Further Research, Analysis, and Commentary on the Dallas Police Department Recordings of November 22, 1963

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Introduction

In response to Dr. Don Thomas' essay, "Sabato, Sonalysts, & Sophistry," the Sonalysts' team revisited its analysis for Larry Sabato's book, "The Kennedy Half Century."[1,2] Dr. Thomas states that our conclusions overlooked pertinent evidence and erroneously interpreted the data. Our intent with this paper is to clarify and reaffirm our conclusions.

The Dallas Police Department (DPD) used two recorders to log radio communications during the presidential motorcade on the day of President John F. Kennedy's assassination. Channel 1 was used for routine traffic and police communications and was recorded on a Dictaphone Dictabelt recorder. Channel 2 was reserved for motorcade use and was recorded using a Gray Audograph machine. A police officer's defective motorcycle radio transmitted for several continuous periods. This transmission was recorded on the Channel 1 Dictabelt, and is alleged to have contained the sounds of assassination gunfire. Central to our analysis was the content transmitted by this malfunctioning motorcycle radio. The defective radio is often referred to as the "stuck microphone" or "open microphone" in the literature. We will refer to it as the stuck transmitter throughout this paper.

There has been substantial debate in the literature regarding whether or not the stuck transmitter belonged to a motorcycle in the motorcade. The conclusions of our original paper are:

1. "These data uniformly indicate that the motorcycle with the stuck transmitter was not part of the motorcade.
2. Therefore, it is unlikely that the motorcycle was in a position to record the sounds of gunfire.

3. Based on these observations, we conclude that the Dictabelt recording *is not applicable* to the identification of assassination gunfire."[3]

Our research aim was to provide new insight by conducting a detailed analysis of many sounds that we believed had not been adequately studied, and to apply modern forensic audio tools to the examination of these sounds.

Directly Observable Evidence

Our investigation focused on what we call directly observable evidence – data that are observable within the recording and are not dependent on assumptions. One example of directly observable evidence is the motorcycle engine speed obtained from the sound of the engine found in the recording. This record of engine speed is important in order to understand the motorcycle's movements. In his testimony before the House Select Committee on Assassinations (HSCA), Professor Mark Weiss acknowledges that the location of the motorcycle with the stuck transmitter was an "essential component" of his ultimate conclusion.[4] His statistical analysis of impulse patterns placed the motorcycle approximately 120 to 138 feet behind the presidential limousine when the first shot took place.[5] Using an amateur film taken on that day, the HSCA concluded that the stuck transmitter likely belonged to Officer H.B. McLain, a member of the presidential motorcade. By analyzing motorcycle speed, we were able to support Officer H.B. McLain's own assertion that the recording did not match his movements.[6,7]

Another example of directly observable evidence is the audio associated with the instance of alleged crosstalk of a transmission ("I'll check it") made by Deputy Chief Fisher on Channel 2. The notion of "I'll check it" being a valid crosstalk is essential to establishing a timeline in which it is possible for the recording to have captured the sound of gunfire.

The Motorcycle

Figure 1 is a graph of motorcycle engine speed versus time. The graph begins when a single motorcycle transmitter switches on, and ends about five minutes later when the Dictabelt recorder stops after the motorcycle radio ceases its transmission.

The transmission presented in Figure 1 is of particular importance because it spans the time period during which the assassination occurred. It is also significant that this transmission is continuous, as confirmed by the absence of the characteristic waveforms associated with the recorder stopping.[8] We confirmed the continuity of the recording using other methods.[9]

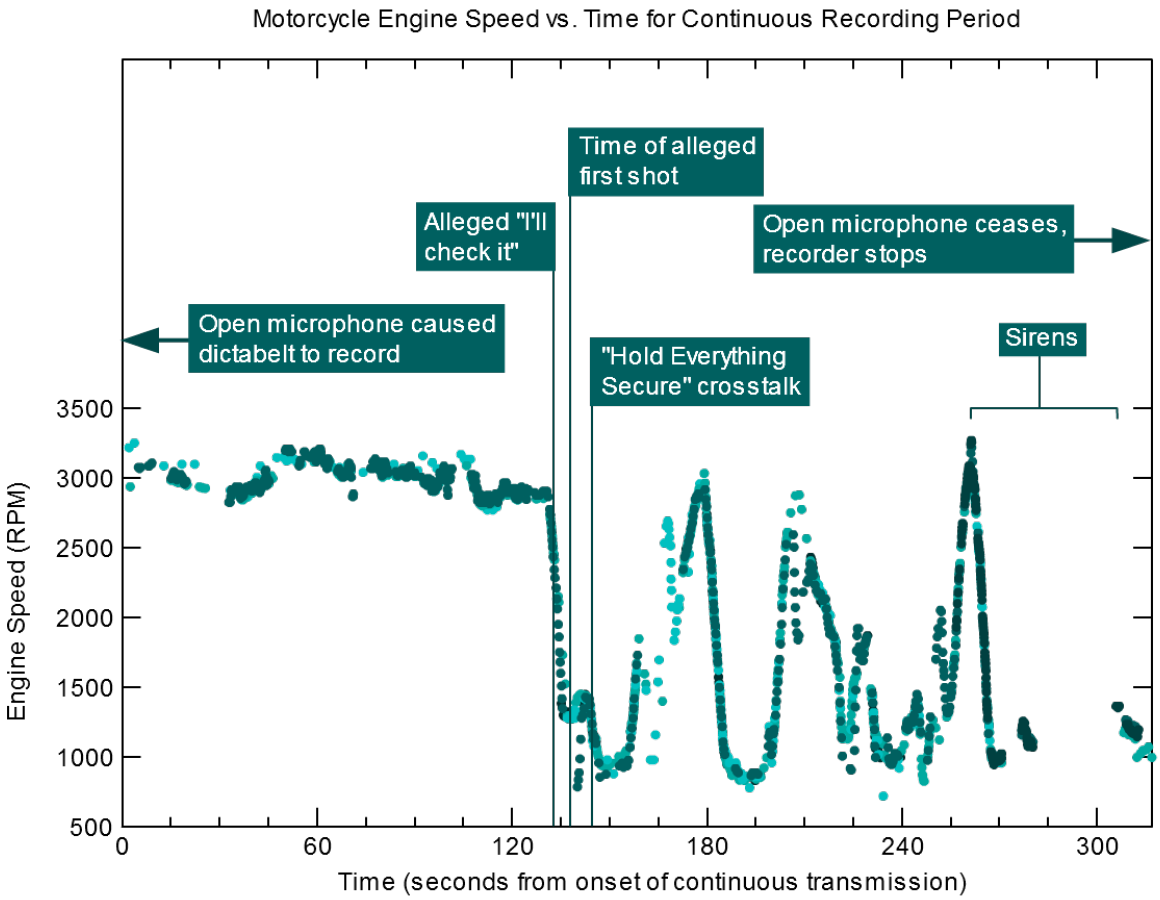

Figure 1. Motorcycle Engine Speed vs. Time

During the first two minutes, the motorcycle engine sustains a consistently high speed. The engine speed then decreases around the time of the alleged crosstalk of Deputy Chief Fisher's "I'll check it" transmission. We have also indicated where J. Barger, S. Robinson, E. Schmidt, and J. Wolf (BRSW), of Bolt Baranek & Newman Inc. (BBN), place the first shot, and where Decker's "Hold everything secure" crosstalk appears. Decker's speech is a genuine instance of crosstalk.[10] The speech appears at the same time as the impulses identified by BRSW as a match for the grassy knoll shot.

During the next three minute period of recording, the engine periodically speeds up and slows down, in contrast with the first two minutes when the motorcycle sustained high speeds. Broadly speaking, there are three speed excursions, each lasting less than 30 seconds, over this latter period. This would not be expected if the motorcycle were racing to Parkland Hospital.

As can be seen in films, McLain leaves Dealey Plaza approximately 25 seconds after the shooting.[11] In an interview with Captain James Bowles, Officer McLain states that after hearing Chief Curry's order to go the hospital, he "accelerated to catch up with the rest of the motorcade. Turning right and up onto Stemmons Freeway, northbound, I opened it up. I neared them as we reached where Stemmons goes over Continental… I was part of the motorcade en route to the hospital."[12]

McLain's motorcycle would be expected to accelerate and show a period of sustained speed after the initial 25 second pause. Following the motorcade route, McLain would have reached the point where Stemmons Freeway goes over Continental Avenue after about 3,000 feet of travel. At a conservative average speed of 30 miles per hour, for example, McLain would have covered this distance in an additional 68 seconds. Therefore, we would expect a period of sustained high speed when McLain caught up to the motorcade on Stemmons Freeway, and "opened it up." The graph around this time does not exhibit this. The motorcycle engine speed only briefly exceeds the speed seen in the initial two minutes of the graph. Instead, what Figure 1 shows is a motorcycle that variously speeds up, slows down, and idles during this latter period.

The sirens can be heard as the motorcycle engine speed drops to near idle. The motorcycle engine is again operating near idle RPM even after the sirens pass. This is consistent with a stationary motorcycle being overtaken by vehicles with sirens, but it is inconsistent with a motorcycle racing to Parkland Hospital.

Alleged "I'll check it" Crosstalk

Captain Bowles identified a portion of Deputy Chief Fisher's "Naw, that's all right I'll check it" Channel 2 transmission as crosstalk on Channel 1.[13] If this is in fact an instance of crosstalk, then it can be used to establish a timing relationship between the two channels at a time near the assassination gunfire.

Our analysis for this paper confirms our previous conclusion that this is not an instance of crosstalk for the following reasons:

1. The spectral compositions of the two signals are very different [see Figures 2 and 3], and cannot be reconciled by adjusting for the known differences in recording/playback speed. In other words, the structure of the vocal features does not match, and cannot be matched by correcting for speed differences. Furthermore, the recording speeds of the two channels are stable over this period. Similarly, the heterodyne tone seen in the Channel 1 audio is relatively stable. We can therefore safely rule out a momentary speed variation in either of the recordings as a cause of the observed differences in pitch and duration. There are no other mechanisms that would cause these differences. Specific features of the recordings that are visible in the spectrograms are also obvious to the listener. For example, Fisher's voice undergoes a rapid pitch change, ascending and then descending, when he pronounces the word "I'll." The corresponding vocalization from Channel 1 only descends in pitch. It is not the case, either, that only a portion of Fisher's speech that is descending in pitch was reproduced as a crosstalk, as that portion is far too short in duration to match.

2. The Channel 1 transmission is accompanied by a heterodyne tone. The heterodyne is an artifact of the simultaneous reception of two transmitters, and is caused by nonlinearity in the receiving system. The resultant heterodyne tone (a mixing product) appears at a frequency that is the difference between the two transmitter carrier frequencies. There are many instances of heterodyne tones accompanying known Channel 1 transmissions when the stuck transmitter is operating. This heterodyne tone is just what would be expected from an ordinary Channel 1 transmission. This is the simplest and most likely explanation for the transmission, given the abundance of known Channel 1 transmissions sharing these characteristics.

We performed a thorough spectrographic analysis of the relevant audio. Figure 2 shows a Time-Frequency Reassignment (TFR) spectrogram.[14] The "I'll check it" portion of Fisher's Channel 2 transmission is shown on the left. The Channel 1 transmission is shown on the right. The time spans of both audio samples shown here are sufficient to contain the entire relevant portions of speech.

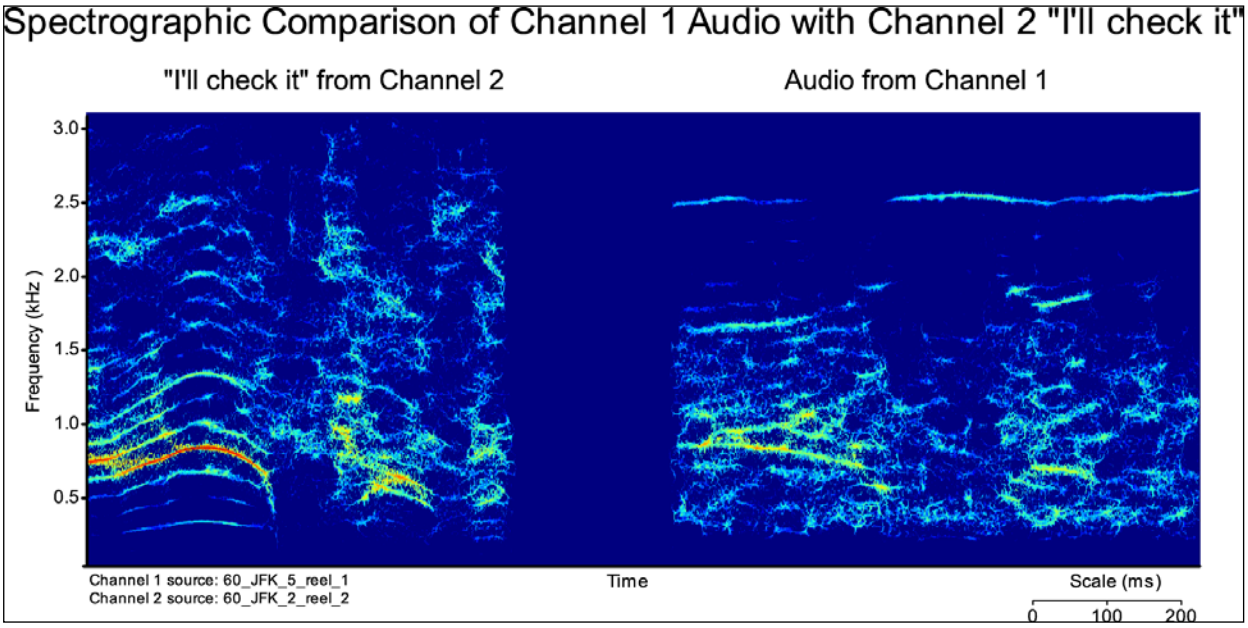

Figure 2. Spectrographic Comparison of Channel 1 Audio with Channel 2 "I'll Check It"

The structures of the vocalizations, as seen in Figure 2, differ significantly. For example; the arc shaped structures corresponding to Fisher's word "I'll" in the left hand spectrogram do not resemble the gentler slope of the audio in the right hand spectrogram. We find corroborating data in the work of Linsker, et al., in which they examine the time-frequency products associated with spectral features that must match if the sounds are of the same origin.[15] When Linsker, et al. applied this method to the recordings, they found that the recordings did not match.[16]

Overlaid Spectrograms

To better illustrate the differences between the spectrographic features, we overlaid the spectrograms in Figure 3. The spectrograms each have a 30 dB dynamic range, which reduces the confounding effect of noise while preserving the strongest speech components for comparison. We controlled for the differences in speed according to the observed 60 Hz power hum in each recording. The hum in the Channel 1 recording was found to occur at a 57.20 Hz frequency, while the Channel 2 hum frequency was found to be 63.05 Hz. The spectrograms were then scaled to correct for these speed errors Corrected in this way, a meaningful direct visual comparison of the spectrographic features may be made.

Figure 3 shows that the spectrograms differ markedly in their composition and duration of features. While both exhibit the vocalization of three syllables, the individual syllables differ in their pitch, structure, duration, and spacing. The spectrograms only overlap weakly and without structural similarity, as shown by the blue-colored regions. In short, these are spectrograms of different sounds. We conclude on the basis of these observations that this is not an instance of crosstalk.

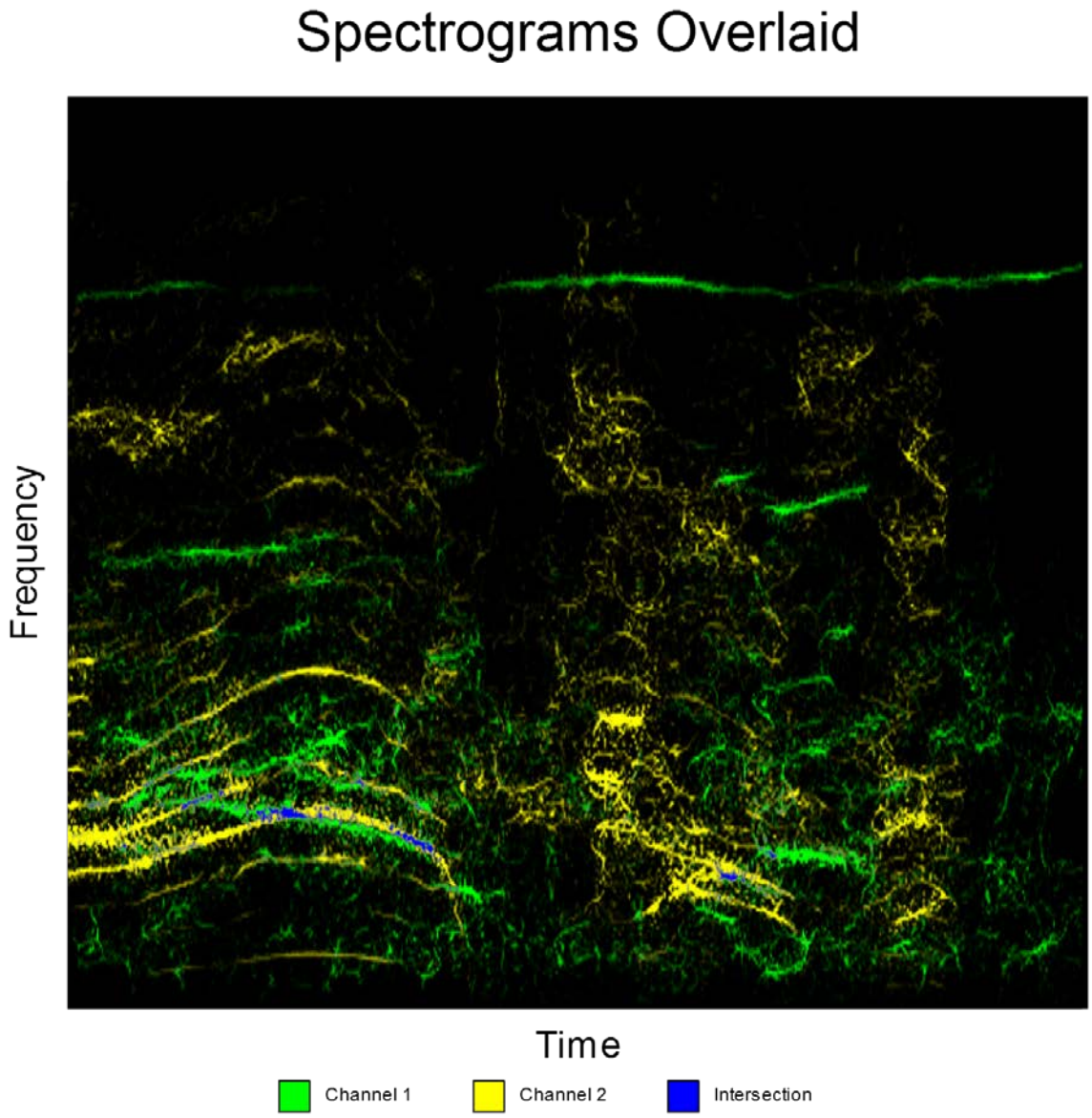

Figure 3. Spectrograms Overlaid

“Five Seven”

Our conclusions regarding the alleged “I’ll check it” crosstalk are further supported by subjective observations. When various noise reduction methods are applied, the spoken phrase is more clearly heard. Under these conditions, it is clear to the listener that the two recordings are not the same.

In our original paper, we show mixing products that are visible both above and below the heterodyne tone.[17] The sidebands contain the same information as the baseband signal, as evidenced by the similarity in the spectrogram.[18] We were able to demodulate the upper sideband energy, thus converting it into a baseband signal. This upper sideband energy appears in a relatively noise free portion of the spectrum, and is, therefore, less impaired than the original baseband signal. When listened to, the demodulated audio sounds nothing like Fisher's "I'll check it" Channel 2 transmission.

Our suggestion that the Channel 1 audio is an officer saying "five seven" is merely our best guess after listening to copies of the audio that were processed in the aforementioned ways.

The Impulse Patterns

The BRSW conclusions and the HSCA findings are based on the assumption that the sounds on the recording occurred at the time and in the vicinity of the assassination gunfire. This assumption conflicts with evidence embedded in the recording that shows that the stuck transmitter was not in the physical location required to receive the sounds of gunfire and satisfy the timing requirements of the BRSW study.

Our results demonstrate that the chain of inference in the BRSW report follows from an incorrect assumption and thus leads to an unsupported conclusion. Whatever the true events of that day may be, the BRSW methodology sheds no light on the matter.

Concluding Remarks

Since the original BRSW analysis in the 1970s, there have been remarkable advances in the technology and accepted methodology for audio analysis. We have been able to measure features of the recording that, as far as we know, have gone unmeasured until now. The data we have obtained does not support the conclusion that the recording contains the sounds of assassination gunfire where it was identified as such by BRSW.

The conclusions reached by the HSCA are invalidated by the evidence of the recording itself. In our first report, we established that an acoustical analysis of motorcycle engine speed versus time was not reconcilable with the known movements of the motorcade.[19] In this report, we examined the engine speed with regard to Officer McLain's movements and arrived at the same conclusion. Furthermore, analysis of the alleged Fisher crosstalk showed that it cannot be used to establish of synchronization of the recordings. The times of occurrence of true crosstalk events show that the impulses happened at the wrong time to have been assassination gunfire. Analysis of other sounds further supports these findings.[20] These observations are not based on assumptions or hypotheses about the nature of the data, but follow directly from measurements of the acoustic properties of the recording.

It must be noted that our work does not draw any conclusions – because it cannot – about whether there was a conspiracy or more than one shooter. What it does support, however, is the proposition that researchers should look elsewhere for evidence of such possibilities, because the Dictabelt recording is of doubtful utility regarding assassination gunfire.

References

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[15] Linsker et. al pg. 5.

[16] Ibid., pg. 7.

[17] Olsen and Martin, Figure 11.

[18] Ibid., Figure 11 and associated text.

[19] Ibid., conclusion item 3.

[20] Ibid., conclusion item 3 details.