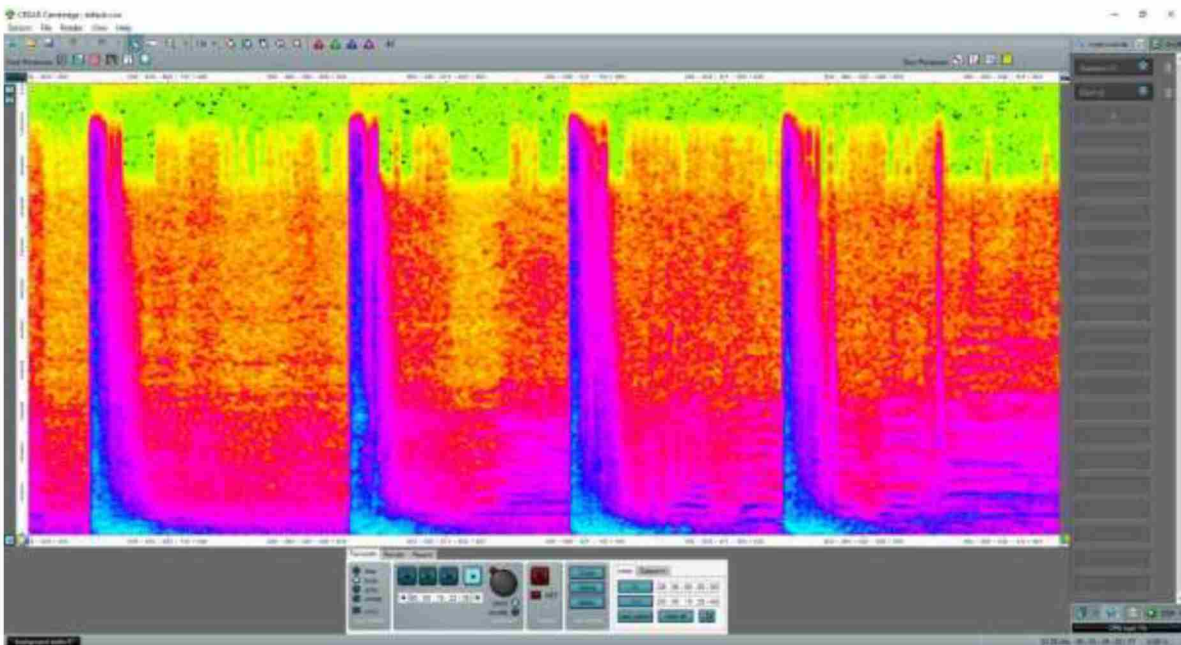


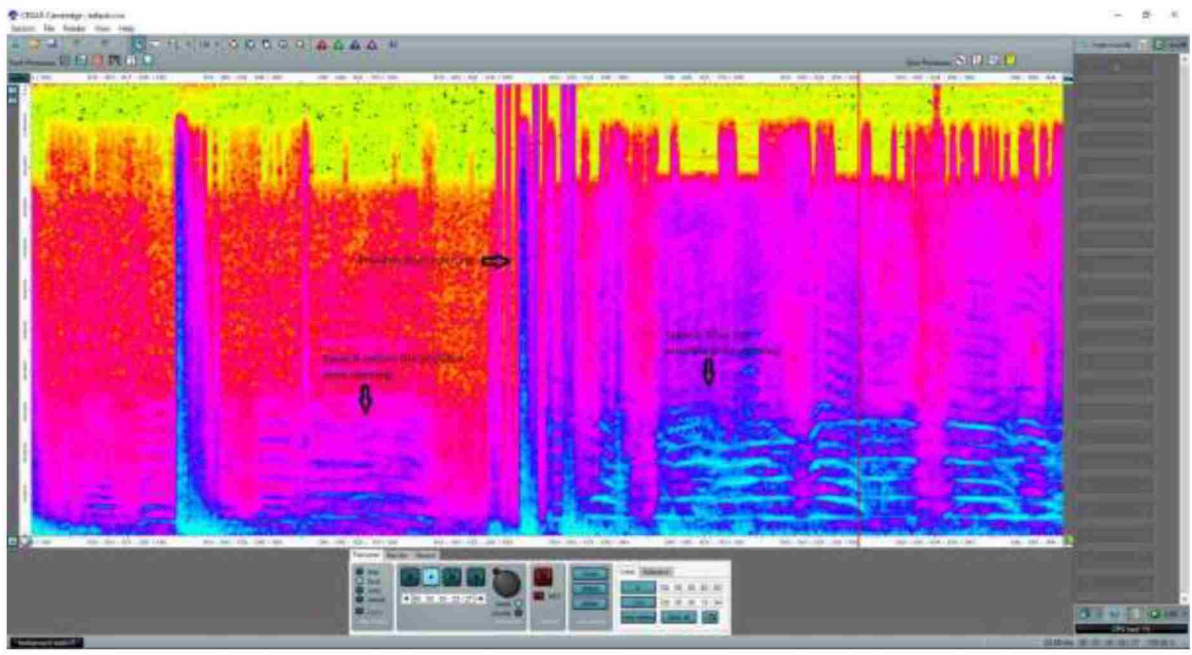
## Identification of the gunshot

3. With regards to this case, I have been informed that the Audi vehicle containing Mr Baker was subject to an intervention by the police officers, the door of the vehicle was opened and that one fatal shot was fired into Mr Baker from a .556 MCX carbine.
4. I understand the fatal shot did not penetrate either the window or bodywork of the vehicle but was fired directly through the gap from the open vehicle door and hit Mr Baker.
5. I believe it is also accepted that this fatal shot occurred very early in the intervention.
6. I was originally asked if I could determine when the shot occurred on the recordings. When I was first approached by the IPCC (as it then was) to work on this case in 2016, I believe I suggested that the best chance of identifying the fatal shot, would be to recreate the scene using the same equipment, to record the discharge of a number of rounds from the same weapon (if available) or a similar weapon, at various distances from the vehicle. This would have provided some sample material from which I could then attempt to identify any possible shot on recording **A\_DEF222 111215-085427**. This exercise was not carried out.
7. I used recording **A\_DEF222 111215-085427** from the store and retrieve device to try to identify the fatal shot, as it seemed to be much clearer in quality for this purpose (compared to recording **Ch1\_003** from the live feed) and it was from this recording that I produced an annotated spectrogram\*.
8. \*A spectrogram is a 3-dimensional visual display of an audio signal. The side (Y) Axis represents the frequency of the signal, the bottom (X) Axis represents the time elapsed. The intensity or amplitude of the signal is represented by different colours. On the spectrograms used here, the colour intensity is adjustable. I have adjusted the colour intensity so that sharp or loud noises are a blue colour which appears to give the best clarity/definition. This can be seen on the first and second spectrograms below with the loud banging noises sharply defined in blue. The second spectrogram below, shows some speech noises after the possible door opening. The various speech frequencies are shown as blue wavy horizontal lines and are quite different to the loud banging type noises. Quieter passages of the recording are a pink to yellow colour.
9. Analysing the spectrogram, I was able to suggest possible causes for a number of noises heard during this period.

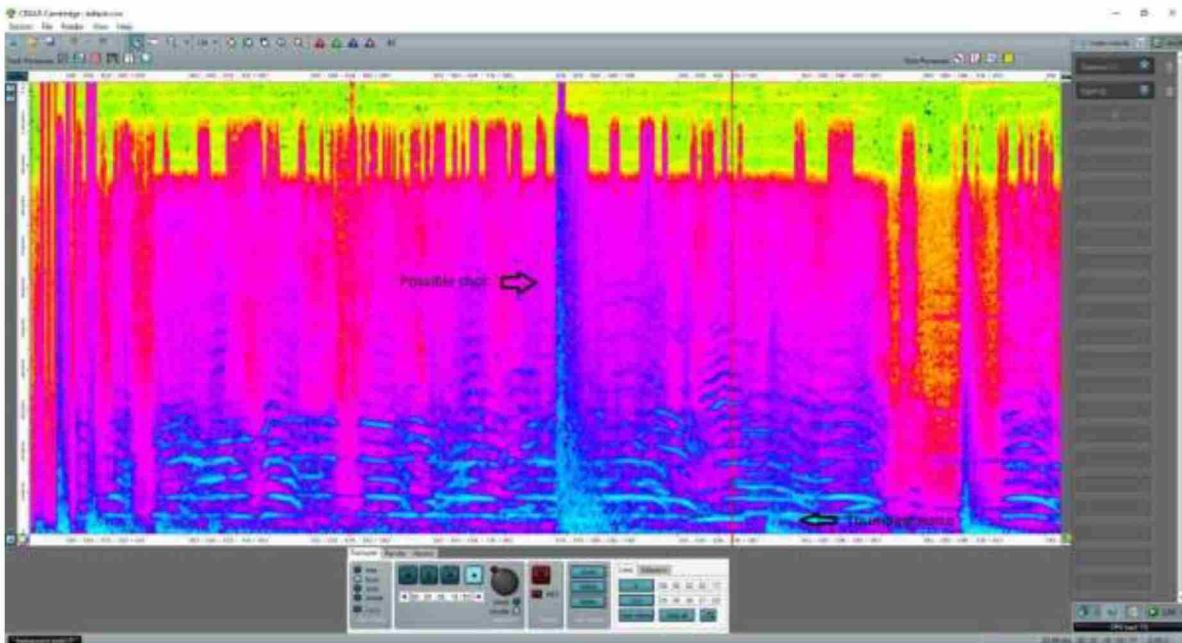
10. Recording **A\_DEF222 111215-085427** starts with four loud banging noises and shouting. I consider it is likely that these four banging noises are the police officers banging on the windscreen or bodywork of the vehicle. This is what these four noises sound like to me.
11. If you view the representation of these noises on the spectrogram you can see quite clearly that these four noises are almost identical. This would probably rule them out as being the gunshot in question, as we know only one gunshot was fired.
12. I have attached a spectrogram of these four banging noises below.



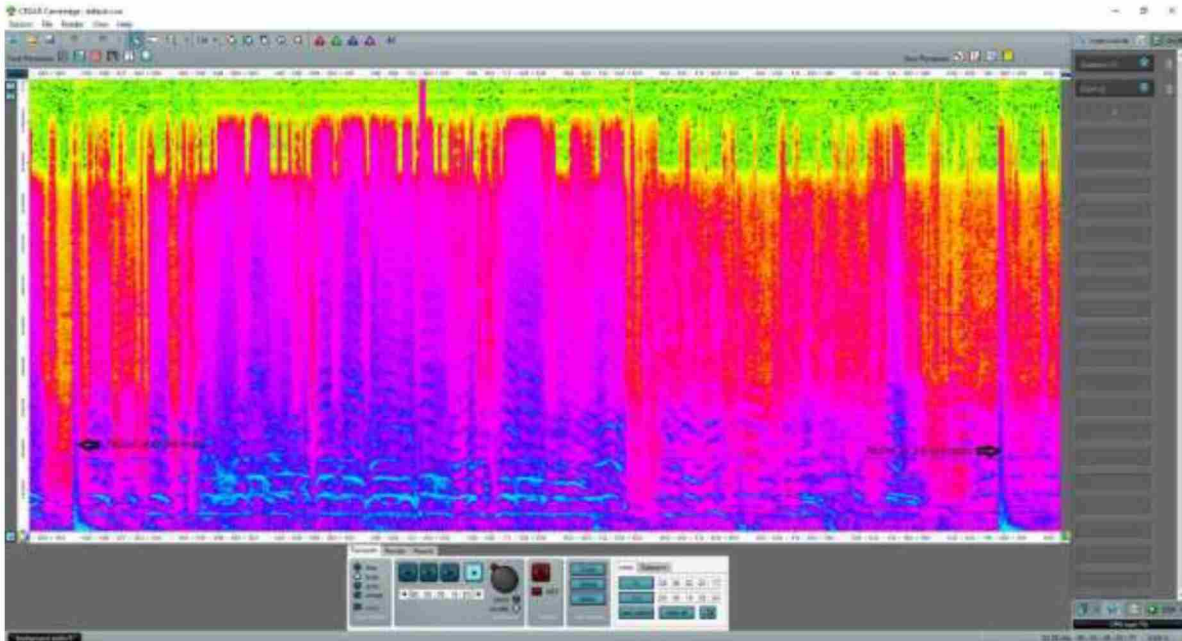
13. After the four banging noises mentioned above, there is a lot of shouting that distorts the audio recording greatly.
14. On my annotated spectrogram below, I have marked a noise at just under 3 seconds from the start of the recording. This may have been the vehicle door being opened by the police officers.
15. There is a small possibility that this burst of sound is actually the fatal gunshot but this noise does not seem to be loud enough in my opinion.
16. Another possible indication that this may be the door opening is that the shouting of the police officers seems to be a bit clearer and louder after this point. This would be expected if suddenly the speech path from the officer to the microphone becomes unimpeded by a glass/bodywork of the vehicle.



17. The noise I have flagged as the possible gunshot occurs at just under 5 seconds from the start of the recording.
18. This particular noise is sharper and louder than the surrounding background noise and any other noise on this recording. The spectrogram below has characteristics of other gunshots I have seen in other cases.
19. Another point in favour for this argument, is the actual acoustic quality of this noise. It has a metallic quality to it. I have noticed this metallic quality in some other gunshots that I have analysed in other cases.
20. I cannot think of another possible cause for this type of noise occurring in or around the vehicle, but would consider any suggestions.
21. There is also a light thumping noise at just under 6 seconds, but I do not think this is loud enough to be the shot and it is possibly a door slamming or a thump to the body work of the vehicle. I have marked this on the spectrogram below.



22. After this initial intervention phase of this recording, there are two other thumping type noises at 6 seconds and 16 seconds approximately. I would suggest that these sound like the slamming of vehicle doors. Both noises sound similar and viewing them on the spectrogram below shows them to be similar in shape. We know only one shot was fired so it is unlikely that either of these noises are the gunshot.



23. There are also other thumping type noises at 43, 50 seconds and 1 minute 8 seconds approximately, from the start of the recording. The noise at 43 seconds sounds like a heavy item being dropped or moved, the noise at 50 seconds sounds like a vehicle door slamming. The noise at 1 minute 8 seconds could be a vehicle door slamming or again something hitting the vehicle body work.

24. Apart from the noises mentioned above, there is nothing else on recording **A\_DEF222 111215-085427** which I would suggest is a possible gunshot.

## Effects of the equipment on the recording of the gunshot.

25. Accurately recording the sound of gunshots is a difficult task and specialists who do this sort of thing tend to use very specific audio recorders and microphones to make accurate recordings.
26. One of the problems that they have to deal with is the actual loudness of gunshots. Any microphone and recorder combination used to record them must be able to record the gunshot without being overwhelmed by the sheer amount of energy entering the microphone.
27. I would suggest that the surveillance system and microphones used in the Audi were unlikely to be able to make an accurate recording of any gunshot fired. These systems are generally designed to record speech at much lower volumes than any gunshot.
28. Also, the recording audio bandwidth of these surveillance systems is limited. This will undoubtedly have an effect on the how any recorded gunshot would sound.
29. In Mr Barry's statement (Transcript Report (Met Police Op Bittell, A-1062-21)-signed), he noted that Recording **A\_DEF222 111215-085427** showed audio energy up to around 8.7khz. This means that the system will not record any higher frequencies than 8.7khz This would be adequate for speech but would likely have an effect on the recording of a gunshot making it sound different to a perfectly recorded gunshot made on a recorder with a wider recording bandwidth.
30. One other point to consider is, that when the shot possibly takes place, there is a lot of shouting which is already causing the recording to distort, in effect overwhelming the recording system. If the shot occurs whilst this is happening then I would expect the recording to sound different to a perfectly recorded sample gunshot.