Drum Set Ergonomics
by Bob Gatzen

As both a player and a product designer, I spend a lot of time thinking about how drummers interact with the instrument. One thing should be apparent to anyone who has ever sat behind a drum set and picked up the sticks. It is a VERY physical act. Think about it... besides drummers, how many people, while in a sitting position, viciously flail all four limbs simultaneously? OK, replace “flail and vicious with, “move their limbs in a synchronized and independent fashion”. So consequently, I’ve invested quite a bit of thought, time, energy, and research into understanding ergonomics and how to reduce stresses on the body that result from playing the drums.

Habit Forming
When I first began playing, I sat as low as possible leaning slightly forward into the drums. For a long time this felt natural to me until I realized it was simply a habit that I was unwilling to change... Sound familiar? I raised my drum stool slightly and discovered an inch is a mile! I felt more relaxed more and played with great fluidity. Also, my practice sessions weren’t as tiring resulting in less muscle soreness. My drum-world changed! Again, I thought, perhaps this is just another habit I’ve acquired? Being an inventor I recognized an opportunity. I said to myself “The way we sit at the drums has never changed. Is there a better way?”

Body Mechanics
Everyone’s body mechanics are different, making it impossible to establish steadfast rules that govern the way we play drums. It’s a lot like running and in a way, we are running at the drums. There are general rules that should be observed yet each and every runner creates a personal style that best suits their body mechanics. With that said, let’s discuss two basic principles that I believe apply to all drummers regardless of style.

#1- Path of Least Resistance
Four-limb motion from a sitting position is unnatural, working against laws of physics. This thought led me to two basic concepts; Follow the Path of Least Resistance & Economy of Motion (both of which are prevalent in many forms of martial arts).

Position drum components that you hit the most within arms length. For example, in relationship to the snare drum, position the ride cymbal and hi-hat in a way that allows you to keep your elbows as close to your side as possible (see pic). Next, position the toms minimizing upper-body movement. This will vary depending on the size of your kit but it’s easy to figure out... simply focus on the components you use the most. Finally, even though you want to be “seen” behind the drums it’s wise to position your cymbals as close to the toms as possible. It’s just a matter of priorities. Which is more important, to be visual or to be comfortable playing at your best?
Surface Angles
Pay close attention to the surface-angles of drums and cymbals. This will vary depending on your technique, whether it's matched or traditional stick grip, wrist and arm motion style, etc. In general, the rule is to position drums and cymbals at about the same angle. This minimizes quick adjustments in the arms, wrists and fingers. Keep reminding yourself, Economy of Motion.

#2- Resistance to Movement
Taking things further, my research included detailed viewing of drum videos featuring world-class drummers; drawing comparisons between drum set-ups and body types. I enlisted an expert, a young, brilliant physical therapist, Peter Benke. Peter uncovered a very important study from an esteemed medical college library stating, “Muscle tension generated in the upper torso area creates resistance to movement in the extremities (arms and legs)”. Sounded like a drum-thing to me! We decided to conduct our own research study at the University of Connecticut Medical Department. We chose several drummers with different playing styles. Electrode sensors were placed at key body areas measuring muscle activity. To draw comparisons, drum-kits were set up in specific formats with the drummers playing pre-programmed patterns. The resistance to movement theory held true.

Sitting Position
So, here is the general rule regardless of your style and kit set-up. There is a natural tendency to lean forward into the drums creating an intimate relationship with the instrument. From an ergonomic standpoint this should be resisted. The angle of your back relative to your legs (thighs) should not go under 90-degrees (see picture #1). Leaning forward, breaking the ‘right angle” position creates resistance to movement in the arms and legs…not a good drum thing! Additionally, with today’s advanced (aggressive) style of bass drum and hi-hat pedal technique, it becomes increasingly difficult to lift your legs upwards “floating” your feet on pedal surfaces. Consequently, the straight back, right-angle position or slightly backwards (over 90 degrees) is most beneficial (see picture #2).

Leg Position
The 90-degree principle seems to hold true with leg positioning as well. A 90-degree angle or slightly over at the knee, between the thigh and shin is more efficient than under (see picture #3).

Test
Need convincing? Try this test: Sit upright on a drum stool. Lift both feet off the ground paying attention to the amount of effort it takes. Next, lean forward, breaking the 90-degree angle at the hip and lift both feet off the ground. It’s almost impossible without exerting tremendous effort and muscle activity in the lower back to stabilize and balance your self. You tell me - which way is the better way to play?

Examples
Need more convincing? Pick up a few drum videos and watch closely to the styles of Buddy Rich, Tony Williams, Billy Cobham, Dennis Chambers, Carter Beauford, Vinnie Colaiuta, Dave Weckl, John Riley, Will Kennedy…the list goes on an on.

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