

Unraveling A Well Woven Solo

By Jason I. Brown

I have always been fascinated by George Harrison's guitar work, his precision, his taste, his ability to play exactly the right part to complement a song. And it is George's "other" contribution to *A Hard Day's Night* (beyond the famous opening chord) that continues to puzzle me. That great solo that George plays, one that is as etched in my mind as the opening chord is – how did he play it with such technical proficiency? It seems, as Beatles musicologist Alan Pollack has said, "impossibly" fast, though certainly George played the solo verbatim in concerts. I have always found it difficult to play the sixteenth notes with the same evenness that is on the recorded version. If you listen to the previous eight takes of AHDN (the final take was take nine), there is little there that resembles the solo. So while the opening chord has always attracted much discussion, what about the famous solo?

When I was younger, I used to use my father's Ferrograph reel-to-reel tape recorder to record Beatles' songs (some of you younger ones may never have seen such recorders, with everything digital now, but way back, all studio work was recorded on tape). The reason I used the reel-to-reel tape recorder was that, like most of its ilk, it had two speeds, with one speed exactly double the other. If you recorded a song at the top speed, and then cut the speed down to half, the pitches of the notes dropped exactly an octave. This fortuitous fact allowed me to play along with Beatles songs, taking off George's solos and exquisite lead work. All I had to do after learning the parts at half speed was move them up an octave (an easy task) and get them up to speed.

Now I have had a nagging suspicion that perhaps, just perhaps, that when The Beatles recorded the solo to AHDN, they cut speed in half on their reel-to-reel recorder in Abbey Road studios. If they had, George would have played it down the octave, at half speed, but when it was played back at full speed, it would sound up an octave, and at the speed we hear it on the record (and CDs). It is well documented that George Harrison overdubbed the solo, which was played in unison by their producer, George Martin, on piano, at the same time (and on the same track).

Now it seemed unlikely, but not impossible, that the two Georges could have played the solo so perfectly in rhythm and together. And yet I have found very little to support my feeling that the tape speed was cut in half in the overdub. Robert Gille, the editor of the *Beatles Nytt* magazine, and a true Beatles expert, has assured me that the recording sheets always noted when such changes in tape speed were done (e.g. in George Martin's beautiful baroque solo in *In My Life*) and there is no mention that the tape speed was altered on the recording sheet for AHDN. If the solo was recorded at half speed, wouldn't it be well documented and well known?

I did find a hint that the tape speed may have been altered in Ian MacDonald's *Revolution in the Mind*. There it is stated "Harrison's solo, doubled on piano by Martin, was taped at half speed, as was the jangling arpeggiated fade", and I spent a few weeks trying to track

down the reference, leading finally to a dead end. And the statement from the book was clearly at least partially wrong. If you slow down the ending guitar pattern, you will hear that all the notes except the Cs and Gs are played in octave pairs: they are F4/F5, A4/A5, C5/C5 and G5/G5 (C4 is “middle C”). If the tape speed was cut in half, George Harrison would have had to play the pattern down an octave, somewhere on the guitar, and as the lowest note on the 12 string guitar is a B4, all of the notes would have been in octave pairs. Thus we conclude that at least for the ending, the tape speed was not altered, and George played it up to speed. (This is confirmed by interviews by George where he described playing the pattern on the top four strings fingered as F with a G on top).

The error in *Revolution in the Mind* did not bode well for the claim that the tape speed was altered when recording the solo of AHDN. So perhaps there will never be a way to know.

Again, I thought about whether mathematics could help answer the question. Having listened to the solo many times, often at half speed, I could verify that all of the notes appear in octave pairs. So the solo could have been recorded, up at regular speed, starting on the A string, 10th fret, or the low E string, 15th fret (on a “G”). Both of these positions allow for all of the notes of the solo to be played fairly easily on the bottom four sets of pairs of strings on GH’s 12-string (starting on the pair of D strings or the open G strings would invariably lead to playing on the paired B strings, which would not sound as an octave pair). In fact, from a live version of the solo (provided to me by Robert Gille) the grainy recording seems to show that George started high up on the neck, with his ring finger on either the 8th fret of the A strings or the 13th on the E strings.

So I was still left with two possibilities – that George played the solo up to speed, high on the guitar neck, or he played it at half speed, at the bottom of the neck, starting at the third fret on the low E strings. The latter, when brought up to full speed would sound like the former. As George played it live up the neck, is anything more to say?

Yes, indeed. And without the other George’s contribution to the solo, I would never have been able to figure it out.

Proof!

What I keyed in on is the piano that George Martin plays in unison with George Harrison on the solo. I realized from previous work that piano’s are a rather special strung instrument. At the bottom of the piano, there is one string for each note. Then there are pairs of strings for each note, and from a certain point onwards, all strings have three strings that are struck by the note’s hammer. The point at which it changes from single strings to double strings is about A1. Where it changes from single strings to triple strings varies a little bit from piano to piano, but is approximately C3 or D3.

Now here is what I keyed in on. While there was no clue to be found from the guitar part, perhaps the piano part was more useful. The starting note of the solo, a G, sounds as G3 on the piano and the pair G3 and G4 on the twelve string. If the solo were played down

the octave, the notes played on the piano would have to be G₂ (and on the 12-string, a G₂ and G₃). Now on the piano, the G₂ always has 2 strings under the hammer, while the G₃ always has 3 strings. Aha! At last, a difference I could hang my hat (or Beatles wig) on!

It remained to be seen whether this clue could be something I could detect. It would be almost impossible for the strings on the piano to be tuned exactly the same, nor for them to match the corresponding string's pitch on the guitar. By using the same mathematical operation (a *Fourier transform*) I used previously to explore the opening chord of AHDN, I could find the frequencies that were present.

I took a stereo version of AHDN, where the solo was separated on one side. I selected part of the opening G note, but to my chagrin, I had too many G₃'s present. Why? Some of the rhythm instruments are mixed onto the same side as the solo (in particular I can hear an acoustic guitar strumming along). As well, there is likely some "bleed-through" of the rhythm track; some of the G₃'s played on the guitars in the rhythm tracks might have been picked up on the microphone when the solo was recorded (from what I read, at this point the Beatles rarely used headphones when they overdubbed).

This was very disappointing – I was left in the dark, much as I was at the beginning of my endeavor. The other opening G, at the start of the second phrase gave me the same problem. But rather than give up, I tried a G at the end of the solo. And here is where my fortune improved.

When I analyzed the frequencies of largest amplitude (which correspond to the loudest pure tones), I got the following: three G₃'s, with frequencies 195.181 Hz, 198.795 Hz, 202.41 Hz, and one G₄, with a frequency of 390.361 Hz. Clearly one of the G₃'s and the G₄ were the notes played on GH's 12-string, so the other two must come from GM's piano. But if the solo was recorded at full speed, then the piano's G₃ should give *three* G₃ frequencies, instead of two! This gave me the proof I needed that the tape speed must have been cut in half when recording the solo.

Now you may ask whether there might be another G₃. Indeed there should be, as George (or John) likely played a G chord with a G₃ in it. But the next G₃ I find in the spectrum of frequencies is much softer than the others (its amplitude is almost half the amplitude of previous three G₃s), so I could deduce it was not part of the guitar-piano solo, but part of the backup rhythm track.

Fitting It All Together

The above proof of the tape slowdown for the solo fits something that has bothered me since I heard a recording of AHDN taken from a recording The Beatles did of the song for the BBC's *Top Gear* program. The recording was done live on July 14, 1964, almost three months after the "take 9" version of AHDN was recorded. There is an obvious edit just before the solo, where the "take 9" solo was spliced in to the BBC track. Why would they do such an edit, and at exactly this point? What makes sense now is that George Harrison had not yet perfected playing the solo up to speed.

More woodshedding was needed. And within three days they re-recorded AHDN live again for the BBC, this time for the show *From Us To You*. George has the solo down pat.

What Does It All Mean?

I'll end off with a few concluding remarks. First, from the opening chord with the piano in the mix to the solo, carefully constructed by the two Georges with the freedom of slowing down the tape speed, *A Hard Day's Night* to me is the first true "studio" recording of The Beatles, much earlier than any experimentation taking place on the *Revolver* and *Sgt. Pepper* albums. There are essential parts of AHDN that owe their existence to the studio setting, and would likely never had occurred if The Beatles and George Martin had only stuck to a live recording.

Secondly, I see now why George played the solo high up on the guitar neck; I had always assumed he played it in third position, starting at the fifth fret of the D string(s). It certainly would make sense to have it lower down the neck. But the tape speed issue points to why George played it live where he did – he could use exactly the same fingering he used on the recording, only starting at the eighth fret of the A strings.

Second, I am amused to note that the transcription of George's solo in *The Beatles: The Complete Scores* (Hal Leonard, 1989) is down an octave. But in fact the transcription, while being wrong, is actually correct in the sense that it most likely exactly how George Harrison played it in the studio when the tape speed was cut in half!

Finally, I don't think that the fact that the tape was slowed down for the recording of the solo detracts anything from George's construction and playing of it. In fact, it shows what a confident young guitarist he was. It is to George Harrison's credit (and Beatles' fans delight) that he had the nerve to play such a daring and quick solo at half speed, knowing that very soon he would have to step up to the plate and play it up to speed, with all of the world watching.

Jason I. Brown is a professor of Mathematics at Dalhousie University in Halifax, Canada, and a long time Beatles fan.