June 2, 2021: (email from Martin)

Example 1: About the first example, we need to adjust the tala annotation because 1.2, 1.3 just means the second and third taps of cycle 1 - they fall on matras 5 and 9. Ideally we should estimate the intermediate points and have a label for each matra. For most of the examples we have to think about this: for the vilambit we should indicate every matra, for the drut maybe that would look too cluttered, let's see (maybe in some cases a stronger line for vibhags and a lighter one for matras would work?).

We’ve used a dashed line for matra and solid for vibhag.  
  
Two other possibilities come to mind for this example that would also apply to other examples:  
a. whether we can have a play button to audition whatever is visualised  
b. whether we could add a semitone scale relative to Sa for the pitch? I expect that would need an additional annotation file (f0 of Sa), but it wouldn't be difficult to produce these.

Observations: we see two melodic phrases (roughly 8s duration each) spanning 2-matra intervals.

MC: This looks very good. One remaining issue is the labels 1.2, 1.3 and whether we can replace them with the matra numbers (I.e. 1.5, 1.9). The time axis might be easier to read in units of 5 rather than 3.33 secs, what do you think? (If this is a default it’s best not to override, then fine...)

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Example 2: For the second example (the sitar masitkhani gat) a similar solution would work well. I don't know if the pitch track will work as well for the sitar as it does for the voice, but we can try it out. It should be clear where the main sitar strokes fall - the waveform may be enough for that, or we could use a spectrogram if it is easier to see that way. (Maybe both plucks and pitch modulation are visible on the spectrogram and that would be the most efficient representation?) If we can see both the plucks and some of the pitch modulation (meend), as well as the matras, that would be great.

The sitar pitch track is seen (with some octave errors). The plucks (read from the CSV file) are plotted on the spectrogram.

MC: This looks good. It’s a pity the onsets\_selected file only has the onsets after the first sam, but I can explain that in the commentary (also that a couple of significant but very quiet sitar onsets were not picked up in the original extraction process). Could we use the Labels for the onset annotations?

As you say there are some small issues with the pitch track, but I think it is good enough for our purposes. There are a couple of points where the meend is quite clearly visible on spectrogram/ pitch track that I can draw attention to.

I think the most user-friendly layout would be to show just the cents version with the ‘audio + click track’ just below it.

MC2: I think the labelling works well like this. Let me see if I can work with this for the fixed illustration.

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Example 3: For the third I wanted to draw attention to the exchange between sarod and tabla, so I suppose separate representations of sarod and tabla tracks would be good. We can decide the best representation in the light of the previous example...

We see clearly the sarod pitch modulations in the sarod spectrogram; the CSV plucks are superposed. Not sure what to make of the tabla spectrogram.

MC: Can we try this?

1. Reduce the time a little – end point 294.7
2. Remove the onset annotations
3. Add the metre annotation to the tabla spectrogram
4. We could also experiment with the 2Gats\_Annotation file, which includes a note of the tihais in both parts – is there a way of adding those?

MC2: The shorter time is better, but still there may be too much for one window – what do you think? Maybe start at 277 secs? Cycle number labels could also help with orientation.

The extra annotations could work – can we use the SAROD and TABLA tiers respectively? Then we just should just get the Tihai annotations for this clip. They could be more visible, but I don’t know what the options are (bolder horizontal lines?)

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Example 4. Drut khyal in teental. Ram Deshpande, Rag Rageshree Bahar

Example 4, I am attaching the teental annotation (in this folder). The best representation would be one that shows a relatively clear relationship between the tala and the rhythm of the vocal line. So again, whether that is going to be clearer using a pitch track or spectrogram, I don't know. An option here would be a spectrogram of the tabla track, if that shows clearly the khali section (low frequencies dropping out).

What if we go from about 1371.5 secs (after the tabla solo) to 1394? If the tabla spectrogram shows the khali sections that will be helpful, let’s ee.

Nithya: I can’t find the audio file - ‘NIRP1\_RamD\_RagBah\_Stereomix.wav’. Is it on Teams/OSF?

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For no. 5, the main thing was the rhythm of the guitar part, which may be clear on either waveform or spectrogram. The same applies re. tabla tracks.

MC: The metre annotation needs replacing: you have NIR\_SCh\_Malhar\_Metre\_DrutTeental.csv rather than the DBh file. Hopefully then it will be easier to follow. Maybe add cycle number labels?

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**About the later figures**:  
  
6 is a tempo curve, so I can easily do this myself  
7 is the matra length variation, which I can do in R  
8 plots the asynchronies in one performance - again I can develop what I have in R - and share code for Examples 6 to 8  
  
9 is the visualisation of different time series. This is one that you might help with, as handling audio in R is messy. What do you think?  
10 is the plotting of movement data. I can do this in R, as you can see. I think this might be a nice one to plot this data against the pitch track and spectrogram data, maybe also the intensity as I had in the original illustration  
  
So probably Examples 9 (Observer time series) and 10 (movement tracking) are ones that are most worth looking at...

No. 6 was a simple tempo track. It doesn't make much sense to play the audio for the whole thing perhaps, unless we can zoom into a part of the performance (e.g. where the tempo changes a lot, e.g. 1530-1580 or so) - maybe playing the mixed audio while following the tempo curve would be instructive?

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No. 7 (sorry, also labelled 6 on my Word doc!) would just be a question of either using my R code or rewriting this in Python.

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For No.8 (as it should be), I think we should insert another visualisation, of a short extract of guitar and tabla tracks with the onset data from the Onsets\_Selected file.  
Then to illustrate what the asynchrony data looks like, some form of histogram and scatter plot would be good, perhaps with a trend line added to the latter. Another option here would be to create a tempo curve in parallel (which would show how the asynchrony shifts as the tempo increases).

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For No. 9 (VS\_Shree), I am attaching the annotation file here. The video is here: <https://www.dropbox.com/sh/orjhozxmfergp05/AACCKsfEWFm8lW7J3-T27lEfa?dl=0> It would make sense to be able to view the video. The audio is mixed (no multitrack available), but we could use whatever representation gives a clearer impression of the rhythm, with the time series data overlaid. All five (two hand taps, three tanpuras) would be too messy in the same frame - maybe one from for taps and one for tanpura cycles would work?

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For No. 10 (VK\_Multani), the video and the motion tracking data are here: <https://www.dropbox.com/sh/tdgwk80moa5g92i/AAAicYDdItCB_zEyzwXwOM0ma?dl=0>The one I used in the Word doc is 0438\_0604. Again we should be able to see and hear the video with the skeleton overlay. VK's movement data is in person1.csv. The columns I used for the graph are: vertical position of Left wrist (y4) and Right wrist (y18). We could also pull down the vocal track with 4'38" as the starting time and make the pitch track as for Example no. 1; the metre annotation is on OSF already.  
I suppose we could just copy and paste the illustration from my original paper as comparison... The other two video clips I sued in the paper are also in the folder - we can share those in case anyone wants to explore them.  
  
I hope that helps! I know I have left a few options here, but realistically until we start trying things out it is hard to be 100% sure what works best...

PS Sorry, ignore the bit about y4 etc under example 10 (OpenPose data), I forgot I had reformatted the data before I made that chart. The body parts are labelled in the csv file.  
  
Martin