

colligation

JAMES DOOLEY, Integra Lab, Royal Birmingham Conservatoire, Birmingham City University, UK. james.dooley@bcu.ac.uk

1. PROJECT DESCRIPTION

colligation (to bring or tie together) is a physical performance work for one performer that explores the idea of sculpting sound through gesture. Treating sound as if it were a tangible object capable of being fashioned into new sonic forms, "pieces" of sound are captured, shaped and sculpted by the performer's hand and arm gestures, appearing pliable as they are thrown around and transformed into new sonic material.

colligation uses two Thalmic Labs Myo armbands, one placed on the left arm and the other on the right arm. The Myo Mapper [1] software is used to transmit scaled data via OSC from the armbands to Pure Data. Positional (yaw, pitch and roll) and electromyographic data (EMG) from the devices are mapped to parameters controlling a hybrid synth created in Pure Data. The synth utilises a combination of Phase Aligned Formant synthesis [2] and Frequency Modulation synthesis [3] to allow a range of complex audio spectra to be explored. Pitch, yaw and roll data from the left Myo are respectively mapped to the PAF synth's carrier frequency (ranging from 8.175-12543.9Hz), bandwidth and relative centre frequency. Pitch, yaw and roll data from the right Myo are respectively mapped to FM modulation frequency (relative to and ranging from 0.01-10 times the PAF carrier frequency), modulation depth (relative to and ranging from 0.01-10 times the PAF carrier frequency), and modulation wave shape (crossfading between sine, triangle, square, rising sawtooth and impulse). Data from the left and right Myo's EMG sensors are mapped respectively to amplitude control of the left and right audio channels, giving the performer control over the level and panning of the audio within the stereo field. By employing both positional and bio data, an embodied relationship between action and response is created; the gesture and the resulting sonic transformation become inextricably entwined.

2. TECHNICAL NOTES

colligation is for a single performer and would suit either a gallery or concert hall performance space. An earlier version of the work was publicly performed in June 2018 at Supersonic Festival, Birmingham, UK. Setup and rehearsal time requires approximately 30 minutes. The duration of the performance is circa 6 minutes.

The technological requirements for performance of the work follows:

2 x Myo Armbands

1 x Laptop with Myo Mapper and Pure Data "colligation" patch

1 x Audio interface with TRS or XLR outputs

Stereo PA/Sound system with two audio inputs taken from the audio interface (TRS or XLR).

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Two instances of the Myo Mapper software should be running: the first instance communicates with the right hand Myo; the second instance communicates with the left hand Myo. Additionally, the *colligation* patch (available from the author upon request) should be opened in Pure Data (Pd) with the patch interface visible. Once opened, select the “MYO_CONNECT” toggle button to connect Pd to both instances of the Myo Mapper software. Data from both armbands should now be received by Pd. Finally, position and calibrate the armbands before performance. The armbands should be placed below the elbows with the blue Myo logo facing upwards when the arms are positioned straight in front of the body, parallel to one another, with the palms facing downwards and perpendicular to the floor. The “CALIBRATE” button should then be pressed and this position should be maintained by the performer for at least four seconds. Once calibration is complete, the system is ready for performance.

3. PROGRAM NOTES

colligation (to bring or tie together) is a physical performance work for one performer that explores the idea of sculpting sound through gesture. Treating sound as if it were a tangible object capable of being fashioned into new sonic forms, "pieces" of sound are captured, shaped and sculpted by the performer's hand and arm gestures, appearing pliable as they are thrown around and transformed into new sonic material. Using two Thalmic Labs Myo armbands, one placed on the left arm and the other on the right arm, positional data from the devices (yaw, pitch and roll) are mapped to parameters controlling a hybrid synth created in Pure Data. The synth utilises a combination of Phase Aligned Formant synthesis and Frequency Modulation synthesis to allow a range of complex audio spectra to be explored. Additionally, data from the left and right Myo's electromyographic (EMG) sensors are respectively mapped to amplitude control of the left and right audio channels, giving the performer control over the level and panning of audio within the stereo field. By employing both positional and bio data, an embodied relationship between action and response is created; the gesture and the resulting sonic transformation become inextricably entwined.

4. MEDIA LINK(S)

- Video: <https://vimeo.com/255817503>

5. REFERENCES

- [1] B. D. Donato, J. Bullock et A. Tanaka, "Myo Mapper: a Myo armband to OSC mapper", in the proceedings of *New Interfaces for Musical Expression*, 2018.
- [2] M. Puckette, "Formant-based audio synthesis using nonlinear distortion", *Journal of the Audio Engineering Society*, vol. 43, pp. 40-47, 1995.
- [3] J. Chowning, "The synthesis of complex audio spectra by means of frequency modulation", *Journal of Audio Engineering Society*, vol. 21, pp. 526-534, 1973.