s.laag (2016) - for game-audio with 3D body-scanned performer, composer and instrument

Ricardo Climent[1], Manusamo & Bzika[2]

[1] NOVARS Research Centre, The University of Manchester, UK
ricardo.climent@manchester.ac.uk
[2] Manusamo & Bzika, interdisciplinary collective
manusamoandbzika@gmail.com

Abstract. This paper unfolds key compositional aspects of 's.laag', an interactive musical work composed by Ricardo Climent for Dutch Bass Clarinettist Marij Van Gorkom, as part of the dutch-uk.network project. It includes 3D models by both Climent and Manusamo & Bzika based on 3D Body scanners provided by Simeon Gill at the School of Materials Design & Fashion, University of Manchester. The piece employs sonic path-finding techniques using game-engine tools to explore the concept of "modular metaphor". It navigates across the intersections between the Real, the Virtual and the modular augmentation of a musical instrument. The Dutch word 'laag' means *low* but also *layer*, *stratum* and *thickness,* which resonate more with the compositional thinking behind this piece. Slaag (*pass* in Dutch language) evokes the sonic fluxus between the acoustic instrument and the electronic medium.

Keywords: Bass Clarinet, game-audio, 3D body-scan, Expo 58, gamification, Extended Reality, Modular metaphor, Virtual Reality.

Creative Background

The dutch-uk.network 58/58 project is a new network started in 2015 between the Institute of Sonology at the Royal Conservatory of The Hague and the Music Composition department at The University of Manchester, UK. It aimed to build bridges between UK and mainland Europe, via addressing creative questions in the form of concert events, new musical compositions, workshops and debate. The network proposed the "Philips pavilion" as a concept and model, which may inform the project, just 58 years after this World's Fair pavilion was designed for Expo '58 in Brussels.

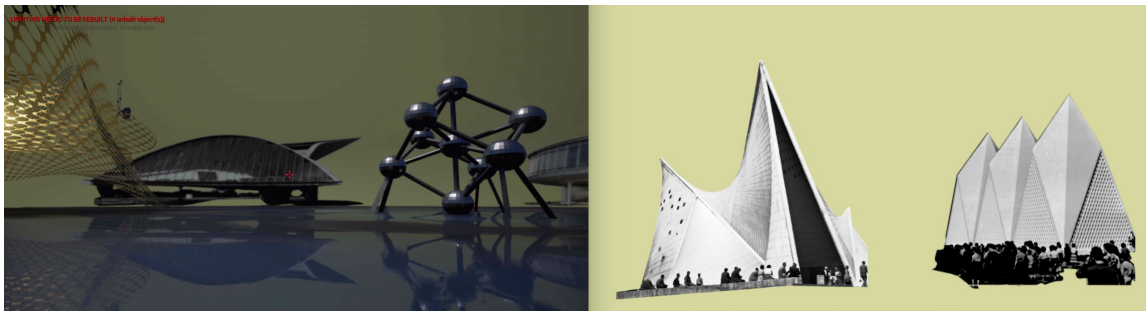

Figure 1. s.laag's Expo 58 buildings in Unreal Engine 4, informed by models from the Philips pavilion and the Atomium

Previous work on game-audio composition: s.laag builds upon several game-engine collaborative works by the composer on this paper. It features musical instruments as virtual characters in a game-engine driven stage performance. Recent examples include the Timbila (a marimba of Mozabique) for the piece "Xi" with Miquel Bernat, a VCS3 analogue synthesizer for "Putney" with Mark Pilkington performing the VCS3 and now featuring a Bass clarinet for "s.laag". The 3D modelling for these works was sketched by Climent and finally rendered by Manusamo&Bzika (Alena Mesarošová and Manuel Ferrer). Such game-audio compositions often employ the concept of "modular metaphor" (Climent, Pilkington, Mesarošová, 2016), to transcend the physicality of the real instrument during game-play. Such metaphor occurs when the whole becomes more than the sum of its parts through the aural assemblage but as in

s.laag, it can also become something else. Such immersive experiences are conceived as game-audio journeys highlighting distinctive aspects of the instrument being explored. For example, they investigate unique timbral or gestural properties, which gradually unfold while the instrument becomes re-assembled as the piece progresses.

Compositional Methodology

Recording session: aural scores

The composition approach to gathering Bass clarinet raw material for s.laag was built upon the concept of 'Aural Score' (Rick Nance, 2006), which was adapted for recording purposes. The ultimate aim of this system is to extract 'DNA' from instrumental performers' unique aural memory, which they are not even conscious about. In the past, the composer in this paper investigated this technique with violinist Darragh Morgan and percussionist Miquel Bernat, providing him with a wealthy pool of their DNA's aural material. For s.laag, a 2-hour 'crunch file' with silent gaps was assembled, where the performer had to insert restricted musical responses to materials on the fly; e.g. by mimicking or playing against within a range or technique. The crunch file is never to be used in the final composition. Instead, the player's response becomes the basis for compositional inventions. In s.laag, six types of materials were crunched, ranging from manipulated excerpts of Jimi Hendrix's best solos, to Peter Frampton's talking box guitar, a 1957 recording from Edgar Varèse in a workshop of Jazz musicians, harmonica phrasing from Sonny Boy Williamson, a performance by Japanese Koto Player Fuyuki Enokido, all intercalated with some extended techniques from the composer's own alto saxophone, transformed with a BigMuff distortion pedal.

Scanning typologies: mosaic-size musical cells

After listening to the recording session, only 20 % of materials were selected and edited. They served as raw sources for further transformations. At this point, several compositional tools were applied with the aim to generate a large collection of mosaic-size musical cells with specific sonic taxonomies. For instance, 101 mosaic-size soundfiles were created using aural scanning and manual editing, 69 with a custom-made waveform pointer to 'chop' materials, 190 files were obtained from a clatter system (Bachelor, 2003), 93 using a doppler tool, a sound freezer, 60 sound excerpts using a Csound sndwarper, 10 mid-size phrases from a MaxMSP granulator, 17 produce by a 'gestural faker' (a constructor of gestures from micro-materials) and 20 via a Nebulae (Qu-Bit Elextronix, 2015) voltage-controlled granulator synth. Total of hours: 76.5 h.

structural artefacts: 3d scenes

For arranging materials at structural level I already had the scenes from the game-audio and engine version in mind. The abstract visualisation of a scene-oriented journey in a 3D environment provided me with four aural pools to make compositional decisions. [0.00 - 2:27 Interactive Counterpoint // 2:27- 4:25 Spectral Multi-phonics // 4:25 - 6:01 Valve Variations //6:01 - 8:43 Inner-pulses]

Scoring the music and building the electronic counterpoint: studio composition thinking

The compositional methodology was arguably closer to working with studio practices than to composing a piece for acoustic instrument alongside electronics. As a result, sound materials were dealt in abstract and layered in two parts; an upper stratum consisting mostly of non-transformed materials, (although heavily edited) and a highly-articulated counterpoint of electronic responses to them, moving outside the physical limits and idiom of the acoustic instrument.

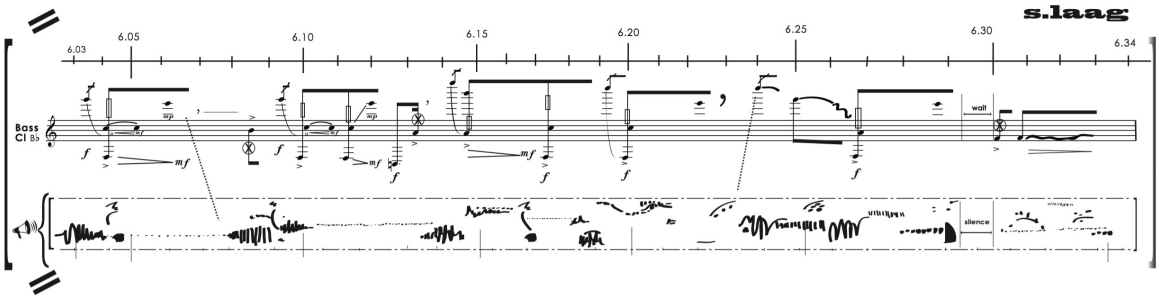

Figure 2. s.laag's reference score:
Splitting the counterpoint between instrument (top) and dynamic media (bottom)

Composing With Game-Engines

The modular metaphor: gamification of the performance environment

Imagine we were to dismantle every part of a musical instrument with the purpose of reassembling them in alternative ways while keeping some of their functions and behaviours intact. Envisage also we were able to extract the sonic nature and extend it and make every part sonically capable of achieving musical outcomes. This is what constituted s.laag's 'modular metaphor'. The bass clarinet modules became a windchime-like mobile (as in Earle Brown's music), clarinet keys marches as in Pink Floyd's *The Wall*'s hammer scene, or became multiple characters informed by Silly Symphony's experimental cartoons in the 1920s and 30s. How could the new 'game-instrument' sound like? Would the sum of its parts become something aurally outrageous?, would its sound resonate with the instrument's DNA? Can this form of re-embodiment provide new modes of expression in a performative game-engine's domain?
To explore so, s.laag heavily relies on the use of physics-graphics-game-audio engines often found in ludic contexts and video consoles, it recontextualises such technologies in a performative environment. The virtual game-audio scenes become a pseudo-score where pre-composed sonic materials are introduced and need to find musical directions during game-play (which are preconceived by the composer as alternative routes and engine matinees). The computer musician plays the role of the composer and performer (seen in 3D) and unfolds the electronic materials by navigating the scenes and interacting with the different parts of the instrument as they appear (via colliders, Deph of Field rays and virtual sonic scanners).

Figure 3. Performative stage on left ("Putney Ponoskty", 2016), and s.laag's bass clarinet hammer march-like scene (on right)

Immersive performers: 3d body-scanned characters

Performer, Instrument and composer were 3D body-scanned at the School of Materials Design & Fashion, University of Manchester and then imported into the game-engine (recombined via Makehuman, Blender and UE4).

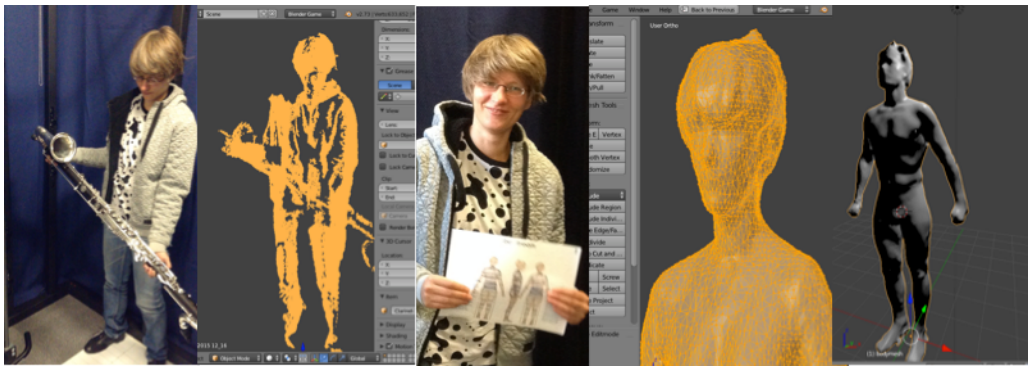

Figure 4. High Poly 3D scanning session at the School of Materials involving performer (left) and composer (right)

Bass clarinet 3d parts: mobile wind-chime construction and rigged performer

Instrument parts and humans were 3D modelled in Blender and exported to Unreal Engine 4 as the final performance tool.

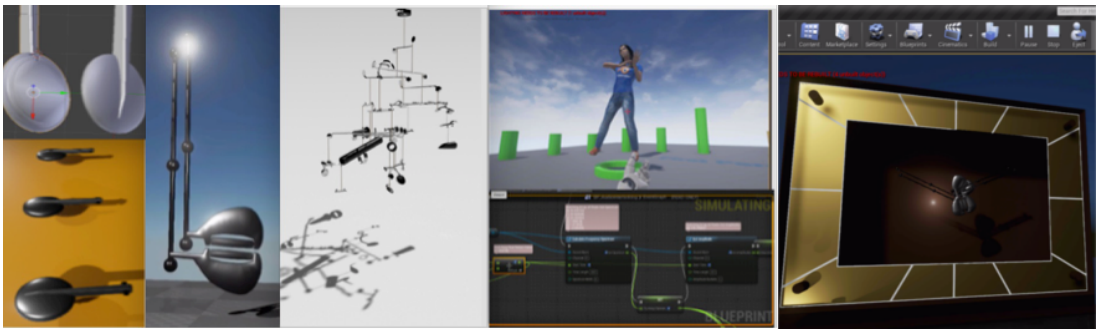

Figure 5. Clarinet parts mounted as musical mobiles and a performer's rig and clock driven by Bhv files and FFT analysis

Frequency analysis: the environment is the main character

The piece heavily relies on real time FFT analysis of frequencies and dynamics to drive and excite the environment and characters on stage (using the visualisation plugin in Unreal Engine 4). For instance, the 3D-mobiles, which are constructed by collecting instrument parts, are FFT driven, while the character's rig is driven by motion capture BHV files.

Conclusion

s.laag is a musical composition aiming to push the boundaries of existing work using game-audio and 3D environment at the core of the compositional thinking. The project is a collaborative work between performer, composer, 3D scanners and modellers. The piece targets non-specialised audiences by facilitating the computer musical language and game-audio aesthetics via the use of gamification processes. This is to say that game-engine tools and the concept of game-play become part of an immersive journey, where audiences perceive complex musical ideas and structures via different channels of perception. In such effort, the composer aims to preserve the musical identity of the original work, which in

this case was conceived before its game-audio implementation. Finally, s.laag aims to explore creative outcomes in a game-audio format, using the "modular metaphor" as the means for assembling aural complexities in the spirit of the dutch-uk.network project.

Additional information

Link to Materials: http://game-audio.org/

Dutch-UK.network http://dutch-uk.network

Motion capture BVH files: www.cgspeed.com (for performance mock before collecting own data)

Acknowledgements. Dutch-UK.network is supported by: Research Network Fund. School of Arts, Histories and Cultures, The University of Manchester, UK. Special thanks to **Kees Tazelaar** (Institute of Sonology director), for providing an insight about the recording archive of the Philips Pavillion Expo 58. http://dutch-uk.network
3D Body scanners were provided by **Dr Simeon Gill** at the School of Materials Design & Fashion, University of Manchester. Bass Clarinetist **Marij Van Gorkom** for her recording session and workshops which took place in Studio 1, NOVARS Research Centre. http://www.novars.manchester.ac.uk

References

Arnheim, Rudolf. 1974 "Art and Visual Perception: A Psychology of the Creative Eye" Berkeley: University of California Press.

Chion, Michel. Audio-Vision: Sound on Screen. Trans. Claudia Gorbman. New York NY: Columbia University Press, 1994.

Climent, Ricardo and Pilkington, Mark. Putney (2015) Vimeo video “Putney Live Performance @ xCoAx Conference 2015.

Climent, Ricardo (Live Game-Audio Engines) and Pilkington, Mark (1969 VCS3). 2015. Posted by “Wunderbar Lab Berlin”. http://vimeo.com/139128350 [Last accessed 21 May 2016].

Climent, Ricardo. Pilkington, Mark. Mesárošová, Alena. "Exploring Real, Virtual and Augmented Worlds Through 'Putney', an Extended Reality". http://econtact.ca/17_4/climent-etal_putney.html - Last visited 21 May 2016

Collins, Karen. Game Sound: An introduction to the history, theory, and practice of video game music and sound design. Cambridge MA: MIT Press, 2008.

Mesarosova, Alena and Manuel Ferrer Hernández. “Art behind the mind: Exploring new art forms by implementation of the electroencephalography.” Proceedings of the 2015 International Conference on Cyberworlds (Visby, Gotland, Sweden: Uppsala University, 7-9 October 2015).

Nance, R., “Compositional explorations in plastic sound”, PhD thesis, DeMontfort University, Leicester. 2006
John Wiley & Sons, 2008. "Game Design: Principles, practice, and techniques — the ultimate guide for the aspiring game designer. New York City:.Caillois, Roger. Man, Play and Games. University of Illinois Press, 1961

Pecino, Ignacio and Ricardo Climent. “SonicMaps: Connecting the ritual of the concert hall with a locative audio urban experience.” ICMC 2013: “Idea”. Proceedings of the 39th ICMC (Perth, Australia) http://icmc2013.com.au

Sparnaay, Harry. 2011. "The Bass Clarinet: A Personal History":Periferia Sheet Music. ISBN: 978-84-938845