ALIVE MACHINES

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CONTEXTUAL REPORT

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FIGURES

INTRODUCTION

"First, you build the machine, then it tells you what it's for."

-Catherynne M. Valente

The purpose of this research is to explore the ways in which we can avoid dualities of human and non-human entities and assign agency to the co-performers through the lens of dance. Located in Donna Haraway's notion of cyborg, that will be described in the following chapter, this project is opposed to dichotomies, such as nature and culture, concrete and abstract, human and machine. Experimenting with creative techniques, this research questions what impact this context has in the contemporary performance scene.

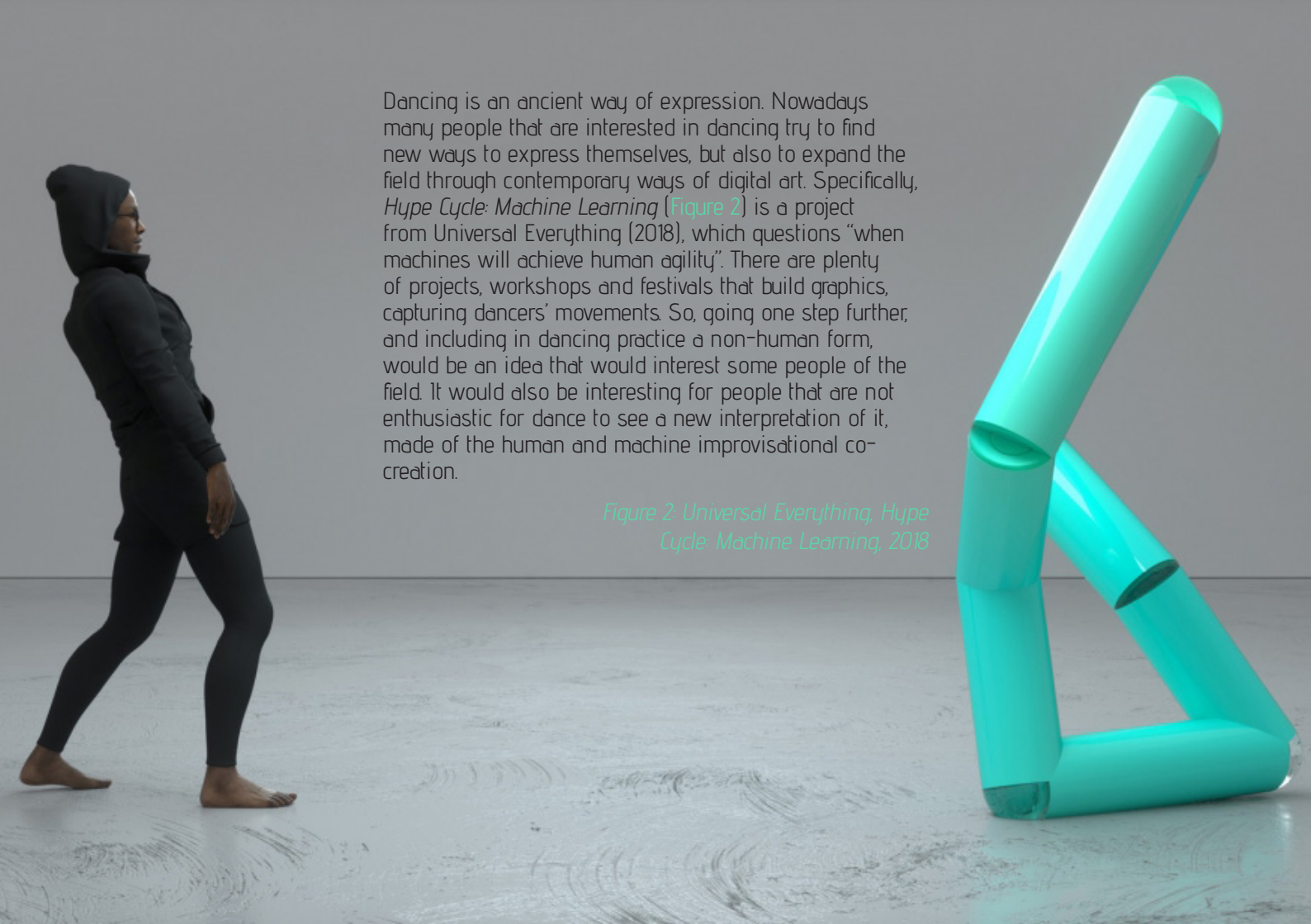
The title of this report represents the position that there is an inherent liveness in the machines. The design outcome of this research is going to be a performance from human and non-human entities. The performance is located in the method of artistic practice, that has a long-term history. On the other hand, the notion of the cyborg is a more recent term, which is not related to the performative arts field. This research investigates the possibility of collaborating this method with this field and raise further questions around these concepts. Can we collaborate with a robot to dance and improvise? What is the robot's role in the performance? What is its aesthetic? Can we learn with and through them?

My research is a speculative exploration of the future of human-machine collaboration through the lens of performance. I try to speculate about "how things could be - to imagine possible futures" (Dunne and Raby, 2013). In my concept, the boundaries between the man and the machine are blurred. Many people support that machines and computational systems cannot be creative, but I want to question and debate this norm, trying to find the metaphorical and philosophical components under the machines and its movements. Posing "what if" questions, I am trying to discuss the future of dance and the relationship that it could have with non-human forms. Dunne and Raby (2007) have also developed *Technological Dreams Series, No1, Robots* (Figure 1), based on the idea that "robots are destined to play a significant part in our daily lives - as technological cohabitants". In this research, I am trying to open up space for discussion and speculate about an equal relationship between a robot and a performer.

Figure 1: Anthony Dunne and Fiona Raby, Technological Dreams Series, No.1, Robots, 2007

Dancing is an ancient way of expression. Nowadays many people that are interested in dancing try to find new ways to express themselves, but also to expand the field through contemporary ways of digital art. Specifically, *Hype Cycle: Machine Learning* (Figure 2) is a project from Universal Everything (2018), which questions "when machines will achieve human agility". There are plenty of projects, workshops and festivals that build graphics, capturing dancers' movements. So, going one step further, and including in dancing practice a non-human form, would be an idea that would interest some people of the field. It would also be interesting for people that are not enthusiastic for dance to see a new interpretation of it, made of the human and machine improvisational co-creation.

Figure 2: Universal Everything, Hype Cycle: Machine Learning, 2018



My personal interest in this project is multidimensional. First of all, I am interested in performance as a way of embodiment expression for my practice. Secondly, in terms of implementation, I find it very challenging as I want to explore new techniques for kinetic art that include sensors and sound. I aim to locate my work in a performative practice that allows collaboration of people -performer and audience- with a machine in an exhibition space. However, this research is also focusing on researchers, practitioners and choreographers that are interested to include in their work aspects of choreography and dance into the new complex, embodied and physical forms. For instance, Motion bank, Choreographic Coding Lab and Node Festival, that deal with the subject of digital simulation of dancing, could be interested in looking into robotics forms in dancing performances.

This research is based on primary and secondary research in the ideas of complex relations between hybrid entities, embodied intelligence, materiality, agency and interaction of the participants. It starts from secondary research into the literature so as to find interesting insight in concepts and frameworks that I want to be based on, but also in other case studies that I want to analyse and criticize. Then, I conduct primary research through experimentation and testing so as to support my analysis.

The research starts from the literature analysis with the frameworks of cyborg and naturecultures from Donna Haraway, and it tries to synthesize new ideas and relations for the human and machine co-creation. It discusses ideas of multiagency from Actor-Network Theory and the role of the posthuman that comes from Kathrine Hayles and speculates for an automate agency for dancing survival and development. Then, it refers to the concept of the materiality and the embodied forms of the medium. Finally, it explores the forms of interaction that I would like to experiment, through the theoretical framework of animistic design by Betti Marenko and Philip van Allen.

Except for the literature texts, the research is looking into specific case studies that express human-machine co-creation or the potentialities of machine randomness. Analysing and criticizing four other projects I want to find the strengths and the weaknesses that I could use in my own practice and that can create a tool for other practitioners. *Black Flags* by William Forsythe is a dancing performance by industrial robots that debate the traditional choreographic thinking. André and Michel Décosterd's *Nyloïd* is a performative installation from a robot that is characterized from assigning unpredictability and machine agency, creating a narrative of a living object. *Motive Colloquies*, created by Ruairi Glynn and other practitioners,

investigates a speculation for hybrid environments between living buildings and human beings. Last but not least, Sougwen Chung creates the drawing performance *Omnia per Omnia*, which explores the potentialities of co-creation between the human and the robots, sharing equal roles and multiagency.

In my practice, the methods that I will use in order to develop these theoretical ideas into practice have been analyzed by other designers and practitioners. In the book *Design research through practice*, the construction takes place with a prototype, a scenario, a mockup, a detailed concept. "The interesting thing is to explore an issue, to figure out how to turn it into a project, how to turn the project into some design ideas, how to materialize those design ideas as prototypes, and finally, how to disseminate them through exhibitions or publications" (Koskinen et al., 2012). Starting from experimentation in design concepts, my work is going to be presented in an exhibition place and will try to criticize, speculate and debate the norms of human-machine co-creation and the possibilities of multiagency, so as to make people think and discuss all these ideas. It is an important part of the effectiveness of this research to evaluate how people will interact with the final performance and what their feedback and reactions are for the 'alive' machines.

there is an inherent liveness in the machines

CONTEXT

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Homogenity in human-machine co-creation

In 2018 the distinctions between the brain and the body, or the human and the machine have been questioned and do not represent antagonistic concepts anymore. A characteristic example of this norm is the *Omnia per Omnia* by Sougwen Chung. In this hybrid performance, we can clearly see that a human being collaborates with her robots in order to draw. There is no any competition and duality, but only homogeneity in co-creation. This and other similar projects raise further questions, like how we will interact with non-human forms and what new interdependencies and relationships might exist.

This research is built on Donna Haraway's frameworks of cyborg and naturecultures. Haraway discusses the reconfiguration of nature, to show the complexity of nature and culture, or body and mind, human and non-human. In this research, we also deal with the complex relationship between the human and the machine performer. Each of them is faced as a cyborg, "a cybernetic organism, a hybrid of machine and organism, a creature of social reality as well as a creature of fiction" (Haraway, 1991) (p. 149). Escaping these universal categories and distinctions of woman and male, or body and mind, the cyborg creates its own identity, allowing multiplicity and contradictions.

Having this in mind and looking in multiple agencies, I want to design and develop my own work, not through this dualism of human and machine, but through the prism of the cyborg that I am, my machine is, and my audience is asked to be. We are all cyborgs in today's society, and with all the advantages and disadvantages that this entails, we should try for survival and development.

Kathrine Hayles (1999) also supports that "humans displaced as the dominant form of life on the planet by intelligent machines" (p. 283) and there is need of dynamic partnership between these human and non-human actors. In her book *How we became Posthuman*, Hayles is referring to many other writers about this posthuman idea. For example, Veronica Hollinger expresses the idea of deconstructing the human-machine opposition and focuses on the techniques that we could use in order to produce a mutual evolution (Hayles, 1999) (p. 264). Ihab Hassan predicts the arrival of the posthuman, and Hayles claims that we have always been posthumans (Hayles, 1999) (p. 274-279). In the partnership concept that I am trying to create, I want to give the people the opportunity to think about our evolution and the posthuman philosophy, and as a result to face the machine as an

intimate component, a heterogeneous force and a friendly self.

However, no matter how these people try to undercut dichotomies, "technology cannot replace the personal bonds that tie humans to humans, humans to animals and humans to their own ownsenses" (Hayles, 1999) (p. 278). Kevin Kelly (2014) – a technological determinist, has a different view from Kathrine Hayles, as he sees technology as a near-living system that determines what it wants and drives social evolution. He argues that we should align ourselves with technology's needs in order to prepare for the future. The truth is that we cannot be sure if this technological change is an evolutionary advance or a catastrophe. For example, *Uninvited Guests* (Figure 3) that created by Superflux Lab (2015) and focuses on a criticism related to domestic space, echoes that machines have not a collaborative and equal role with the human, but seem like they have enough agency to interpret the human needs.

Figure 3: Superflux, Uninvited Guests, 2015

the cyborg creates its own identity, allowing multiplicity and contradictions

Assigning agency to a non-human actor

The term "actor" is coming from the Actor-Network Theory (AT) and is related with three writers - Michel Callon, Bruno Latour and John Law - reaviling the complexities of our sociotechnical world. "An 'actor' in AT is a semiotic definition -an actant-, that is, something that acts or to which activity is granted by others. It implies no special motivation for human individual actors, nor of humans in general. An actant can literally be anything provided it is granted to be the source of an action" (Latour, 2017). This framework considers both human and non-human entities equally as actors with the same amount of agency within a network, overcoming with this way the duality between them. However, there are different views in the way that we face the technical objects. Georges Simondon (1958) (p. 12) supports that "On the one hand, it treats them as pure and simple assemblies of material that are quite without true meaning and that only provide utility. On the other hand, it assumes that these objects are also robots and that they harbour intentions hostile to man."

In my practice, I am not looking at the robot as a tool but as a creative entity. There are no distinctions and dominance, but collaboration and multiagency.

"Creative machines are capable to expand the script they are given by their human creator and skilful in bidding for the audience's attention, 'translating' software scripts into an 'experienceable' reality" (Gemeinboeck, Saunders, 2015). The cyborg expresses its creativity through movements, changing forms and shapes. It chooses to be slow or quick, to synchronize with the music or not, to jump, to rotate, or to kick, to relax or to explode. It learns from its partner and its partner learns from it. They work together or separate, organizing from internal or external stimuli.

Hayles is building on Haraway's theory and refers to the posthuman, an entity that may help humanity to survive and be developed. Additionally, Hayles supports that in the posthuman period "distributed cognition replaces autonomous will; embodiment replaces a body seen as a support system for the mind; and a dynamic partnership between humans and intelligent machines replaces the liberal subject's manifest destiny to dominate and control nature" (Hayles, 1999) (p. 288). Both Haraway's and Hayles' theories are based on the argument that we need to stop thinking of distinctions and look at more interesting and complex relations between human and

non-human. Cyborg impacts posthuman and vice versa. As a result, the future of dancing performances changes accepting other creatures and ourselves. We should leave behind the ideas of master dominance and the dualities of virtual and material, and we should accept the human and machine union, so as to survive and develop.

In her book *How we became Posthuman* Hayles supports that "in posthuman view, the conscious agency has never been in control" (Hayles, 1999) (p. 288) and asks really interesting questions that are important to take into account. "What if humans were made to function as if they were components of another entity? What if a computer behaved like a person?" (Hayles, 1999) (p. 251). The topic of agency is important in this context, as we don't know at the end who is going to be in control and if the individual agency will be possible. But the main goal is to experiment and ask these questions, targeting in a mutual creation from the actors and shifting the emphasis from ownership to more interesting relations and equality.

In this context, we talk about a speculation of assigning agency to the machines, as an extreme hypothesis in order to bring discussion. But the truth is that we create the machines and we make them move, imposing intelligence, creativity and other human characteristics. "It is not whether machines are intelligent [...] but whether computers can solve problems that have traditionally been regarded as requiring intuitive knowledge and creativity" (Hayles, 2005) (p. 142). We have the notion that if a machine acts cognitively sophisticated then it must be better than us. It is in human nature to engage with mediation and to appeal by human-like robots because of the uncanny valley phenomenon that described by Masahiro Mori in 1970. The graph (Figure 4) depicts this relation between the human likeness of an element and the perceiver's affinity for this entity. It is like children's confusion over the computer's aliveness. They know that they are not real, but they have the tendency to attribute them personality, because of the cognitive abilities of the computers to process information.

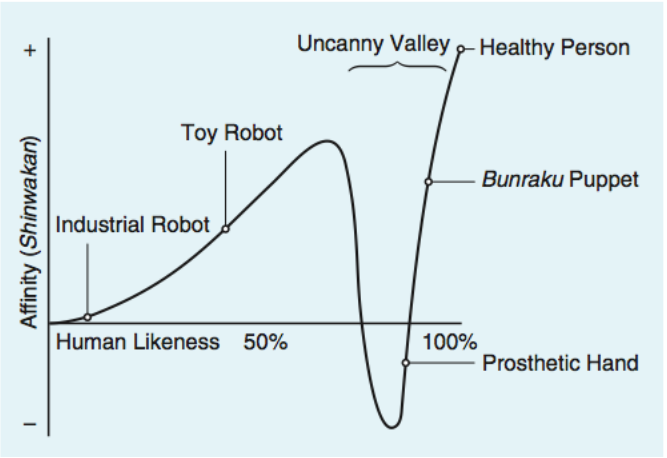

Figure 4: Masahiro Mori, Uncanny Valley, 1970

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Embodiment and Materiality

Hayles (1999) claims that there is intelligence embodied in cybernetic machines and this unfolds in different ways, contrast to human awareness (p. 284). She also argues that "embodiment cannot exist without the material structure" (Hayles, 1999) (p. 199). In other words, we need embodied creatures that enact intelligence, because there is superiority of the moving embodied robots, compared with the digital algorithms, which have no moving capability and are not able to discover their environment. (Hayles, 1999) (p. 199). Through this new ideology in dancing, the embodied experience changes. New material structures that have dancing qualities inspire the human dancers. Whoever participates constitutes an embodied informational entity. When these entities cooperate, they create a system. For example, both the human performer and the robot, create individual systems which observe and impact each other. These systems are also observed from an external system, like the audience, that is called to give its input in this performative co-creation.

In terms of embodiment and intelligence, physical devices can be constructed informationally open in order to choose the way that they will react to their internal and external conditions (1993), analyzing Gordon Pask's electrochemical devices and their epistemological implications, question "Could one construct devices that have the capacity to adaptively construct their own perceptual categories and their own means of influencing the world?" (p. 2). This old experiment hides a lot of interesting aspects that we try to explore in this research, like the importance of the physicality of the medium, instead of a digital algorithm in a screen.

Betti Marenko and Philip van Allen try to experiment with similar topic through animistic design. The animistic design is a research through making approach, that based on the uncertain and unpredictable tries to reimagine the interaction between the human and the non-human. "The notion of animism we propose draws on ideas of effect, agency (both human and non-human) and the material relationality of interactive ecosystems, thus moving away from the anthropomorphism." Following their one examples, we can allow the interaction to develop with a creative and unlimited process. The creative practice uses prototypes - design experiments, so as to communicate with complexity in an embodied manner, to raise questions and generate discussion between designers for alternative futures.

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Interaction and Unpredictability

So, "first comes the embodies materiality and then the concepts evolve through interaction with the environment" (Hayles, 1999) (p. 263), or other actants. Hayles also refers to the concept of randomness, which plays an important role in the evolution of complex systems and she questions for the kinds of the environments that are going to be created because of them (p. 286-287). Randomness is really important in the context of dancing and improvisation. This is one of the factors that create an interesting performance which is going to differ from one time to another, depended on the random choices and moods of the dancer and the robot.

I recently spoke with André Décosterd, one of the two creators of the *nTon* (Figure 5) and he explained to me that the five segments of the long rubber tube are triggered to move by the motors' movement that follows the twisting of the material. The choice of the motor to move combined with the random place and angle of the whole structure the specific time can create this unpredictable movement. In this way, they had an incident once, that the motor never triggered any movement and the *nTon* stayed stable, during the whole performance, like it was in bad mood, as André said (Décosterd, 2018).

The creature is surrounded by a group of human beings equipped with vocal prostheses. In this way, André and Michel Décosterd using their artistic practice, prove the theories of Hayles (1999), for "complex interactions within an environment that includes human and non-human actoras" (p. 288).

In the context of dancing performance, the robot, choosing its movements with a combination of inputs and randomness, can give inspiration to the human dancer, because of the combination of rhythm, posture and movement quality, that probably the human partner never imagined before. And on the other hand, this co-performance opens the possibility that the movements can be taken out of the human body and placed into a machine. It is a surprising discovery to take human's dancing qualities out of the body and put them into a machine, where they can manipulate in a way that the human had never danced before.

In the animism framework, the same norms take place, trying to reimagine interaction with objects and reformulating agential issues. "Animistic design focuses on experimenting with designed ecologies where the actors

engaged (objects, prototypes, humans, data and things) affect each other in ways that allow not only uncertainty and unpredictability to emerge but to capitalize on them as a resource to trigger creativity." In this way, the more agency we allow the robots to manifest, the more uncertainty and unpredictable they will show to be.

This idea of disturbing interaction and add unpredictability is really interesting for the design output of my practice. But as we said also before, the machines have not really the agency, because we construct and operate them. So, they are not really unpredictable as if we watch them carefully, then we can predict their complex movements.

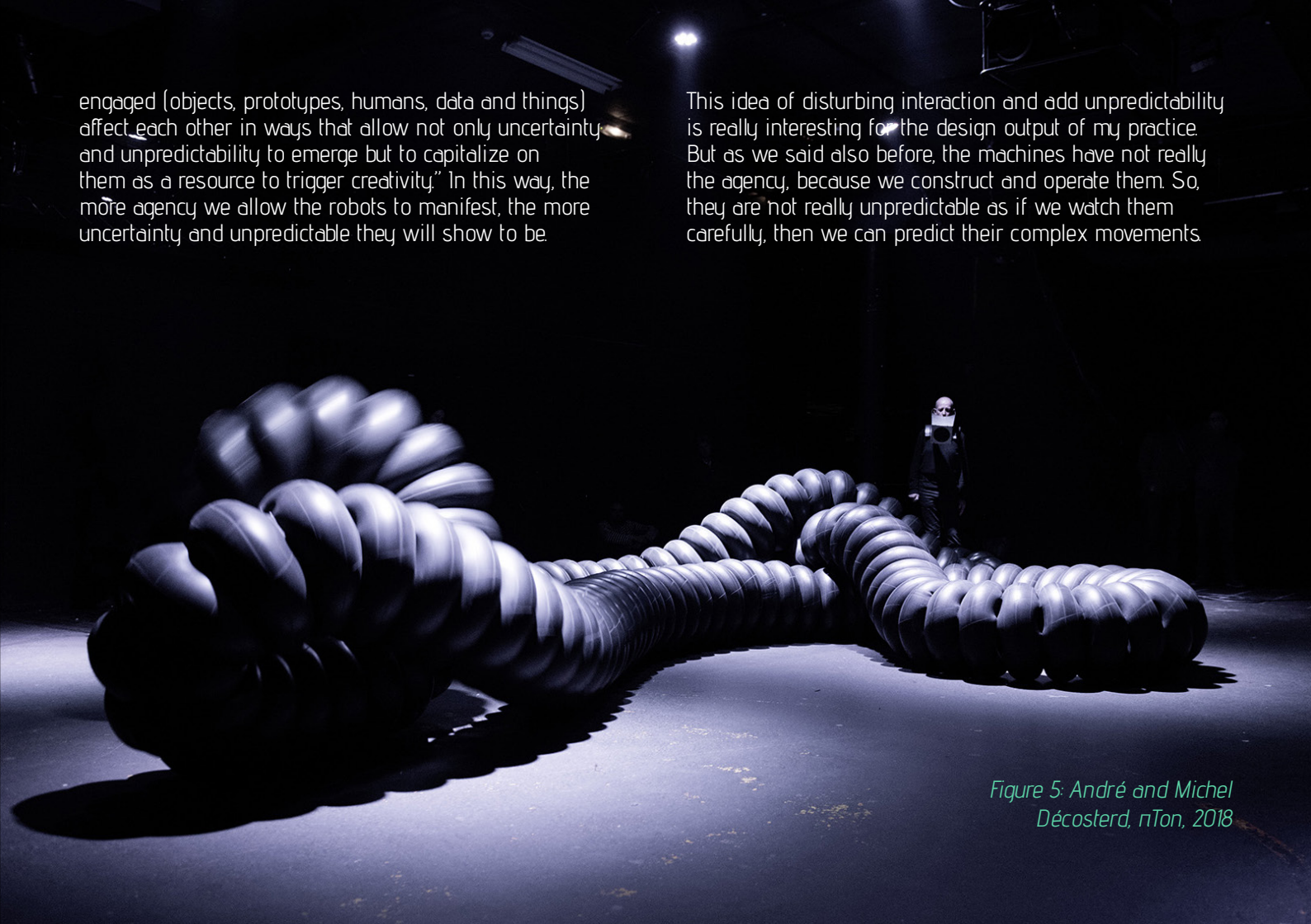

Figure 5: André and Michel Décosterd, nTon, 2018

unpredictable
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interactions?

CASE STUDIES

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Black Flags

William Forsythe has been researching and working on interactive sculptures that he called *Choreographs Objects*. He is questioning "Is it possible for choreography to generate autonomous expressions of its principles, a choreographic object, without the body?", but also "What else, besides the body, could physical thinking look like?" (Forsythe, 2011). He supports that a choreographic object is not acting in place of the body, but instead as an alternative entity that suggests new potential kinetics and motions. He is trying to offer insight into choreographic ideas that would defend from the countless manifestations of the choreographic thinking. In this way, his work applies to the theoretical context of Kathrine Hayle about the superiority of the embodied materiality, but also the choices of Betti Marenko for non-anthropomorphic machines that have an inherent liveness.

One of his *Choreographic Objects* is the *Black Flags* (Figure 6), a duet for two industrial robots that wave enormous black flags. The waving flags are programmed to move with gestural movements that control them and make their motion seems like unpredictable. These non-anthropomorphic machines seem like they have life and move like dancing.

The noise of the industrial robots and their ability to create these continuous movements create a spectacular performance for the audience, that feel like gazing a living object. I am really interested in this practice of using the industrial robots in this way and even further in the robot's context, instead of the exhibition place. Also, the choice of the fabric as a material is really smart for this concept, as it is a material that can be easily manipulated from the industrial robots and can create the qualities that remind us dancing.

Figure 6: William Forsythe, Black Flags, 2011

Nyloïd

Nyloïd (Figure 7) is the result of a continues research on mechanical devices which have the ability to move in an organic, unpredictable and harmonious way. These artists' main argument, that comes through experimentation, is that the complexity of an organic mechanical movement comes from the addition of many different constraints, like compression or twisting, but also from strengths that act at the same time in various directions. Their approach consists of a synthesis of many parts, such as the materials and their mechanics, the structures and their kinetic energies, the movement and musical synchronization, but also the musical composition. Their work is an "impressive sound sculpture, a tripod consisting of three nylon limbs of six meters in length animated by a sophisticated mechanical and sound device". This installation draws its dramatic power from the reactivity of its plastic and sound material, expressing a threatening narrative. Similar to a living object, it's tension, effort and suffering, which result from its contortions and its vocal manifestation, can be sensed.

This project represents a lot of the terms that we discussed above, for the imposing of unpredictability and agency in the machines.

Under the label Cod.Act, the two artists André and Michel Décosterd are always interested in exploring the sense of object agency. Nyloïd is a chaotic element that is not choreographed, but it moves with perfectly random kinetics. It hides a narrative that it is interesting and makes you think that it is alive. I want also to use in my work this insight in structures, energies, dynamics and materials, that create these complex kinetics that looks random and improvised.

Figure 7: André and Michel Décosterd: Nuloïd, 2013

Motive Colloquies

Motive Colloquies (Figure 8) is a performative and interactive installation that developed by interaction designers, architects and performance artists. The project's research area focuses on the fact that as computation dominate our built environment, our virtual and physical worlds are becoming hybrids. Our buildings are playing an important role in our daily life and our emotions. In this concept, the buildings are becoming robots and communicate with us through their own gestures. Based on these ideas, they create an aluminium robot that is static like a tower structure at the beginning. However, as people draw closer, it appears to be a living and sociable creature that comes to life. Robot's movements are uncanny, like a human in motion, but inhuman in form. The audience that comes across with this performative installation, questioning how the perception of the interaction is important in the way that we are related to our physical and virtual worlds to the further side of form and scale.

This work expresses many of the ideas that we developed above, such as Donna Haraway's cyborg, a hybrid entity or environment. It is a machine- an actor is a system- that is dependent but also equal to the human actants that are part of the system. This project is interested in my practice because examines the design of kinetic and performative architecture, creating a robot that interacts with the audience through gestures and co-create with the human performers.

Figure 8: Ruairi Glynn, Motive Colloquies, 2011

Omnia per Omnia

This project (Figure 9) by Sougwen Chung is a painting performance by the artist and a robotic swarm. Its topic is connected to the flow of a city. Specifically, this project "reimagines the tradition of landscape painting as a collaboration between an artist, a robotic swarm, and the dynamic flow of a city". Sougwen investigates different oppositions such as physical and mechanical or improvisational and computational. She collaborates with a swarm of custom-designed drawing robots, creating a drawing collaborative performance with multiple agencies of a human and machine, complex relations and plural identities. It is also originated from a really interesting research about surveillance systems which is very well documented and offers insight into a debate, asking questions like "Are we at the onset of a new, collaborative imagination – of radical new intersubjectivities? What does it mean to collaborate with the spaces we inhabit, the tools we build? Where does 'I' end and 'we' begin?".

Sougwen's project is not related to dancing performances but it expresses the same norms of imposing creativity and agency in machines and in human-robot co-creation with my work.

The robots seem like respect their human partner and she also shares the same amount of agency with them. In this way, they create a harmonic co-performance as an equal creative entity, forming a kind of team.This performance depicts Haraway's concept of naturecultures, exploring new media that can enrich the non-human view. It concerns a series of questions for agency, abstraction, subjectivity and non-human processes. Sougwen thinks beyond dichotomies allowing this coupling of the human sensorium with the non-human worlds.

Figure 9: Sougwen Chung, Omnia per Omnia, 2018

CONCLUSION

My research investigates the theoretical ideas of cyborg, agency, materialism, posthuman philosophies, embodied intelligence, animism and interaction between different actors. It looks into the literature of the cyborg and naturecultures from Donna Haraway, or Kathrine Hayles' posthuman ideology, and applies the idea of homogeneity in human-machine co-creation in Sougwen's drawing performance. Then it exaggerates the notion of assigning agency to a machine, so as to give it the opportunity to be creative. Looking into the *Nyloïd*, a robot that moves similar to a living object, we try to find the techniques that we can create machines and make people impose them human attributes. Some characteristics that echo all of these case studies, is the superiority of the embodied materiality and physicality of the object and the design of non-anthropomorphic machines. Black flags express these principles, opposing the classical manifestations of choreographic thinking. Located in Betti Marenko's and Philip van Allen's animistic design, the last chapter tries to reimagine interaction and add unpredictability to the complexity of the movements of the animated machines. Ruari Glynn creates 'alive' creatures that are human in motion, but inhuman in form and develop complex interaction with the audience and the human performers.

I have gained different principles to take forward for my artistic practice, such as opposing dualism and inequalities and using techniques that seem like giving agency and unpredictability to non-human forms. Also, I am really impressed by the idea of materiality and space cognition of the objects, contrast to digital intelligence. In the context of dancing, my goal is to create a robotic form that I will be able to co-create with and learn from it, exploring new interesting relationships between the human and the machine.

Setting criteria for the success of a performative project like that would be the participation of people in the performance and their expression of interest for arising questions and debate for the subject. Where is the line between human and non-human in this context? Is there any hierarchy? They are made of us, but they are automated. Perhaps the most significant criterion of evaluation is to bring discussion about what an 'alive' machine is or what it could become in the future and also if we want to live with one.

On the other hand, I found out the problematics in the use of the terms of aliveness, creativity and intelligence.

"A robot is a cultural construct, with much of what it is and what it can do arising from the human cultural environment, rather than the robot itself" (Gemeinboeck, Saunders, 2015). Maybe we should consider the fact that we impose creativity on a machine because of cultural and perceptual factors. Through my practice, I want to explore how I can visualize my hypothesis about assigning agency and randomness to a machine and make it look alive, so as to co-create with a human entity. Is the robot bringing something new to the performance? Additionally, in terms of agency, the distinction of who is responding to whom is going to be complicated and difficult to reveal.

My next steps are to experiment and explore the inherent liveness of my creation. We have the tendency to attribute personality to devices because it is easier with this way to explain behaviour. As a result, the aesthetic choices of the robot are important. It is going to be a machine that doesn't have a human form, but an abstract mechanical one. The complex movement is going to come from the structure of the object and the digital algorithm that runs behind the robot.

My work aims to create debate, uncertainty and empathy for 'alive' machines, without creating an idolatry for them, but setting the principles for collaboration and potentiality of interaction with these entities. This research can be extended in terms of autonomous, autopoietic and self-organizing machines or machine learning algorithms, neural networks and artificial intelligent agents. Nevertheless, it is important to acknowledge that all these sophisticated machines, are biased and result of human programming. But we can discuss further and design interesting connections and interactions with these convincingly 'alive' robots. Instead of looking at them as tools, we can try to face them as equal collaborators and see what new creative ideas we can develop with them.

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