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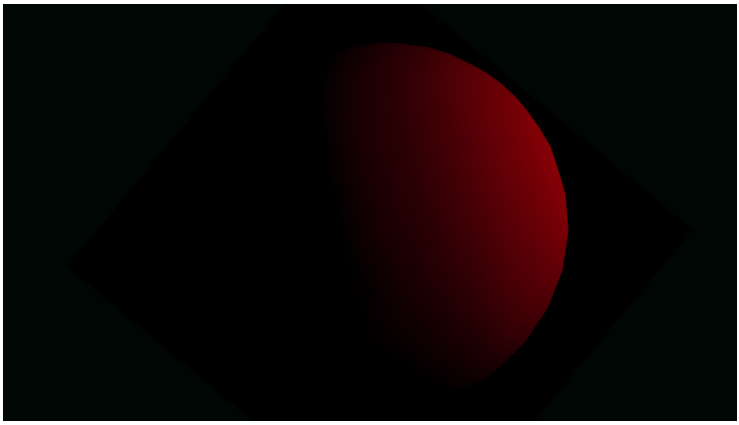

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The Body in the Machine: Indices Online

Keywords: Online Installation, Sound Art, Machine Learning, Music, Indices on the Body, AMAE, DePinto, Jean-Luc Nancy

This piece is an online audio-visual installation that uses machine-learning techniques to reflect on the interplay of the artist and the artifact in the context of technologically mediated arts collaborations. This project grew in dialogue with another ongoing project titled 58+1/63 *Indices on the Body*. That project is a collaboration between the artistic collective AMAE and the artist Pier Giorgio De Pinto and philosopher Jean-Luc Nancy to which the author has also contributed. Adopting Nancy's view of the body as extended in the work of AMAE/DePinto and the author, the piece asks what happens to the body when we begin to rely heavily on translations across disembodied technologies to mediate our communication and art-making. It reflects on how meaning mutates and transforms as the work is translated across various technologies and media.

Inspiration and Early Developments

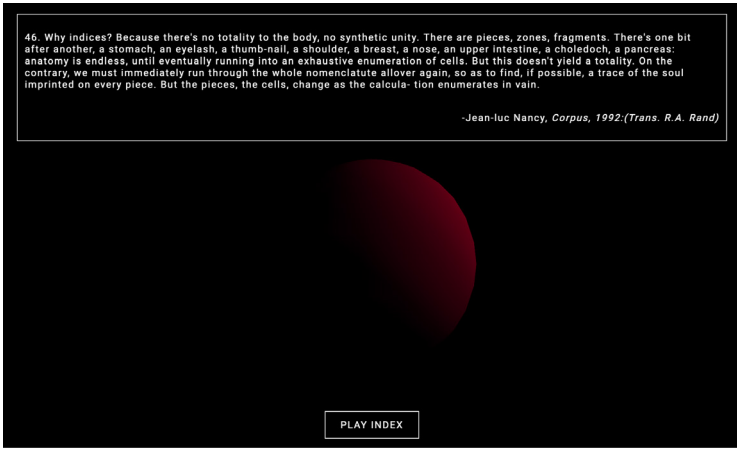

Fig. 1. *The Body in the Machine: Indices Online.*

This project grew in dialogue with another ongoing project titled 58(+1)/63 Indices on the Body. That project is a collaboration between the artistic collective AMAE and the artist Pier Giorgio De Pinto and philosopher Jean-Luc Nancy. This project focuses on Nancy's 58 indices on the body, written in 2006 by Jean-Luc Nancy and presented, alongside 4 additional new compositions, in the 2008 translation (by Richard A. Rand) of his 1992 book *Corpus* (Nancy 1992, Nancy 2008). Throughout this project, Nancy has produced 5 additional indices. The project combines performances, videos, interactive installations and collaborations with a large and varied group of artists.

As part of this project Jean Luc Nancy recorded himself reading his 58 indices on the body, he also wrote an additional index specifically for the project in 2013. The project presented here grew out of a collaboration with AMAE, Pier Giorgio De Pinto and Jean Luc Nancy in which I originally set some of these indices to music in 2015. The result was a piece that we were invited to perform during the *Helicotrema festival* at the Francois Pinault Foundation in Venice, alongside La Biennale events taking place throughout the city (see fig. 2).

This original piece entitled *21,7 & 3* (feat. Jean-Luc Nancy, Amae & DePinto) represented a sonic reflection on the materials presented in indices 21, 7 and 3 of Nancy's *Corpus*. The piece was informed by the content of the indices as translated to English by Richard A. Rand and also by Nancy's own rendering of the indices in his native French. This second rendering of the material is inter-

woven through the original composition. As a result, the composition can be heard at times to respond to the intonation and rich prosody of Nancy's vocal performance and at other times it operates in references to the translated text.

Later, in 2016/2017, I recorded additional sound works and musical pieces incorporating Nancy's indexes, a portion of which will be set to performances and recorded by video artists as part of the 63 Videos on the *Body* project. Those pieces were released independently in the collection "Le Son Du Corps Et Un Corps de Sons". Each of these pieces was assembled similarly. They each respond to the English translations of the text, but they are guided by the ebb and flow of Nancy's voice as he reads the pieces. The prosody in his voice, the vocal patterns of stress and release convey much new information and modulate the meanings of the words as they were written on the page. The original composition *21, 7 & 3* (feat. Jean-Luc Nancy, Amae & DePinto), was realized as a harmonic piece that had obvious points of reference to Western art music. The 14 new compositions created for this phase of the project were diverse in their texture and instrumentation, as was demanded by the introduction of 15 new indices. They follow where lead by Nancy's vocal performance and Rand's translations to explore sound-worlds with which listeners of electroacoustic music, soundscape composition, glitch and microsound might feel comfortable while wondering back from time to time to the familiar sounds of the Western tradition

Fig. 2. *21, 7 & 3* for Helicotrema 2015. Credit: Pier Giorgio De Pinto.

The pieces composed for this project were originally interesting to me for their translations across domains. Nancy distills bodily experience into language in Corpus. Then at the end of the book he presents some core ideas further transformed into small little packages of meaning he calls indices. When AMAE & DePinto started their work with Nancy they originally re-interpreted and re-presented that work through the medium of performance art. They then involved Nancy in another translation of the work when he performed and recorded his indices. My contributions contained yet another layer of translation as I engaged with Rand's translations of Nancy's work alongside Nancy's performances. I then re-presented that performance in a series of musical and sonic contexts. In these works I had hoped to reveal the soundworlds suggested by the interplay of these layers of translation, and find within them something which still held its link back to the bodily experience which was Nancy's original subject matter. As the work progressed, I found that the process of translation through technology provided that link as at each step the work was filtered through human bodies but also through technology. Nancy's original exposition and later recording of the indices are of course technologically mediated. In 2013 AMAE/DePinto performed 58 (+1) indices on the body, Index *N.17_Proximity* and *Distance* at the *Spuren 2.0 symposium* at E-WERK in Freiburg. This multimedia performance drew from Index 17 and integrated the body with technology in contemporary performance involving both live performers and digitally manipulated video projection. In 2014 AMAE, DePinto & Nancy performed *Indices 60_61*. A Living Archive at the *INACT Festival* in Strasbourg. This another multimedia performance in which the first performer's body had been tattooed with the numbers of the 58 original indexes and 2 new indexes created for the project. The piece involved an augmented reality (AR) implementation for mobile tablet devices. The system recognized each tattoo and presented the corresponding text of the index mapped to the tattoo's location on-screen. A second performer used the AR implementation to scan the performer's tattoos allowing the author to read his own writing from the tablet. A feed from the tablet was also projected live to a screen allowing the audiences to experience the AR performance from the perspective of the author and second performer. You can see a recording of the piece in figure 3.

Building on this theme of the index as mediated through the body and technology, I began to work on an installation that would re-present the musical pieces I had created and translate them through a critical engagement with technology. In 2019/2020 I began work on an installation to be delivered via a web application. Early iterations of this work were installed at the 2020 edition of NIME: The International Conference on New Interfaces for Musical Expression[1] and

1. NIME 2020: The International Conference on New Interfaces for Musical Expression 2020

the 2019 edition of the Irish Sound Science and Technology Event at the Cork School of Music[2] and built conceptually around the representation of physical sound waves as amplitude values over time as demonstrated in figure 4. The current installation is a further iteration on those earlier works. This iteration collects together and iterates upon my sonic/musical work for the project to date introducing rudimentary 3D primitives and exploring AI/ML techniques. The audience is invited to listen to the pieces, experience their visual expression and reflect on the indices, which have been translated into English from Nancy's native French by Richard A. Rand for the English translation of Nancy's *Corpus for the Perspectives in Continental Philosophy Series*.

2. Irish Sound Science and Technology Event at the Cork School of Music: https://drive.google.com/file/d/1W_np9Jb-QEeny_Hd4wzR12Zvv-CdpXFr/view

Implementation

The current installation is a further iteration on those 2 previous installations. This iteration collects together and iterates upon all of my sonic/musical work for the project to date. The audience is invited to listen to the pieces, and reflect on the indices, which have been translated into English from Nancy's native French by Richard A. Rand for the English translation of Nancy's *Corpus for the Perspectives in Continental Philosophy Series*. It then introduces a new element a machine learning model for sentiment analysis. Sentiment analysis is an emotional AI approach that applies NLP (natural language processing) techniques to systematically quantify affective states as represented in written or spoken text.

Fig. 3. *Indices 60_61*. A Living Archive (https://vimeo.com/102234129). Credit: Pier Giorgio De Pinto.

This installation, being web-based and written in Javascript[3] with the p5.js[4] library, uses a machine learning model for in-browser sentiment analysis implemented in ml5.js[5]: an open-source, friendly high-level interface to TensorFlow.js[6] that brings machine learning and deep learning functionality to the web. The reference[7] files describe the model as follows:

> Sentiment is a model trained to predict the sentiment of any given text. The default model, currently 'moviereviews', is trained using IMDB reviews that have been truncated to a maximum of 200 words, only the 20000 most used words in the reviews are used. (ml5.js 2021)

The sentiment model is used to analyze Rand's translation of Nancy's indices. These translations are presented on screen alongside the soundworks composed around Nancy's reading of the given index. In the center of the screen underneath the translated indices is a sphere rendered on a WebGL canvas object via p5.js. It is illuminated by a colored light source. Sentiment returns a value on a scale of 0 (negative) to 1 (positive). A sentiment score below .4 (neutral) will result in a light with red/purple color space and rightwards rotation while a sentiment score above .4 will result in a light with blue/green color space and leftward rotation. The audio, both Nancy's speech and the music, is analyzed for frequency content (using the p5.js FFT implementation)[8] and the frequencies present determine the color space for the light is traversed as well as its overall intensity. Thematically, the abstract 3D primitive, the spherical body, provides a surrogate for the physical body, the experience of which is illuminated by the light, the color and intensity of which are themselves determined and controlled by both Nancy's spoken indices and the accompanying soundworld composed around them.

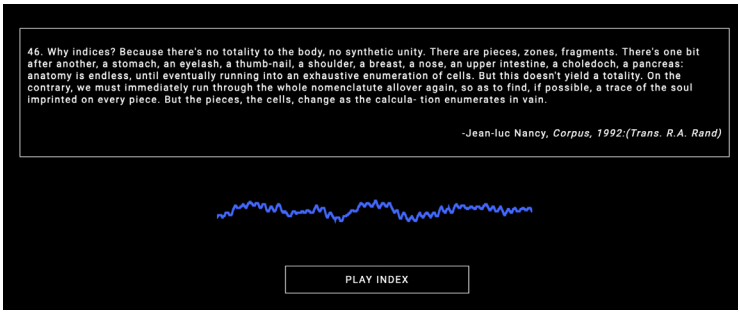

Fig. 4. Early Iteration of the piece.

3. https://www.javascript.com/
4. https://p5js.org/
5. https://ml5js.org/
6. https://www.tensorflow.org/js
7. https://learn.ml5js.org/#/reference/sentiment
8. https://p5js.org/reference/#/p5.FFT

Reflection

The piece is a reflection on translations through language, speech, vocalization, performance, music and technologies. The original indices were written in French. Jean-Luc Nancy's reading of them reveals a new layer of meaning through his use of prosody and intonation. We are presented with English translations of the text that must, to some degree, reflect the choices and interpretations of the translator Rand. The sentiment analysis introduces an additional layer of meaning/distortion. It is in essence, having been trained only on a corpus of Hollywood movie reviews, rating the sentiment of the translated indices as though they were Hollywood movie reviews. It does not always represent the translated text very well and rarely represents the information conveyed in Nancy's vocalizations in the original French. The colorspaces chosen to reflect the sentiment values introduce further culturally conditioned ideas about sentiment and emotion.

The use of sonic and musical materials to frame the texts brings yet another layer of distortion. The soundworlds evoked do not always match the content of the indices, sometimes they are built around the ebb and flow of Nancy's vocalizations as he reads. Sometimes around Rand's translation, and a number bare only tenuous relation to these materials.

Rarely are the original text, the spoken words, the translation, the sound, and sentiment analysis in harmony with one another.

Further, the translation of sound to light, the use of that light to reveal the 3D sphere, and the further mapping of sentiment to determine the direction in which the sphere rotates introduce further mutations of meaning. It is both Nancy's spoken words, and the soundworks they are set within here, which determine the color and intensity of the light. This light in turn reveals the dimensions and behavior of the sphere, which would otherwise remain cloaked in darkness. But while the light simply reveals the sphere, the sentiment score itself, according to the ml5 sentiment implementation, determines how that sphere behaves. In this way Nancy's words don't just illuminate the abstract body, but exposing the body to an interpretation of Nancy's text as translated by Rand and mediated by the sentiment model, directly affects how the body behaves.

However, the choice of a sphere as a surrogate for the complex human body, and our experiences of and through, it is a dramatic oversimplification. Reductionist tendencies of this nature are not uncommon in technical and scientific fields

and in this installation, it allows for reflection on the vast difference between technologically mediated representations of the human body and the thing itself.

There is also a random factor at play here in the use of light. The sphere is lit from a light source that initially emanates from behind the sphere on the Z-axis to the right on the X. The focal point of the light shifts across the face of the sphere. The light source holds its Z-axis position but moves along the X and Y-axes as per an implementation of a simple "Random Walk" algorithm. This involves a simple step-wise movement across our WebGL canvas space where, at each timepoint, the direction of the step is random. This limited degree of randomness helps to counterbalance some of the more direct and deterministic mappings involved in the piece, representing those aspects of the body that we cannot predict or control.

There is a complex network of translations and interactions here between the original text, the English translation, the authors recorded indices, the compositions, the sentiment model, the virtual light and the spherical body. This multifaceted and sometimes discordant configuration however is in perfect harmony with Nancy's vision of the human body as expressed in his indices. As Nancy comments in Index 46:

> Why indices? Because there's no totality to the body, no synthetic unity. There are pieces, zones, fragments. There's one bit after another, a stomach, an eyelash, a thumbnail, a shoulder, a breast, a nose, an upper intestine, a choledoch, a pancreas: anatomy is endless, until eventually running into an exhaustive enumeration of cells. But this doesn't yield a totality... (Nancy 2008)

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Available at: https://stephenroddy.github.io/Indices-Online-xCoAx/

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