Q: Position playing on lower strings

Hello Knut! Great idea for a website, I'm sure it will be very useful for some of us. I am interested in the behaviour of the lower strings, especially when played in high positions. I know it takes practice, but I often get a muffled or slightly whiny sound when I play high on the low strings. I've tried playing closer to the bridge, more pressure, less pressure, less speed and more, and cannot work out the best way to get the best sound. Can you explain how the string is behaving and the best way I can practice to make it sound good. Thank you.

A: (Knut Guettler)

Hi!
What causes the problem when playing high positions on a low string, is the relatively high bending stiffness with the corresponding (wide) Helmholtz-corner rounding. See the figure below:

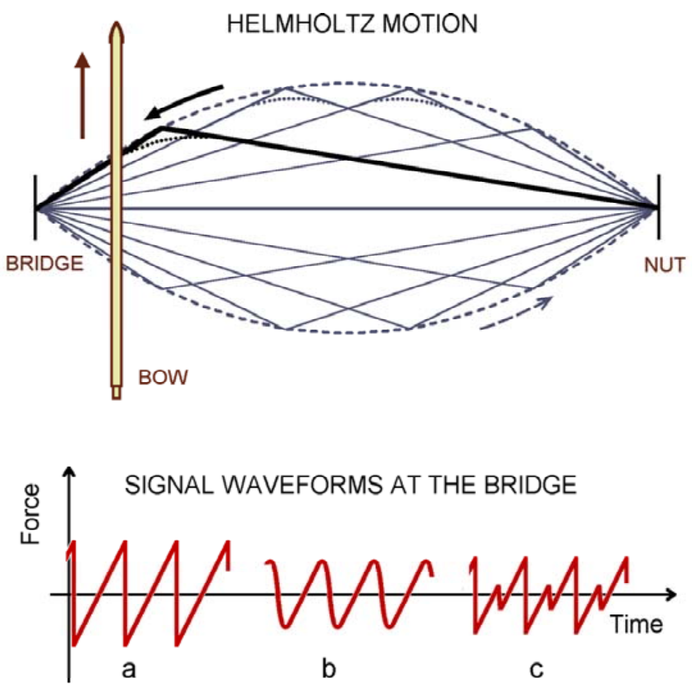

Figure 1: A thick string will distribute the rotating Helmholtz corner over a wider part of the string. See the dotted lines. When played in high positions, this area will occupy an even greater part of the active string length, with the result that the string-release triggering point will lose definition.

Lower panel shows three force waveforms at the bridge:
(a) waveform with perfectly sharp corner
(b) waveform with rounded corner
(c) non-Helmholtz waveform with one additional slip .

When the corner is sharp, the time-point of string release is well defined as the instance when the corner passes under the bow. When the corner is rounded, the release can take place at any time while the rounded section is passing under the bow. Most commonly, a small delay will occur, causing a small flattening of pitch (see Fig. 2, below). So, in order to control the string in high positions, one should try to give the string a well defined corner/kink, which is done best by moving the bow somewhat closer to the bridge. By doing so, one also avoids undesirable pitch flattening. There is a tradeoff here, between bow force (“pressure”), sharpening the corner, and the same bow force causing the pitch to fall due to delayed releases. Bowing position is what makes the difference here. One should also experiment with bow speed, to see what works best for that particular position.

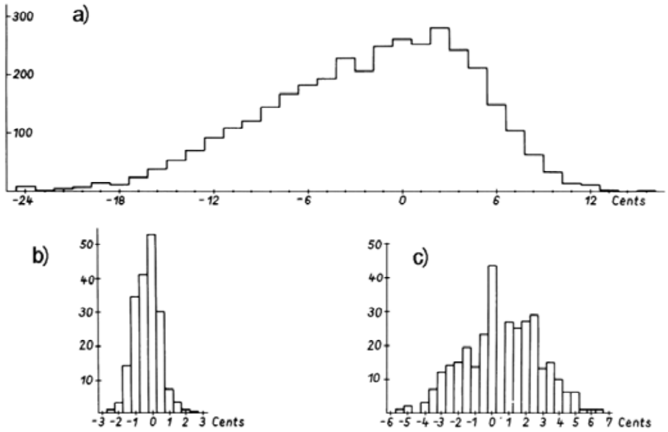

Figure 8.12
Measured frequency distributions of periods. Top, for a mechanically bowed string (after Beldie and Hermes). Bottom, for a hand-bowed g string. Left, open g string. Right, at a frequency of 715 Hz on the same string (after McIntyre, Schumacher, and Woodhouse).

Figure 2: (From Ref. 1.) When a string with high bending stiffness is played in high positions, the rounded Helmholtz corner fills up relatively more of the active string length. This causes the string-release triggering to become less clearly defined, with the result that a wider distribution of stick-slip periods occurs.

Another aspect of great importance here is the choice of rosin. I mention this problem in my article on rosins (Ref. 2). You might want to try a harder rosin to achieve more control. I believe that could solve your problem.

Good luck!

Ref 1: M. E. McIntyre, R. T. Schumacher and J. Woodhouse, "Aperiodicity in bowed-string motion" Acustica **49**, 13-32 (1983). Available at: http://www2.eng.cam.ac.uk/~jw12/JW%20PDFs/Aperiodicity.pdf

Ref 2: K. Guettler, "How does rosin affect sound?" ASTA String Research Journal (II), pp 37 – 47 (2011).