

# Why musicians need a better bowing notation

BOGEN group  
May 3, 2006

## Bowing for a violinist or violist

- Bow has a frog and tip
  - Held at frog with the right hand
  - Bow is heavy at frog, light at tip
- **Downbow** moves from frog to tip
- **Upbow** moves from tip to frog
- Playing at either frog or tip is clumsy
- Easiest to play in middle of bow
- Middle is where you try to be most of the time

## Planning how to use the bow

- String players think a lot about how they use the bow
- But they don't write those plans down
- So other players can't benefit from what they have learned
- And it's hard to discuss and improve a plan

## Bow is moved in 2 directions; that's all we can specify

- The only bowing notation used today just specifies these directions:
  - **Upbow** and **Downbow**
- We suggest new notation that includes **6** annotations

## Specifying parts of the bow

- Some notation has been developed in pedagogical books, such as the Applebaum series
- We base ours on that approach
- **WB** means **Whole Bow**
- **UB,MB,LB** mean **Upper, Middle, Lower** parts of the bow

## Specifying the direction in which to move

- Player may need to plan a move to another part of the bow
- This could take place while playing several notes
- **→** means **Move towards the frog**
- **←** means **Move towards the tip**

## Why is bowing notation needed?

- Suppose you are driving in a strange town
- You need to make a right turn
- There are no maps, and no signs
- But you need to prepare the turn by
  - Slowing down
  - Looking up and down the road before turning
- And you have enough to look at just to drive safely on the current road

## Making the turn probably won't kill you

- But it might
- Signs would make it much easier to drive
  - even though you could survive (often) without them

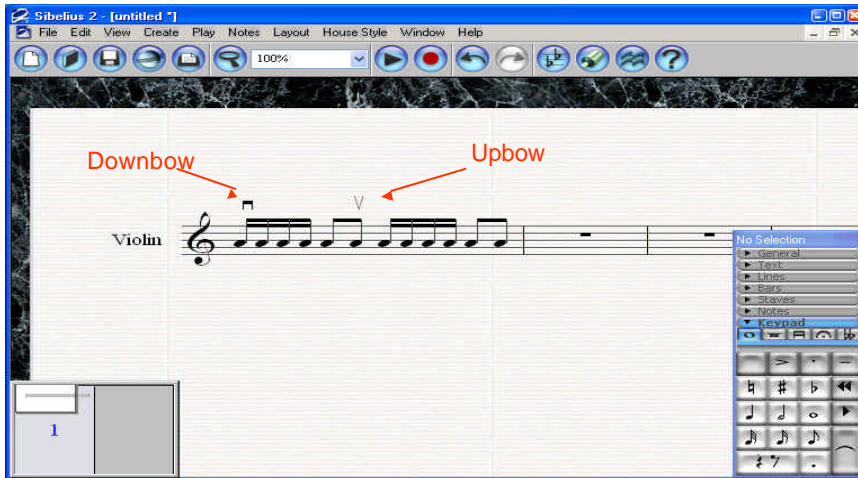
## Our notation is a bit like road signs

- UB specifies what part of the bow to play in
  - Just as 20 specifies how many miles an hour to drive
- → specifies the direction in which to move the bow
  - Just as a town name specifies the road to that town

## How to use this notation?

- We look at the solo parts of the Bach Double Violin Concerto in D minor
- And see what we can find there
- Later composers, such as Beethoven, create more complex bowings

# Downbow and upbow symbols



## A Bowing

- Sequence of notes with bowing notation
- Orchestra concertmaster creates the bowing used by the first violins
- Other section heads adapt it
- Conductor and concertmaster alter it at will
- Slurs may be added to make bowing easier to play, more musical

## Strong beats played with downbow

- In 4/4 time, first and third beats played with downbow
- Pickup notes played with upbow
- First and last notes of piece played with downbow

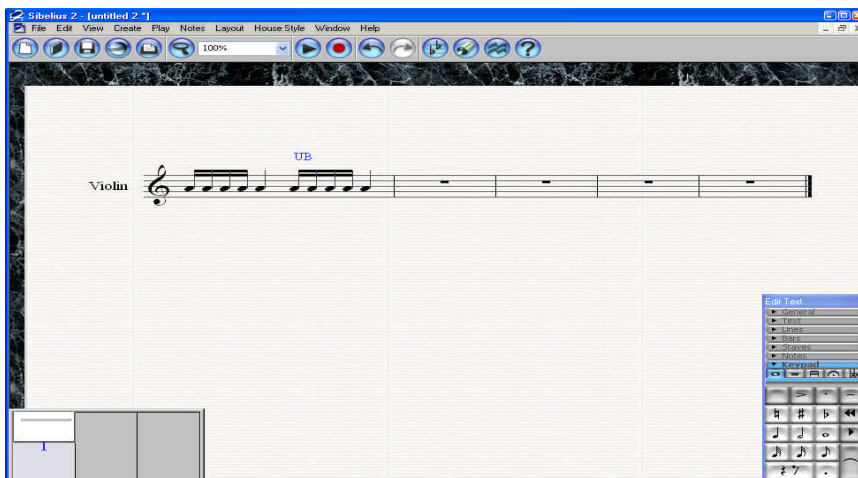
## Except for triplets

- Since triplet has three notes, second triplet (which may be on a strong beat) played with upbow
- Player has to compensate for lighter stroke on upbow
- Can slur first 2 notes and take more bow on 3<sup>rd</sup> note (an upbow) to make bowing triplet easier

# Bowing long and short notes

- Fast notes take short bows
- Slow notes take long bows
- Once you've taken a long bow, you may be in an awkward position (at frog or tip)
- The bowing has to tell you how to get out
- Current notation doesn't tell you where you will be on the bow

## A simple example



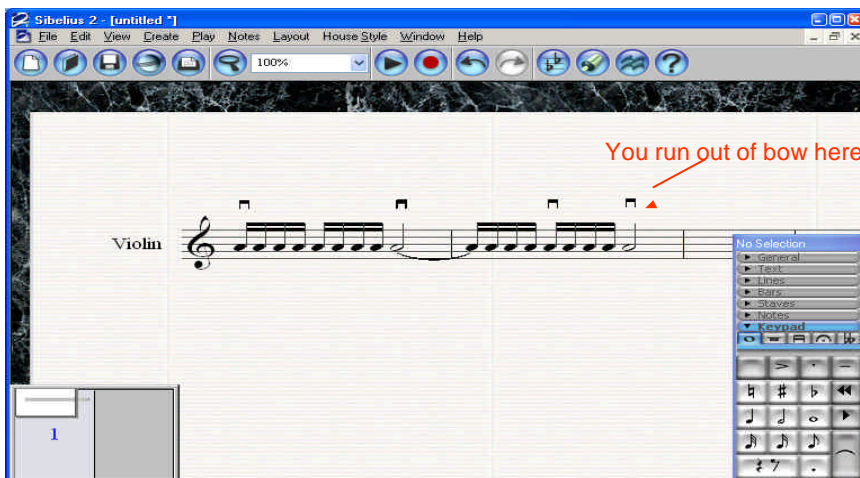
The screenshot shows the Sibelius 2 software interface. The main window displays a violin staff with a musical sequence. The sequence starts with a series of eighth notes, followed by a rest. A blue annotation 'UB' is placed above the staff. The interface includes a menu bar (File, Edit, View, Create, Play, Notes, Layout, House Style, Window, Help), a toolbar with various icons, and a 'Edit Text' panel on the right side.



# How did we end up here?

- First four notes played starting downbow in middle of bow
- Since 5<sup>th</sup> note is long, playing that leaves you at the tip
- Next 4 notes played at tip, starting with upbow
- Final (long) note takes you back to middle

# But a related pattern causes trouble



The image shows a screenshot of the Sibelius 2 software interface. The main window displays a violin staff with a musical score. The score consists of a series of notes, with a red arrow pointing to a specific note. A red text label above the arrow reads "You run out of bow here". The software interface includes a menu bar (File, Edit, View, Create, Play, Notes, Layout, House Style, Window, Help), a toolbar with various icons, and a keyboard control panel on the right side. The keyboard panel shows various musical symbols and controls. The window title is "Sibelius 2 - [untitled \*]".

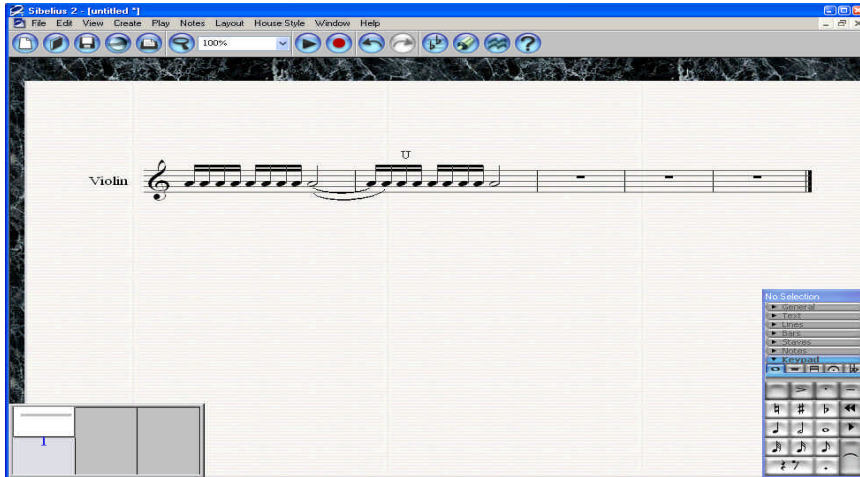
## Why did you run out of bow?

- Each of the long notes occur on a downbow
- And there's no way to get to the frog before playing the second one

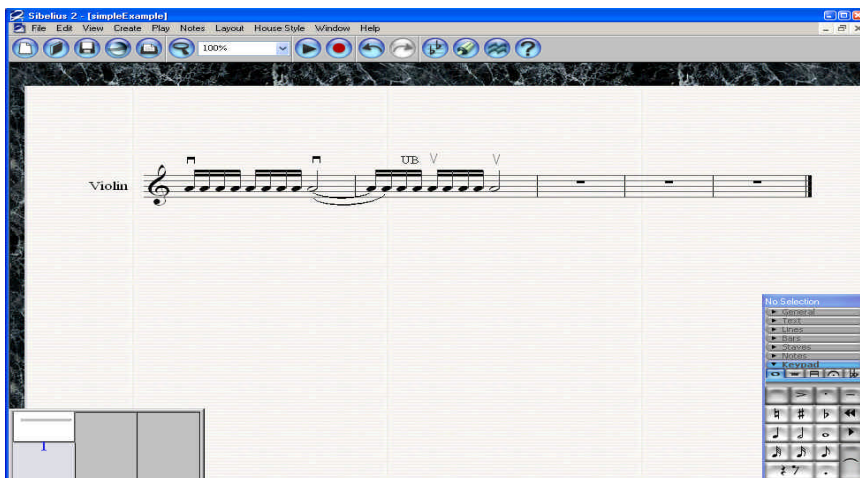
## Here's where inserting slurs helps

- If you add a slur to the end of the first minim,
- Then the following semiquavers are taken at the tip, and since the following minim is an upbow,
- The bowing takes you back to the middle of the bow

# Fixing a bowing problem



And we would like a bit more information



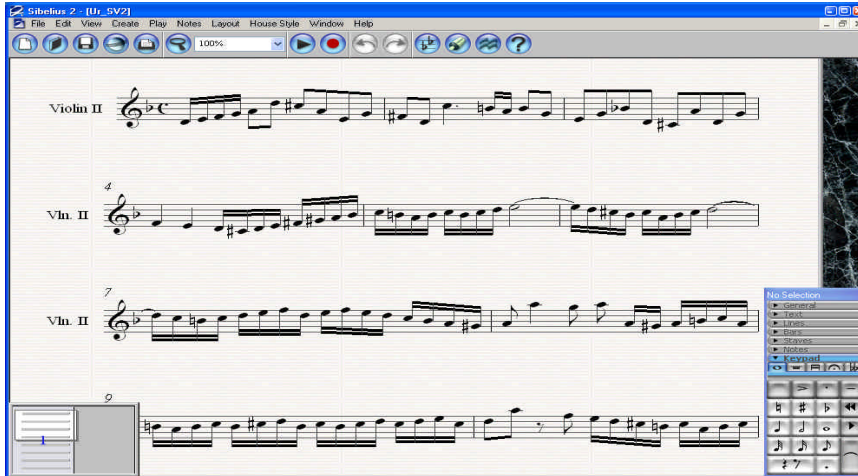
## Making the bowing musical

- This pattern may be a common one in the music
- In the Baroque period for example, Bach often used patterns of this kind
- The string player has to use the bowings consistently to make the changes introduced a feature (at least not a bug)

## Now, imagine playing in an orchestra

- You are a second violinist
- The conductor has asked everyone to start at bar 3 in the Bach Double Concerto
- You have to know
  - Which direction to bow starting at bar 3
  - What part of the bow to use
- Can you tell this from the music?
- Can the professionals?

# Check out bar 2



The screenshot shows the Sibelius 2 software interface. The main window displays three staves of musical notation. The top staff is labeled 'Violin II', the middle staff is 'Vln. II', and the bottom staff is 'Vln. II'. The notation is in treble clef with a key signature of one sharp (F#) and a common time signature (C). The first staff shows measures 1 through 3. The second staff shows measures 4 through 6. The third staff shows measures 7 through 9. A vertical scroll bar is visible on the right side of the notation area. Below the notation area, there is a control panel with various icons for editing and playback, including a 'No Selection' indicator and a 'Properties' section.

## Bar 3 starts on an **upbow**

- And how do you find that out?
- Currently, you look at each bar before bar 3 and calculate whether it starts with an upbow or a downbow
- Suppose it had been bar 10?

## Suppose the conductor changes the bowing at bar 2

- What happens to all of the other bowings you've memorised?
- Now they are out of date and you need new ones
- Fast
- And the concertmaster might change those too

## Some simple recalculation is needed

- A computer can do some of this for you,
  - Letting you concentrate on the rehearsal
  - Helping the section leaders and conductor give everyone up-to-date bowings

## We propose adding notation which should be done by computer

- Each line currently has a bar number
- Why not add a bowing symbol (upbow or downbow) as well?
- The player could then calculate from the beginning of the line
- Not the beginning of the music
- So that's what we add in the rest of the slides

## Now, we can edit the 2<sup>nd</sup> violin solo part bowings

- And the new information will help us discover problems which should be fixed
- If the beginning of a line starts on an upbow, there should be a good reason
- Or there's a problem that has to be fixed
- So we look at lines where the first note starts on an upbow

## Problem 1 – beats should start with downbows

- But some clearly aren't, after we've annotated each line with bowing information

## Sometimes we have to work backwards

- We find a line on which there's a possible problem at the beginning
- We go to the previous bar and see if it starts with an upbow
  - If so, go back a bar
  - If not, the problem's here



Sibelius 2: [SV2\_With\_Problem1\_Indicated]

File Edit View Create Play Notes Layout House Style Window Help

100%

Beats start with down-bows

Which means fix this (1c) Which means fix this (1b)

Violin II

Fix this (1a)

Vln. II

Vln. II

No Selection

Control

Text

Lines

Beats

Staves

Notes

Keypad

Control

Text

Lines

Beats

Staves

Notes

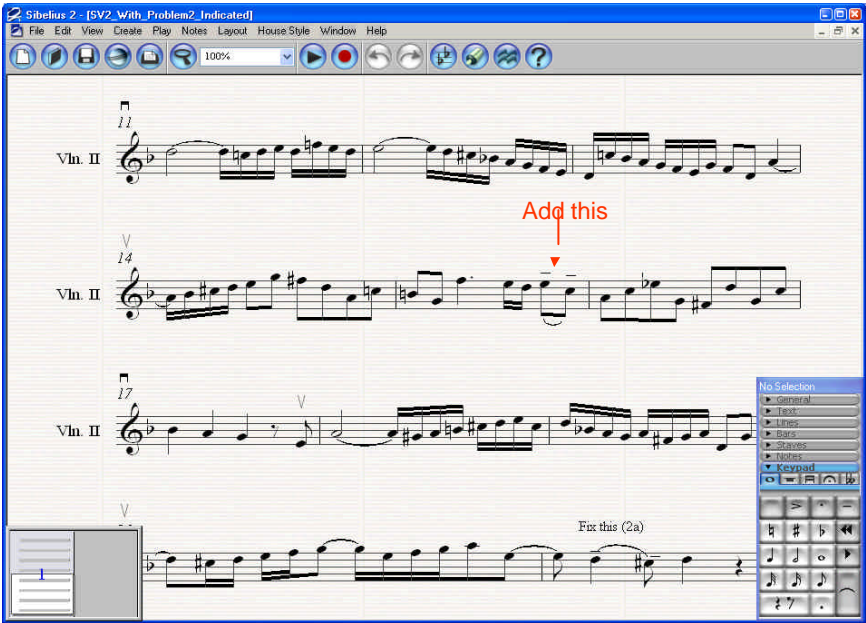
Keypad

## A fix for problem 1

- Make the last 2 quavers of bar 2 one upbow,
  - With *detache* markings, so that they sound like separate notes
- Then bar 3 starts with a downbow
- Have to do the same thing if or when this pattern is repeated elsewhere
- Deciding whether it is repeated may need artistic insight

## Look for other places where this fix might be needed

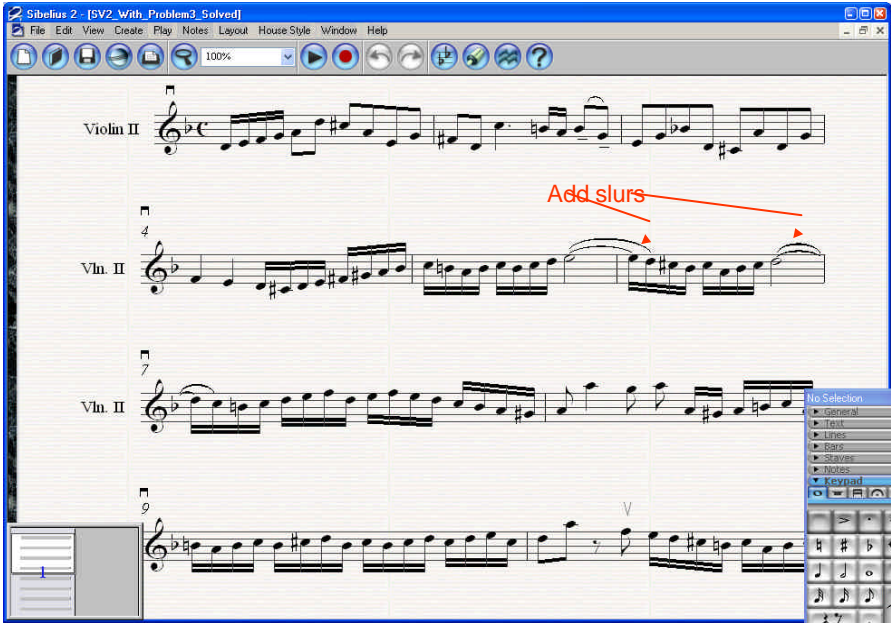
- We repeat the new bowing where a similar pattern occurs
- And we fix up the last note on the page, which is on a downbeat (Problem 2)



The screenshot displays the Sibelius 2 interface with three violin staves (Vln. II). The first staff starts at measure 11, the second at measure 14, and the third at measure 17. A red arrow points to a bowing mark on the second staff, labeled "Add this". A zoomed-in view at the bottom shows a bowing mark labeled "Fix this (2a)". The software interface includes a menu bar (File, Edit, View, Create, Play, Notes, Layout, House Style, Window, Help), a toolbar, and a status bar.

## Remember the pattern mentioned earlier?

- There are 8 semiquavers, followed by a minim, and that pattern is repeated
- On the second minim, you run out of bow
- Well, that is what appears in Bach's music for the second violin
- We apply the fix mentioned earlier



The screenshot displays the Sibelius 2 software interface with the title bar "Sibelius 2 - [SV2\_With\_Problem3\_Solved]". The main window shows four staves of music. The top staff is labeled "Violin II" and contains a melodic line. The second staff is labeled "Vln. II" and contains a rhythmic pattern of eighth notes and a half note. A red arrow points to the second half note with the text "Add slurs". The third staff is also labeled "Vln. II" and contains a similar rhythmic pattern. The bottom staff is labeled "Vln. II" and contains a rhythmic pattern. The interface includes a menu bar (File, Edit, View, Create, Play, Notes, Layout, House Style, Window, Help), a toolbar with various icons, and a keyboard control panel on the right side.

The image shows a screenshot of the Sibelius 2 software interface. The window title is "Sibelius 2 - [SV2\_D\_Distrach]". The menu bar includes File, Edit, View, Create, Play, Notes, Layout, House Style, Window, and Help. The toolbar shows various icons for file operations and playback. The main workspace displays four staves of musical notation for Vln. II. The first staff starts at measure 9. The second staff starts at measure 11 and has two red arrows pointing to slurs with the text "We add these slurs too" in red. The third staff starts at measure 14. The fourth staff starts at measure 17. A keyboard control panel is visible on the right side of the interface.

And that's it for the 2<sup>nd</sup> solo violin part (page 1)

- But we should check our bowing against an experienced editor's

## What does David Oistrach, editor, do?

- Oistrach was a great violinist and musician
- His edition contains our fixes, but nothing more on the 2<sup>nd</sup> violin part
- Both fixes are repeated once, as that both solves bowing problems and is more musical

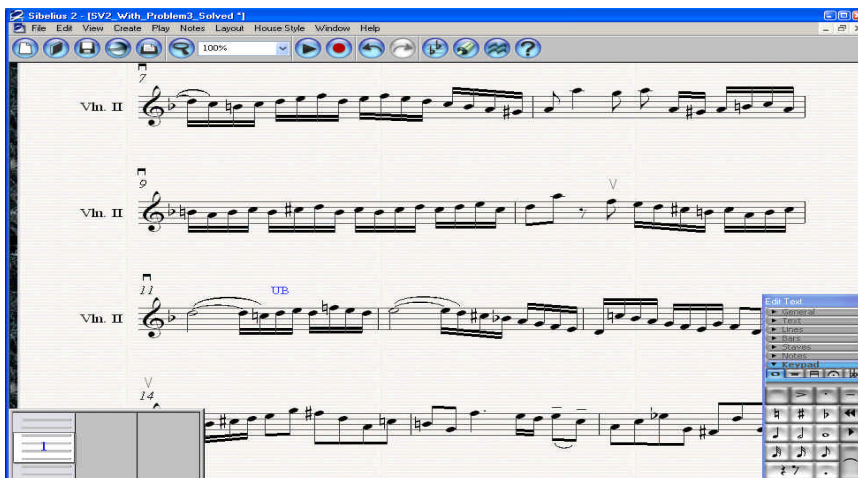
## At this point, what should the software be doing for us?

- We need the software to propagate bowings through the part while we're fixing it
- We need the software to remember patterns created by fixes and help us apply the fixes to similar patterns
  - This has to take place in all the parts, for consistency and musicality
  - So we should expect to apply our fixes to the 1<sup>st</sup> violin part

## But there's something else

- We know from our work that at bar 4 of the 2<sup>nd</sup> violin part, the player will have to remain at the tip
- That is valuable information
  - Which the player will have to recalculate or remember
  - Unless we mark that too
    - Everywhere the pattern occurs

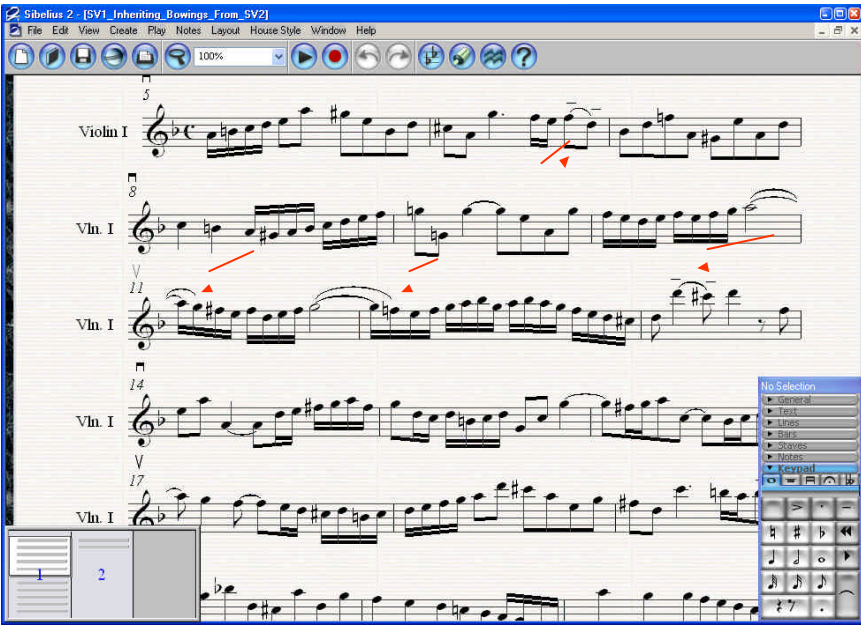
## Adding notation to bowing



The screenshot displays the Sibelius 2 software interface with a score for Violin II. The score is divided into four systems, each starting with a measure number (7, 9, 11, 14). The notation includes various musical symbols such as notes, rests, and accidentals. Bowing annotations are present: a 'V' above the staff in measure 9, 'UB' above the staff in measure 11, and a 'V' above the staff in measure 14. A 'V' with an upward-pointing arrow is also visible below the staff in measure 14. The software's menu bar (File, Edit, View, Create, Play, Notes, Layout, House Style, Window, Help) and toolbar are visible at the top. A 'Edit Text' panel is open on the right side of the interface.

# Now, working on the 1<sup>st</sup> solo violin part

- We add the fixes for the problems we found in the 2<sup>nd</sup> solo violin part



The screenshot displays the Sibelius 2 software interface. The main window shows a musical score for Violin I and Violin II parts. The Violin I part is on the top staff, and the Violin II part is on the bottom staff. Red arrows point to specific notes in the Violin II part, indicating areas for editing or fixing. The software interface includes a menu bar (File, Edit, View, Create, Play, Notes, Layout, House Style, Window, Help), a toolbar with various icons, and a status bar at the bottom. The title bar reads "Sibelius 2 - [SV1\_Inheriting\_Bowings\_From\_SV2]".

## Problem 4 – the theme should start downbow

- And we have to calculate from the bowing information at the beginning of the line to even find the problem
- Violinists can often be seen moving their right arm to calculate whether they are going to play a note upbow or downbow
- Now, we don't have to do that

The screenshot shows the Sibelius 2 software interface with a musical score for Violin I. The score is displayed in five staves, each labeled 'Vln. I'. The first staff shows a complex rhythmic pattern. The second staff has a measure with a blue annotation: 'So must fix this (4b) Theme should start on a downbow (4a)'. The third staff has a measure with a blue annotation: 'Theme should start on a downbow (4a)'. The fourth and fifth staves show further musical notation. The software interface includes a menu bar (File, Edit, View, Create, Play, Notes, Layout, House Style, Window, Help), a toolbar with various icons, and a 'Edit Multiple Selection' panel on the right side. The score is set to 100% zoom.



# Adding a small, not very musical slur

- The main theme is repeated in a new register
- But it needs to start on a downbow, and so
- We need to fix the earlier bar
  - And apply the fix elsewhere musically

The screenshot shows the Sibelius 2 interface with a musical score for Violin I. The score is displayed in four staves, with measures 11, 14, 17, 20, and 23 visible. A red arrow points to a slur in measure 17, which is highlighted in blue. The software window title is "Sibelius 2 - [SV1\_Problem4 \*]". The menu bar includes File, Edit, View, Create, Play, Notes, Layout, House Style, Window, and Help. The toolbar shows various editing tools and a 100% zoom level. The "Edit Line" panel on the right shows the "Slur" option selected. The score is in G major and 2/4 time.

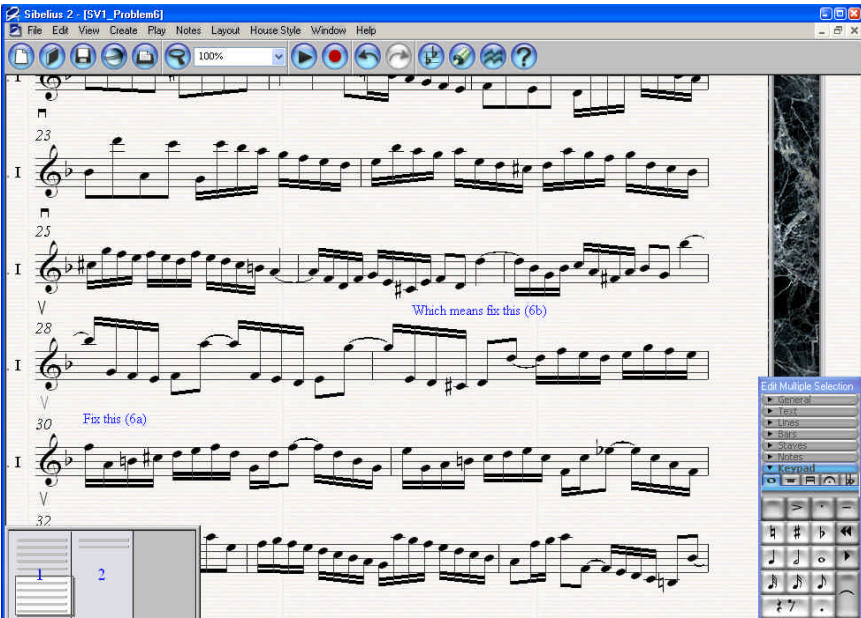
# Applying this fix elsewhere (Problem 5)

- The fix is needed
- Is it musical?
- The patterns aren't exactly the same
- This requires judgement

The screenshot displays the Sibelius 2 interface for a file named "[SV1\_Problem4\_Quick1 \*]". The main window shows a musical score for Violin I (Vln. I) across five staves. The first staff starts at measure 11, the second at 14, the third at 17, and the fourth at 20. Red arrows point to specific notes in the third and fourth staves, highlighting a pattern of notes that may require a fix. The interface includes a menu bar (File, Edit, View, Create, Play, Notes, Layout, House Style, Window, Help), a toolbar with various icons, and a keyboard control panel on the right side. The keyboard panel shows a "No Selection" status and various navigation and editing controls.

# Now, we find the next problem (Problem 6)

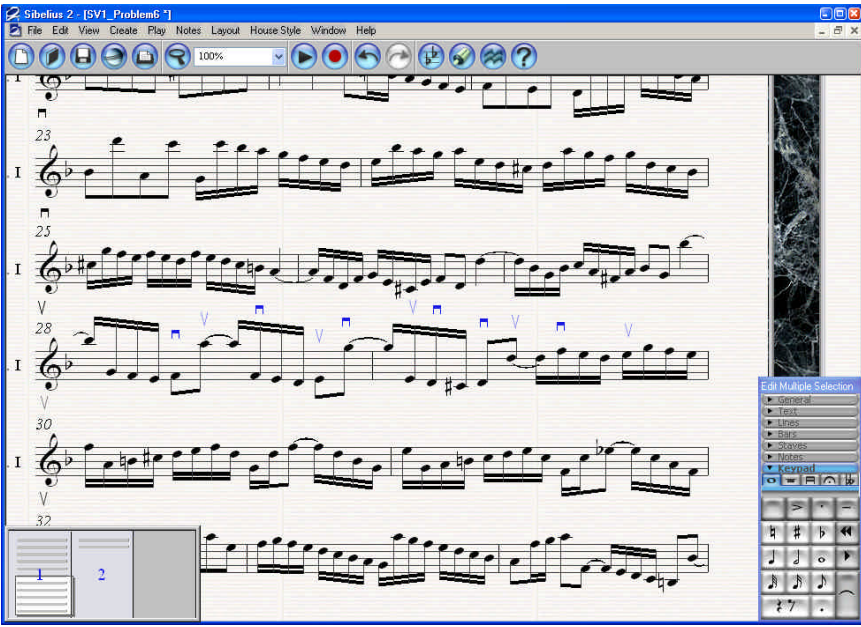
- Using the bowing notation at the beginning of the line



The screenshot displays the Sibelius 2 software interface for a file named "[SV1\_Problem6]". The main window shows five staves of musical notation in a single system. The notation includes various note values, rests, and dynamic markings. Annotations in blue text are present: "Which means fix this (6b)" is placed above the third staff, and "Fix this (6a)" is placed below the fourth staff. The software's menu bar (File, Edit, View, Create, Play, Notes, Layout, House Style, Window, Help) and a toolbar with icons for file operations and playback are visible at the top. A vertical toolbar on the right side of the window is labeled "Edit Multiple Selection" and contains icons for selecting and editing musical elements like staves, lines, slurs, strokes, notes, and key signatures. A small panel at the bottom left shows two numbered tabs, 1 and 2.

## In this next example, things get hard to read!

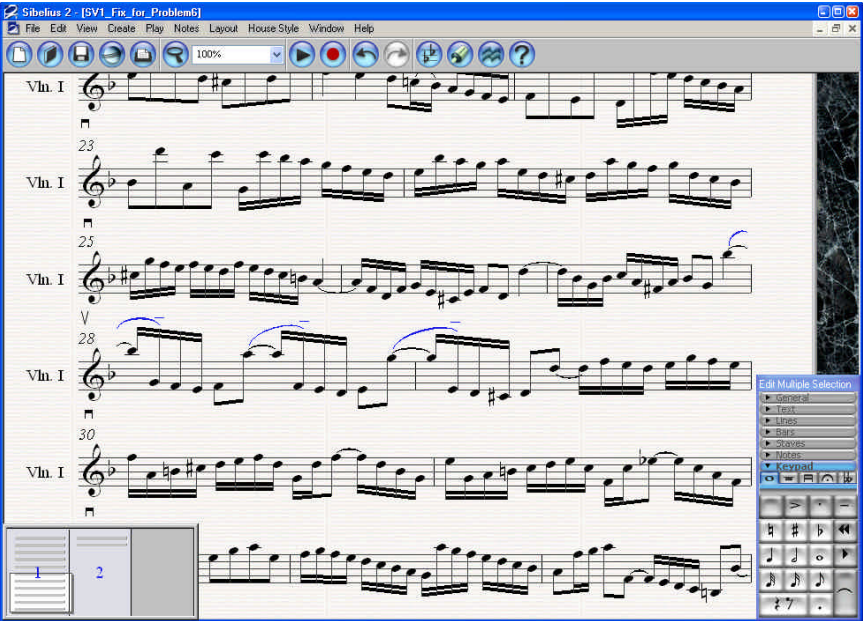
- What is wrong with this bowing?
- Where is it going wrong?
- Well, let's get some more information about the current bowing before trying to understand it
- The software should also provide this information on demand



The image shows a screenshot of the Sibelius 2 software interface. The window title is "Sibelius 2 - [SV1\_Problem6.\*]". The menu bar includes File, Edit, View, Create, Play, Notes, Layout, House Style, Window, and Help. The toolbar shows various icons for file operations, playback, and editing. The main area displays a musical score with four staves. The first staff is a grand staff (treble and bass clefs). The second and third staves are single treble clefs. The fourth staff is a single bass clef. The score is in 2/4 time and features a complex, fast-moving melodic line. The bowing is indicated by blue 'V' marks above the notes. The software interface includes a sidebar on the right with a tree view for editing multiple selections (Staff, Lines, Staff, Staves, Notes, Keymap) and a keyboard control panel at the bottom right.

# We fix this using our earlier solution

- We generalise from our solution for the first problem we discussed in the talk

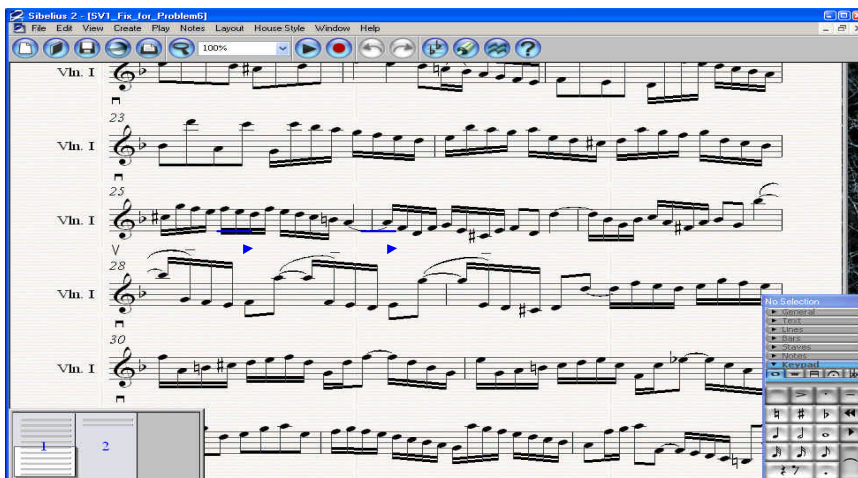


The image shows a screenshot of the Sibelius 2 software interface. The window title is "Sibelius 2 - [SV1\_Fix\_for\_Problem6]". The menu bar includes File, Edit, View, Create, Play, Notes, Layout, House Style, Window, and Help. The toolbar shows various icons for file operations, playback, and editing, with a zoom level of 100%. The main workspace displays five staves of music, all labeled "Vln. I". The staves are numbered 23, 25, 28, and 30. The music is written in treble clef with a key signature of one sharp (F#). The score consists of complex rhythmic patterns, including sixteenth and thirty-second notes, with some notes beamed together. A "Keyboard" panel is visible on the right side of the interface, and a "Multiple Selection" panel is also present. The bottom of the window shows a piano roll view of the selected notes.

## Solution uses knowledge about violin playing

- Like an earlier solution, a slur is added so that the long note now includes a semiquaver
- This makes the next quaver occur on an upbow
- Which makes it possible for the player to lift the bow from the strings to gain a better position for the next (long) note

And we add some notation to help the player recall this



The screenshot displays the Sibelius 2 software interface with a violin score. The score is for five Violin I parts (Vln. I). The first staff shows a long note with a slur extending to the next measure, which contains a semiquaver note. A fermata is placed over the long note in the first measure. The second staff shows a similar pattern with a slur and a fermata. The third staff shows a similar pattern with a slur and a fermata. The fourth staff shows a similar pattern with a slur and a fermata. The fifth staff shows a similar pattern with a slur and a fermata. The software interface includes a menu bar (File, Edit, View, Create, Play, Notes, Layout, House Style, Window, Help), a toolbar with various icons, and a status bar at the bottom.

## Could the software make use of this kind of knowledge?

- Possibly
- Notice that the solution is very appropriate musically
- It dramatises the leap from one register to another
- And it avoids emphasising the first quaver too much
  - Which might happen otherwise

## Now we propagate this solution backwards

- The previous bars also had a similar problem, so we solve both at once
- And add in a solution to an older problem that first occurred in the 2<sup>nd</sup> violin part

Sibelius 2 - [SV1\_Now\_Integrate\_Musically]

File Edit View Create Play Notes Layout House Style Window Help

100%

Vln. I 22

Vln. I 25

Vln. I 28

Vln. I 30

Vln. I 32

Edit Multiple Selection

- ▶ Symbols
- ▶ Lines
- ▶ Bars
- ▶ Staccos
- ▶ Notes
- ▶ Keypanel

1 2

Sibelius 2 - [SV1\_Now\_Integrate\_Musically]

File Edit View Create Play Notes Layout House Style Window Help

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Vln. I 22

Vln. I 25

Vln. I 28

Vln. I 30

Vln. I 32

Edit Multiple Selection

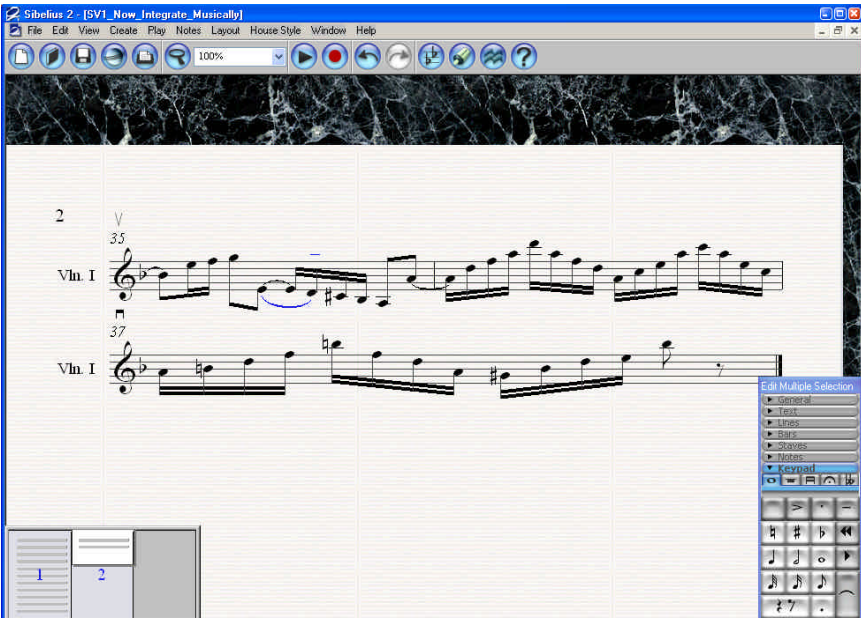
- ▶ Symbols
- ▶ Lines
- ▶ Bars
- ▶ Staccos
- ▶ Notes
- ▶ Keypanel

1 2



## And there are a few other places which need it too

- And this turns out to be what David Oistrach did in his edition
- So we must be doing something right musically and technically



The image shows a screenshot of the Sibelius 2 software interface. The window title is "Sibelius 2 - [SV1\_Now\_Integrate\_Musically]". The menu bar includes "File", "Edit", "View", "Create", "Play", "Notes", "Layout", "House Style", "Window", and "Help". The toolbar contains various icons for file operations, playback, and editing. The main workspace displays two staves of musical notation for Violin I (Vln. I). The top staff is numbered 2 and 35, and the bottom staff is numbered 37. The notation includes treble clefs, a key signature of one flat (B-flat), and various rhythmic values. A blue selection box highlights a group of notes in the top staff. On the right side, there is a "Edit Multiple Selection" panel with a tree view showing "Staff", "Lines", "Staves", and "Notes", with "Keypaint" selected. Below the main workspace is a "Piano Roll" window showing two tracks labeled 1 and 2.

## So what have we discovered?

- There is bookkeeping a computer could help with
  - Calculating whether first note is upbow or downbow at beginning of each line
  - Keeping track of fixes for problems so they can be applied to similar problems later on
  - Keeping track of notations such as UB, etc. inserted by the player, so that those could also be applied elsewhere later on

## And

- String players need to start writing down their solutions
  - So that they can recall them quickly
  - Alter them
  - Discuss and present them

## At present, we don't know the work of the world's great teachers

- Dorothy DeLay spent her working life with students, solving problems
- Aside from what they may remember –
- There is no record of her work
- The rest of us would like to know what she knew!