MosAIk: staging contemporary AI performance - reflections on connecting live coding, e-textile and movement...

Author one
University of Live Coding
one@livecode.mx

Author two
University of Bricolage Programming
two@onthefly.ca

Author three
University of Creative Coding
three@creative.uk

ABSTRACT

Replace this text with a maximum 300 word abstract. You'll find it in the 'metadata block' at the top of your markdown document), be sure that each line of the abstract is indented.

1 Introduction

This paper introduces our collective work "Patterns in between intelligences", a performance piece that builds an artistic practice between live coding sounds and coding through dance, mediated and shaped through e-textile sensors, feeding into a networked system of which both live coded processes and human bodies are part.

The project began as a response to a funding call by the LINK masters initiative to produce an artistic work using Artificial Intelligence. Our multidisciplinary team: choreographers and performers, live coders and e-textile makers gathered together to strategise how AI could inform an artistic work, both in terms of the concepts from AI that could be explored through the work, and how AI tools could be explored to realise the work.

In terms of AI concepts, we aim to challenge mainstream ideas of AI, such as the emulation of human neural pathways as the method of creating new intelligences. Instead, we take a collective view of intelligence. Through a ritualist frame, the spiritual and social dimension of AI is questioned, and machine learning reconnected with ancient patterning techniques. In terms of tools, a wide range of technologies have been branded as AI. Accordingly we have explored a range of techniques, with some focus on machine learning, machine listening and neural audio synthesis.

The group, initially working under the moniker "Pattern In Between Intelligences" was formed in September 2020. Through a phase of prototyping, various ideas were trialled. We began with an ideation phase, where we expanded further what our ritual could look like. By treating intelligence as collaborative, we undermine the dualist thinking of body/mind as well as science/fiction, and open ourselves for a more human-centric approach to AI, in terms of pattern generation and recognition and connectedness, but also resonance, textility, perhaps even spirituality. Inspired by public ceremonies and formalistic celebrations performed by humans since ancient times, the final performance hosts a collective, healing ritual that searches for a new spiritual code.

[Add an image from the prototyping phase]

2 [Background] Establishing rituals

An ephemeral shift at the end of the 19th century saw advancements in science and technology that provoked interest in mystical practices, rituals and spirituality – sounds emerged from mysterious boxes, light could appear inside a small glass bulb, photography and cinema. Discourse in occultism augmented as an antithetical practice to the emerging technologies of the era.

Our contemporary relationship with mediating intelligence has led us to once again explore esoteric practices to decipher wider meaning from our developments in AI. People are turning to AI in a monotheistic way in the same way that earlier generations formerly turned to religion. Musings on AI in the media are mostly prone to using the singular noun "an AI"- resonating with Western monotheistic cultural practices.

In the ritual that we established, we aim to turn the singular noun variant of "an AI" into its counterpoint- "artificial intelligence". An intelligence that is not centred in a small plastic case, or a human or animal body, but instead as something animalistic, distributed across many spirits and all encompassing.

3 Live data flows and time travel

Throughout our project we have jumped between imagining rituals and creating technical systems, with it not always being clear which is which. For example, as collaborating e-textile, live coding and performance artists, working together required us to establish meaningful dataflows and protocols for collaboration, which we could also characterise as channels for carrying resonances between us.

The development and refinement of these custom technologies was crucial in establishing the way we could interact. A core problem was how to connect moving bodies with comparatively static actions of live coders, typing at their laptops. With battery-powered, e-Textile sensors capturing movements and interactions with the textile surfaces, and wireless networking acting as conduit, several problems around how to interpret and respond to the data flows remained.

We focussed on our technological constraints as creative material, and one such constraint was the delay or latency in our systems. There were several steps in the processing and transmission of sensor data, starting with the sensors themselves and the use of machine learning in reducing the sensed dimensions. The most significant cause of latency came from our use of the TidalCycles live coding system, however. By default, for compatibility with low-powered hardware, Tidal adds a delay of over 0.2s. This can be tuned to be much lower, but further significant delay comes from the way that Tidal events are placed on metrical cycles. In summary, both due to inherent delays and the way we use Tidal to generate patterns, there could be a delay approaching half a second before a live coder's work could connect a sensed movement into a sound triggered by it. Human perception is tuned to the speed of sound (**chafeEffectTemporalSeparation2010?**), so that any delay between seeing an action and hearing the result is perceived as distance. Such a half-second delay therefore translates to 171.5 metres, significantly dissociating the movement and the result.

We creatively worked with this delay in two different ways. One approach was to use the sensor in ways other than triggering sounds, which can in any case be perceived as too direct, and heard as 'mickey-mousing'. When applied to pattern transformation or synthesis parameters, the movements shaped the music in a less direct but still fundamental and tangible way. Another was to reduce the latency for the interactions that did not involve live coding. For example, sounds triggered from sensors placed on the faces of the four performers were directly translated into sound with a custom Python code according to simple 'counting' patterns.

However for live coding interactions, we found a different, and perhaps counterintuitive approach to working with live sensor data. Rather than minimising the delay, we instead explored increasing and compounding it. This relied on ideas of patterned repetition and resonance that were already a recurring theme in our discussions and collaborative work. For example, where the piece worked within a metric cycle of 1.4 seconds, and we found a latency of 0.4 seconds, to keep everything in time, we simply had to delay the signal for an additional 1 second. On top of this we added additional data 'echoes' of additional cycles, by applying a cycle-length delay line to the data signal, with feedback. As a result, repetitive movements fit perfectly to the metric cycle, and built up and dissipated over time with the introduction and breaking of the repetition.

4 E-textile Sensors and magic spells

4.1 Precision and Abstraction

E-Textiles create soft and flexible sensors that are worn on the body to sense movements. For this performance, we explored e-Textile pressure sensors made of Eeontex stretch resistive fabric to sense bend and stretch of garments caused by body movements. Embroidered capacitive sensors were also used to detect touch or fold of fabric surfaces. In early prototypes, we focused on pressure sensors placed proximate to the body, for example embedded in tightly worn, stretchy clothing, to detect bend/stretch movements of the performers. We used a Bela mini board which allowed us to read up to 8 analog sensors per performer and 1) directly trigger sound from a single sensor data, 2) process multiple sensor data with machine learning to be used as certain pattern and synthesis parameters. E-Textile pressure sensors placed proximate to the bodies capture precise movements well enabling the system to recognize repetitions. However for the performers, these sensors create the notion of "activation points", which tend to become unwanted frameworks when choreographing new movements. In the later prototypes, we moved on to use conductive thread embroidery on large textile surfaces (140cm x 280cm, 140cm x 140cm) which function as capacitive touch sensors . We used them as 1) direct trigger of a sound, 2) to create data patterns that influence live coding patterns. When used in this way, the textile sensors capture relative positions of the textile surface with the performer's body. When the data mapping is indirect with the

sound outcome, we observed that the onlookers are likely to misunderstand the correspondence and it tends to give an impression that they are not interactive. Currently we are evaluating above e-Textile sensor designs to decide for the final design strategies, including how we use the data in the live coding processes. ## Machine Learning and e-Textile sensors In our first prototype, we used eight e-Textile pressure sensors on performers' bodies capturing every 40 milliseconds, streaming the data simultaneously. These raw data are difficult to use as control parameters, while one needs to monitor many sensors at once to make sense of the incoming information. Reducing the dimensions of data to necessary numbers using machine learning became our practical solution. E-textile sensors often show hysteresis and wear-and-tear during the performance and require one to make fine tuning as it proceeds. Instead, assigning posture as pattern of data and training the machine learning system reduces the necessity of manual tuning. We observed smoother and more intuitive interaction with the interactive system ### Materialising AI-Generated Images We used *Disco Diffusion* AI image generator (https://colab.research.google.com/github/alembics/disco-diffusion/blob/main/Disco_Diffusion.ipynb) to produce series of images with prompt texts composed of keywords taken from the conceptual investigations, in order to create pattern design for large scale digital print fabrics. Although a human designer created input prompts, reference styles and an initial image to influence compositions and the colour scheme, the main "drawing" of the pattern is made by AI. Generally, AI-generated images make mistakes in continuity of the space or geometry, which work against the overall composition. Sometimes it generates strange associations of image with prompt texts, that gives us a new, creative idea or sensation. It is like a deformed mirror that reflects our interpretations and associations of things. These AI image generation tools can produce many variations of images in a relatively short time and can inspire the creative process of a designer. But in the end, we found this is not a 'hands-off' process. A human designer needs to create her/his own interpretations and compositions for these images, through hand-editing and collage, to work as an artistic piece. In this sense one can say "artificial intelligence" is a powerful creative support tool for us humans to make use of, but it is not creative on its own.

4.2 Sound

Rave including the struggles Adding the livecoding looper? Live input from the voice face sensor > python > superdirt

[UPdate diagram and add here]

The sound that was made during the performance was done primarily using the TidalCycles software (**mcleanMakingProgrammingLangu** for creating music using computer code as the artistic medium. The live coders- Alex and Lizzie- were listening and responding live to the sounds created and updating their codes in response to each other.

In the opening, before the arrival of the drone, face sensor data was used sending via the zmq protocol. In this, the sensors' were thresholded so that the movement of the face would lead to different sounds being triggered. Each performer had a set of sounds associated with their sensor. These sounds were generated from an AI model (a Neural Audio Synthesis model called RAVE) that was trained based on the performers recordings of their voices and reconstructed by the model.

During the performance, live vocals were also used to pass to a real-time version of the model (implemented in the PureData software), which allowed us to manipulate the voice of a human performer and reconstructed as a synthetic voice.

We also received the data from Mika's textiles on Alex and my computers via the zmq protocol. This data from the textile was then used in different ways. Both Alex and Lizzie used the data from the textiles separately, to control different parts of the sounds. For example, the touch of the textile could be used as a variable within the code, to control the speed or pitch at which sounds were played back, making the relationship between sound and gesture apparent to the audience.

4.3 Staging AI

As we started off with responding to the call for AI in creative practices, we looked into how we can incorporate AI technology in our collaborative works. We often discussed whether we treat AI as a tool or whether it plays a role as a subject matter. Here are some other discussions we explored: - AI as a difficult theme/subject matter - AI is widely discussed and criticised in our society, and we have certain expectations of AI technology, such as what we see in science fiction. This makes it not easy to stage AI if you do not want to "fake" the technology, especially in a non-text based (i.e. not narrative theatre) performance piece. - AI tools accessible for creative coders are limited and do not live up to what we know from popular science. On the other hand, we do not want to make the piece as a cutting-edge technology demo. We do not want to be an artistic 'sweetener' for the newest AI technology showcase, but how do we meet the expectation of what we imagine as AI? - Fighting with expectation of "stage magic" - for spectators, everything that happens on a stage is a spectacle. How do we show/not show the technology behind our work, especially when technology is a subject matter? Our response to this is framed by our artistic team including proponents of live coding, open source and open hardware - how can we be open about our work when AI is so associated with mysterious 'black box' technology? - One challenge is the distinction between live composition and audience attention and engagement. How to keep the action fresh and spontaneous while at the same time keeping the attention of the action focused? In a way AI technologies have more agency to make decisions live on stage but these decisions are barely noticeable unless you fall back to explaining them.

In the following sections, our attempts to tackle some of the above issues are described in detail.

Maybe we could all have a short reflection on what artificial intelligence means/could mean for our disciplines ++ what we see to be "intelligent" behaviour of a machine/computer/spirit?

5 What is "artificial intelligence" to pattern-makers?

((A definition of artificial intelligence . . .))

Artificial : made or produced by human beings rather than occurring naturally, especially as a copy of something natural
Intelligence : the ability to acquire and apply knowledge and skills (New Oxford American Dictionary (what is on mac osx))

The term "Artificial Intelligence" is notoriously problematic. The word 'artificial' suggests that a human-made machine creates artifice, but in that case, why don't we say that a fan motor creates an 'artificial breeze'? If we consider a heritage technology such as a floor looms for handweaving, they are so culturally situated that you would never say that the textile produced using such a machine is 'artificial'. As a group incorporating creative live coders, likewise we would never say that the work from our collaboration is in any way 'artificial'. The word 'intelligence' is perhaps even more problematic, when the history of measurements of intelligence (IQ tests) is wrapped in the racist ideology of the eugenics movement, what can we consider as "knowledge and skills" and what it means to "acquire and apply"?. Intelligence generally implies a separation from the mind and body as the definition in the dictionary already illustrates: as if the skills of bodily action are outside of the knowledge acquired in mind. While we should be careful in over-romanticising the history of handcrafts, we nonetheless argue that situating intelligence in craft practices demands a less dualistic approach, rather seeing intelligence of mind as inseparable from the intelligence of the body and indeed the collective intelligence of a community of practice.

So while we incorporate contemporary tools in our systems that overtly describe themselves as AI and ML (machine learning) technologies, like dimensional reduction algorithms, pattern recognition systems and neural audio synthesis, one of our background interests in AI is in its relation to the 'heritage algorithms' of traditional pattern-making, in music and textile. In essence, many traditional approaches to pattern-making are a form of computational creativity. For example in weaving, the tie-ups of shaft looms combine binary sequences through matrix multiplication to create complex, three dimensional structures from simple treddling patterns. This creates very rich creative ground, supporting a traditional and continually evolving practice that still finds new structural techniques despite the technological development over millennia. This human-driven, computational pattern generation is a clear analogue to pattern recognition techniques in AI. A longer term challenge for our collaboration that brings together dance, e-Textile and code artists/technologists is to find ways to develop new technology that is respectful and (to some extent) literally interwoven with such heritage technologies, to create a properly grounded approach to AI.

6 Sheffield prototype: Patterns In Between Intelligences

The first (and at the time of writing, latest) iteration of our live performance debuted at No Bounds Festival in Sheffield, as a prototype of the overall project. This performance provided the test bed to implement ideas in front of a live audience, and see how they shape the performance as a real-time feedback channel.

https://drive.google.com/file/d/1wL3cPEFlNi9IBxypkyLWHKi7kb9UDbPd/view

This performance can be considered a site specific piece, as we brought together these elements but staged them specifically to achieve a close interaction with an audience that was present in a big church. Staging refers to the composition of the different elements and disciplines to achieve a whole thread or narrative based on the experience of the audience. In this case choreography with body movements and gestures, sounds and text produced by the human voice, and the overall hints at a stage situation were the main staging of the bodies and the objects. At the beginning the audience gathers in the church after purchasing their tickets and some drinks, the initial expectation of this audience relates to the specificity of this event and the location (an electronic music festival and a cathedral). The space was lit with cold light, but given the dimensions of the cathedral the background and surroundings of the center was very dark, hinting at the magnitude of the building. There was no sound, just the chatter of the audience was hearable. In the brightest part of the space, the area inside the columns, we see a textile hanging from a tripod, and some folded fabrics of a color similar to the floor. In the edges of this space and behind the area inside the columns we see other tripods, a desk with the sound and light technicians, a stage, as well as all the symbology and paraphernalia of a church. At some point a woman dressed in black with a sensor on her face and a headset microphone stands next to a group of audience members, gets close to them as if she was one of the visitors of the festival, she opens her mouth, triggering a loud voice sound that interrupts the silence, echoing throughout the cathedral. This sound disruption made the overall volume of the audience chatter lower for a moment, most of them were not aware of where it came from, it might just have been a sound checking error. The woman moves slowly within

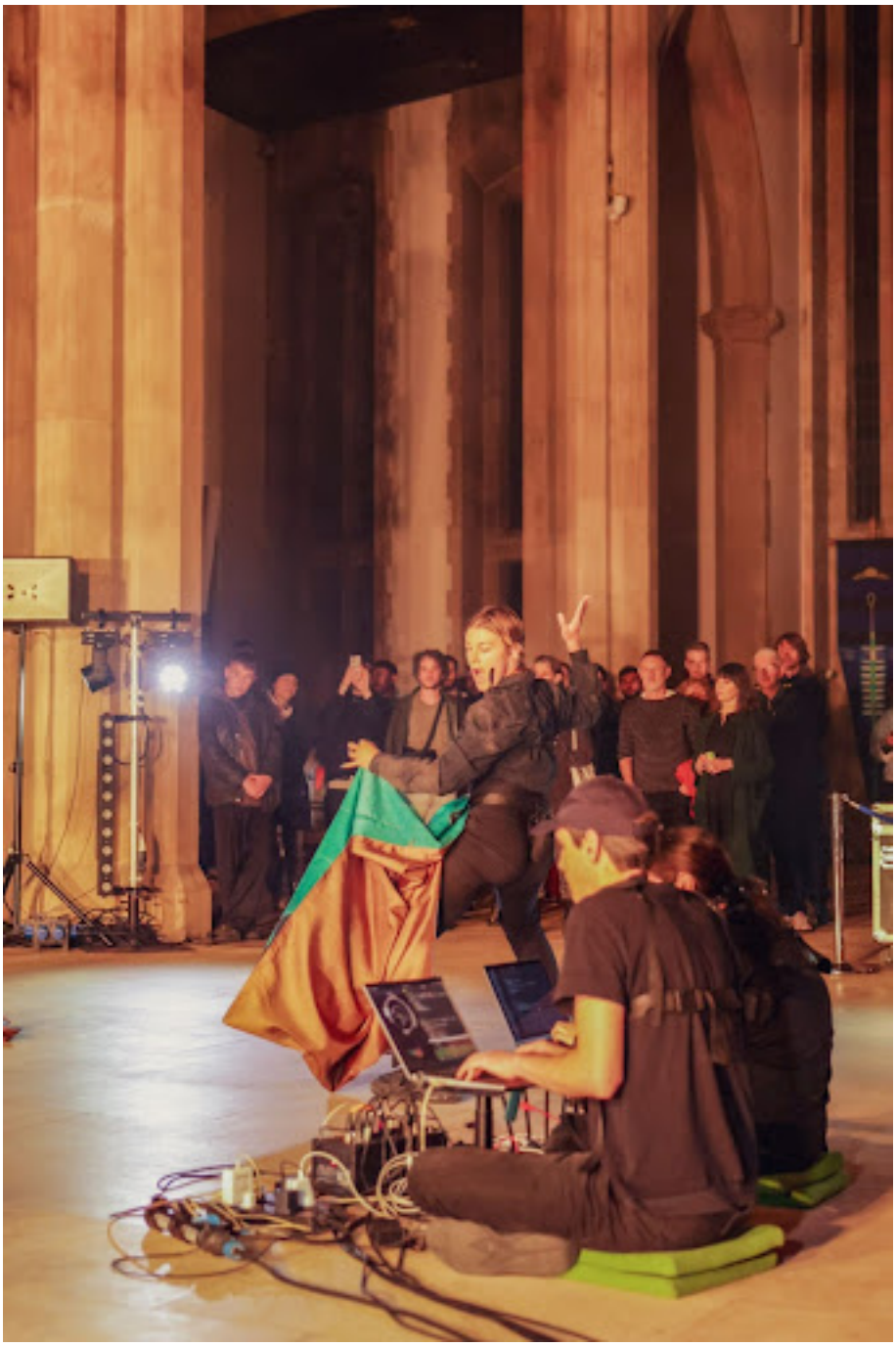

Figure 1: Performance of “Patterns in between intelligences” at No Bounds Festival, Sheffield

the group of audience members, some of them notice her presence. She suddenly opens her mouth again a couple more times, triggering the loud sound again. The overall volume of the chatter lowers and at some point the audience knows that something started, changing the mood in the space. At this point though, not everyone knows what is going on, as the woman is very much one of the many bodies present in space. She then goes next to a column and most people get to see how when she opens her mouth a sound is produced in the whole space. At some point other bodies, also wearing black clothes and face sensors join the space, some of them are next to the columns others in the background. At this point the sounds being produced happen more often and the relation between the gesture of some people wearing black clothes and sensors on their face becomes clear. The sounds voice recordings as if they were snippets of someone talking, murmurs, gibberish, and they repeat independently of who opens their mouth. The people producing the sounds gather next to the column of the space and at the distance they exchange looks, as if they were playing with the timing of when to open the mouths and produce sound, but also as if they were communicating in some way. They change positions and create different constellations, sometimes two of them come closer, sometimes they observe from a distance. The accumulation of the voice sounds becomes more and more present, but their gestures are simple and it contrasts with how they move around and space. It is a very mechanical and minimal sudden mouth movement. Then they gather next to the hanging fabric and the sounds and mouth movements become faster, as if you see a group of four people discussing something, the sounds they produce, these voice snippets overlap and accumulate filling the whole cathedral. Two of them then sit on the floor next to the laptops visible in the space and start typing something. The other ones do some more of the mouth opening gestures but now the way they walk and their interactions involve going towards each other and creating a spinning trajectory, walking and facing each other while they produce the sound. They smile and share a complicity between them as well as with the ones sitting on the computer as if they were plotting something in that space. At this moment somewhere far from the dark a buzzing sound is heard and from behind some of the audience out of the darkness we see a person wearing some kind of robe and holding a string attached to a small drone. The drone flies over the audience into the space and behind the columns and the person holding it looks very concentrated at it, sometimes the drones pull this person and they follow, other times it looks like the drone comes to them, you can't be completely sure who is controlling who. The person enters the area inside the columns and the drone goes to one of the folded fabrics on the floor, the wind it produces unfolds part of it and the attention of the other performers seem to be directed at that moment. The initial surprise of this figure that entered the space with a drone, wearing an outfit that is not black clothes and the fact that while the drone flies over the cloth, transforms this surprise into an intrigue and curiosity of what are these cloths that have been laying down all this time and a curiosity of what other figures might appear from the darkness of the cathedral. The figure with the drone leaves in the opposite direction, she takes off the robe and disappears behind the space into the darkness. A subtle sound is heard and still some of the voices from the beginning. At this point the woman that first appeared has all her attention directed towards the fabric on the floor and slowly walks towards it. She bends down and starts to unfold it, extending it on the floor. We see an image, similar to the one hanging on the tripod but in a different color. She looks at it and then kneels down to touch it and when she touches it a distorted and loud sound is heard. She caresses the fabric and the sound changes in accordance to how she moves her hand over the surface of the fabric. The sound also stops when she takes her hand away. She looks in different directions, reacting to something that happens every time she touches the fabric, and she whispers some text as if she was talking to someone in the darkness or as if every time she touches the fabric it makes her speak. We just cannot understand what she's saying because it's fast, it's being whispered, and the sounds (the background sound, the sound produced by touching the fabric, and the occasional voice sounds of the sensors grow louder and louder). The intensity of this interaction grows together with the movement of the person, the intensity of her whispers, and the intensity of the sound. While this is happening in the background one of the four bodies with the face sensors looks at this action and sees a fabric folded next to him. He approaches it and unfolds it, maybe inspired by what the other person is doing or maybe out of curiosity. We get a glimpse of another image in the fabric but this one is never fully extended on the floor. He then proceeds to wrap himself with it, wearing similar to the figure with the drone but never fully wearing it properly. He seems to be struggling with it, he seems to be feeling its texture, he seems to be stretching it around himself. His movements become more erratic and it looks like by wearing the fabric the way he moves got transformed by it. He is more in the background, in the space behind the columns, close to the audience. His gaze is directed towards the horizon and even though he gets very close to some audience members and in the outbursts of his sudden movements almost hit them, he is not really present but addressing something else in the space. He also moves his mouth as if he was mumbling something but he doesn't whisper like the other person. His movements grow more intense and erratic, as if being controlled by the sound, he goes inside the area of the columns. We see both bodies grow in intensity, the woman just opens another fabric and the whispering transforms into voice and body glitches. The sound intensity keeps on growing, it accentuates the speed and scope of the movements of the bodies (which also gradually grew) but also you are not sure if they are following the music or if it's their bodies and the fabrics controlling the intensity. This moment grows and it becomes darker, from the repetition of these sounds and the movement vocabulary being repeated, the musical buildup becomes an intense techno moment. The two bodies that were interacting with the fabrics start extending all the other fabrics on the floor, revealing the images on them. Two other persons, one of them the drone figure, hang the remaining fabric on the tripod outside of the area with columns. The situation of how the bodies interacted with the fabrics, the whispers and the movements, as well as the kind of music they were building together transformed into a regular and repetitive beat and the space transformed into a display of a series of huge images, each one in a different color scheme and containing different figures, maybe related to the bodies we have seen. The two performers that extended the fabrics and have been interacting with them start doing a

repetitive movement on top of them, spinning their torsos and arms and heads in synchronisation with the beat. Once the audience sees all the images and also supported by a stroboscopic light they seem to have entered a trance, enhanced by the techno as in a rave. At one point they collapse against the wall and move in slow motion against it. The audience gets the chance to appreciate the whole composition that all the fabrics produce together and the space becomes a club or rave space. One of the bodies gets stands, the loud music suddenly stops, and he approaches the audience and addresses them. He talks directly to the audience, very fast nd in close proximity. He says the following text: "I see mystical patterns amongst the noise. What is behind it all? I see five archetypes. I see the new age possessed jester of ai. I see the machine learning weaving of ancestral knowledge. I see the mother performing neural endurance rituals. I see the synthetic choir queen of information technologies. I see the pagan data center workers ritualizing spiritual cables. I see these five archetypes, and there is something behind them. It's like a bill. The worth is in the image printed on it and not in the paper itself. There is an intelligence behind all this! There is, there is! But who's responsible for it? It's not about the content, it is about the context." You nevertheless cannot fully understand the content of his speech because it is very fast, he interrupts the amplification of it by opening his mouth, triggering the sound of the sensors, and he repeats some of the sentences, strangening the way the audience perceives the content. It looks like an attempt to explain what has just happened but distorted in such a way that it becomes more like a repetitive sound similar to the techno music that was just heard. The other body who is still laying on the floor starts to accompany this speech cacophony by contrasting it with a repetitive and slow singing in a high pitch. The voice seems to be distorted, we then realise that everytime she sings other voices appear through the amplified sound, since no one else is singing. The man talking leaves, continuing to talk but fading out in the darkness of the cathedral. The person singing also approaches the audience and sings close to them, we realise, in the proximity that there is a relation between her voice and the amplified voice intervals from the amplification. At one point she also leaves into the darkness. Her voice is still heard in the space in repetitive tones. After she leaves all the other music is also gone and her voice stays like a mantra. The people sitting on the laptops stand up and leave. We are only left with the voice and the emptiness of the room. After some cycles and repetitions we appreciate the emptiness of the room and the fabrics hanging or laying on the floor, we see other audience members staring into the space, and due to its length we revisit what just happened and how the initial space and situation transformed. At some point the final repetition of the mantra happens and the lights go out, leaving the audience in complete darkness.

(if we refer to this prototype particularly, we could explain the rough outine of the performence?) - 4 performers with a face sansor each. mouth movements triggering one voice sound. - scored movement by 2 performers - drone - narrative of choosing fabric, oracle? - scored movement, a performer "reading" the fabric - scored movement, a performer moving in pattern with touch sensor fabric - speech/ glitch - rave, climax of the performance, burst of movements by 2 performers and live coded sound, improv (?) - recede to the end.

6.1 Reflections

Some of the overarching aims of this project include:

Framing AI as a traditionalist and/or esoteric practice rather than a rationalist one from 'cutting edge' technological practices. [Technology etymology, from Teckhne – meaning art and crafts] To critique AI being used as a hegemonic God within society [remove this one?] Attempting to make a distinction - Are systems artificially intelligent or artificially intuiting? The former needs an appeal to consciousness. Is AI mapping the old boring mainstream and broken world? If we want to open new vistas we need to feed data/images about the world we wish to create, not the one we are trying to shed.. Emphasises Haraway's situated knowledge - the ideas that truth/knowledge is subjective and dependent on the lived experiences of the knower. [This was not discussed but have been doing some writing on this recently within the context of AI and actually found it relevant to this project]

6.2 Collective intelligence: Cross-displinary and Collaborative Working

How can interaction with textile work as live coding? One of the challenges in this project is how to connect live data input from multiple performers in the live coding process and still make sense as a performance. We tried several approach to explore what makes it feel intuitive and expressive for performers involved, live coders on the real-time production side, and the spectators who do not have the knowledge of the technology behind.

In this project, we encountered issues of how live stream of movement data could be imcorporated in live coding processes. (ok, i notice I can not just write nice sentences... so I make bullet points instead...) - live input from performer » timing issue, one does not know if what they are doing is effecting something, - is this sensor working? » feeling of delay or randomness. how do one understand the mapping of interactive systems - tech demo? or aesthetic? » obvious interaction vs. complex interaction. how do we make balance between so it stays poetic but understandable? - chicken or egg? » who gives the cue to creative decisions? rules given by coders/ design of interface/ choreography and physical performance/ improvisation and liveness. how do we all contribute with creativity as one coherant piece?

we try to discuss how we cope with these issues in our prototype performance process, or afterthoguths on these... and how we plan to proceed for the final piece production. (ok, this will be great, if we could do this

7 Toward a collective view of intelligence

- comparison to swarm intelligence, like flocking algorithms. » Neural network is also a type of swarm intelligence (**can we say this?), each participatns of the performance, the performers, live coders, sensor makers collectively create data patterns that emerge. it is up to us to define if this unique pattern is an intelligence or a mear random dots.
- we see the current AI technology and narrative around AI being top-down and technocentric approeach. we use the esotericism/ occultism as our narrative vihecle to critically jaxtapose the two AI approeaches.
- the question still remains: how do one work with technology like AI in artistic context, so that it is understandable and meaningful to their audience? How can one even propose alternative idea or criticism in technology topic? (here, i need some reference or research I feel)

8 References