

## Beethoven's *Große Fuge* (Viewer's Guide to animated scores)

I was overwhelmed when I first heard Beethoven's *Große Fuge* in the 1970s, and I've been trying to come to terms with the piece ever since. I've listened to many recordings, studied the score, heard it in concert, read articles about it, played along with recordings on piano and viola, played the four-hand version, and ... I'm still overwhelmed.

In 2009, when I was learning how to synchronize my animated graphical scores to live recordings, I knew I wanted to make one for the *Große Fuge*, so I licensed a royalty-free recording of the piece and started working on it. In 2010 I published four versions of the animation:

*simple bar-graph*      <https://www.youtube.com/watch?v=PnjvJDi8BPg>  
*same, with barlines*      <https://www.youtube.com/watch?v=T7q8t6K5ygw>  
*bars and balls*      <https://www.youtube.com/watch?v=6s0Mp7LFI-k>  
*all three*      <https://www.youtube.com/watch?v=uHxukzT31do>

In these, all the notes of the piece are depicted in the same way (with bars, balls, or both), with color used to indicate which instrument is playing.

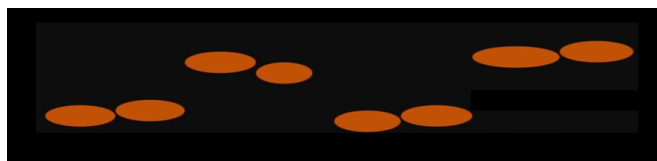
In 2013 and 2014, I collaborated with the conductor of the San Francisco Chamber Orchestra (<http://www.thesfco.org/>) and the Palo Alto Chamber Orchestra (<http://pacomusic.org/>), Ben Simon (<http://www.thesfco.org/about/staff/>), to provide live-synchronized animations for performances by his groups ...

*live sync concerts*      <http://www.musanim.com/live>

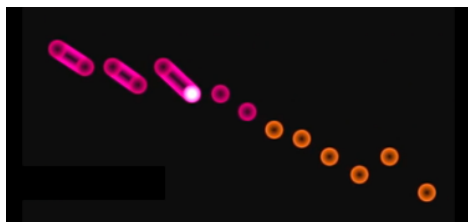
... and took that opportunity to re-think the animation. I thought it might help people understand the piece if the shapes used to represent the notes were based on what themes of the fugue they corresponded to, so I made this version of the video ...

*motivic view*      <https://www.youtube.com/watch?v=z6NLY5Jp1wM>

In this, the main theme is shown with ellipses ...



... the second theme is shown with pairs of dots that get connected ...



... the third theme is shown with a line that loops around the note dots ...



... and everything else is shown with simple rectangles ...



In 2014, I started collaborating with the Alexander String Quartet (<http://www.asq4.com/home.htm>), and since they'd made a very good recording of the *Große Fuge* (better than the one I'd licensed previously), I decided to revisit the piece. I made a second version of the motivic view animation ...

*motivic view*      <https://www.youtube.com/watch?v=z6NLY5Jp1wM>  
*same with barlines*      [https://www.youtube.com/watch?v=EF\\_Xif2hvuk](https://www.youtube.com/watch?v=EF_Xif2hvuk)

... using their recording, and as an example for my page about Harmonic Coloring ...

<http://www.musanim.com/HarmonicColoring>

... made a version using that technique ...

*harmonic coloring*      <https://www.youtube.com/watch?v=fnANPLM5yW8>

## Showing augmentation/diminution

In some of my videos (of pieces other than the *Große Fuge*), I'd tried using different time scales to show that a theme was the same even when it was being played at different speeds. I first did this in 2012 (<https://www.youtube.com/watch?v=nHCG595aWv8>) in my *Fantasia Ostinato*, which has a motive that repeated. I also used it in Bach's

*Contrapunctus 7* (<https://www.youtube.com/watch?v=zQXPoJjfz0I>) from the *Art of Fugue*. However, because Beethoven varies both the speed and the rhythm of the subject, the same technique wouldn't work so well. But then, in 2017 ...

## August 2017

... listening to a performance of the piece by the Thalea String Quartet (<https://www.thaleastringquartet.com/>), I had an idea for a better way to show the unity of the main theme, and revisited the piece again.

August 2017 <https://www.youtube.com/watch?v=JG47mxCMfrI>

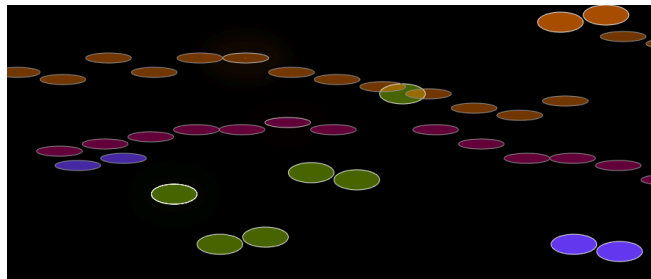
In this version, every note in the piece is depicted visually to show its compositional derivation (there are no "everything else" notes as in the previous version). This required I make a fair number of subjective judgments; many times my choices were based on nothing more justifiable than "how it seems to me," and I make no claim for correctness. In fact, since many of my decisions were based on what the animated score itself suggested to me, it's entirely possible that some of my choices have more to do with the way the music looks than how it sounds. I'm too close to it now to be objective.

The main innovation I made for the 2017 animation was to give all notes of the main theme the same horizontal width. This might sound like a small change, but its implications are significant. How do they move across the screen? If they were to cross the "now" point (the center of the screen) while they are sounding, then notes of different durations would have to move at different speeds, which would look terrible.

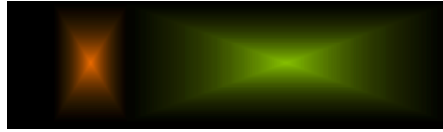
My solution was to have each phrase (sets of notes that are grouped together) move at its own speed, determined by the duration of the phrase. Therefore, the start of the first note of a phrase crosses the *now* point when the phrase starts, and the end of the last note crosses it when the phrase ends; in between, the notes might be to the left or right of the now point, depending on the relative durations of the notes in the phrase.

There are two results of this. The first is that the theme can be easily recognized even when the rhythm has been significantly distorted and when it has been truncated (sometimes just down to a single note, a favorite Beethoven trick). The second is that it's much harder to find your place in the animation. I decided that I liked this: the piece is hard to listen to, and the animation mirrors that—when Beethoven cuts loose with the theme being played at multiple speeds at once, fragmented and inverted, the display is just as chaotic as the sound. If you wonder why the piece is hard to understand, this video will show you why: there's a ton of stuff going on at once!

The notes of the main theme look pretty much like they did in the previous motivic view video, with one main difference: when the theme is continued beyond its original length (or fragmented in a way that gets out of hand), they're shown at half-height (and in subdued colors) ...

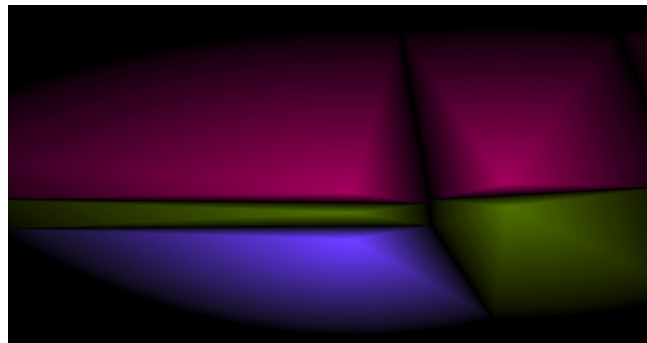


The first notes of the piece are depicted with a shape that looks like this:



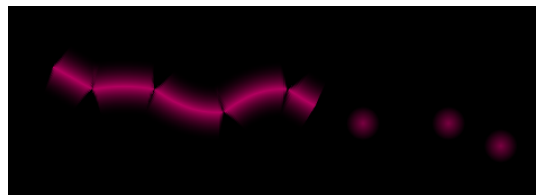
These notes happen throughout the piece, and they function in a way that I don't have a good name for. They are prominent (not background), they are not related to any of the themes (at least, not in any obvious, consistent way). They sometimes emphasize a harmony, or provide rhythmic punctuation. I think of them as just saying "I am!" — providing energy, life, without having to justify themselves.

At the other end of the spectrum are the notes I consider *background*. These are notes which don't function melodically/motivically. They look like this:



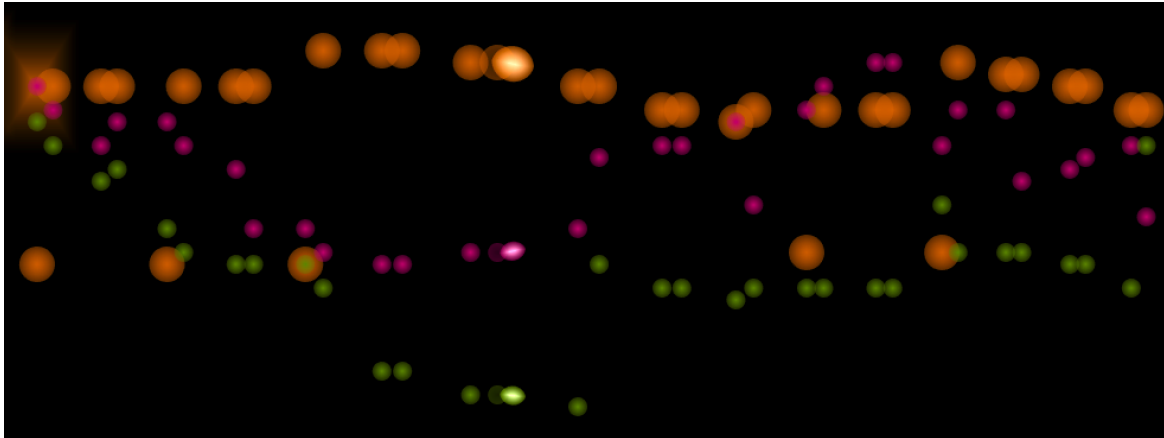
These notes provide a harmonic background. I think of them as being like a screen that the notes in the foreground are standing in front of, to give context. Often, when these appear, there are significant harmonic changes going on.

The second theme is done with dots that get connected as they're played ...



There are two reasons I abandoned the two-note-grouping idea for the second theme. One is that the pattern is often extended in ways that don't make sense as two-note groups; the other is that the break between the two-note groups seemed at odds with the flowing character of the motive, and I wanted it to look more connected, smoother.

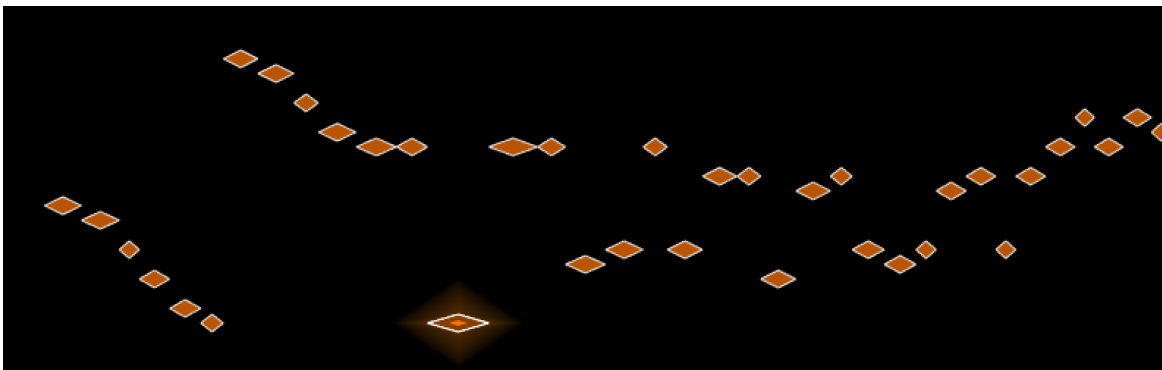
The third theme uses a motion that's similar to what I used before, but this time the moving shape doesn't leave a trace. Also, as with the main theme, I use two sizes of it, one for when it appears in its original form (or something close to that), and one when it's just continuing on in the same spirit (rhythm) without being melodically identical. In this passage, one instrument has the large size and two have the small size:



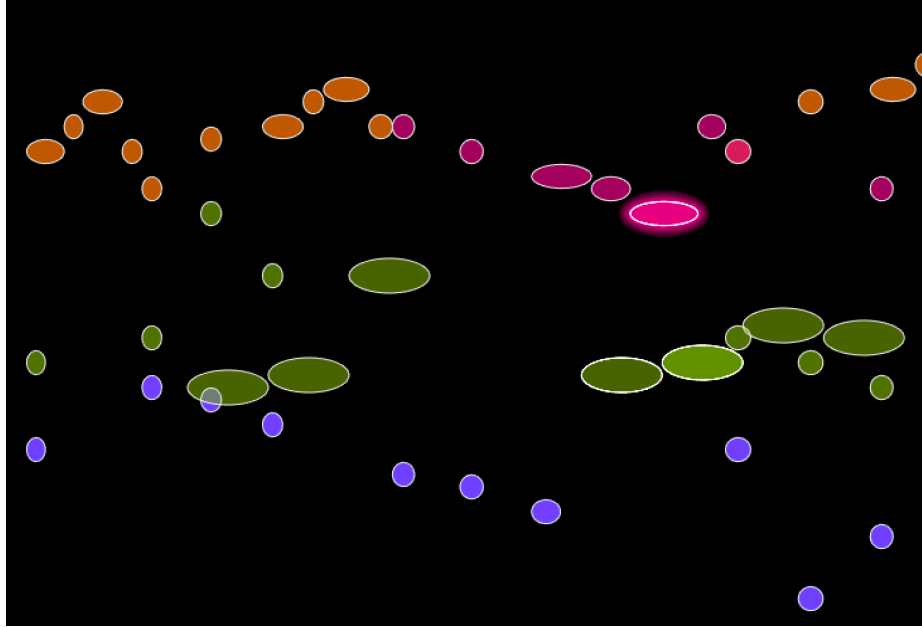
At measure 58 (1:56 in the video), the first violin breaks into running triplets ...



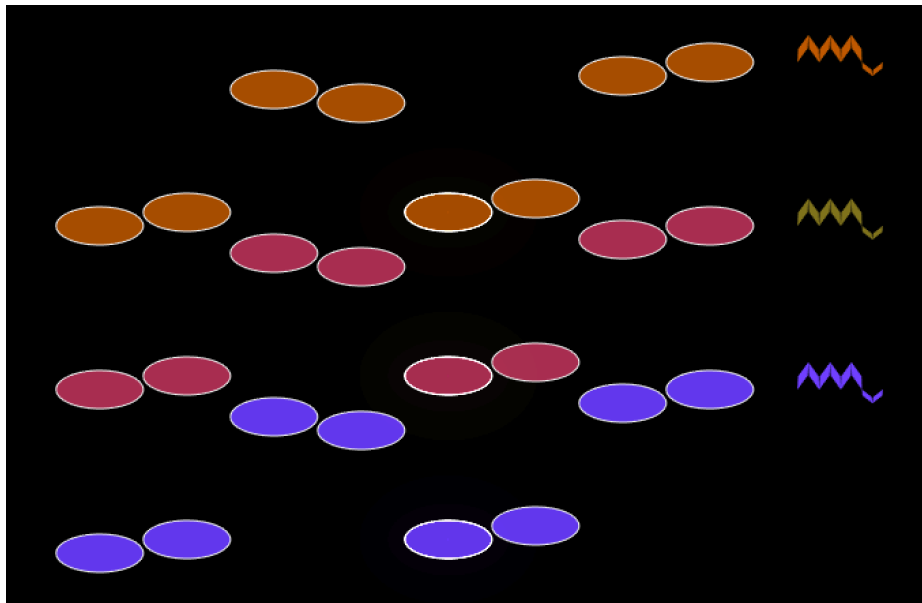
... which I depict with little rhombi ...



At measure 233 (9:00 in the video), the piece switches to B-flat major (the key it ends in), the tempo wakes up, and the time signature switches to a jaunty 6/8. In this section there is material that is similar enough to the 6/8 version of the main theme to seem related, but not close enough to justify using the same exact shape, so I use a very small ellipse (without the "all the same size" method I use in the main theme). I think of these as the "happy notes." They look like this (there are some real theme notes in here too) ...



Last but not least: the trills. For most composers, a trill is "just an ornament" but in the *Große Fuge*, Beethoven elevates it to an important structural component (as mentioned in the Wikipedia article about this, <http://tinyurl.com/GrosseFugeBuildingBlocks>). The trill is introduced on the last note of the theme, the first time it is stated. They look like this ...



The trills work in a bunch of different ways in this piece. Sometimes, they end with a bang (and I've provided a little explosion to go with that), and sometimes with a whimper. They can mean "that's a wrap," or they can mean "something's about to happen," or they can play a role in Beethoven's "are we ending or aren't we?" game.

## 2017 experimenting with rhythmic indications

When Robert Winter (UCLA Distinguished Professor of Music, <https://www.music.ucla.edu/winter-robert> and author of *The Beethoven Quartet Companion*, <https://www.amazon.com/dp/0520204204/>) saw the first 2010 version, he mentioned that he missed the barlines. I saw his point—Beethoven does striking things with the rhythm and barlines help you understand/appreciate this—so I made a few versions with barlines added. I also tried adding them (and a "now" line) to the 2017 version ...

2017 *September*      <https://www.youtube.com/watch?v=K2GRnNokk5I>

Because the notes of the main theme move in irregular ways, the positions of these lines doesn't always work for them, but for the rest of the notes they do, and if you're trying to understand the rhythm (which is often highly syncopated), they can be helpful.

However, the more I watched that version, the more unsatisfactory it seemed: cluttered, ugly, and hard to watch. I remembered using a different method for showing the rhythmic background of a piece as a kind of pulsing "curtain" (Bach, *D minor Sinfonia*, <https://www.youtube.com/watch?v=BU2E7Nnucp4>), and gave that a try. After several tweaks ...

- only show pulses at the barlines (that is, one per measure)
- make the effect more subtle (so that it's more of a background effect you can ignore if you want)
- pulse the downbeat slightly (make it brighter); this turned out to be tricky, because pulsing it at the same time as the notes didn't work; the less dramatic the brightening is, the longer it takes for us to sense it; so, to make the curtain brightening appear to happen in sync, it needed to be done slightly earlier than the note brightening
- adjust the timing of the horizontal warping (fisheye effect) so that it felt more like the sudden motion of the measure edge was happening in sync with the downbeat
- align all notes so that their visual centers are at the onset (note start) position

... it seemed like an improvement ...

2017 *"curtain"*      <https://www.youtube.com/watch?v=yokkcLWuQjk>

I made another attempt to reduce clutter: only show the main subject right before it's about to sound (also has the useful effect of directing your attention to it); I also tweaked a bunch of small details; with these two, I think I might be "done for now" with these ...

2017 *"hide future"*      <https://www.youtube.com/watch?v=pxdPuS7HAHg>  
*same, with "curtain"*      <https://www.youtube.com/watch?v=mP8Jem982iY>  
*Surprise!*      <http://www.musanim.com/Surprise/>

— Stephen Malinowski, September 2017