I. Emotional responses to sound effects : Lo-Fi (noise) & 2B's final battle

Huiberts' study showed that players consider sounds as an important information resource which indicates the state of the avatar (character), either it is a threat that might scare the players, or it is associated with the vitality of the avatar. Since the protagonists of《NieR: Automata》are all androids, the audio team utilises the "Lo-fi" plugin to add noise effect in different levels to present the avatars' current circumstances. It is generally used when the player encounters problems with the transmitter voice or when the player's senses are being jammed, such as : being hit by specific status or effects.[271] Given that the Lo-fi noise is essential for this game, this effect is inserted into many Audio Buses and the Actor Mixer, combined with other effects in the Multi effect plugin, such as : distortion, filtering and flanging.[272] However, to keep hearing the noise without making players feel uncomfortable is difficult. Hence, not only did the audio team apply this effect very lightly in most of the scenes, but also utilised the real-time audio for the sound-crafting.

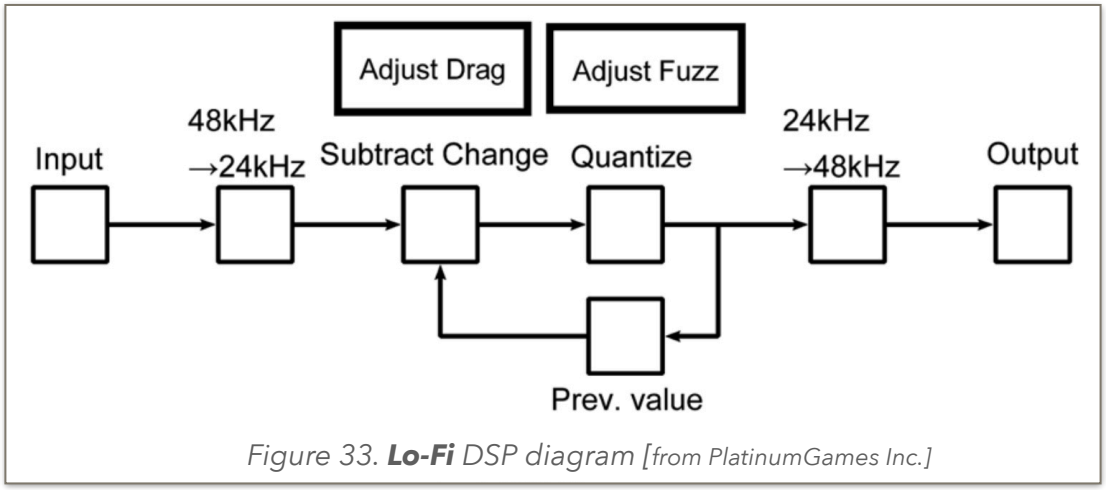

*Figure 33. **Lo-Fi** DSP diagram [from PlatinumGames Inc.]*

Figure 33 only exhibits the mono setup for the Lo-fi plugin processing, but it will duplicate based on how many channels are needed. The sound-crafting process starts from lowering the sampling rate to less than 50% or 24kHz, because Lo-fi sound doesn't need high sampling rates and this procedure can largely reduce the processing load.

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[271] See footnote 104.

[272] Shindo, M. and Kohata, S. (2019, January 9). Part 2: The spatial acoustics of NieR:Automata, and how we used Wwise to support various forms of gameplay. [Web log post] Audiokinetic Blog. Retrieved from https://blog.audiokinetic.com/the-spatial-acoustics-of-nierautomata-and-how-we-used-wwise-to-support-various-forms-of-gameplay-part-2/

*Figure 34. Noise & Screen flicker present **2B's vitality** (left: menu ; right: virus contamination rate 90 %)*

Secondly, it makes the value closer to the previous value, and then is quantised. The more the quantising note is lost, the more buzzing is heard, so, this step helps prevent excessive noise and roughness in sound after the quantising. Finally, the sampling rate is turned back and we get the output. 'Even a standard process like this can make the game more immersive if you add an additional step or two', stated Shindo and Kohata. When it comes to the real implementation, the final battle of 2B in gameplay 16 (55:52–1:10:01) can be cited as the best example of how the amount of noise represents the vitality of the character. This scene takes place after the Bunker and Commander have been invaded and destroyed by the enemies. 2B put 9S into the escape route and entered herself into the combat zone. However, she had already been infected by circuit virus which was rapidly progressing in its own algorithm inside her body and was impossible to remove.

When the virus contamination rate was 16%, she can fight with countless machine lifeforms, and the player could hear the soundtrack clearly with the environmental sounds (e.g., waterfall, the heel's reverberation in the underground passage) when 2B ran inside the sewer. After the contamination rate rose to 21%, the noise effect got stronger and the screen slightly flickered. Interestingly enough, even a professional player like Shirrako, had to pause the gameplay twice in order to check if there is any problem with the hardware (1:00:04). Along with contamination rate increasing from 32% to 57%, the noise effect was heard more clearly while the soundtrack was playing meanwhile, the screen was full of the flickers and glitches making it harder and harder to recognise situations. The left screenshot of Figure 34 shows the menu interface after the contamination rate has reached 70%. It shows the attempt of the player (Shirrako) who

was trying to control but apparently failed. Then, the right screenshot is the final alert from Pod 042—2B's circuit system has been totally corrupted and all of a sudden, she self-destructs herself on the bridge (1:06:56). Noises and flickers were shown on the screen, because of 'the abnormality detected in visual sensor' as Pod 042 said (see Appendix #6). Then, the player only sees the black and white screen without soundtrack or any environmental sound before A2 arrives to execute 2B's infected body.

Aside from the technical part, it is noteworthy that the soundtrack 〈***37.*** *The Sound of the End*〉 continues playing in the background from 2B's landing at Flooded City to her automatic explosion (55:52–1:06:55). Even if the volume of noise keeps raising up, the music loop doesn't cease but accompanies the player (as 2B) to go through the whole contaminating process. Considering there are countless fights happening during these 10 minutes, such as other sounds from the weapons, the changing environments, the noise, the dialogues between 2B and Pod 042—should one consider that too much stimuli with heavy information to players? Why did they still decide to reserve the room for music? Or in other words, what kind of functions of music are necessary for such busy scenes? What do they want to realise through the music, when the protagonist is approaching her end? Lastly, how do they achieve their aims and avoid the cognitive load at the same time?

The soundtrack 〈*37.The Sound of the End*〉 is probably the most essential combat music which not only appears at Goliath battles through 5 main routes (i.e., prologue, gameplay 6, 8, 9, 11, 14, 15), but also accompanies all the final battles of principal characters, including Pascal's battle with Engles before his memory is erased (gameplay 18), the last fights between 9S and A2 (gameplay 20, 21) and the death of 2B (gameplay 16). In most cases, the score would play from INTRO, VERSER-A to VERSE-B [273] and so on whereas, only here (gameplay 16) it sounds distinct from others. This is because it only plays **VERSE-C** and continues its 24 bars as a loop till 2B launches the self-destruction. The original tempo (bpm 104) has already set this combat tune to a "quick and lively"

[273] In light of the space limit, the INTRO and VERSE-B are omitted in Figure 35. However, they're in similar structure which consists of continuous sixteenth notes at high clef and accented eighth notes in Staccato at bass clef, as VERSE-A.