

Suggestions for Improving Glissandii, Slurs, Hammer-Ons, Pull-Offs and Bendings in MuseScore

Yves Poissant
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First some context. I don't consider myself a musician although I managed to become a lead guitarist in a rock band and had fun doing that in the 70s. I'm now a retired C++ programmer specialized in 3D photorealistic renderers who took back the guitar a few years ago to develop and improve my guitar fingerpicking style but I like to play electric guitar riffs from time to time like the old days. And I am also acquiring music theory, which I had very sketchy notions in the 70s.

I've been using MuseScore since about 6 years for different purposes such as choral sheet music, doing music theory homeworks, transcribing some pop and rock pieces and transcribing guitar riffs and solos. I'm quite pleased with MuseScore for all that except... for guitar solos and riffs transcriptions and playbacks rendering, which I find is missing several expression renditions.

Thus, my proposition for improving glissandii, slurs, hammer-ons, pull-offs and bendings, both for notations, properties editions GUIs and MIDI renditions. But keep in mind that I view those issues from an amateur guitarist perspective.

I will review each of those expressive effects in the order given above but I will start with a review of the MIDI capabilities for rendering those effects.

MIDI capabilities

From my research, here is my understanding of how MIDI can be used for rendering those effects. I may have missed some capabilities/technicalities though.

MIDI 1.0 already has provisions for rendering legato notes, which is required for glissando, slur, hammer-on and pull-off. This is achieved either by sending a Legato Pedal ON message or setting a legato mode. When a MIDI device is in legato mode, two notes are played legato if the first note duration overlaps the second note. In this case, the MIDI device is supposed to skip the attack portion of the second note envelope and jump right to the sustain portion.

However, those two approaches require that the instrument be played in monophony mode. While this perfectly acceptable for wind instrument, it is not acceptable for fretted instruments since it is not uncommon to play a set of legato notes on a string while holding a bass note or even a chord on the other strings.

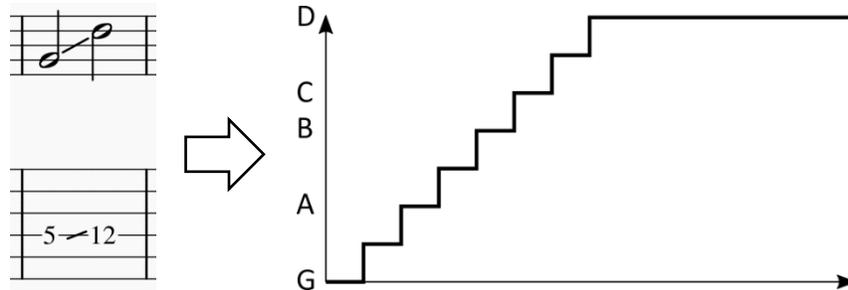
The only other MIDI 1.0 capability available that can support those expressions without requiring that the instrument be placed in monophony mode is the pitch bend message. So for the MIDI rendering of all such expressions, pitch bending seems to be the only way to go.

Glissando

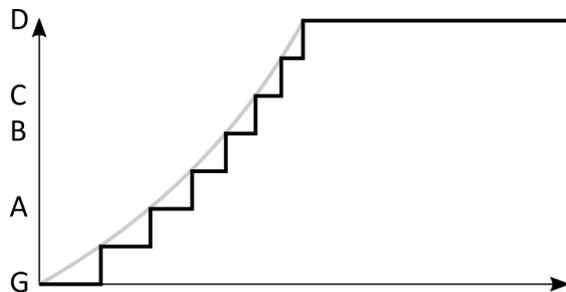
Glissando current notation is already suitable.

On a fretted instrument, glissando is usually chromatic (except when using a slide). However, a chromatic glissando on the guitar currently results in a long set of chromatic notes each with their own attack, far from the expected rendition.

Glissando for fretted instrument should be rendered with a chromatic MIDI pitch bend, that is, a staircase function.



In the above example, the glissando uses a staircase function and the underlying progression curve is linear. I'm considering exposing the underlying progression curve and letting the user modify it to model ease-in or ease-out or both as a spline curve. The staircase function would adjust accordingly. Something like this for an Ease-In:



Using MIDI pitch bend for a glissando may test the limits of the pitch bend rendition capabilities when a glissando stretches for more than a few steps, though. This might be somewhat attenuated by selecting a pivot pitch that is in the middle between the start and end pitches.

MIDI 1.0 also has a Portamento Control message but this results in a linear slide from one note to the other and is not suitable for fretted instruments

Slurs, Hammer-Ons and Pull-Offs

Current Slur notation is already suitable.

Hammer-ons and a pull-offs are usually notated simply like a slur, that is with an arc joining the two notes. This is sufficient since, on a fretted instrument, a slur cannot be performed in any other ways but with a hammer-on or a pull-off. In some books, though, an 'H' or a 'P' is placed above the slur mark,

The image shows two examples of Hammer-On (H) and Pull-Off (P) techniques. The top example shows a standard musical staff with a slur over two notes, a horizontal bar above the second note, and another slur over two notes. The bottom example shows a guitar tabulation staff with fret numbers 5-7 and 7-5, with 'H' and 'P' labels above the respective pairs.

above the tabulation staff and in the middle between the two notes in the tabulation notation but not in the standard notation. This could be a notational option for the slur properties.

On the left, is an illustration of the two different Hammer-On and Pull-Off notations. With simple slur marks on the left and with slur marks augmented with a 'H' and a 'P' letter above the tabulation staff on the right.

Those expressions should all be rendered with a MIDI pitch bend using a step function.

The diagram illustrates the conversion of notation to MIDI pitch bend. On the left, a standard staff shows a slur over two notes, and a tabulation staff below it shows 'HP' above a slur over frets '1-3-1'. An arrow points to a MIDI piano roll on the right, which shows a step function between two pitch levels labeled 'D' and 'C'.

Bendings

There are too many issues with the current MuseScore bending notation and rendering to start criticizing it. I'd rather start anew.

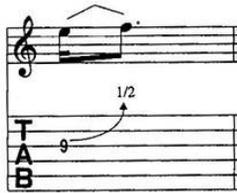
I could not find consistent bending notations between different web sites. There are at least 3 documented ways of notating bends on the web and there are many other undocumented ways. Even the 3 documented ways are implemented in different manners by publishers and notation softwares.

The notation I suggest for MuseScore uses an angular hat in the standard staff and bend curves in the tabulation staff. This has the advantage of leaving the standard staff uncluttered and all the useful information in the tabular staff.

Also, using the suggested notation, the standard staff notation for bends is different from the slur notation. All notes, including bended notes are explicit in the standard staff but implicit (omitted or inside parenthesis) in the tabular staff.

Here are some examples:

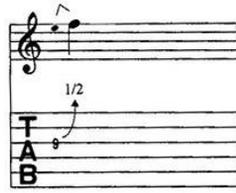
HALF-STEP BEND: Strike the note and bend up 1/2 step.



WHOLE-STEP BEND: Strike the note and bend up one step.



GRACE NOTE BEND: Strike the note and bend up as indicated. The first note does not take up any time.



SLIGHT (MICROTONE) BEND: Strike the note and bend up 1/4 step.



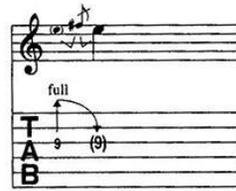
BEND AND RELEASE: Strike the note and bend up as indicated, then release back to the original note. Only the first note is struck.



PRE-BEND: Bend the note as indicated, then strike it.



PRE-BEND AND RELEASE: Bend the note as indicated. Strike it and release the bend back to the original note.



UNISON BEND: Strike the two notes simultaneously and bend the lower note up to the pitch of the higher.



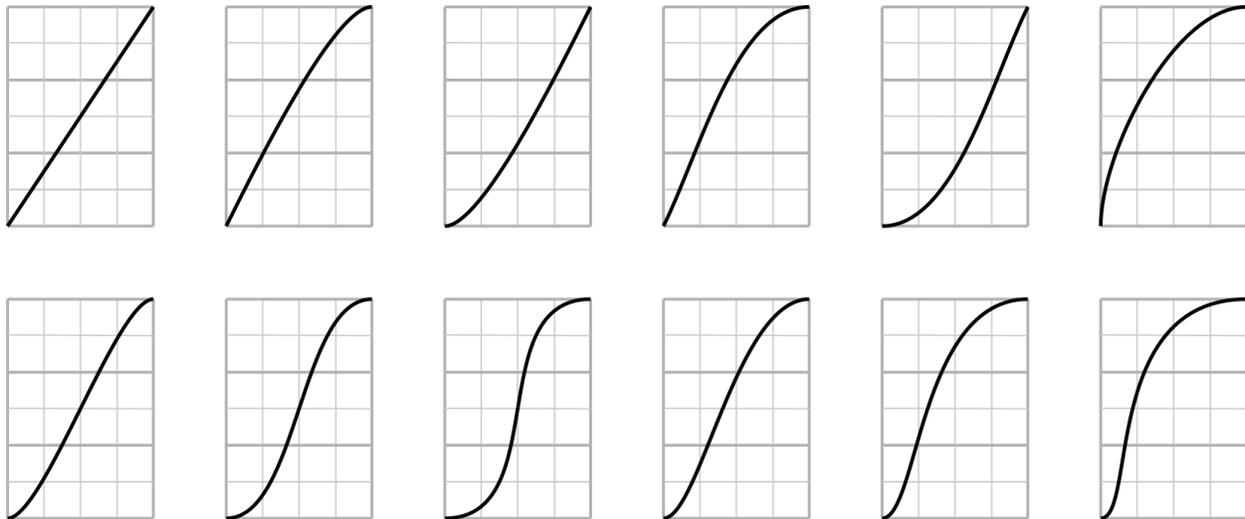
VIBRATO: The string is vibrated by rapidly bending and releasing the note with the fretting hand.

WIDE VIBRATO: The pitch is varied to a greater degree by vibrating with the fretting hand.

HAMMER-ON: Strike the first (lower) note with one finger, then sound the higher note (on the same string) with another finger by fretting it without picking.

PULL-OFF: Place both fingers on the notes to be sounded. Strike the first note and without picking, pull the finger off to sound the second (lower) note.

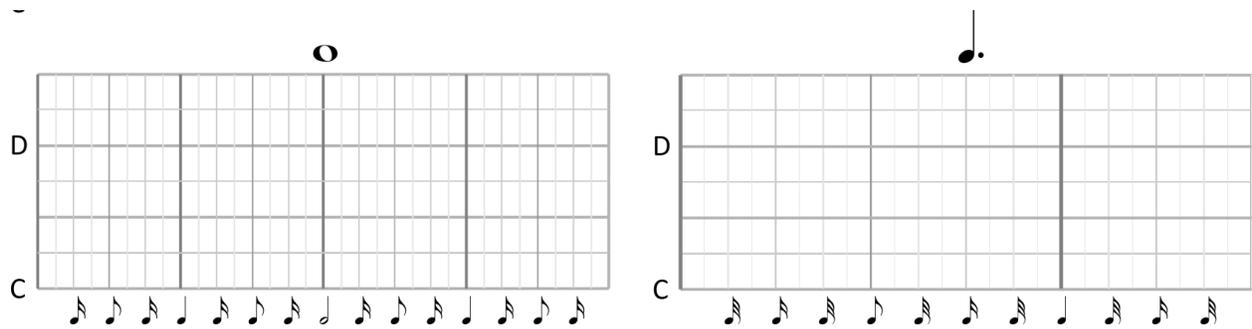
Bending notation must also include many more bend techniques where held bends is probably the most complex to handle notationally speaking. The bend curve editor needs to be able to handle much more complex curves than linear ones.



In addition to the currently available linear function, there must be an option for adding an ease-in, an ease-out or both, to better simulate the inertia of a real string bend. The actual bend curve should be fully editable as a Bezier curve to simulate any expressive use of string bendings.

Such flexibility imposes edition complexity. Because of that the bend curve editor should have a simple mode and an advanced mode where the simple mode roughly works the way it works right now and the advanced mode allow better modeling of all the subtleties of practical bends.

The bend curve editor horizontal grid must adjust to the note duration such that it is easy to set bend curve control points at exact sixteen, eight, quarter, half, etc. positions with snap functionality and two control points may be positioned one above the other for sharp step function modeling.



Bend rendering already uses the MIDI pitch bend functionality.