Some of the techniques and concepts listed here may seem familiar, while others are introduced here for the first time. The first and possibly most important concept I will be addressing in this article, one that I haven’t seen mentioned anywhere else, is the principle I call “Real-Time Editor”.

You’re not playing—you’re editing!

When using a multi-sample library or a sample based virtual instrument, you’re not really playing an instrument. You’re not actually producing the sound from a physical instrument, acting as an instrument player, but rather you’re acting as a real-time editor. This might be a little counter-intuitive, as you would typically play the parts using your MIDI keyboard, which feels very much like playing, not editing, but as I’ll explain here, in reality you are merely editing musical elements into music in real time.

With your MIDI keyboard, you are merely triggering the digital playback of the recordings of notes that have already been played by someone else, who likely never heard your music. These notes that were played outside of the context of your music, are the pieces of a musical puzzle that you are putting together, creating a new context for those notes though what is essentially editing. Understanding and acknowledging this concept is crucial in your quest for creating ultra-realistic MIDI mock-ups. So you might think: This is all very well in theory, but what does that mean in practice? Well, that means several things:

This means you can only use what has already been played and recorded by the developers of the sample library. You can only use the existing recordings that are included in the sample library and rearrange them creatively in order to create music.

It also means that if the samples in the library were not expressive or were played with a certain musical expression that doesn’t match what you are trying to play, it is most likely not going to sound very

convincing. A simple example would be attempting to play a loud note played with excitement, using a sample where the note was played softly and without excitement. You may play the note and make it loud in the mix, but it still just isn't going to sound quite right. While this example is extreme and might seem obvious to you in theory, you'd be surprised how often you will be running into this exact scenario, and more importantly, you will also be running into situations where the mismatch is not as obvious, and it is important to develop an ear for that.

As an editor you have to work with the material you've got. In this case it's the recordings included in the sample libraries and virtual instruments you are using. Those samples are notes that had already been performed. You are merely playing those recordings back. Work with what's there. Don't force those recordings to be what they are not. In that sense, using multi-sample libraries (and multi-sample based virtual instruments) is just like putting together a puzzle. Each sample is a piece in the puzzle, and you decide what picture you are going to compose using those pieces. If you use pieces that don't belong, the mismatch is going to be noticeable.

Know the Real Thing

You must be familiar with the real thing before you try to emulate it! This principle is more important than any mock-up technique out there. It might seem obvious to some of you, but shouldn't be taken for granted. In fact, it is an important principle, whether your music is going to be played by live musicians or played by you using virtual instruments.

You must know what the instrument you are emulating sounds like when played by live musicians, preferably you would have seen and heard the instrument played live in person, not only through recordings, and could have noticed what the instrument

player was doing. Think about it: if you are not extremely familiar with the instrument you are emulating, how can you emulate it?

Being familiar with the real instrument includes a lot more than just knowing how it sounds. It includes being familiar with how it is played, what are its technical limitations. For example, a baritone saxophone, being a huge instrument, when played in the low registers in fortissimo, cannot prolong notes or legato phrases, as the player uses an enormous amount of air very quickly. If you play a long legato phrase with no breathing breaks, it would be a dead giveaway that it's fake.

Being familiar with an instrument also includes being familiar with typical playing styles of musicians playing that instrument, which will guide you in the choices of articulations and other performance nuances, and will help you artificially recreate typical imperfections of performance that, in turn, will help you achieve a more realistic mock-up.

If you don't have much experience working with live musicians and you don't feel very comfortably familiar with the instruments you are trying to emulate, make yourself familiar with them by both listening to recordings in the relevant genre, and go listen to live music in concerts, or even in rehearsals if you have access to them. If you have access to the multi-track recorded material of music played by high caliber musicians, or even just the relevant stems, listen to those. Listening to the relevant instrument isolated from the rest of the arrangement can be very helpful in the quest of training your ear to replicate the nuances of a live performance when using sample libraries and virtual instruments. Also realize instruments sound different when heard from a seat in a concert hall vs. when captured by a nearby microphone.

Real legato samples

Legato sampling, initially introduced by Vienna Symphonic Library and now slowly becoming the new standard in high-end sample libraries and virtual instruments, is a clever way to improve realism, because it includes actual recordings of the transitions between notes. This is significant for several reasons. First, because when playing a legato phrase (most melodic

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Mock-Up Magic



instruments do that most of the time), the notes in the phrase flow into each other, and there isn't a fresh attack for each of the notes in the phrase. If it is a woodwind instrument, the air flow will be continuous while the valves will cause the transition between notes. With a string instrument, it would be the left-hand fingers that will transition between notes without the bow changing directions, etc. Web Example 1 on the *Recording* website compares a short phrase played with legato samples vs. one without.

This content-heavy, time consuming and somewhat expensive (for the developer) sampling technique also helps capture the musician's attitude, style and expression—all contribute to the realism. Whenever possible, you should choose virtual instruments that offer real legato samples. This really does make a major difference.

If you're combining virtual instruments that offer true legato samples with other VIs that do not offer them, try to hide the non-legato instruments behind the legato instruments so they will "ride" on the true-legato instruments' improved realism and musicality. In such a mixed section, make sure that the dominant voice will be played by your most convincing true-legato instrument, while the inner voices can be played by the less convincing instruments. Make sure they don't stick out too much in balancing between the voices—editing velocity values after the fact can help you there.

Recognize strengths and weaknesses

Recognize strengths and weaknesses of the instruments that you are using. Interestingly, this is an excellent advice even when working with real-life instrument players, but it becomes absolutely crucial when using virtual instruments.

Just as live players have individual strengths and weaknesses, virtual instruments do too. By recognizing the strengths and limitations of a live player, you can avoid exposing their weaknesses and make your music sound better and the performance more solid. By recognizing the strengths, limitations and weaknesses of a virtual instrument, you can not only do the same, but also make the mock-up far more expressive and realistic.

Once you've recognized the weaknesses and limitations, you must do everything in your power to avoid those and try not to expose them. Once you've recognized a virtual instrument's strengths, identify those which are appropriate to the music you are working on, and try to make use of them.

Use what's there!

Virtual instruments are instruments. Each virtual instrument you choose to use is different from the other. You must learn how to use each of them, read the user manuals, play around and practice. Listen to recordings of the real instruments you are trying to simulate, and try to replicate what you hear.

High-end virtual instruments may offer a wealth of playing techniques and music articulations. Not all of them may be appropriate for each track, but always try and find opportunities to make use of what's there. If a virtual instrument you are using offers a lot, and you are not making use of it, you are not using it properly, and will not maximize the quality of your results.

There is an exception to this rule: Don't misuse FX articulations. Using cool-sounding FX articulations when they are not musically called for can be distracting and just as destructive to your mock-up's realism. Another way of misusing samples is too much repetition.

Minimize repetition

You're probably familiar with the concept of alternate samples, or what is sometimes called "round robin" – a technique developed to avoid "The Machinegun Effect" – the unnatural sound of a single sample played repeatedly, over and over again. The reason is that real-life instrument players do not repeat their performance of a note in a perfectly identical manner. Each repeated note sounds a little bit different from the other. By cycling between several alternate samples instead of repeating a single sample, virtual instruments and sample libraries simulate that slight variation real-life instrumentalists produce in repetition. Web Example 2 on the *Recording* website demonstrates the difference between a round-robin sample selection and the Machinegun Effect.

That same concept applies to you in your choice of articulations. On one hand, it's a good idea to use multiple different articulations in even a single phrase, and on the other hand, it is very important to avoid overusing highly recognizable FX articulations, as those might stick out like blinking signs screaming "This is not real! This is just a MIDI mock-up!". Be careful with those.

A good example of articulations you need to avoid overusing by repeating too frequently would be highly recognizable guitar slides and effects (realistically no guitar player would repeat those in the exact same way in the same song). Using such an effect once in a song adds a lot of life and realism, but repeating it would achieve the exact opposite result. Another good example would be strings portamento and glissando. Many recent orchestral mock-ups I've heard are guilty of overusing those, possibly as a result of those articulations becoming so readily available in most of the mainstream strings libraries and virtual instruments. The two main problems with those are that, firstly, real-life string players don't play those articulations very often, and secondly, the way these articulations were sampled was too technically oriented, and does not emulate a real string section playing a glissando or portamento in a real musical context. In a sense they have been performed too perfectly in the recordings of those sample libraries, to be very convincing, especially if used too frequently.

Timing, pre-attack and quantization

Quantizing can be one of the worst things you can do to your mock-up. Other than often killing your natural groove in favor of a mechanically accurate, yet grooveless performance, one of the hidden problems with quantizing, and/or using step-sequencers and arpeggiators, has to do with inconsistent pre-attack in the samples.

Pre-attack is what's included in the very beginning of the sample, before the recorded note is fully realized. Certain instruments and note ranges take longer for a note to be heard at full volume than others; the ear perceives the "start" of the note as being later than the moment the waveform actually begins. When playing a note on a tuba or a flute, it takes much longer for the air blown into the instrument to develop a stable waveform that produces a fully-developed note than on, say, a piano or a xylophone, which produce sound almost instantly. Live players, being familiar with the time it takes for the note they are playing to be fully realized, simply begin playing it a bit early, so that by the time it is fully realized and clearly audible, it would be exactly on time. When using virtual instruments, we must do the same, but the rules are a bit less predictable.

Different developers have different preferences when it comes to their editing styles, particularly the attack and pre-attack. Some developers prioritize fast response for keyboardists playing live, and cut most of the pre-attack content out, so that the played note would be fast to respond to the MIDI keyboard. Other developers prioritize realism, maintaining and including more of the pre-attack content in the sample. When that pre-attack time is consistent throughout an instrument, you can quantize safely, and then just shift the entire part slightly backwards, so that the pre-attack is played before the actual notes, and the actual notes are realized right on time and not a little too late. Unfortunately, it is very difficult for the developers to keep the pre-attack timing consistent throughout an entire instrument. When the pre-attack timing is not fully consistent (that's the case with most virtual

instruments and sample libraries, even the high-end ones), quantizing, step-sequencers and arpeggiators expose that inconsistency and creates timing problems with the musical performance.

So, what to do if you are unhappy with the timing of your initial performance? Well, you can either tweak the timing of the MIDI notes manually in your MIDI sequencer, or if you do need to use quantize, either use quantization at less than 100%, so that some of the variation of the human performance can be preserved, and/or tweak the timing of some of the notes after the quantization. Use your ears to identify moments that just don't sound quite right, and tweak them. By tweaking, I mean dragging the MIDI notes horizontally, either individually or in groupings; dragging the beginning or ending points of individual MIDI notes, and considering alternative articulations that might better fit the bill. Experiment with different approaches and find what works for you in each situation. See Figure 1 and listen to Web Example 3.

Make it breathe

When playing long sustained notes, try to either use a long and dynamically developing sample, which includes changing

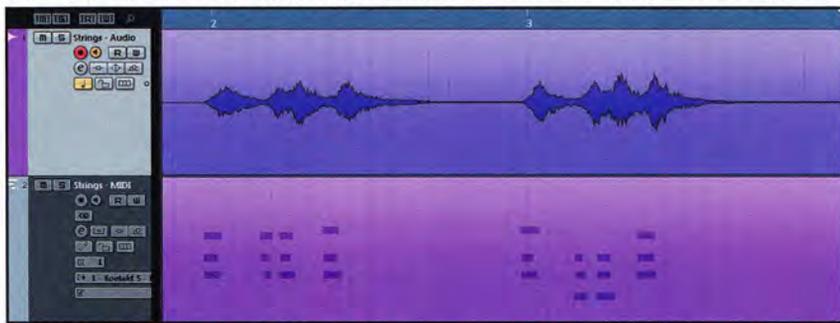


Figure 1: In this illustration, the MIDI events are played before the actual beat, but the audio is exactly on time.

dynamics built-in the actual recording, or use MIDI CC (continuous controllers) to add slight movement in the note's dynamics. A slight crescendo can go a very long way in making your mock-up more expressive and realistic. If the instrument you are playing does not support MIDI CC to control dynamics, try to achieve the effect by dynamically changing the instrument's level in the mix. See Figure 1 and listen to Web Example 4.

Mixing and matching

No sample library is perfect. No virtual instrument is limitless in what it covers and what it can do. Try to always use the most appropriate tool for the job, and often it is going to be a combination of tools that you're going to want to mix and match.

Without going too deeply into mixing techniques, I should at least touch on some basic guidelines for successfully using multiple virtual instruments in conjunction with one another, as more often than not this becomes necessary when producing music with virtual instruments.

Creating homogenous sounding sections becomes a real challenge when building sections from multiple virtual instruments, as each product was recorded differently, with a different recording style, in a different room and with a different concept. Some virtual instruments may only offer a very close and dry recording that was done in a small recording booth, while others may have been recorded with more distant or even far microphones in a concert hall. Combining such two virtual instruments in a single piece of music creates a major mixing challenge, as in order to sell the illusion that these vastly differently recorded instruments were played by live musicians, you will need to make them sound as if they were sharing the same space and that the recording style was consistent enough to be sonically coherent. There are a few things you can do to overcome this challenge:

Some sample libraries and virtual instruments offer multiple microphone setups. When using a product that offers this feature, that should be the first thing to try. By matching the tonal characteristics of the various instruments in a section via microphone

setup selection (or sometime mixing multiple microphone setups of the sample instrument for that matter), you will be getting the most natural results. When multiple microphone setups aren't available, or when that is not enough, try the following:

EQ: This goes both for matching two (or more) different products so that they sound similar to one another, and for creating the illusion of two different instrument players in a section, when using several instances of the same sampled solo instrument, in creating the virtual section.

Reverb: Make the instruments share the same space. If one virtual instrument was recorded very dry, and another was recorded in a concert hall, you will need to add a similar concert hall reverb to the dry sample, before you can add any additional reverb which both instruments can share. That said; beware of using convolution reverbs on samples that already include a prominent room sound, as this will generate the "room-within-a-room" effect, which sounds bloated and unnatural.

Pan / Position: When the entire section comes from the same direction and from the same spot in the room, something is just not going to sound right. That is also true for the sonic placement of the different sections compared to one another. You can use panners or positioners for this purpose, but don't skip this step unless all instruments were recorded in the correct position in relation to one another.

Individual Sends: For best results, send each

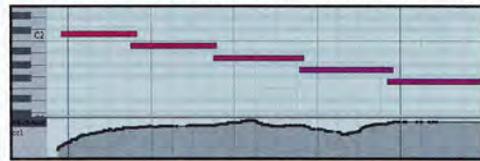


Figure 2: MIDI CC messages are used to add dynamic development to these notes.

individual instrument from your sample-player to your DAW or mixing board, (as opposed to mixing multiple instruments within a single sample player), so that you can have maximum control of its tonal characteristics in the mix. That is a very good habit to get into.

Be patient, make it sing, use your ears!

Always remember that all of the technical practices are only tools. The most important thing is to use your ears. Does it sound real to you? Is it expressing what you want to express musically? If it isn't sounding quite right, don't just settle, concluding that virtual instruments can never sound as good as the real thing; with modern high-end virtual instruments that is no longer necessarily the case. Experiment with different approaches until you satisfy your own ear. Listen to similar tracks played by live musicians for reference. Imagine how live musicians would have played your own arrangement, and then work to make your MIDI mock-up sound like what you heard in your mind.

Use your ears, and be patient. A great mock-up often takes some time to perfect; be it a few seconds, a few minutes, a few hours or a few days. It doesn't have to always be a lengthy process, but be prepared to invest some tinkering time. When you're nearly done, listen again, and look out for moments that stand out as problematic, and then tweak them until they blend in and function musically to your satisfaction. I guess it's called "attention to details" but this is what the art of making art is all about, isn't it? ☺

Yuval Shrem is a composer, arranger and producer, as well as a developer of virtual instruments. He co-founded Fable Sounds and musically directed the development of the Broadway Big Band and Broadway Lites virtual instruments. Yuval is also known for his MIDI mockups, some of which can be found online as both official and unofficial product demos on the Fable Sounds website (www.fablesounds.com). See www.yuvalshrem.com for more information.