Electronic Percussion: The Artist or the Medium?

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JUST A FEW DAYS AGO, I RECEIVED A VERY nice letter from Gordin Rowand of Springfield, Ohio. Mr. Rowand pointed out that he was one of the first twenty-five charter members of our Percussive Arts Society. After introducing himself in the letter, he wrote:

"In playing marimba, my wrist control produces a very wide range of dynamic control. From the rafters roaring to the silence required to hear a pin drop! This is more than can be produced on the piano or organ where the control stops at the key.You are right about some routine commercial ads. But nothing can replace the real artist. I believe this expresses my concern for electronic drums."

I thank Mr. Rowand for sharing his views and taking the time to respond to the article in the Spring 1990 issue of *Percussive Notes*. I agree with him one hundred percent! Nothing can replace the real artist. But, the question is then: "Who is the artist, the performer or the medium?".

While some advertisers would like you to think differently, most readers would argue that the performer is the artist. The medium is just the tool used to convey the message. To say it in a nutshell...you can't compose like Stravinsky by simply buying a certain brand of manuscript paper.

The other side of the coin is also valid. Manuscript paper is a tool. Without the proper tools, the artist may not be able to turn his ideas into reality. To push this analogy even further, the tool of manuscript paper carries with it centuries of history. The five line staff is ideally suited for our particular type of Western notation which has developed due to our particular musical instruments (additional tools). Would Stravinsky have been able to express his artistic talent if notation still relied on neumes placed around a single line staff? What would Stravinsky's music have sounded like if his tools were entirely different (no major/minor system, only string instruments, adjustable tuning systems, etc.)?

The point of defending both arguments is to realize that the artist is the creator who must use the available tools to convey his or her art. Both the artist and the medium are intertwined and married together in a symbiosis that is essential to art's very existence.

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Mr. Rowand also jumped right to the heart of the matter by saying that the control of the sound can't stop at the key. In other words, the artist must be able to control the tools. And to do that, we must have tools that can be controlled.

Let's examine a suspended cymbal, and see how this tool can be controlled by the artist. First of all, the artist can select the type of beater used to initiate the sound. Small tips create a different sound than large tips. Hard sticks produce a different sound than soft sticks. Heavy sticks invoke a different sound than light sticks. You might even say that sticks of different materials contribute another facet of the sound: wood, plastic, nylon, cord, wool, foam, rattan, etc. One could even go further by choosing less common materials such as a cello bow, fingers, coins, combs, etc.

After the artist decides which beater to use, the next consideration could be playing position. Play near the bell, on the bow, or close to the edge? How close to the edge? How far from the bell? Is the cymbal going to be hit once or struck many times to create a roll? Perhaps the coin is scraped from the bell toward the edge. Perhaps the bell is struck with the shaft of the stick rather than the tip. All these factors need to be weighed by the artist.

Next, the artist must decide how hard to hit the cymbal (or how fast to drag the coin across the surface). A cymbal is an extremely dynamic tool. Any volume, from "rafters roaring" to "pin drop" is available to the artist.

Last but not least, the artist needs to decide the length of the sound. Will the cymbal decay naturally? If the sound is muffled, should it stop abruptly or feather its way into silence? Should any muffling be employed while the cymbal is being struck?

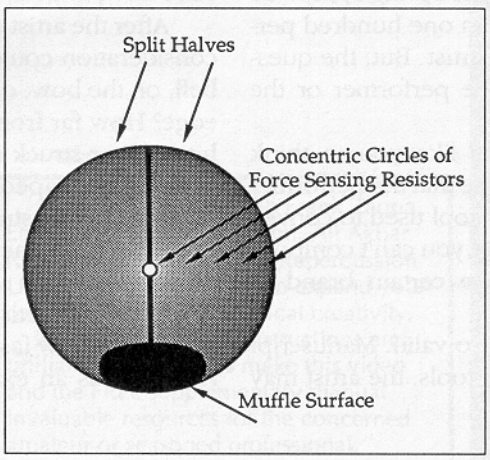
As you can see, the cymbal is a tool which possesses numerous parameters just begging to be controlled. By making different choices, an artist could create literally thousands of sounds. Is it possible to create an electronic cymbal that can be controlled to this extent? Why not? In fact, let's invent one right now.

We'll need to start with a controller that is about the same size, shape, and weight as an acoustic cymbal. By doing this, we'll make the instrument "feel" as natural as possible. Our controller must be able to sense the posi-

tion of the beater, and it must be very responsive to pressure so that it can respond to dynamics in a natural manner. Our controller should also be able to sense pressure at some point when it's grabbed by the hand during muffling.

Take a look at the illustration. This potential controller is made up of concentric rings of *force sensing resistors*. FSR technology is not new (currently it is used in products by several manufacturers), but it is rather expensive. Because FSRs read changes in pressure rather than vibration, they could be placed very close together without fear of cross-talk or false triggering. This controller is broken up into two halves so that the performer could program two unique sound sources. This way, it would be easy to emulate the use of a different stick in each hand. The controller should also include an area that could be touched in order to produce the effect of muffling the sound.

The signal from the controller must now go to a trigger-to-MIDI converter. The converter's job would be to read the signals from the FSRs and then determine where the cymbal was being struck. Depending on its position, each FSR could be programmable along several MIDI parameters: MIDI channel, MIDI note number, minimum velocity, maximum velocity, velocity curve, velocity sensitivity. Typically, an FSR near the bell of the controller would fire the sound of an acoustic cymbal being struck in the identical position. Velocity switch, velocity crossfade, note stack, note alternate, and other MIDI features could be included to give the controller more versatility.



The muffle surface should be able to generate a variety of MIDI information. It too would be an FSR and respond to pressure. Normally, the amount of pressure could be mapped to Note-Off velocity (low pressure readings make the sound fade gradually while high pressure levels cut off the sound more abruptly), but it could also be used for things like pitch bend, vibrato, master volume, or stereo pan controls.

The signal from the trigger-to-MIDI converter would then go to a sound generator. The sound generator must have many, many cymbal samples in its memory. We'll need samples of cymbals from six to twenty-six inches in diameter. We'll need samples of small light wood sticks, large heavy yarn mallets, and samples of everything from coin scrapes to fingernail pings and up bows.

The current MIDI specification allows sixteen discreet channels. Each channel is capable of receiving 127 different note numbers. A little math will show that there could be a maximum of 2,032 different sounds available at one time. If more sounds were needed, they could be stored on an optical disk for automatic transferral to the sound generator when they were required.

The sound generator should be able to receive any type of MIDI data and route it to any control available on the machine. Perhaps velocity could be mapped to the attack portion of the amplitude envelope, the filter cutoff frequency, the stereo placement, vibrato, or a hundred other parameters. Readings from the muffle surface could also be routed to any parameters or groups of parameters.

As you might guess, an electronic percussion instrument like this doesn't yet exist. Even though the technology to create such an instrument exists, the price of manufacture would be prohibitive. For example, if each of the 2, 032 sounds were five seconds long (in order to catch most of the natural decay), the sound generator would require almost 170 minutes of sample time. With a sample rate of 44.1k per second (the sonic quality of a compact disk), that amounts to over 400 megabytes of RAM!

While that may not be practical at this time, who knows what the future will bring? Many people remember when a six transistor radio was over a hundred dollars, and just a few years ago, digital watches were only for the wealthy. As the price of memory continues to goes down, and the construction and manufacture of electronic devices becomes easier, faster, and cheaper, instruments like this may end up in the discount stores.

If an instrument like this did exist, it could be controlled along several more parameters than its acoustic counterpart. In addition to the choices of instrument, beater, playing position, volume, and duration, decisions could be made concerning the the sound's envelope, vibrato, pitch bend amount, frequency content, stereo placement, and more. But, would it be musical? Would it be cast aside because it wasn't a "real instrument" capable of true musical expression? Or, would the artist be able to express his control over the tool, and make it become a medium of subtle nuance? What do you think? Is it the artist or the medium? ■