PRODUCER AS PERFORMER: MUSIC PRODUCTION AS AN ACT OF PERFORMANCE

by

Anthony Cammarota

An Abstract
of a thesis submitted in partial fulfillment
of the requirements for the degree of
Master of Arts
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ABSTRACT

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The identification of music producer and music performer can create the perception of a binary. In this binary, the music producer is relegated to a domain of music-making but not of music-playing. This paper will explore the extent to which music production is an act of music performance informed by bodily expression, technological mediation, and perception. By evaluating gesture and physicality in music production, I aim to examine how the embodied subject enacts the performance of music production. The growing autonomy of technology in music production has empowered machines to act as collaborators, facilitating new forms of performance capabilities between humans and machines. To understand how music production functions as performance, I draw on neuroscience and cognition, examining how performativity in music production emerges at the intersection of internal and external experiences.

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CHAPTER 1: FOUNDATIONS OF MUSIC PRODUCTION AS PERFORMANCE

The term producer encapsulates a wide range of music-making modes and frequently refers to a personality which has often been separated from identities of music performance. Over the course of the 20th century, the advent of music production evolved from technical duties associated with the recording artifact and moved towards a creative role that contributed to the aesthetic, compositional and performative aspects of record making (Moorefield 2010). In capturing music performance, the producer not only facilitates the recording of a musical performance but becomes a performer in their own right. In this paper, I will argue that performance is an expression of self through actions and that this encompasses artistic expression, social expression, cultural expression, alongside other modes of performative expressions. Before proceeding, it is important that I clarify what I consider to be the meaning of the terms self, expression, and action.

By self, I mean an embodied subject who actively engages with the world, understanding and experiencing it directly through bodily perception and interaction (Merleau-Ponty 2012). I will be taking an enactive view of self where "cognition is not the representation of a pregiven world by a pregiven mind but is rather the enactment of a world and a mind on the basis of a history of the variety of actions that a being in the world performs" (Varela, Thompson, and Rosch 1993, 9). I consider expression as the articulation of identity that is anticipated and produced through the body, not as a pre-existing essence but as a constructed phenomenon (Butler 2006). Expression emerges as a culturally and contextually shaped phenomenon that reflects learned social realities and the individual's internal state, rather than a universally recognizable condition (Barrett 2017). Emergence refers to behaviors and patterns that develop

from interactions within a dynamic self-organizing system, influenced by the processes of increasing and decreasing complexity (Hansen and Clarke 2009). Lastly, I would define action as the embodied process of engaging with the environment through which perception emerges (Noë 2004). Action establishes a relationship to social and physical backgrounds in order to establish a "dynamical attunement of organism to environment in the complex mix of transactions that involve moving, gesturing, and interacting" (Gallagher 2017, 162). The assemblage of self, expression, and action form the framework of performance that I consider music production to be rooted in.

Historical Trajectory

I believe that it is important to outline a historic trajectory of production because of the way that this trajectory demonstrates the emergent role of the producer. In its earliest form, a producer was viewed as a technologist subservient to the composer and recording artists (B. Ward and Huber 2018). Engineering aspects and specialization in sound recording techniques empowered production to gain self expression through technology. The bifurcation between composition and production submerged the production procedures beneath performance status which in turn allowed its role to later emerge as a music-doing expression. What arises is not as simple as the producer is an engineer and an artist, the producer is a unique role that has emerged out of these things (Ruff 2022).

Experimentation in sound recording techniques and electronic music development traces back to its prototypical formations in the 1910's and 1920's, with figures such as Edgard Varèse, René Bertrand and Joseph Schillinger, whose works contributed to the earliest foundations of the path towards music production (Manning 2004). Transformative thinking about electronic music coevolved with the explosion of recording technologies, allowing for a philosophical

reconsideration of music with publications like the 1913 *The Art of Noises* (Russolo 1986) and *Sketch of a New Esthetic of Music* (Busoni 1911). Sound generation technologies, like the dynamophone, thérémin, sphärophon, dynaphone, and gramophone enabled the likes of Pierre Henry, Pierre Schaeffer, and John Cage to advance the newly emerging field of music production into further developmental stages (Manning 2004).

The rise of the newly forming classification of electronic music demanded new procedural techniques in music creation. Pierre Schaeffer's concept of *musique concrète* allowed for mundane and non-musical sounds to be absorbed into the identity of musical ideas and emphasized a dependence "on sound fragments that exist in reality and that are considered as discrete and complete sound objects, even if and above all when they do not fit in with the elementary definitions of music theory" (2012, 14). The composition emerges from the experimental procedures of audio manipulation, layering, cutting, and reassembling, forming an abstract work completely separate from any written score. Composer Éliane Radigue, collaborating with Schaeffer, integrated experimental techniques such as tape loops and microphone feedback into her production procedures (Herrera 2021). In the absence of a written document, musical ideas are channeled through the authoring source of studio procedures,

> On the one hand, composers may choose to start the creative process by developing a clear concept of the sound structures they wish to achieve. Such a picture then requires rationalization and modification in terms of the available practical facilities, leading in the case of *concret* work to a precise set of studio routines, which may then be executed. On the other hand, composers may wish to start with a selection of potential sound sources, offering a range of characteristics with which they may experiment, building up from the results of such investigations the elements for a complete composition. (Manning 2004, 22)

The rapid development of communications and recording technologies exploded after the Second World War ushered in new "analog technologies, ranging from individual hardware devices that could be used to generate and manipulate audio signals, such as laboratory

oscillators and filters, to facilities for mixing and recording sound materials via the medium of magnetic tape" (Clarke, Dufeu, and Manning 2020, 5). Gaining access to these newly available tools meant that the act of recording could in itself become the focus point. One example from this period is composer and experimentalist Daphne Oram, who used experimental techniques of recording and manipulating sounds on magnetic tape (McCabe 2021) Instead of simply being considered a technical procedure that assists in capturing performance, music recording began to express itself as a creative act.

Moving into the 1950s, sound became an aesthetic category where the "divisions between music and sound stimulated adventures in electronics, field recording, the spatialization of sonic presentation, and the introduction of alternative procedures. Musical composition was to take on a broader set of terms that often left behind traditional instrumentation and the control of the composer's hand" (Sterne 2012, 471). Commercial styles of music began to incorporate these compositional procedures and creative recording techniques and in the domain of popular music the producer became an even greater figure. Music producers such as Phil Spector, George Martin, and Sam Phillips carved their sonic signatures into the sounds of the records they produced and contributed to the developing identity of producer-artist (Zak 2001). Creative power was extended to the music producer, allowing their role in the studio to further elevate in artistic status. Viewing the process of music production as one of music-doing transformed how the producer viewed the overall identity of a studio.

Slowly, the music studio transitioned an enclosed space populated with various things into a comprehensive instrument, collectively forming something which was playable through all its various parts and materials. Brian Eno developed techniques of in-studio compositions that allowed for the spontaneous creation of works by entering a recording session with either limited

material or nothing at all, with compositions emerging from the relationship of a producer to the facilities of the studio (Cox 2013). At the turn of the 21st century, the producer gained even greater artistic influence in the production process and a space for the producer-artist identity to arise was created.

Contemporary producer Max Martin elevated the role of producer to encompass every aspect of music creation, from rough sketches of ideas all the way through the final mastering steps, using his creative influence to steer the trends of modern pop music (Seabrook 2015). The studio, being an instrument in itself, is played through the various techniques and procedures of the recording process. There still seems to be a divide between the producer and some other identity, with a hyphen separating the producer from some other aspect of musicality. Producer-composer, producer-artist, producer-composer-performer, all of these labels still perpetuate the attitude that production is not fully a form of playing music. This perpetuates the notion that production remains relegated to its technical identity,

> Music producers whether by title or by virtue of their actions are composers in sound. They fix creative ideas, not as musical notes and instructions on a page for interpretation by performers, but rather, directly to a medium that also captures subtleties of individual performances and timbral qualities. Music production fuses the composition, arrangement, orchestration, interpretation, improvisations, timbral qualities, and performance or performances into an immutable sonic whole. (Burgess 2014, 1)

While production is given these generous tributes, it remains fixed as an assistive process to other forms of performance. Producer and writer Richard James Burgess further distributes the identity of the producer through a categorical framework of functional typologies (2013). There are six categories in total which include:

1) Artist - individuals who produce what they themselves have created and have complete control over the process, for instance Les Paul.
2) Auteur - from the French word for author, the producer is the driving creative figure in the work whose sonic signature is inscribed into the recording but is creating the work for someone else, such as with Quincy Jones..

3) Facilitative - a producer who works alongside an artist, often remaining outside of the public eye, who facilitates the creation of a separate artist's work, in the vein of Dave Cobb.
4) Collaborative - this is where the producer and artist co-author a work together in a more balanced exchange of ideas, along the lines of George Martin.
5) Enablative - being more involved in the discovery and building of new creative acts, these producers may not be as technically oriented but provide aesthetic and career building skills, like John Hammond.
6) Consultative - as the furthest removed from the actual recording aspect, this type of producer orients their efforts towards the psychological aspects of creating records and developing a direction for the future, think Rick Rubin.

The idea that production and performance are different is perpetuated by claiming that while production encompasses the similar designations of music performers, the producer does not actually perform. This in turn keeps production in the peripherals of music performance and outside the boundaries of inclusion. While it facilitates, enables, consults, and collaborates with performers, production is still limited to everything but performing.

Technology acts as a key driver in creating a more elastic boundary between music production and the neighboring musical identities that surround it. In the same way that recording artists enter a music studio to record their performances, a producer enters the studio ready to capture their own unique style of performance. Environments that house the technologies of music production are spaces of playful experimentation that express the performance of the producer,

> The recording studio can be seen to be a keeper of a plethora of recording technology and perform an important role in the development of new sounds and ultimately new musical identities, whether generically or socially situated. The studio environment and the technologies utilized during the recording process, such as the types of microphones employed, dynamic treatments, equalization, are an important consideration for the creation of recordings. (Stahl and Percival 2022, 209)

The producer is able to use the available technologies as a means to express the performance of their own procedures. Considering the actions of the producer as "an integral component of the compositional process" reinforces the binary between production and

performance even though “the boundaries have become blurred” (Manning 2004, 395). Creative considerations such as microphone choice, acoustic treatment, equalization settings, are intentional expressions of the performance of production. Maneuvering through the limitations of analog hardwares is a type of performative methodology for the producer. Each unique piece of gear influences the way in which the producer performs the actionable capabilities of the selected hardware. The plethora of available digital softwares in the modern era have opened the door for new possibilities for the producer to perform with.

The Digital Audio Workstation

A radical shift for music production is the enabling of independent artistry and the common dislocation from traditional recording studios that was brought about by the Digital Audio Workstation (DAW), a combined hardware and software environment housing the capability to edit, process, and mix audio (Hosken 2011). There is virtually no limitation to what type of music can be created in DAWs, as musical genres ranging from hip-hop (Exarchos 2019) to heavy metal (Marrington 2019) and anything in between has been created with DAWs. There are many different DAWs available, such as Ableton, Pro Tools, Logic Pro, Reaper, the list goes on. Each offers a unique vantage point that guides the user into specific creative directions. It is important to note that they are not neutral in how they present music production to the user, ultimately exerting influence over the producer. This power relationship arises “within the user interface, the onscreen visualization of the ideas that underpin the software’s workings, with each DAW having its own particular set of music production features that inevitably channel the efforts of creative users in particular directions” (Constantinou 2019).

Bringing new potentials and perspectives into music production, the DAW transformed recording techniques and allowed for the multi-faceted analog environment of traditional music

studios to consolidate into a composite instrument (A. P. Bell 2018). This technological advancement enabled independent instruments to be reconfigured into an amalgamated entity via the interfaces of digital devices such as laptops, tablets, and smartphones and this in turn created a "new media logic in music production" (Reuter 2022, 2). These burgeoning technologies orient our musical creativity towards new paths of discovery and through these transformative tools the doing of music production begins to encapsulate tenets of performance. Bell, Hein and Ratcliffe observe how the separated functions of performance, recording, and composition have merged into a single act as DAW production has become the creative standard of the modern digital era (2015).

As more than an instrument, the DAW environment is an entire digital world of sonic creativity that is played and performed through a connection made with its user. The immateriality of digital softwares leads the user away from the object of music and guides the user towards what music scholar and producer Michael Anthony D'Errico describes as the experience and exploration of digital interface sounding (2016). "The emergence of digital tools for sound reproduction after the new millennium," D'Errico writes, "has encouraged conceptions of sound as an experience rather than an object", in this way the experience of sound's unfolding is a connection point for the producer to the align their activity to the identity of performance (2016, 5).

Expanding Performance Identity

Theatrologist Marvin Carlson writes how performance is a "display of skills" requiring the physical presence of others to legitimize a given performance through demonstration (2018, 14). Although some producers often work in collaboration with others, it is more often the case that music production is an action which unfolds in an area of isolation. Even if the doing of

music production is not seen publicly, this private act does not rob it of the behaviors of performance; creativity, self-expression, and storytelling are all components of music production. As music production is an integral part of music creation, its unique traits can expand the definition of performance as being considered a self-facing mode of performance where "the individual body remains at the center" (Carlson 2018, 15). Qualities of play are conceived in the unfolding of music production and this private play is a valid form of performance independent of public awareness. Carlson introduces a second tenant of performance, patterned behavior, claiming performance comes about by conscious decision making:

> The recognition that our lives are structured according to repeated and socially sanctioned modes of behavior raises the possibility that all human activity could potentially be considered as performance, or at least all activity carried out with a consciousness of itself. The difference between doing and performing, according to this way of thinking, would seem to lie not in the frame of theatre versus real ‑life but in an attitude- we may do actions unthinkingly, but when we think about them, this brings in a consciousness that gives them the quality of performance. (2018, 15)

There is a permeable division between doing and performing, that has an ambiguous distance between them. Music production displays clear signs of doing, being an easily recognized physical action or happening. To advance music production from an act of doing to a performative act requires what scholar and philosopher Judith Butler considers to be the entrance into the sphere of appearance, a space where one's identity is not contingent upon any doing but rather being (Butler 2009). In framing performative acts as "a certain kind of enactment", Butler suggests that deliberate intentionality and self-choice provides states of being their performative qualities (2009, 1). A necessary ingredient to the allowance of performativity is recognition and the legitimization as being seen as performative, otherwise the being of any act remains as a doing. Performative qualities in music production, whether acknowledged outwardly or inwardly, emerge as expressions of being.

A performance, regardless of its nature, is inherently vulnerable to judgment. Producers are often judged by the criteria of workflow efficiency, execution of mixing or mastering techniques and the ability to successfully portray the intention of the work. Arguably moreso, the judgment of production stems from the degree of satisfaction that the recording brings to the listener. Contemporary theater and performance scholar Jonathan Pitches remarks that a performance is judged firstly "in strictly artistic terms - a play or a piece of music - and as a simple action in everyday life, something 'carried out'" and secondly by "the manner in which somebody performs and the effectiveness of that performance are both included in this range of definitions. Thus, performance can be the thing on offer and a measure of how good or bad that thing is" (2011, 3). To judge the manner and effectiveness of music production remains a highly subjective position of criticism. If the fidelity of a recording has been compromised and the audio quality causes physical irritation, discomfort or pain, then it can be deemed a poor recording and in turn reflect a sense that the performance of its production was below the standard of the listener.

There is a degree of scrutiny inserted into acts that are deemed performative, functioning as a kind of verification that the given act was more than just a mundane happening. Too much reverb on a snare drum, not enough compression applied to the lead guitar, over saturating the background vocal mix, all of these are aesthetic judgements that point to the performance choices of production. Alternatively, praise of execution and recognition of skill is equally a part of recognizing the performance of music production.

Music production is musicking, an act of human music-making that expresses forms of play that arise from the attitudes and behaviors of a producer (Small 1998). Through its various forms and procedures, music production functions as an action of human music doing, through

which a human essence is expressed. “To music,” according to musicologist Christopher Small, “is to take part, in any capacity, in a musical performance, whether by performing, by listening, by rehearsing or practicing, by providing material for performance (what is called composing)” (1998, 9). The importance of relationship is a central aspect to musicking:

> The act of musicking establishes in the place where it is happening a set of relationships, and it is in those relationships that the meaning of the act lies. They are to be found not only between those organized sounds which are conventionally thought of as being the stuff of musical meaning but also between the people who are taking part, in whatever capacity, in the performance; and they model, or stand as metaphor for, ideal relationships as the participants in the performance imagine them to be: relationships between person and person, between individual and society, between humanity and the natural world and even perhaps the supernatural world. (Small 1998, 13)

The producer occupies a crossroads of intersecting relationships, where the meanings and values of musicking are present. Production encompasses the performative social relationship between interacting humans as well as the performative social relationship between humanity and technology. Sound-making is one facet of performing music production that exists among other performative expressions that arise from immersive participation in production domains. In establishing spatial relationships, the producer enacts the music studio through physical engagement and occupying its space.

CHAPTER 2: EMBODYING THE PERFORMANCE OF MUSIC PRODUCTION

Our living experience of music-making is tied to the body in space and time. Movements, gestures and physicality bring us into the world and situate us within our environment. Music production is an embodied act that merges musical gesture and worldly gestures together through an overlapping body-centered toolkit of expressions (Gritten and King 2011). The embodied self enacts a lived experience in the world and, according to biologist and neuroscientist Fransisco Varela, actively engages with the world through direct experience and the immediacy of subjectivity (Varela, Thompson, and Rosch 1993). Varela states that "technology, among other things, acts as an amplifier" of reflection and allows us to more deeply observe our bodily experience of reality (1993, 5). As the movements of music production guide us across various interfaces, our bodies are connected to tools and objects that extend our physical self.

Through movement, the producer is connected to objects of sound making. Physical causes facilitate "spatial, temporal and qualitative ties between maker of sound and occurring sound" and form the substrate of musical potentials (Peters, Eckel, and Dorschel 2012, 18). These movements are the first conduits of the performance that enact music production. Joining our senses and tactile functions to sounding objects permits a sounding connection between the internal and external through gestural behavior (Siddall and Waterman 2016). Records are, in a sense, a history of the producer's body acting in the studio, telling a story of what things were done but they don't explicitly tell us how these things were done. As we move the body, we express the living self through our music and the technologies which aid creativity capture these gestures. Production procedures and recording techniques are methods of acting music production by "transforming materializations of sound and the aural" (Cimini 2022, 14).

Our body engages with sound making objects in tandem with our perception. The playing of music production arrives at the onset of our perceptual embrace of unfolding events. Philosopher Alva Noë illustrates how perception is "touch-like" with an interactive essence that uses bodily skills to form the content of perceptual experience (2004, 1). By perceiving a sound object, one thinks of its possibilities and sounds begin to take the form of potential textures to manifest in the production process. From the enactivist view, the playing of music production arises through the interplay of bodily actions and perceptual processes. Noë further elaborates how "the process of perceiving, of finding out how things are, is a process of meeting the world; it is an activity of skillful exploration" (2004, 164). It is in this exploration that the body becomes centered in the performance of music production.

Allowing the body to guide the creative process, as opposed to controlling the body, invites the body to express its own leadership. In an interview for Tape Op, producer Lance Skiiiwalker explains how he relates to his at-home studio on a personal level and describes the ways in which his physical self and the space of the studio are engaged in an intimate relationship (Crane 2024). Skiiiwalker uses the awareness of the body within a space as a method of "finding sounds with my ears" and the sensation of space enables him "to get the idea straightened out" in his creative workflows (Crane 2024, 12). This demonstrates how the body can gravitate towards creative action simply by being in a space and being given the freedom to resonate with physical enclosures. By being attuned to a space, the body is given the opportunity to use its innate abilities to contribute to the play of production.

It is the connection to sound, through the body, that gives a producer the ability to perform their works. Listening and attentiveness to sensation is a crucial aspect of how

production unfolds in a performative manner. When the producer listens to sounds it is not simply with the ears, it must take place in a holistic bodily way,

> Listening is paying attention to those sounds, being present with them, being in communion with them. Though to say we listen with the ears, or the mind, might be a misconception. We listen with the whole body, our whole self. The vibrations filling the space around us, the act of sound waves hitting the body, the spatial perceptions they indicate, the internal physical reactions they stimulate - this is all part of listening. Certain bass sounds can be felt only in the body, they can't be perceived by the ears. (Rubin and Strauss 2023, 109–10)

Technology is deeply entwined with this embodied listening process, aiding in the reception and felt presence of sound. Through its ability to translate sound into tactile and spatial sensations, modern tools cultivate an intimate connection between the producer and their devices. Computers and laptops are instruments of intimacy that create the relationship of embodied listening and emotional connection. The body of the producer relates to their computing technology with an intimate embrace, constantly feeling its materials and maneuvering across its interface to find the sounds of performance. Artist and composer Holly Herndon expresses how the intimate relationship she has with her devices goes beyond traditional acoustic instruments,

> I have this really intense relationship with my phone and with my laptop, and in a lot of ways the laptop is the most intimate instrument that we've ever seen. It can mediate my relationships…in a way that a violin or another acoustic instrument just simply can't do. It's really a hyper-emotional instrument, and I spend so much time with this instrument both creatively and administratively and professionally and everything. (Staff 2015)

This relationship of intimacy draws the producer closer not only to their devices but also to their physical self, blurring the boundaries between person and tool. Through this connection, self-identification extends to include the technological objects around them, making these tools an integral part of their creative identity. When the feeling of connectivity permeates the act of production, a sense of affection and partnership emerges. This connection extends beyond the tools themselves to encompass the physical and emotional act of creating. As producer Amen

Dunes recalls, “I fucking fell in love with Ableton Live. By the end of the year working on this, I would turn on my Ableton, and I would get a warm feeling in my body, like a friend was coming up. It was like my partner” (Sommer 2024).

Inside the creative ecosystem of a studio, the producer moves through space and their physicality enables the doing of music production. The producer is linked to objects of perception as the autobiographical self emerges in space through both sensorimotor experiences and neuropsychological processes (Riva and Waterworth 2003). There is a “motor logic” of procedural sequencing that organizes the potentials of the motor system to allow for kinesthetic expressions (Seitz 2000). Musicologist and cognitive scientist Mariusz Kozak points out how a “kinesthetic knowledge” is inherent to all bodily movement and this forging of the body’s capabilities is “truly cognitive” in their nature (Kozak 2020, 127). In our movements of creativity, there is a rationality that is expressed through an innate bodily intelligence. A producer that is contained in movements, allowing for consistent enacting of bodily unfolding.

There is drama and excitement in setting up a studio, arranging gear, calibrating equipment and all the possible physical connections a producer establishes in their work. The movement of the body maneuvers through a performative fieldwork that can “be captured in the motion of a microphone, or, even more subtly, in the placement of a microphone, and in the choices of recording conditions” (Peters, Eckel, and Dorschel 2012, 26). Studio performance is played out in dramatic fashions by experimenting with the way objects are positioned together or even against one another. In arranging and organizing a space, a producer orchestrates the performance of music production, using object placement as a defining tenant of performativity.

What Kind of Space is a Music Studio?

Music production is happening in spaces that we designate music studios. When we use the term music studio, what is implied? There is a wide range of imagery that comes to mind when the term music studio is mentioned. What do we attempt to convey when we say that music production happens in a music studio? The meaning of a music studio varies on the individual level, it cannot be described as having a universal definition. A technical approach to defining a music studio leads towards the consideration of this space as a laboratory of sonic experimentation, where scientific and technical works are conducted to create recorded artifacts (Hennion 1989). This space exists as a type of boundary that defines itself in a deterministic relationship, one of material forms that permit the creative and intellect works to be performed. A studio space may be defined by the threshold of its enclosure, a space which divides the sonic environment within from the world outside (Goldman, Gribenski, and Romão 2020). Limiting the studio space to its physical perimeters omits the critical aspect of the music studio space as a refuge for social behaviors,

> Ultimately, studios are social spaces – the term 'social' here relating to a wide variety of ways in which people interact with other people and with technological objects – and what defines the unique characteristics of a studio as a social space arises from patterned relations between these four, always entangled, domains. In other words, the physical matter of the studios, the organization of objects and people in the space, the positionality of the studio in relation to the outside world, and the way in which occupations contribute to production labour define the studio as a kind of space – and constrain the social dynamics of that particular space. (Bates 2020, 126)

Taking this into consideration, the studio may be a site to create and represent a sonic culture that emerges from the dynamic social relations of creating and listening (Bradley et al. 2011). The spaces of music production are not limited to themselves but they exist as part of a larger framework situated inside of society. Music studio spaces often act as appendages of the city landscape in which it resides, functioning as a relational space fueling the cultural scene (C.

Gibson 2005). Material boundaries are more of a distinct position within the larger societal context because of the way in which "studios rely on the cities that host them, to supply streams of musicians as clients, but also to add credence to them, and to provide a cosmopolitan or stimulating social environment for their workers" (C. Gibson 2005, 200). These spaces do not exist in a musical or cultural vacuum and are just one point in a series of relationships. Modern technological advancements have even allowed individual studios to function as a singular node within a network of studios linked together with digital communications (Théberge 2004). This challenges the idea that a studio space is limited to its local designation, allowing the studio to exist as more than its singular locality.

A music production space "is designed and built to house some aspect of human behavior and relationships" (Small 1998, 20). Intentionality within a physical space creates a purpose of use and guides the creator toward a prescribed significance. As a room, a music studio is not only "the setting of a work but an active participant in it, its material elements, volume, form, and connection to other architectural structures all actively shaping the transmission and transformation of energies in and through it" (Matthews, Burry, and Burry 2024, 243). The music production space becomes a theatrical space, one staged for musicking to generate modes of behavior for thinking, acting and being creative. Human and technological entities are engaged together in the drama of space and become actors of behavior, each playing a discrete role within the larger functioning of a studio space.

Within the studio environment, the producer is living the experience of play through the medium of space. The self-directed form of communication in music production conceives of its own performative nature and becomes an experience in itself (Barnouw 1989). Music studios can be both public and private, allowing the producer to perform their duties simultaneously with

public reception and separately from it. When in isolation, the elements of performance are communicated in music production when it unfolds without a public embrace.

Emerging from the subjective experience, the studio becomes a space of performance for the user within a private realm of activities. Over time they begin to extend themselves towards the public in the form of recorded mediums and technical executions that are to be realized later on. Henri Lefebvre states that "lived space bears the stamp of the conflict between an inevitable, if long and difficult, maturation process" (1991, 362). Originating in states of isolation but not strictly fixed in this state, music production travels through time in an elongated trajectory that directs itself towards forms of public awareness. A unique performative trait of music production is that it can cross thresholds of isolation and extend publicly, being expressed as an artifact or recorded work. Having a transient nature and flexible identity, music production landscapes can be recognized within the larger "cultural map" of music performance (Geertz 1980, 166).

Environmentally, the studio is a terrain of affordance, composed of perceivable and behavior-enabling landscapes (J. Gibson 2015). Affordance, according to psychologist James Gibson is what the environment "offers the animal, what it provides or furnishes" through perceivable and actionable objects or surfaces (2015, 119). Within this ecological framework, the studio is populated with tools and technologies that enable the creative possibilities of music production to emerge. The producer and the studio form an interdependent relationship: the producer's work relies on the studio's existence, while the studio's purpose is shaped by the producer's presence. Technologies in the studio become known through what Gibson defines as substances, surfaces that delineate the material components of the environment (2015).

The studio environment serves as a domain of creative potential shaped by affordances. Technology within the recording space provides specific opportunities for creative action, which

the producer leverages to achieve artistic goals and carry out the recording processes for a given project. According to Gibson, an affordance is a dynamic and multifaceted element of reality, offering possibilities that emerge through interaction with the environment,

> An important fact about the affordances of the environment is that they are in a sense objective, real, and physical, unlike values and meanings, which are often supposed to be subjective, phenomenal, and mental. But, actually, an affordance is neither an objective property nor a subjective property; or it is both if you like. An affordance cuts across the dichotomy of subjective-objective and helps us to understand its inadequacy. It is equally a fact of the environment and a fact of behavior. It is both physical and psychical, yet neither. An affordance points both ways, to the environment and to the observer. (2015, 121)

In the presence of the producer, the studio is engaged into existence as the environment is realized into being through one's presence. "Space is a performative medium," writes architect Dorita Hannah, "and therefore an inherently active entity, which reciprocally acts on, and is activated by, its occupants" (Pitches and Popat 2011, 55). Alive in a fluid form, a studio immerses the producer within an ever-changing ecology of constituents held together by the performance of actions, bodily causation being a central component of this network.

The various elements of a production space are in a state of constant interaction. As a dynamic ecosystem, the studio becomes a lively site of engagement where objects, sounds, and technologies contribute to a larger creative synergy. It all comes together in the occupancy of this space and the presence of the producer within this space gives rise to the phenomenon of a studio experience. Drawing from feminist theorist and physicist Karen Barad's definition of assemblages, the music studio can be considered as a network of diverse objects summed together, giving rise to the creation of something new (2007). In this space, there is distributed power between things and properties of creation emerge from the coming together of self and environment.

There is no producer without a space for production and the studio finds its existence in the presence of the producer. The concept of intra-action, according to Barad, states that things do not pre-exist in an independent state, they exist from the emergent relationships that define and produce them (2007). Barad states that "the notion of intra-action recognizes that distinct agencies do not precede, but rather emerge through, their intra-action" and stresses the importance of entities existing "in relation to their mutual entanglement; they don't exist as individual elements" (2007, 33). Production is grounded in time and space, it cannot exist apart from them. Likewise, the producer is grounded in spaces which enable musical creation.

The body uses its facilities to create studio spaces in areas that aren't intentionally designated for recording, incorporating the performance of labor into music production. Musician Kim Deal converted her Dayton, Ohio home into a recording studio with different pieces positioned from the highest upstairs floor "with a snake all the way down the steps from the second to the first floor, going into the bathroom through the laundry chute, from the first floor into the basement" (Coons 2024, 26) Labor-intensive production techniques are intimate performance choices that reflect how an individual orchestrates and conducts the studio environment. By translating human effort into recorded mediums, technologies establish "connections between the musical notes and human facts", with the producer's body playing a central role in the act of music-making (Abbate 2004, 530).

A studio offers a scenery of objects, tools, and sonifying sources that construct an ecosystem for the producer's creative practices. The scenic landscape of a studio creates the backdrop for physical, perceptual, and emotional processes related to music production. These various elements coalesce into a scenographic environment. As a place where body and environment merge, the scenography of a music production space manifests the formation of

"our perception and experience but is at the same time reinvented by our whole body in flux and in a heightened sense of perception" (Lotker and Gough 2013, 5). There is an aesthetic quality to the experience of a studio's space, one which stimulates perception and aids in fueling the creative direction of a producer. The materials, interfaces, and sensory stimuli of a music production space generate the expressions of music production.

The studio is a sensory space that presents itself to the producer. Creative stimuli are constantly shaping the experience of space through a dynamic play of sensations. Attentiveness placed on the visual aesthetics of the music studio aligns with philosopher Martin Seel's idea of the aesthetics of appearing, highlighting the power of perceiving in the present moment (2003). Connecting our visual senses to objects and creative tools generates the spontaneous arisal of ideas and creative decision making. Rather than being a fixed object, a studio is a part of the experience of music production. "What we perceive when we perceive something aesthetically," says Seel, "is a play of appearances that is never just appearance but a connecting and interweaving of phenomenal aspects" (2003, 21). Just as the producer must play through the devices of their craft, they also must play through the streams of aesthetic stimuli that influence their creative directions. The appearance of a music studio's aesthetic qualities create meaningful play-like relationships that fuel creativity and channel the flow of music-making.

Emotional Performing

The music studio is not only a space for intellectual performance but also one of emotional performance. Sociologist Arlie Russell Hochschild uses the term emotional labor to define the management of one's emotional expressions during the performance of a job (2012). Emotional labor recasts the studio as a space which elicits emotional performativity. When working with artists, the producer must strike a balance between their own internal states and

those expressed by the artist. A producer may desire to move the project in a creative direction that is in contrast to what the artist desires. Master engineering Heba Kandry describes what this experience can be like,

> My gut instinct about a record could be completely off from what they [the artist] had in mind. Let's say someone sent me a bunch of mixes and they say, "Do your own thing." Then I master the whole thing, send it back, and they say, "This is not loud enough! This is not compressed enough." A lot of times, people say, "Make it dynamic, but loud." But that makes me think, "Okay, that's a bit of a contradiction there." I have to wade through a lot of what people think they want versus what the mixes can offer. Obviously the goal is to give the client something they're over the moon about and happy with; something that exceeds their expectations. (Stanfield 2020)

The expressions of the self must be negotiated as the producer operates in the theatrical environment of the studio. This increases the drama of production through what Hochschild refers to as "surfacing acting", the means through which one may "deceive others about what we really feel, but we do not deceive ourselves" (2012, 33). Sometimes the expression of the self must be altered in order to better suit the needs of the context. Being concerned with only performing the absolute truth of the self may lead to negative consequences. At times, the producer must be willing to adapt to the emotional requirements of a project and fulfill the role they have been assigned.

Producers are engaged in an on-going performance of emotional labor inside the studio "to elicit appropriate and desired emotive musical performances" (J. Ward and Watson 2016, 6). Feelings that are embedded in production translate into the emotional atmosphere of a record. Emotional dynamics and the "management of emotions is often referred to, by producers and engineers, as creating the right 'vibe'" (Watson and Ward 2013, 2). Vibe connects the producer to the listener and persuades them to enter the emotional space of the produced work. The emotional labor of production is intricately connected to the "complex nature of the contexts and spaces in which it occurs; as material spaces (and often technical spaces), as spaces of emotion

and performance constituted by social and emotional relations, as relational time-spaces actively made and remade by the practices of those working within them" (Watson and Ward 2013, 25).

Sentimental expressions carried out by this labor give a studio space the capacity to be felt through the work, playing upon feelings and generating moods. Producer Lachlan Goold writes how "every recording must contain a vibe or feel, which is challenging to identify. The recording studio is an emotional space in which a producer uses emotional labour to instil a sense of trust and acts as a protective environment in which songs must be nurtured before they are completed" (Goold 2022, 58). Nurturing the feeling or vibe of a record requires attentiveness on the part of the producer to understand what the artist is intendending to portray in the work. Via discourses of labor, the producer exchanges their emotional states for those of the artist, performing through surfacing acting.

The emotional tone of the studio must be properly curated by the producer. Author and professor Geoff Harkness illustrates the intense emotional tone that producers must curate for rap artists, noting that "being a rapper mandated that one tap into core emotions and display them through the production of cultural objects such as recorded songs. To rap, participants insisted, required more than merely reciting 16 lines that rhymed, it was to put one's very self into the act of doing so" (2014, 92). A producer is responsible for constructing the music studio as a space to facilitate the emotional resonance required by the artist. This responsibility extends beyond rap music, as producers across genres must balance technical execution with fostering an atmosphere that allows artists to connect with their emotions authentically. Whether it's creating a sense of vulnerability for a ballad or channeling high energy for an electronic track, the producer's ability to manage the studio's emotional tone directly influences the artist's performance and, ultimately, the work's emotional impact on listeners.

CHAPTER 3: MACHINE AGENCY AND COLLABORATIVE TECHNOLOGY

Machines are much more than an arrangement of raw materials assembled to execute commands and perform various tasks. As devices of creativity, machines transcend their physical components and become extensions of the human identity (McLuhan 2013). Music production makes full use of technology to not only aid the creative process but act as co-authoring entities. Being autonomous entities, technology exists as a part of the social reality of humanity. Scholar and sonic creator George E. Lewis provides thoughtful insight into the sociality between human and machine,

> System design and real-time musical interactions with the results were marked by efforts to achieve nonhierarchical, collaborative, and conversational social spaces…Interactions with these systems in musical performance produce a kind of virtual sociality that both draws from and challenges traditional notions of human interactivity and sociality, making common cause with a more general production of a hybrid, cyborg sociality that has forever altered both everyday sonic life and notions of subjectivity in high technological cultures. (McLean 2018, 4)

To the producer, a machine is a partner that contributes equally to the materialization of artistic expressions. Technology reconfigures the body of the producer, allowing the material self to extend through the physical and digital devices involved in music production. This technologized extension of self is not only limited to the physical body of the producer because machinery can equally be a part of the producer's consciousness. "I can just hook my piano to the computer" says hip-hop producer RZA, "with a USB and play my first instinct, and Ableton would convert that to MIDI. So, you're just flowing with your mind" (Retzer 2024, 23). The availability of new technologies engender behaviors of experimentation and creative ideation that would otherwise remain latent. Through this complex interaction, "performers and creators using these new technologies are not able to escape the collaborative force of the object. That is,

the instrument itself acts as a collaborator in the development of a new performance practice by either restraining certain behaviors or urging and encouraging others" (Kaiser 2018, 90)

Machines enter into our minds not as mere contributors of thought but as active agents which shape our consciousness. The producer is entangled in a dynamic non-linear relationship with technology, where body and thought form a circularity. Psychologist Mihaly Csikszentmihayli provides an explanation of this circularity,

> If attention, or psychic energy, is directed by the self, and if the self is the sum of the contents of consciousness and the structure of its goals, and if the contents of consciousness and the goals are the result of different ways of investing attention, then we have a system that is going round and round, with no clear causes or effects. At one point we are saying that the self directs attention, at another, that attention determines the self. In fact, both these statements are true: consciousness is not a strictly linear system, but one in which circular causality obtains. Attention shapes the self, and is in turn shaped by it. (1990, 34)

Machines act as transformative objects which expand the limitation of what is considered human through reconfigurations of biological, intellectual and communicative relationships (Borgo and Kaiser 2010). By engaging in an interactive exchange, we are situated in a system-environment of structural coupling as machines nestle into our identity. It is crucial to observe that these boundaries do not remain fixed since both biological and technological bodies form a relationship of entanglement. Tools of music production have become an aspect of the embodied self and our devices are an inseparable element to the music producer's identity. Fusing together biology and technology, the music producer transcends a purely biological state and enters into a cyborg identity.

As a nexus of organism and machine, the producer is a hybridized being whose essence is cybernetic. A cyborg is, according to critical theorist and philosopher Donna Haraway, "a cybernetic organism, a hybrid of machine and organism, a creature of social reality as well as a creature of fiction" (1985, 85). As the boundaries between human and machine blurs, their

experience of intimacy emerges from intra-action. When "it is not clear who makes and who is made in the relation between human and machine", what emerges is a symbiotic relationship extending the notion of self (1985, 97).

This cyborg reality does not imply that chips or devices are surgically implanted into us, turning us into some kind of science fiction frankenstein. Being a cyborg does not require any kind of body modification and it predates modern scientific experimentation. Our human evolution has provided a cybernetic existence since our hominin ancestors first began using tools and objects to alter the environment and shape reality. We are, in the words of cognitive philosopher Andy Clark, "natural-born cyborgs" that from the very beginning have been cybernetic:

> It is because our brains, more than those of any other animal on the planet, are primed to seek and consummate such intimate relations with nonbiological resources that we end up as bright and as capable of abstract thought as we are. It is because we are natural-born cyborgs, forever ready to merge our mental activities with the operations of pen, paper, and electronics, that we are able to understand the world as we do. (2003, 6)

Theoretical cognitive scientist Mark Changizi's theory of music as an act of nature harnessing states that the brain evolved musical capabilities as a way to mimic the natural landscape (2011). This frames reality as an objective proper of the external world, with our brains passively absorbing sensory information. This information is used to create a representation of the objective world through musical metaphor. "Music has," Changizi writes, "the signature auditory structure of humans doing stuff, and can thus get into our brains by tapping into our auditory recognition mechanisms for identifying the actions of other people" (2011, 19). In our developing understanding of technological influence, we must look for ways in which music harnesses the sounds of technology.

Machinery is at the core of our creative pursuits in music production, leaving no separation between the biological self and surrounding technologies. Our engagement with these

agents is a bond that unites the intimacy between producer and technology. Philosopher and sociologist Bruno Latour explores the idea that social phenomenons are created through a dynamic network of connections, associations and references (2005). Latour proposes the concept of Actor-Network-Theory (ANT) as a way to redefine the meaning of social as a "re-association and reassembling" of various connections that converge at a given point (2005, 7). In this perspective there is "no distinct domain of reality to which the label 'social' or 'society' could be attributed" and it is instead points of connection that are "glued together by many other types of connectors" (Latour 2005, 4, 5) At the core of social phenomenon there is "a movement, a displacement, a transformation, a translation, an enrollment" of combined entities whose entanglement result in moments of action (Latour 2005, 64).

According to ANT, an actor is a participant "in the course of action" within converging nodes of association (Latour 2005, 71). An actor is not simply "the source of an action but the moving target of a vast array of entities swarming toward it", this allows for a wider scope of inclusion (Latour 2005, 46). To broaden the scope of actor, Latour uses the term actant to allow non-human entities, such as technology, to include "any thing that does modify a state of affairs by making a difference" (2005, 71). Any amount of actors in combination form a type of group that permits the unfolding of a given social phenomena. There is no materiality to what is social nor an objective state, Latour states that it can be known by "the traces left behind by their activity of forming and dismantling groups" (2005, 20). Through this understanding, technology itself becomes an actant which moves, influences and forms associations of the social. George E. Lewis notes that machines are rightfully deserving of their creative agency,

> Interactive environments that incorporate a dialogic imagination oblige the reconsideration of the aesthetic and music-structural agency of the creative machine. Just as actor-network theory makes no distinction between human and nonhuman nodes in a given network, creative machines become full actors with an articulation of agency and a reception of affect that ranges both within and beyond the moment of the immediately staged concert, workshop, or other approved "performance." (Dean 2009, 462)

We find ourselves within these agents, relating to them, forming intimate bonds of emotional resonance and intellectual stimulation. Because "what often appears as separate entities (and separate sets of concerns) with sharp edges does not actually entail a relation of absolute exteriority at all" (Barad 2007, 135). Through the understanding that human and machine are united in a shared identity, a relationship emerges that deconstructs the perception of separateness and dissolves the conception of otherness. The human self and agential self "are locked in a complex dance of co-evolutionary change and learning, each influencing, and being influenced by, the other" (Clark 2003, 31). From this connection emerges a companionship that fosters personal bonds with technological agents, augmenting and expanding the self. Here are a few examples that demonstrate the relationship between human and machine.

Anne La Berge

Anne La Berge's work *RAW* (2014) is a collaboration with Isabelle Vigier and Marcel Wierckx that demonstrates real-time interactivity between human and technological agents. This intentionally unfinished piece centers around "a Max patch that organises the flow of instructions to the musicians" and situates the technological agents in a forwarded position of power (Vear 2019, 132). In this example, the production has remained incomplete in order to be fully realized in a live environment. La Berge utilizes the incompleteness of the work to create space for machine agency to co-author the experience (La Berge n.d.).

The indeterminate compositional working of *RAW* demonstrates a co-operative partnership between machinery and their human counterparts. When the machinery, in this case a computer, is seen "as another personality in the performance" then the collective autonomy of creation widens to include objects both biological and electronic (Ricks 2019). As a multimedia work, there are a vast array of stimuli that create the whole of the work. Sight, sound and touch merge together to form the totality of this work. Musician and researcher Craig Vear's concept of Gesamtkomposition illustrates how La Berge achieves this totality by harnessing the complex mixing of sensorial media to create an affectual completeness of production manifesting through performance (Vear 2016). Gesamtkomposition, translated as overall composition, is a multimedia work that stems from a framework reaching "into neighbouring disciplines from the performative or media arts" (Vear 2016, 4). This places the focus on the heard, the felt, and the seen, all of which are expressed through the collective media items. La Berge effectively connects the listener into crosscurrent streams of sights, sounds, and perceptual states in *RAW*, dazzling the senses in a multimodal experience of sonic and visual textures.

In the performative realization of *RAW*, we find architect Juhani Pallasmaa's experience of touching between production and performance that feeds the imagery of the former into that of the latter (2005). This perception of imagery arises from an entwinement of objects and entities present in both production and performance which coalesce into a merged act. The workings of production are seen within the unfolding of the improvised work and the preconceived structural framework of production becomes a realized performance. Inside of this framework, La Berge traverses the "familiar territory" of *RAW*'s preconceived production while simultaneously "getting lost" in the ever-changing sonic landscapes reconstructed by the co-designing technological agents (La Berge 2006, 558). La Berge creates alongside her

technologies without needing full control of the musical happenings, leaving space for mental estimations and speculations that are part of the compositional framework. Through a vast series of internal model-building and informed guesswork, La Berge's *RAW* is a demonstration of predictive processing enacted through musical expressions.

The predictive processing model, as put forth by Andy Clark, intervenes against the dogmas of Cartesian dualism through the claim that our experience of reality is formed through a series of outward flowing predictions (2023). In this cognitive model, backwards running information is sent from the brain outward towards the sensory organs and merges with incoming sensory information. The feedforward model, rooted in the Cartesian framework, is a process where our senses absorb external stimuli and send it into the brain through various layers which extract and process the information (Tweyman 1993). According to this perspective, our brains are passive organs that simply interpret the external stimuli that it receives. Our minds therefore are just containers of information which act as an interpreter that feed off of the information that it digests. A sense enters our perception, our brain initiates a series of discerning judgements and our behaviors are motivated to respond accordingly. In opposition to this, Clark asserts that we are actively constructing the world around us through predictions that seek to match external sensory data. The world is not objectively situated apart from us but instead becomes constructed through our predictions.

Instead of passively receiving sensory information from the external world, we are constructing our reality by extending our predictions into the external world. This creates a guessing game for our brain and our inner model of prediction grows more accurate as we experience different forms of sensory input. Predictive processing stimulates bodily motion towards sensory consequences that align with the accumulated library of successful prediction

outcomes. Familiarizing ourselves with the look and feel of correct prediction requires an awareness of the embodied self expressing a successful inner model. Our "perception and action constantly engage in a kind of coupled unfolding" as we exercise the learned memories that grow within our inner model (Clark 2023, 81). Our past memories act like a bank of previously exercised predictions and the history of this memory bank influences our present construction of reality.

When our guessing causes errors in prediction, the sensory input simply nudges or gently corrects our perceptual models and allows for greater processing accuracy. This leads to increased prediction precision and greater ability to harvest information. Spending energy actively perceiving things from sensory input is an exhausting and expensive way to use the limited energy in the body. Predictive processing allows for the conservation of energy by utilizing our brain's ability to guess with high degrees of precision. Clark details how "creatures equipped with ever-active, predictive brains are, of course, already (quite literally) 'ahead of the game', as brains like that are-as we have seen-constantly guessing the ongoing stream of sensory input, including the inputs that should result from their own next actions and worldly interventions" (2016, 176–77).

Alexandria Smith

Much of the guiding behavior of technological agents is antecedent to a later occurring environment of spontaneous expression. Structural characteristics and pre-set functions are a framework for live improvisations that become an aggregate of production. One such example of this can be found in Alexandria Smith's *Heart Music for Milford Graves* which features a wearable electronic configuration that translates real-time biofeedback of respiration, heart rate and galvanic skin response into a sonified experience. This biofeedbacking approach stems from

Dr. Barbara B. Brown's techno-centric concept of "a mind-machine communications technique" which allows the conscious self to establish dialogue with dimensions of the "inner self" (1974, 4). Entering into a musical dialogue replete with unknown variables requires a certain level of preparedness that may be established in the production process.

By leaving room for an anticipated series of casual events, the finality of production surfaces as embodied performance. Smith foregrounds a non-hierarchical relation to the processes of the unconscious that guide her bioartistry and explains how "instead of grasping for control, I dance with my unconscious and embrace the inevitable limits of autonomy" (Zorn 2021, 279). In admitting the limits of autonomy, both bodily and mental, Smith confers an empowering discretion to her co-creating and co-composing devices. Smith creates a more balanced power structure that "reflects the complex interleaving of endogenous and exogenous, perceptual, proprioceptive, and interceptive - causes, effects, feedbacks, motives, long-term states such as moods and theories, along with distinct transitory physical or verbal events" (Sedgwick 2003, 104). Through these technological means, a performance reality of embodied biological data constructs an interactive procedure which merges production and performance into a unified experience. As overlapping dimensions of a unified whole, the technical and creative procedures of Smith's work form a mode of communication that informs the happenings of each other (Smith 2023).

Smith is actively engaged in conversation with her technologies, viewing their voices as equal contributions to the ongoing dialogue. Composer and theorist Pauline Oliveros describes how these spontaneous conversations emerge from "engaging with numerous overlapping dimensions created by sounds. At the same time we may be imagining what to say next. We then feel the dimension of imagination or memory" (2005, 16). *Heart Music for Milford Graves*

unfolds through time and space in a series of imagined sonic estimations, reacting with and through the body and technology. The technologies that Smith creates with are sentient actors who consciously contribute to the constructed sonic experience.

Being irregular and unpredictable, *Heart Music for Milford Graves* uses an improvisational background that aligns with neuroscientist Anil Seth's notion of conscious experience as a controlled hallucination (2021). Seth states that the conscious experience of the world and self are enacted through a controlled hallucination where "the immersive multisensory panorama of your perceptual scene, right here and right now, is a reaching out from the brain to the world, a writing as much as a reading" (2021, 68). Perception itself is viewed as a controlled hallucination and, equally, a hallucination is thought of as an uncontrolled perception. This suggests that our conscious experience is constructed internally, forming the way in which things in the world appear to us. In *Heart Music for Milford Graves*, the sonifying biological signals are both generating novelty and responding to the ideas created by the established feedback loop. Virtual and biological bodies are conjoined through a feedback loop, forming "the causal relationship that observers construct in their mind when they perceive the system interacting with the environment" (Hayles 2008, 138). The technology and Smith are linked together in a perceptual exchange, creating an environment that uses prior knowledge and incoming sensory input to construct the work's reality.

Self in the performance of *Heart Music for Milford Graves* extends as a collection of perceptions, challenging "the subjective ownership of the entire body, and the location of the first-person perspective" (Seth 2021, 119). Seth labels the sensation of having control over the physical self as body ownership, something that Smith intentionally opposes in her bioartistry. "This biofeedback system affords me a way to listen to a broader spectrum of embodied states in

real-time," writes Smith, "and feel a connection with my body as the sounding output for electronic music. This is a system for autonomous, empowered, embodied collaboration and the extension of one's instrument, not a means for achievement, domination, or control" (2023, 86). Interpreting the internal physiological conditions of the body through interoception, as defined by Seth, is a primary driver of Smith's creative directions and her relational approach to technology (2013). Emotional responses actively shape the unfolding of Smith's work and the expression of her extended self are portrayed through cyborgian selfhood.

Sarah Belle Reid

Trumpeter and composer Sarah Belle Reid is the creator of Minimally Invasive Gestural Sensing Interface (MIGSI), a sensory based interface attached to Reid's trumpet using optical sensors to capture gestural data (Reid n.d.). This device is combined with various softwares programs such as Max, Pure Data, and Super Collider, and is built around an Arduino Fio development board hardware in order to create an augmented musical instrument capable of embodied musical expressions (Reid et al. 2016). As a remote device, MIGSI frees the performer from the necessity of direct computer handling and creates a distinct bridge of agency between the physical and technological self. Reid's piece Pocket Fig (2016) demonstrates the unpredictability and spontaneity of human-machine interaction that is built into the conceptual framework of MIGSI (Reid, n.d.).

Much of MIGSI's processes are a synthesis of predetermined digital parameters and meaningful improvised gestures that express a series of intentional actions on the part of the performer in order to associate technical facilities with embodied actions (Reid and Gaston 2023). In this association, the cooperative interplay of machine and human creates a multi-layered interdependence of unpredictable behaviors which allows for the "seeding,

influencing, anticipating, or surrendering to potential future outcomes" (Reid, Gaston, and Kapur 2019, 239). MIGSI allows the computer to become a partner which "possesses the usual capacities of a human", enabling it to think and act in tandem with Reid (Oliver La Rosa 2008, 43). The circularity of the MIGSI system creates a unified network between biological and digital creators. Out of this emerges a singular expressive entity, acting and thinking as one.

Reid's use of trial and error in her creative process generates immersive sound worlds that become liveable spaces for certain durations of time (Shepherd 2023). These technological ecosystems are living entities whose existence is sustained through the performance of the work. MIGSI is a biotechnology organism that affords a way to anticipate what is otherwise unpredictable, creating a feedback loop between the performer's actions and the resulting sounds. At first the sensory inputs are surprising and seemingly chaotic, but Reid uses iterative adjustments to refine these inputs and reassembles them into familiar patterns that make sense in the context of the performance. This adaptive real-time response is what neuroscientist Karl Friston refers to when speaking of active inference.

The term active inference is part of the free energy principle, which states that any living system uses a scalar metric of prediction error to reduce its own entropy and in turn remain living as long as possible (Friston 2010). The free energy principle explains how a living system attempts to reduce surprise, or compromised expectation, in the perception-action system and minimize expelling its free energy.

Maintaining lower levels of free energy usage results in more accurate inference and inexpensive metabolic output, whereas high free energy usage results in less accurate inference and more costly metabolic consumption. This is performed when biological systems sample their environment in order to form an adaptive exchange of free energy minimization. Friston uses the

term predictive coding to represent how inference errors adjust our internal generative model until these errors have been “minimized and the most likely causes of sensory input have been identified” (2005, 816). MIGSI resembles the brain’s continuous action-perception cycle, where actions are guided by predictions and adjusted based on sensory feedback to minimize free energy. The exploration of new sounds increases unpredictability, something which Reid explores in Fig Pockets through fostered variations and generative improvisation. Present throughout is the acoustic trumpet tone, a texture which counterbalances the barrage of chaotic tones and reduces uncertainty. This balance helps maintain a coherent musical experience, as unexpected sounds are incorporated into a dynamically evolving framework.

The examination of works by Anne La Berge, Alexandria Smith and Sarah Belle Reid are case studies in how machine agency contributes to the performance of music production. These selected examples are, like many others, creative examples that illustrate the role that technology plays in how a producer performs. For the producer, technological agencies bring people and objects together in the creative process. The concept of machine agency provides a foundation for the “refusal of a dualist split between people and things”, empowered through the reciprocal coupling of human and machine (Pickering 2010, 19).

CONCLUSION

In examining the producer through the lens of performance, it has been my goal to articulate the various ways in which music production is music performance. This paper has challenged the dichotomy between producer and performer by recognizing music production as an embodied act of performance. Through the interplay of bodily gestures, technological autonomy and perception, I have intended to illustrate how music production encompasses the traits of performance. The producer embodies a performative practice that exists at the intersection of musicking, intra-action and technological mediation.

This perspective shifts the producer from a static creator to an active participant in a dynamic performance process. Music production utilizes spaces creatively to create performances, with the studio becoming an instrument and a site of enactment. The growing influence and capabilities of technology has empowered our devices to co-author the performative acts of the producer. Through their agency, machines are living individuals that are alive in the human reality. Technology is an active collaborator with the producer through "an array of sonic, bodily, emotional, visual, and tactile forms of communication and perception—complex sensorimotor loops (sound, vision, affect, and movement) whereby individual performers constantly take on and offload various cognitive tasks to and from the extended environment to sustain a musical world they coenact" (Schyff, Schiavio, and Elliott 2022, 46)

Coming from a background of instrumental performance, I find the process of music production to be abounding in performativity. In working alongside producers in different projects, I long wondered why their expressions were omitted from considerations of performance. It seems exclusionary to dismiss the producer's craft from the realm of

performance simply because it lacks traits traditionally associated with established performance identities. Whether it is moving a fader, adjusting compression threshold, selecting a microphone, or creating a Max patcher, the broad procedures of music production are expressions of playing music. Music production is a sound creating ritual, a type of "consecrated behavior" that fuses together both lived and imagined worlds of musical output (Geertz 2017, 112).

By allowing production a performative identity, new pathways for inventive techniques, workflows, and procedures can become available for producers. Viewing music production through a performance lens can open up transformative possibilities for how producers learn and teach their craft. Redefining the identity of the music producer is crucial in our digital age, as advancements in technology "demands a new kind of literacy and critical understanding with respect to the emergence of the new media and electronic technologies" (Giroux 2013, 175). The role of the producer, having evolved from past functions, can continue to transform and take on new forms in the future.

What new roles might emerge from contemporary music production? In what ways can music production further evolve? These questions fuel the growth of music production, expanding its boundaries and creating new possibilities for future creators. By reconfiguring music production to include performance, new and previously unrealized forms of creativity and expression can emerge. This shift blends traditional performance with technological innovation, positioning producers as both creators and performers who enact their vision through dynamic processes. As technology evolves, the role of the producer will continue to transform, opening doors for deeper engagement, greater experimentation, and the exploration of novel musical landscapes.

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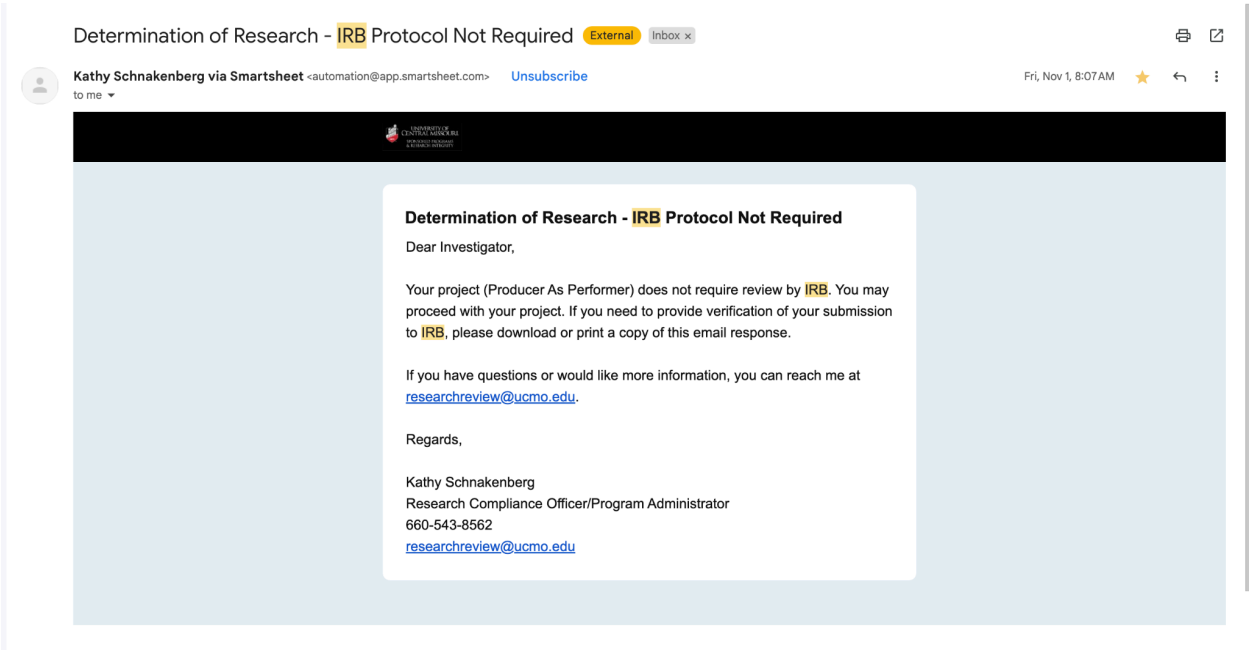
APPENDIX
DETERMINATION OF RESEARCH



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Regards,

Kathy Schnakenberg
Research Compliance Officer/Program Administrator
660-543-8562
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