

A Co-Lab on Developing Cyborg Arts – Interdisciplinary Collaboration and Practice Based Solutions

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ABSTRACT

A co-lab in Cyborg Arts was conducted at Parsons/New School University, a leading design school in New York City, over the course of sixteen weeks. This paper discusses the use of Bruno Latour's Actor Network Theory (ANT) (Latour, 2007) in facilitating creative collaboration solutions. Previously, an open call had been placed in targeted venues such as Art and Education, as well as a number of technology user groups in the New York City area to solicit ideas and participants. With the assistance of the Cyborg Foundation three teams were chosen to build prototypes of a new cyborg sense: Team Glass, Team Radiation, and Team Haptics. Team Glass strove to make a cyborg sense detecting the rhythm of changes in the sun's solar flares. Team Radiation made a sense that distinguished between, and alerted the user to different types of organic and inorganic radiation in the environment. Team Haptics used the team leader's own body as a site environment to correct a medical problem by developing a new cyborg sense. Students from Parsons chose which team to work with. Experts and guests either visited the co-lab in person, or used Skype to converse with the participants throughout the course of the semester.

Registered Parsons students stayed committed to the lab in order to receive a grade. Other participants had various reasons to remain involved, such as learning new skills, seeing their ideas realized, or stepping outside of their core discipline. The major conduits of communication for the teams outside of lab time were the web-based Slack application that logged a history of their thoughts and interactions, as well as a private student Tumblr to document their progress. This paper discusses how an ANT analysis of practice based learning led to incremental breakthroughs such as starting, stopping, abandoning, and resuming developing these sensing techniques. This resulted in proof of concept artworks, and showcased new aspects of cyborg art.

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Key Words: cyborg, cyborg arts, co-lab, cybernetics, practice based, actor network theory, creative group dynamics

INTRODUCTION

After consulting with the Cyborg Foundation consisting of living cyborgs Neil Harbisson and Moon Ribas, an open call was placed in a variety of media, art and technology sites for a “collaboration between artists, technologists, designers, engineers, makers, and/or scientists to create and develop technologies that expand human capabilities and perception” (Harbisson, Ribas, Pearlman, 2017). Posthuman scholar Katherine Hayles defines the cyborg as having “informational pathways connecting the organic body to its prosthetic extensions” (Hayles 1999, p. 2). The idea behind this call was that enhanced senses using various digitized parts would eventually be implanted inside the living tissue of the human animal, but not as part of the co-lab, where they would only exist as built proof of concepts. Harbisson, born color blind implanted a sensor into his skull that turned the colors he could not perceive into sounds, a process he currently uses in his creative output. Ribas has a chip implanted in her arm and both feet that senses earthquake data twenty-four hours a day. She uses that data to create live time choreography (Harbisson, Ribas, 2016).

More than seventy people responded to the open call, with three project ideas selected with the guidance of the Cyborg Foundation. Approximately twenty-five individuals with varying skill sets were chosen to work on the three teams. Each team was led by artists: Team Glass, Team Radiation, and Team Haptics. Team Glass, headed by glass artist Laurie focused on a sense to detect changes in the sun’s solar flares using data obtained from NASA readings. Team Radiation, led by artist Arnold strove to develop a sense to detect organic and inorganic radiation. Inorganic radiation in this case refers to electromagnetic signals, and organic radiation meant something as simple as a sound wave, meaning a natural type of occurring radiation. Team Haptics, headed by Marcella, wanted to make a cyborg sense to coordinate her gait, which had been impeded by a medical condition. Students self-selected the team they would work with.

CO-LAB IMPLEMENTATION

The Parsons co-lab was a collaborative laboratory approximately sixteen weeks long that included external professional participants, and various invited guests within the confines of an academic setting. A co-lab differs from a workshop, which is usually a skills based short-term exploration of a particular set of tasks. The goal of this co-lab was to produce a tangible proof of concept art work that could theoretically be turned into a cyborg sense. This proof of concept was developed through transdisciplinary modes of knowledge production, thinking, and making. The selected team members, culled from the open call were comprised of programmers, research scientists, designers, artists, indy makers, creative business studios, and even non-profit executives. Students were treated as fully engaged apprentices in a transdisciplinary problem solving environment. They logged the progress of the class on a private Tumblr account, as well as posted their team's progress onto the co-lab's group Slack account. This posting allowed them to track and monitor their progress and research. The Slack also allowed me, as facilitator, to monitor group dynamics, progress and setbacks in terms of ANT analysis.

The students were assigned readings on the posthuman and cyborgs, and one reading about creative collaborations. Some students jumped right in and began contributing either their coding or design skills towards the creation of cyborg senses. Other students chose to study theoretical aspects of the topics they were learning about by researching and composing papers on the topic of the posthuman.

During the semester different guests participated via Skype, or in person. The Cyborg Foundation's Haribisson and Ribas Skyp'ed in from Barcelona, Spain to initiate the first class, and to view and comment on the team's projects for the last class. Other guests included scientific researchers, other cyborg artists, cyborg start up companies, body hacking conference organisers, and directors of maker spaces, all who lectured on their areas of expertise and gave the teams feedback.

The teams would present their project ideas to the guests with both sides exchanging viewpoints. The need for external guests, especially in the beginning of the semester was important because the topic of living cyborgs was new to almost all of the students, and not deeply familiar to the professional participants. All members of the co-lab needed real world examples supplied by conversing with guest mentors. The students and other participants were not introduced to the theories of Bruno Latour's ANT, as ANT was used solely in my role as supervisor/facilitator to mediate the learning goals and monitor their development.

METHODOLOGIES -ANT AS PRACTICE-BASED RESEARCH AND LEARNING

I employed Bruno Latour's Actor Network Theory. The actual working method includes examining both people and things. ANT became an invaluable methodology enabling myself as facilitator to deal with, and better understand the failure and crisis of multiple actors (human and non-human) in the network. ANT portrays both human and non-human elements as equal actors. It does this by employing a 'sociology of translation' with each 'actor' representing a vital link in the network, and the types of interchanges that occur between objects and individual subjects. A signal that was not processing information correctly, or computer code that was compiling with multiple errors was just as important as the communication between the two people that may have been trying to rectify the error. All components were actors in the network.

Latour concludes that in ANT it is better to trace connections or "associations" between controversies than explain the actual controversies themselves. ANT examines the problems being tackled, the actors involved, how to make other actors interested in the situation, have actors agree with their assigned roles, and make sure the delegated actors represent the situation correctly. If the actors are not in agreement, then the network under consideration ceases to function, or communicate. This type of breakdown happened a number of times during the sixteen-week co-lab. Latour states:

You have to follow the actors themselves, that is try to catch up with their often wild innovations in order to learn from them what the collective existence has become in their hands, which methods they have elaborated to make it fit together, and which accounts could best define the new associations that they have been forced to establish. (Latour, 2007, p.12)

He notes information technologies are equipped in such a technically sophisticated way that they allow us to trace the associations that were previously impossible to track.

ANT's methods revolve around a 'sociology of translation' that consists of four aspects for living and non-living actors and the situations they are involved in. It allows for the inevitable things that break and fail. Everything can be an actor (human and non-human) in a network, depending on how it is interpreted. For example, the participation of a key 'actor' (person) or their non-participation can lead to a host of new decisions and directions to take. Likewise the functioning, or non-functioning of a key non-human actor (a piece of equipment) can lead to other new decisions and directions. Each change or disruption must be dealt with either on the spot, or at a later date depending on its urgency.

English professor Bruce Clarke says Latour follows the circulation of "quasi-objects" that "name the objecthood of subjects (such as human persons) and the subjecthood of objects "such

as machines and on-human organisms” (Clarke, 2008, p. 44). He says, “Latour comes to see that this more refined ontological and procedural mode of translation as one of the two poles of modern practice” (p. 49). Latour admits many of his concepts and methodologies are ethnographic in nature, and derive from the “sociology of science and technology” (Cressman, 2009), and that the central tenants of ANT come from a “sociology of translation”.

ANT is comprised of four aspects. The first looks at the problem being tackled, and which actors are involved. According to Latour, the lead actors position themselves to become indispensable. The second aspect is to make other actors interested in the situation. The third aspect is having actors agree with their assigned roles. The fourth aspect makes sure the delegated actors represent the situation correctly.

Latour’s use of the word ‘actor’ is extremely complex and loquacious. He says, “An ‘actor’ in the hyphenated expression actor-network is not the source of an action but the moving target of a vast array of entities swarming toward it...Action is borrowed, distributed, suggested, influenced, dominated, betrayed, translated” (p. 46). I understand the use of the word ‘actor’ as any person or thing involved in an exchange, or chain of events that relates to a situation in the past, present or future that affects the outcome of that situation.

ANT clearly recognizes that works employing complex technologies are bound to stall, fail, and fall apart. This methodology also covers relationships between things (equipment, cameras, computers, cable connections), and transient, dissolving and re-forming relationships between “actors” (humans) and things. It allows for adversarial relations, since conflicts arise between human agents, or software and hardware components, or combinations therein.

Within this context any actor serves as an amalgamation of all the parts in a specific situation communicating with one another. This is referred to as punctualization. Punctualization can also be thought of as ‘encapsulation’ a process of enclosing bits of software programming code in ‘capsules’ that forms the basis of object-oriented programming. If the network breaks down, then the punctualization or communication breaks down, and the capsulation is broken open. This is referred to as depunctualization. Cressman refers to punctualization as “the process by which complex actor-networks are black boxed and linked with other networks to create larger actor-networks” (p. 5). Depunctualization would be its opposite, where networks de-link from larger actor-networks. Interactions between specific actors are referred to as “tokens” or “quasi-objects” in a network. Tokens are created when networks connect, or experience punctualization. They can be thought of as tiny little objects existing for a brief moment in time. Creating tokens that are continually used strengthens the network. Tokens that do not perform transmission, either between objects, people, or objects and people, through either breakdown, conflict, or even boredom can cause full network breakdown. When an actor does not transmit the token, punctualization and reification decrease accordingly.

One of the difficulties of articulation in ANT is that everything can be viewed as either an actor, or as part of the network. It all depends on the perspective, or framing of the environment as to which label is applied at what time. In a physical network one computer can be one node alone by itself, or part of a multi-node system – depending on how one focuses on it. This analysis is definitive in working with both human and non-human ‘actors’, meaning components of the technology the co-lab teams worked within the context of their larger networks.

IMPLEMENTATION

Team Glass was unclear about how to actually implement their cyborg sense of interpreting solar flares. The team leader Laurie considered all suggestions from all team members. She decided all ideas were equally importance, which led to the team unable to make a decision, as all decisions were treated the same. Therefore, no one decision was acted upon. Team Radiation had a dominating team leader Arnold, who shut down other points of view. This led participants to withdraw, which led to a similar result in that no one decision was acted upon. The other team members resented his dominance, and refused to contribute anything further. Though the two team’s styles were completely different (indecision vs. dominance), their outcome was similar in that both teams could not come to an informed decision to progress to the next step. Team Haptics had the most effective style of decision making brought about by team leader Marcella. Though she considered other’s suggestions and talked through their approaches with them, she was able to make the final decision, albeit with everyone’s consent.

The most effective way to have everyone in Team Glass come to a consensus and move to the next step was to sit with them during class and discuss their ideas as a group. After one particular rough patch of listening to all their concerns and difficulties about finding a solution to creating a solar flare sense, I analyzed the situation using ANT methodology. I saw that they had no ‘actor’ in that they had nothing supplying raw information for their project’s goal. I suggested they consult NASA’s on-line database of solar flare data to anchor their concepts in something tangible and known. A team member then came up with a programming solution to connect the raw data from the NASA space station to a piece of actual hardware. The data, though programming code, triggered a small light to turn on each time it reached a certain numeric threshold. Though it seemed like a small breakthrough, it completed the ANT network comprised of people and non-human ‘actors’. In this case the ‘actor’ turned out to be raw data that linked to programming code. Once the team saw actual progress in their project, they gained confidence in agreeing on a next step. They were now ‘punctualizing’ and passing ‘tokens’ between one another, and within the overall existing network. The next step consisted of finding the correct grade of silicon to make a synthetic skin that would encase LED lights. This skin would eventually be placed on the body.

Sitting with Team Radiation during class was not as effective. They required delicate intervention on a one-to-one basis, either right before, or right after class, or through email, and

only in private. Team leader Arnold deliberately spoke in more technical terms than the rest of his team in order to both confuse and dominate them. He viewed it as an affront to his abilities and competence if he were directly questioned in front of others. Only one other team member was technically knowledgeable enough to even challenge him, which led to a very public stalemate between the two. When this stalemate happened ‘tokens’ or messages between actors ceased. What was necessary was to have all actors exchanging tokens, or units of information in order to drive the creative process forward. I sent individualized, personal emails to the two clashing members, and then spoke to one of them privately before class. I suggested he reconsider his perspective. This ultimately led to the reintroduction of tokens, or the exchange of information.

Witnessing these real life experiences bewildered the Parsons students on each team. They needed assurance that the lab was not running itself into the ground, and that these types of disturbances were a natural and disruptive process of creative inquiry. The students were also grappling with readings on the posthuman, experiencing authentic encounters with real cyborgs, as well as coming to grips with the newness of robust team interaction where their input mattered just as much as any seasoned professional. At the conclusion of every session each of the team leaders stood up summarizing and reporting to the other two teams what their progress and setbacks had been for that particular week. This showed each team that the other teams were experiencing similar trajectories, meaning breakthroughs and obstacles within their progress. For example, Team Glass may have understood that day what circuits to use, but their software coding did not work. Team Radiation may have connected two different pieces of hardware together, but the output was not clear, and there was no way to interpret their data. Team Haptics may have been unable to coordinate their four accelerometers, but they were all in agreement about the difficulty. When each team listened to the other teams experiences, this became part of their ability to see ANT in action, though the term was never discussed. It was not discussed because it would have shifted the focus from a hands-on, practice based lab to a theory-based discussion of methodology of collaboration.

With Team Haptics the team leader used her own body as the site for experimentation. Due to a medical condition her gait had a delay between her intention to walk, and her actual leg movements. The idea was to build a portable motion capture detection system placed on her body that would alert her though either a slight haptic pressure, or audible sound that she needed to change or modify her gait.

An ANT analysis of the situation revealed a functional dynamic between all the participants with a constant flow of ‘tokens’. The team leader’s body was the main ‘actor’. That body was not communicating correctly with all its sub actants. It was not ‘punctualizing’ with its various parts. The solution was to color code specific points on her body as nodes of different colored light, then film them in order to assess her actual gait, and this strategy re-introduced punctualization between her body parts. It was accomplished by using portable accelerometers

that interpreted the numeric of “X” (length), “Y” (height), and “Z” (depth) coordinates. The team would then mathematically create a responsive software formula to read the X, Y, or Z body coordinates over time. This data served as the basis for re-punctualizing the coordinates of a depunctualized ‘actor’s body.

ANT METHODOLOGY AND ARTS PRACTICE AS PRACTICE BASED LEARNING

How can one define and defend arts practice as research and learning without a results-oriented investigative methodology that is quantitative or qualitative? Linda Candy, a professor of creativity and cognition research states this tension arises because of the need for professional practices to be defined in a way that is commonly agreed (Candy, 2011). This commonality takes place within the confines of the research university, as opposed to other locations and institutions. The research needs to conform to those norms in order to be validated and certified as having worth, and contribute towards the production of knowledge.

Arts professor Stephen Scrivener (2004) defines research as “an original investigation undertaken in order to gain knowledge and understanding.” However, art making does not just contribute ‘original knowledge’ in the form of the end product art object (p.1). It is the entire process, and the knowledge gained during the process that contributes towards the making of original art in a practice based setting that spurs innovation. Scrivener argues linguistic statements or propositions are more valued inside academia as contributing something of substance rather than art objects or creative works in and of themselves. The works produced by artists, such as speculative cyborg senses do not always contain ‘arguments’, the pillar of academic discourse. Because of that arts practice, even using methodologies like ANT, has been viewed with varying degrees of suspicion.

Curatorial and interaction design professor Lizzie Muller (2012) argues that the artist/practitioner creates new knowledge while engaging in ‘real situations’ instead of solely setting up situations to create new knowledge. There is no hypothesis to disprove in these events, just an experimental path to engage with, as was the case with Teams Glass, Radiation and Haptics. The practitioner’s role becomes that of someone adopting a ‘stance towards enquiry’. New tools of enquiry must be chosen from a range of practices that involve art, design, science, engineering, psychology, and critical theory to make these types of inventive explorations within practice based scenarios. It is under these circumstances the artist is working with a hybrid or a “transdisciplinary” mode of inquiry. The work of Robin Nelson, Director of Research at University of London Central School of Speech and Drama has models of ‘knowing’ that more realistically resemble the environment of today’s interdisciplinary and transdisciplinary practices (Nelson, 2014). Nelson’s models also align more closely with Latour’s ANT methodology, in that the ‘know what works’ can incorporate both the working, and non-working actors in a network.

Creative practice does not usually begin with a problem. It begins with, according to MIT professor of community development Cesar McDowell, an odd or ‘messy’ situation (McDowell, 2007). How to figure out what the problem is within any disorganized situation uses a process of framing. The origins of the idea of framing arise with John Dewey’s notion of the ‘Problematic Situation’. McDowell explains it begins with a ‘vague image of a reality’ that is identified from a surfeit of the complexity. These identified parts or features are coherently organized in such a way that the problem can be defined. The goal is to drive the thrust of the transformation of the situation by using the elements derived from the information in the frame. Understanding the framing and applying ANT analysis to its outcome was a driving force behind the co-lab.

Framing looks at how the issue or problem is named, organized, and described. Rhetorical frames can be compared to espoused theories, or what an individual or group thinks they know through speech and writing. This became evident in the Team’s Slack postings, and in the student’s Tumblr. Action frames can be thought of as theories-in-use (op. cit.) in live time response to difficult or perplexing situations. This would occur during class time during the building of the cyborg senses. Rhetorical frames can debate with other rhetorical frames of meaning, convincing others that a specific conceptual frame is correct. The conceptual or rhetorical frame that wins this kind of debate does so by exposing the weakness of the other frame, while making sure at the same time to cloak its own inherent logical weakness. Radiation team leader Arnold was especially skilled at this approach. Action frames occur during process, time based moments. They are often non-verbal and require action tasks, or motion based changes in behavior that affect instant changes. They may or may not incorporate the knowledge of a rhetorical based frame, or they can derivate and create something new. This would occur most frequently with Marcella’s Team Haptics, which experienced the least amount of personal friction. The two types of frames can work together, or separately. They are not dependent upon one another, though they can rely upon one another according to circumstances. Connecting the frames through ANT analysis became a methodological solution to moments of inaction, miscommunication and system failure.

McDowell also notes that identifying assumptions, which are part of action framing, is difficult. That is because tacit thinking is an assumption, or an underlying action frame. Once it is made obvious it usually turns into a concept or rhetorical frame. Values are the way we decide something, making a judgment if it is appropriate or inappropriate. McDowell says when we frame a situation live time we do so as an action frame, and apply tacit values. The reason it is so hard to find out what an assumption is because it “is a kind of reverse engineering that disturbs our belief” (op. cit.). It also takes a lot more time to reverse engineer a tacit assumption, instead of a more obvious and stated rhetorical frame. This working with assumptions that turned into concepts stood out the most in Team Radiation. Working in dynamic, evolving group situations can bring conflicts between disparate framing modalities, or can enhance these modalities. It depends upon the ‘actors’ within the framework. Practice based learning in

conjunction with ANT methodology involves identifying which actors are not passing tokens, how the network is de-punctualized, and if it is possible how to restart modes of communication between points in the network.

CONCLUSION

There were approximately 40 team members and students, as well as various guests for a sixteen-week co-lab developing cyborg art at Parsons School of Design in New York City. Three cyborg senses were created as functional proof of concepts. Using the methodologies of Bruno Latour's ANT, team members collaborated in a practice based learning environment. ANT identifies an 'actor' within the network as either a person or a thing. This dynamically evolving designation evolved as the main 'actor' of each team shifted during the weekly meetings. The 'actor' could be the team leader, or the 'actor' could be the programming code. The next week the 'actor' could be the hardware. The following week it could be any of those three designations, or even more than one of them.

The 'actor' was examined to see how it communicated (punctualized), or did not communicate (depunctualized) within the confines of the network, including what kind of 'tokens' were, or were not passed. Structuring framing modes based in ANT analysis allowed various solutions to emerge. It required a skilled assessment of group dynamics with non-didactic interventions to keep all the 'actors' in the network fully engaged. As a methodology for a practice based learning environment in an art and design co-lab, ANT implemented practical solutions within a dynamic matrix of professionals, students, and evolving technologies.

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