WIRING THE SINGER

Classical Voice and the Microphone

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Research Summary

The Research Problem

Given the ubiquity of the application of sound technology to the classical voice, this thesis investigates the ways the amplification of the classical voice is a catalyst for new expressive techniques and aesthetics. Such mediation of the classical voice is becoming widespread and pervasive. It is creating new expressive techniques and aesthetics, facilitating the construction of musical ensembles impossible without amplification, transforming non-traditional physical spaces into performing spaces and enhancing the performativity of the classical singing voice. These practices are challenging traditional understandings of the classical voice as a purely acoustic phenomenon and introducing new expressive techniques and aesthetics, some of which were previously considered dysfunctional or bad singing. This creates a problem for classical singers who clearly position themselves within the classical singing tradition and wish to develop new repertoire requiring the use of the microphone

The Research Question

The thesis asks what defines the classical voice in the 21st century given that most audiences now experience the amplified classical voice in live performance?

The Investigative Field

Sound technology is changing singing aesthetics, including the classical aesthetic. In discussing the amplification of the classical voice, a number of technical terms are used to describe this process: microphone, microphone and playback system, amplification and sound technology. It is recognised that these terms are not interchangeable. The wide field of study and the varied applications of sound technology to the classical voice make pinning down the technology to one thing a futile exercise. Miriama Young recognises the vastness of this field of study in her work on the intersection of the human voice and sound technology.[1] Her definition of technology as it applies to the voice is well suited to defining the meaning of the terms microphone and playback system, amplification and mediation in this thesis:

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[1] Young, Miriama. *Singing the Body Electric*. (Farnham: Ashgate,2015.) 7.

'Technology' (mediation) represents the means by which the human voice-by virtue of the fact it is 'captured' in electronic form-is subject to displacement and transposition, permutation or transformation.[2]

Once having defined what the mediated voice encompasses, the next step is to define what is meant by the classical voice. Does this term refer to a particular type of training, the repertoire sung, the context in which the performance takes place or a combination of these elements? The difficulty in defining the unique characteristics of the classical vocal style are discussed in Chapter 1. Is the ability to sing unamplified a unique characteristic of classical singers? This is demonstrably not so. Are power and expression unique characteristics of the classical voice? Again, not so. Nor is the capacity to sing complex music or develop strong levels of musicianship. Chapter One explores these dilemmas and comes up with a broad consensus on what constitutes a classical vocal technique, although it is recognised that such a thing has never been static or fixed. This chapter concludes that the mediation of the classical voice creates room for many voices, for performers/composers to take greater control over their work, for many shades of intersections between vocal genres to emerge and an exploration of performative elements of the voice that was previously impossible prior to amplification.

The literature review and the case studies demonstrate the diverse practices emerging from this practice: from adding proximity and detail to the classical voice to creating an avatar of the human voice and everything in between. The investigation focuses on live performance, although recordings are referred to.

Theorists such as John Potter (the social and political history of classical singing)[3], Jacob Smith[4] and Jonathon Sterne[5] (sound studies) and Nina Eidsheim,[6] Brandon LaBelle[7] and Steven Connor (voice studies)[8] help to develop a framework for understanding the mediated classical voice and its varying impacts. In classical voice the powerful and the virtuosic have

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[2] Young, Miriama. Op.cit. 6.
[3] Potter, John. *A History of Singing.* (Cambridge: Cambridge University Press, 2012.)
[4] Smith, Jacob. *Vocal Tracks. Performance and Sound Media.* (Berkeley and Los Angeles: University of California Press, 2008.)
[5] Sterne, Jonathan (Editor). *The Sound Studies Reader.* (New York: Routledge, 2012.)
[6] Eidsheim, Nina. *Sensing Sound. Listening as Vibrational Practice.* (Durham, NC: Duke University Press, 2015.)
[7] LaBelle, Brandon. *Lexicon of the Mouth: Poetics and Politics of Voice and the Oral Imaginary.* (U.K.: Bloomsbury, 2014.)
[8] Connor, Steven. *Beyond Words.*(London: Reaktion,2014.)

been preferenced over the sounds the microphone allows us to hear with more detail and nuance: that which lies under the surface can be brought forward into the listener's ear. Miriama Young[9] and Nori Neumark[10] develop a conception of the mediation of the voice as deeply humanizing: one that is not fixed but rather relational, adaptive and responsive to the various beings and entities present in any given moment in performance.

The contextual review examines classical performers/composers (and some performers/ composers who sit in the growing but ambiguous place that is somewhere between art music and popular music). The nature of this practice is that it challenges delineations between vocal and musical genres and those between composer, arranger, producer and performer. Many of the performers discussed (but not all) have emerged at least in part from a classical tradition. They are engaging with the mediation of the voice and in the process writing and producing their own works.

A number of terms are used widely in this thesis. They are identified and defined next.

Definition of Terms

Mediation (of the classical singing voice) refers to the ways that the human voice is transformed into electrical signal and through this is subject to "*displacement and transposition, permutation or transformation.*"[11]

Microphone and playback system refers to the conversions of the acoustic energy of the voice into electrical signal in all the stages of the microphone and playback system. The playback system comprises the mixing (including any vocal processing) and its transmittal via speakers or headphones to the listener. "*Every stage a signal passes through affects the tonal quality, timbre, or colour of the sound for better or worse.*"[12]

Classical vocal technique is defined as fundamentally an acoustic phenomenon allowing the singer to be heard unamplified in particular performing spaces under specific conditions. This technique is understood to be derived from the European traditions of Bel Canto singing. Some

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[9] Young, Miriama. *Singing the Body Electric*. (Farnham: Ashgate,2015.)
[10] Neumark, Nori. *Enchanted Voices.* In Thomaidis, Konstantinos and Macpherson, Ben. *Voice Studies, Critical Approaches to Process, Performance and Experience.* (New York: Routledge, 2015.)
[11] Young, Miriama. Op.cit. 6.
[12] Evans, Bill. *Live Sound Fundamentals Course Technology.* (Boston, USA: Cengage Learning, 2018.)

constant elements of this technique include: a synergetic relationship between breath and voice that delivers a seamless transition between vocal registers[13] and between different vowel shapes; a minimization of consonants as they interrupt breath and vocal line; and the modification of vowels to be most sympathetically resonant in relation to pitch. Legato is valued in this tradition and the tonal ideal is chiaroscuro (a balance between light and shade in the voice).

Vocal Micro-Textures are defined as the extra vocal sounds that the microphone can bring to the foreground. In classical vocal pedagogy they are considered noise and signs of dysfunction: the sounds of the breath, the articulatory mechanism (lips, tongue, palate) and the process of the larynx.

The Seven Functions of Amplification developed by Emmerson refer to the ways that amplification can be used to influence a musical performance.

The Aesthetic Markers developed as part of the methodology refer to the range of aesthetic choices that amplification either introduces or enhances in a classical vocal performance.

Aim and Objectives

Aim: To examine, provide insight and offer a framework for the evaluation of the mediated classical voice in the 20th and early 21st centuries.

Objectives:

1. Provide a literature review across voice studies, sound studies and vocal sound technology research that addresses the problem discussed in the thesis.
2. Examine the impact of the cultural context and classical vocal works that explore the mediation of the classical voice.
3. Develop a set of aesthetic markers that describe the impact of mediation of the classical voice.

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[13] A vocal register refers to the voices' pitch range and areas of the voice where, in an untrained voice, changes in vocal quality are clearly evident. These changes in vocal quality may be prized in vocal genres and traditions other than classical ones.

4. Provide an evaluative framework for this practice.
5. Apply the framework to case studies and creative work.

Approach and Methodology

The methodology is practice led in which an exegesis provides a conceptual framework for the evaluation and performance of works using the microphone. The exegesis provides a portfolio of performances that demonstrate the methodology.

1. Contextual Case Studies of works demonstrating the varying impacts of the mediation of the classical voice and vernacular works that intersect with these practices.
2. Analysis of texts referred to in the Investigative Field.
3. Establishment of an evaluative framework based on five aesthetic markers underpinning amplified classical singing.
4. Practice led research in performance and its analysis using the evaluative framework discussed in (3) above.

The percentage relationship of the total thesis submission between the exegesis and creative work components consists of 70% (exegesis) and 30% (creative portfolio).

Proof of Concept

The creative component consists of a series of recordings demonstrating the evaluative framework outlined in the methodology. Wherever indicated, a Soundcloud link will be provided to give access to all recorded performances.

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Chapter 1: Wiring the Singer: Introduction

Once there is a microphone, no more canons. Anyone can break into this room with a breath; whisper into its waiting ear. Although not everyone can survive an encounter with the forbidding metallic thereness of this strange passive thief, the microphone. [14]

Given the ubiquity of the mediation of the classical voice, this thesis investigates the ways amplification continues the historic evolution of the classical voice. It needs to be recognised that the amplification of the voice involves a number of interdependent steps, the microphone being only one part of this process. The voice is transformed into electrical signal by the microphone. Each microphone has its own characteristics that impact on the nature of what is transmitted. This signal is mixed or processed and then circulated to the listener either through speakers or headphones. The acoustic characteristics of the listening space influences what is heard through the speakers transmitting the sound into the space. Interventions into what is heard by the listener can happen to varying degrees at each part of this process. As a consequence, the field of study is wide and varied as practitioners are developing myriad levels and methods of engaging with this technology.

This thesis analyses these new practices emerging from the mediation of the classical voice. These new practices embrace and experiment with vocal techniques and aesthetics that are new to classical voice and are facilitating musical ensembles and performing contexts impossible without amplification. A framework for examining the nature and effectiveness of this practice is developed. The research investigates the impact and implications of the microphone and associated sound technology on the classical voice with its impact on revealing in detail the many signifiers embedded within the classical singing voice. It will also be shown that the microphone highlights relationships between singing and the expression of text and enables the singer's body more expressive freedom. One simple example of this increased physical freedom facilitated by the microphone is that the singer does not have to face the audience in order to be heard.

The practices emerging from the interaction of classical voice with microphone are rich and varied because of the infinite expressive possibilities embedded in both sound technology and the human voice. The human voice can cajole, persuade, deceive, reveal, enchant, assault, play, surprise, dominate, flatter and transport. The powerful can be threatened by a voice and the

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[14] Penman, Ian. "On the Mic. How Amplification Changed the Voice for Good*". In *Undercurrents. The Hidden Wiring of Modern Music.* (New York: Continuum International Publishing Group. 2002.) 28.

weak emboldened by it. Singers can be powerful signposts for particular times or events and music can provide identity and a belonging to a particular community. The voice can reveal much about identity, gender, cultural background, and age; physical and emotional state and social class. The listener takes many cues from the sound of a voice. The more detail that is heard in a voice, the more signifiers about the speaker and their message.

Music, drama, news and public commentary are predominantly heard through streaming services, radio and television. Amplification is involved in hearing most voices live in a public performing space. Listening to an unamplified voice in any kind of public life is a rare experience: speaking or singing in performance without amplification is like calling out across a football field –the listener might get a lot of what was said and a broad idea of how the speaker or singer was feeling, but the listener would miss much of the message and the subtlety of what was said.

On the other hand, many imbue the unamplified voice with a power, truthfulness and virtuosity denied to the amplified voice: consider Pavarotti as opposed to Freddie Mercury. The voice heard through the medium of air into a constructed acoustic space is given a cultural power not given to the voice that is converted from acoustic energy into an electrical signal and then back to acoustic. That is, the unamplified voice as opposed to the amplified voice. The amplified voice uses sound technology to mould the interaction between the singing, the ensemble and the listening space. The unamplified voice manipulates the singing in relation to the ensemble and the architecture of the acoustic space. The construction of churches, opera houses, concert halls, town halls and recital spaces are technological interventions into how we hear voices that also have cultural implications.

The curious paradox in the mystique of the classical voice is that one of its most revered exponents, Luciano Pavarotti, is best known for his amplified performances as part of the three tenors. The amplification of his voice is seen in this case as incidental to his singing, whereas contemporary singers when using the microphone as part of their vocal technique and often considered less skilled as a result.

This thesis examines classical singers who are working with microphone, mediation and sound technology. The difficulty of defining a classical vocal practice becomes apparent as soon as mediation of the voice comes into play. The nature of this practice is that many singers begin exploring techniques that have previously sat outside the classical tradition, developing musical

ensembles dependant on mediation and performing in spaces and in ways that would be impossible without such mediation. Boundaries between vocal genres become permeable and ambiguous. As a consequence practioners are finding new aesthetics and practices that see the voice as not fixed, but rather adaptive, interactive, evolving and organic. The various steps involved in the mediation of the voice and the interventions that are made at each point are fundamentally as much cultural, creative and aesthetic decisions as they are technical. It is a "complex interplay of motive forces… a configuration of possible events, a complete dynamism of structure".[15]The works resulting from this partnership of voice and sound technology vary from the construction of a particular performance acoustic to the transformation of the voice into something unrecognisable from its source, and everything in between. In order to understand how this practice diverges from what has previously been considered a classical vocal practice it is important to understand some of the historic roots of the classical voice.

1.1 The Dominance of Bel Canto and the Rise of the Microphone
Classical vocal practices incorporating sound technology often struggle to find a place in the Western classical tradition. There is no consensus on the meaning of the term Bel Canto, or of what constitutes classical vocal techniques and styles. A description of the historic debates and their ongoing nature is not necessary here. Such an analysis of the social, political and technological influences on the development of the classical voice have been done thoroughly elsewhere.[16] The consensus on the stylistic elements of classical singing will be defined, despite the lack of consensus as to how these elements are acquired.

Classical vocal pedagogy has developed over centuries from the European traditions of Bel Canto singing. James Stark describes Bel Canto's origins as coinciding with the rise of the solo singer in the late sixteenth century[17]. Some constant elements of this technique include: a synergetic relationship between breath and voice that delivers a seamless transition between vocal registers[18] and between different vowel shapes; a minimization of consonants as they

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[15] Eco, Umberto. "The Poetics of the Open Work*"* in *Audio Culture* Edited by Christopher Cox and Daniel Warner. (New York, London: Continuum, 2004.) 171.

[16] See, for example: Potter, J & Sorrell, N. *A History of Singing,* (Cambridge: Cambridge University, 2012).

[17] James Stark. *Bel Canto, a History of Vocal Pedagogy* (Toronto: University of Toronto 1999)

[18] A vocal register refers to the voices' pitch range and areas of the voice where, in an untrained voice, changes in vocal quality are clearly evident. These changes in vocal quality may be prized in vocal genres and traditions other than classical ones.

interrupt breath and vocal line; and the modification of vowels to be most sympathetically resonant in relation to pitch. Legato is valued in this tradition and the tonal ideal is chiaroscuro (a balance between light and shade in the voice). These vocal qualities have been applied to the voice so it could be heard acoustically in various performing spaces from opera houses and concert halls to small salons, and to interpret repertoire ranging from voice and a single instrument to epic works with orchestra, multiple voices and choirs/ choruses.

Potter argues that classical singing remained virtually unchanged since the mid nineteenth century while at the same time the microphone freed popular vocalists from a generic singing technique and allowed them to personalize their delivery. These emerging vocal styles and techniques included: the exploration of intimacy (as evidenced by the rise of crooners such as Bing Crosby,) rap's experimentation with the sounds of language and the application of shout and the incorporation of scream, grind and other extra vocal sounds into many contemporary vocal styles including rock. The microphone facilitated a level of exploration into the expressive potential of the voice that was impossible prior to its introduction.[19] Contemporary singing styles have evolved from a range of vocal traditions including field hollers and works songs, country, blues, Afro- Caribbean musics, gospel and traditional folk, which developed without the microphone.[20] However, the evolution of these styles is based on the microphone and the "aesthetic fluidity"[21] it brings. Experimentation in the recording studio have led (and continue to lead) to the development of new techniques and styles that has further fed the development of popular musical styles.

Classical singing's engagement with sound technology came much later and has led to an exploration by classical singers of a broader expressive palette. Sound technology can construct, shape and influence the acoustic properties of any physical space. It can create the acoustics of a concert hall in a cinema while at the same time creating a sense of close proximity in a stadium. It can create an acoustic environment that could not exist without sound technology. It can transform the voice.

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[19] Potter, J & Sorrell, N. *A History of Singing.* (Cambridge: Cambridge University, 2012.)
[20] Potter, John,) *Vocal Authority Singing Style and Ideology.* (Cambridge: Cambridge University Press, 1998.) 137.
[21] Zak, Albin "Painting the Sonic Canvas: Amplification as Musical Style". in Bayley, Amanda (Editor). *Recorded Music, Performance, Culture and Technology.* (Cambridge: Cambridge University Press 2010.) 307.

Classical vocal technique is fundamentally an acoustic phenomenon allowing the singer to be heard unamplified in particular performing spaces under specific conditions. These acoustic imperatives helped shape the development of classical vocal techniques up to the present day. This technique has never been fixed or static. The nature of the repertoire, the musical ensemble and the performing space have created imperatives for the evolution of classical vocal technique. The ability of the classical singer to be heard was challenged by the larger performing spaces of the nineteenth century, while at the same time singers competed with bigger and louder orchestras. These changes in performing spaces and orchestras precipitated a need to develop a singing pedagogy to deal with the new conditions. A movement to apply science to the investigation of the singing voice led to the formulation of singing techniques to help singers adapt to these challenging conditions. Part of this new pedagogy involved reducing the voice to its component parts: bone, ligaments and musculature and a range of approaches emerged from these theories and investigations. This included contentious theories of racialized timbre.[22]

The techniques that emerged from these conditions heavily influenced contemporary classical vocal pedagogy, although no consensus ever emerged. This is not surprising as the classical vocal tradition has rarely been homogeneous in its techniques and aesthetics. Consequently, classical vocal technique has been in a state of adaptation and adjustment. The impact of mediation is another factor impacting the classical voice in its latest manifestation.

1.2 The Microphone and New Expressive Possibilities

The areas of singing considered on the fringes of a classical vocal practice[23] are precipitating new areas of vocal expression, embodiment, theatrical forms and intersections with other disciplines such as movement and technology. These works are asking questions about what it is to be a classical singer, singer, voice and indeed to be human. They challenge the Western musical traditions privileging of "sounds that have a precise musical pitch"[24] as opposed to the sounds that have very precise sensory and communicative qualities. The microphone invites and exploration of vocal timbre, (timbre and its relationship to the microphone is discussed in 2.3.) Compared to other musical elements such as rhythm, pitch and dynamic, timbre is a

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[22] Eidsheim, Nina. "Voice as a technology of Selfhood: Towards an Analysis of Racialized Timbre and Vocal Performance." PhD Dissertation, 2008. University of California.

[23] These areas include sound art, music theatre, contemporary art song using voice technology and classical artists using popular music forms.

[24] Chion, Michael. *Sound*. (Durham and London. Duke University Press. 2016) Kindle Edition. Loc 1549.

contentious musical term but one that the listener immediately connects to in a fundamental and visceral way.[25]The origin of the word *phone* come from the Greek word 'phone,' which means sound. *Micro* comes from the Greek word 'mikros' and refers to small things. The microphone is an instrument that was initially designed to bring small sounds into prominence. The microphone can give prominence to the weak sounds, the underheard and those sounds that dwell in the background but nethertheless are rich in communicative power.

Listening to music is as much a socially conditioned practice as singing is. The marginalisation of sounds that do not have precise pitch as noise is part of the consensus on what constitutes a classical vocal technique and leads to the exclusion of a wealth of sensory information embedded in these sounds. Their dismissal deprives the listener of a complex multi-sensory experience. Chion argues for recognition of the functional interrelationship between music, speech and noise, rather than the relegation of them to distinct and independent categories.

There is no doubt that there are contexts where human beings speak and sing to each other without mediation and are able to communicate a wealth of sensory information in that relationship. Singers of any vocal genre can perform unamplified given the right kind of acoustic space. This thesis argues that the microphone and associated sound technology facilitates an expanded and more extensive use of this sensory information and for those performances to take place in more varied performing spaces. The singer is not dependant on the acoustic properties of the performing space to transmit the performance to the listener, and as a consequence has a wider expressive choice. This choice involves the excavation of layers of meaning and the creation of crossings and permutations between speech and singing and all the sounds that belong in the expressive vocabulary of the voice, including the classical voice.

These layers of meaning investigated by the microphone can embrace a range of approaches as to the place of humanness in the world and the diversity of that humanness. Music and the voice are ideal vehicles to speak about the interconnectedness of the world. For instance, it is common for the poet and writer to speak of nature as having voice and of being an active participant in the world. Debussy amongst other poets and composers provides insight into the capacity of poetry to give voice(s) to the world: Debussy sets the poetry of symbolist Stéphane Mallarmé to describe the moment of twilight as an active condition that feels and impacts on

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[25] Sloan, Nate and Harding, Charlie. "A Voice Without a Face," *Switched on Pop. How Popular Music Works and Why it Matters.*" (New York. Oxford University Press 2020.) 56-57.

the universe:

> *Vertigo! Now the space flutters*
> *like a great kiss*
> *which, frustrated at being born for nobody,*
> *can neither flourish nor subside.*[26]

Bennett develops an approach to understanding humanity and its relationships with animate and inanimate beings, technologies, machines, matter and microbes as an area of porous borders. Rejecting a view that it is only human beings that act on the world, she argues for a recognition that all matter, including what she describes as assemblages, are made of vibrant matter that has a creativity.[27] Bennett describes this creativity as sometimes purposeful and sometimes not, but always generative. These effects are:

> Always an assemblage of energies and bodies, of simple and complex bodies, of the physical and the physiological.[28]

Holly Herndon's *Proto*[29] exemplifies this kind of exploration and re-examination of the relationship between human and technology that engagement with sound technology can invite. (This work is discussed in 3.4.9.) Working with an artificial intelligence trained by a wide range of singers from different cultural and singing backgrounds, Herndon has created a work of beauty and power that challenges preconceptions about humanness and machine.

Ceraso proposes that sound and listening are intimately connected to changing conditions within the environment.[30] She describes a study of white crowned sparrows that, over a forty-year span, raised the pitch of their song so that they could be heard over the din of an increasingly noisy urban environment. Other studies cited by Ceraso report that birds sing more frequently at night so that they are not competing with traffic noise and that they lower their calls to avoid distortion from the built environment. Ceraso proposes that human's listening habits need to be as agile as the bird's manipulation of their environment, and recognise the transitory, changeable and interconnected nature of the sonic environment.

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[26] Debussy, Claude. Éventail from Trois Poemes de Stèphane Mallarmè. (1913). Library Commerce. 2017.

[27] Bennett, Jane. *Vibrant Matter.* (Durham and London. Duke University Press. 2010.) 117.

[28] Ibid.117.

[29] Brooklyn Vegan Staff. *Holly Herdon debuted "Proto" Live Show at Pioneer Works* 17/05/2019. Brooklyn Vegan Website.. http://www.brooklynvegan.com/holly-herndon-debuted-proto-live-show-at-pioneer-works-pics-setlist/ (Accessed 24/06/2019)

[30] Ceraso, Steph. *Listen. Sounding Composition. Multimodal Pedagogies for Embodied Listening.*(Pittsburg PA. University of Pittsburg Press. 2018.) 145-146.

It is this kind of listening that the microphone encourages and arguably develops. The ubiquity of the mediation of the voice and sound has created a listening audience accustomed to hearing the range of signifiers that the microphone can foreground and facilitate singers and performers whose practice is underpinned by it.

The mediated voice allows the listener to perceive both the voice(s) and their side effects. The listener attributes meaning to a range of sounds (including those of the natural world) that have no linguistic meaning, referred to by Chion as "sonic animism."[31] Contemporary listeners are more likely to establish meaning from these signifiers revealed by the microphone than the literal meaning of the word, although the perceptual balance will vary according to the work. These signifiers also layer impact on the perception of the literal meaning of the word. The presence of these signifiers allows the listener to fill in the gaps between that which is heard and that which isn't.[32] The amplified voice also has the capacity to make the literal meaning of the word more easily comprehensible. This is because the microphone: i) enhances the capacity to use speech-like vowels and to sing in areas of the voice where speech intelligibility is strong; and ii) provides more and varied sonic information.

Rather than considering an engagement with amplification and voice technology as taking away the power and the breath of the classical singer and being ultimately dehumanizing, classical voice artists use this technology to go deeper. This vocal approach develops from a recognition that each moment in a performance is a result of the complex interplay of elements and that through this interconnectedness, moments of transitory power are created. As Karen Barad writes: "Matter feels, converses, suffers, desires, yearns and remembers." [33]

Singers working with voice technology consider this relationship a fluid interaction. A range of works that result from this practice are discussed in Chapter 3. The singer responds to what is heard through their interaction with the technology, the other beings in the space and the physical environment. All of these elements impact on the singer(s) and the performance. For example, singers and sound technicians speak of particular microphones as having personality and qualities:

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[31] Chion. *Sound*. Loc. 1439.
[32] Ibid. Loc. 1356.
[33] Karen Barad, as quoted in: Neumark, Norie. *Voicetracks: Attuning to Voice in Media and the Arts.* (Cambridge: The MIT Press. 2017.) 3.

What I love about the colour of a microphone is that it's up to interpretation and I feel is best described using emotional language. Picking microphones becomes more art than science. There's simply a difference in emotion when using a U47 to record strings versus using an Earthworks QTC. And picking the right emotion for the song is how we make our art.[34]

The interplay between musical ensemble, singer(s), the physical environment, the audience, the technologies and their interconnectedness shape the performance. The singing is in part shaped by what and how the singer hears the music and the complex interplay of its elements[35], as well as how this experience makes the singer feel. The voice is an instrument intimately tied to the body and the imagination. What is felt and heard directly impacts on the expressive voice. Neumark observes how the embodied voice is shaped and moulded by our emotions.[36] Not only is the expressive voice shaped by what is felt, the voice in turn affects those around it and listening to it. Neumark quotes Anna Gibbs' description of the voice as an expressive telegrapher of emotion, connecting human beings to each other:

Human voices call to us in many ways, often speaking of intimate connections- talking, singing, whispering, breathing…they call across media and space.[37]

The human voice when amplified has the capacity to magnify this effective capacity. This magnification creates a different relationship with the audience/listener, one where attention is drawn to the detail of the performance and the nuance of what is being communicated. Chion uses the analogy of standing at the edge of a busy street and listening to the heavy traffic to describe the effect of listening from closer up. The listener is not confronted by a uniform sound, but by a thousand overlapping sounds that serve to distinguish signifiers such as: the type of car, its speed, whether it is accelerating or decelerating, the condition of the muffler, the manner of driving and the totality of the multi-faceted sounds of that place at that time. [38]

Similarly, the amplification of the voice can reveal a multiplicity of signifiers as to who is speaking, where they are, their physical and emotional state. It excavates the speaker or singer's innermost thoughts. Every breath, sigh, scratch of the vocal folds, use of resonance of mouth

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[34] Weiss, Mathew. "5 Things to Listen for When Choosing a Microphone." *Pro Audio Files,* 12/05/2018. https://theproaudiofiles.com/choosing-a-microphone/ (Accessed 11/05/2019)
[35] The impact of how and what the singer hears on the singing is an under-researched area. Unamplified singers anecdotally describe how a "good" acoustic enables them to sing better and amplified singers speak of the negative impact of poor foldback.
[36] Neumark. *Voicetracks*.5.
[37] Ibid.7.
[38] Chion. *Sound.* Loc 1396.

and body, articulation of the tongue and palate: all communicate specific signals to the listener. It may not be important whether what is heard is truth or a catalyst for something else. What is true is that the listener has been seduced by the wiring of sound and its capacity to give us immediacy and detail. Consequently, the listener is given a richer set of signifiers to interact with and create meaning from. Penman aptly sums this seduction with the metaphor of the syringe:

> But the microphone is like a syringe, it can put in as much as it takes out, filling the singer's head with hallucinatory notions. Outsiders slip through now, because the microphone is a short cut…which repays a more economical delivery, honouring the whisper as much as the holler.[39]

Popular music styles have become expert in the use of those human signifiers that are avoided in classical singing as signs of vocal dysfunction: the catch of the breath, the throat tightening, the air escaping in a whisper. Nate Sloan describes popular music as "Multi-sensory…it can be olfactory, as in 'funk', and it can activate the taste buds, like "sweet" jazz or "bubblegum" pop.[40]" Classical singers have historically used a more restricted palette of timbre and vocality than other genres. The use of the microphone and sound technology are challenging the exclusion of these vocal expressions from a classical lexicon and consequently, the dichotomy between popular and classical vocal styles is shifting.

There is room for many voices in this practice. Practitioners are using technology to explore the expressive possibilities sound technologies enhance. As a result, they are raising fundamental questions about the nature of good singing and the functioning voice. Other practitioners use voice technology to create a mask of the voice and challenge concepts of the truth of the voice and the relationships between humans and technology. Practitioners working in sound art, music theatre and contemporary art music no longer wish to see their work relegated to the fringes but see it as a core vocal practice exploring new forms and expressions.

Boundaries between genres have become more permeable as the intersection between what is broadly considered Western art music and modern composition, minimalist and ambient music, Avant rock, funk, hip hop and jazz and improvisation becomes more organic, and collaborations and cross-fertilization feed creations of new musics. Sound technology has facilitated an exploration of the expressive possibilities of the voice that would be unthinkable

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[39] Penman, Ian. "On the Mic." 28.
[40] Sloan, Nate and Harding, Charlie. *Switched on Pop.* 57.

without it, and in the process created permeations and crossings between vocal genres until these boundaries become irrelevant. It has enabled the singer to explore the infinite possibilities of humanness, while also exploring intersections between technology and human to create unimaginable feats of creation that are entirely human, but then again not. The human voice itself is a complex, interactive, flexible and evolving construct intimately tied to its environment and its humanity. These intersections with technology have been and will continue to be a key element in the evolution of the classical voice.

1.3 Technology, Voice and Possibility

Singing is for many performers an organic interaction between themselves and the sound technology that brings the voice into the listening space. This space can be as intimate as a whisper, as epic as a full orchestra or band in the largest and grandest concert hall, or everything in between. This interaction of singing with technology can be both a deception and revelation. The microphone can uncover the intricacies of intimate experience and create new ones that couldn't exist without the microphone.

These possibilities open up dialogues with other genres, expressions, and disciplines such as the visual, movement, and theatre in ways not possible without mediation. Umberto Eco discusses this openness between musical genres and styles and considers the open works of Boulez, Berio and Stockhausen as an opportunity to set up new relations between the artist and the audience.[41]Eco discusses 'openness' as a fundamental quality of contemporary art and gives examples of works by Berio and Boulez that allow the performer an interpretive and creative freedom often denied in what he describes as "finite" musical works by classical composers[42]:

> It would be quite natural for us to think that the flight away from the old, solid concept of necessity and the tendency towards the ambiguous and the indeterminate represented a crisis of contemporary civilisation…on the other hand, we might see these poetical systems as expressing the positive possibility of thought and action made available to an individual who is open to the continuous renewal of his life patterns and cognitive processes.[43]

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[41] These are works where the composer gives the performer a greater range of interpretive choice in aspects of the work such as duration and pitch, and scores which are often presented as diagrams or other highly graphic forms.

[42] Eco, Umberto. "The Poetics of the Open Work*"* in Cox, Christopher and Warner, Daniel. *Audio Culture* (New York, London: Continuum, 2014) 168-171.

[43] Ibid. 171.

This juxtaposition of certainty and possibility mirrors the possibilities the microphone presents to the classical singer. It shows the movement away from prescribed methods of singing based on the necessity of being heard acoustically, towards a discovery of what singing could be under the conditions created by mediation and voice technology. Unamplified singing necessitates a particular manipulation of breath, body, timbre and resonance to be heard. With the classical voice this singing has mostly taken place in acoustic spaces specifically designed for a particular vocal aesthetic. Once the microphone comes into play, the performance becomes more responsive to aesthetic rather than acoustic imperatives. These performance elements include the expressive palette of the singer, the choice of repertoire, the nature of the instrumentation and of the musical ensemble, where the performance takes place and how the performance is transmitted to the audience.

Sound technology is being used to explore the intersections between machine and voice. In this relationship, such intersections can be about revealing layers of meaning as well as about disguising and transforming the voice. On her *Homeland* album and live performances, Laurie Anderson uses voice technology (a harmonizer) to create a male character, Fenway Bergamot.[44] The line between technology and human becomes permeable. The amplified voice challenges vocal style hierarchies and the representation of gender, race and class.

The microphone can reveal the vulnerabilities of the human inhabiting the voice, reflecting the unique history of that body. The sounds and expressions that we read every day become part of the musical and human expression as the microphone listens to every inflection, and the singer responds by revealing more. But there is more. An organic relationship evolves between the microphone, sound technology and the singer. It is able to reveal more of what it is to be human. Furthermore, the use of the microphone asks what it is to be other than human?

1.4 The Diva Mystique and Resistance to Amplification

The relationship of singer to microphone and sound technology in general continues to be a contested one, even at times in relation to popular singers. The ability of the microphone to give detail and proximity to the listener, foreground vocal timbre, facilitate the construction of musical ensembles not possible unamplified and transform the listening space of the performance are at times seen as standing in for authenticity and real vocal skill. Craig

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[44] For more information on Anderson's use of voice technology see: Goolsby, Julie Malinda. "A Manifest Cyborg: Laurie Anderson and Technology." PhD Dissertation, Georgia State University, 2006.

discusses Frank Sinatra's use of the microphone as an extension of his artistry and the association of microphone use with the untrained (inferior) contemporary singer compared to his classical counterparts:

> We must also question Sinatra's use of the microphone. Some have argued that his close relationship with the microphone throughout his career served to mask inadequacies in his technique, whilst others maintain that 'he saw in the microphone the opportunity to form a style encompassing the full range of subtle, expressive nuance of the human voice.'(Mustazza[45])[46]

This tension between conflicting views of the role of the microphone in singing is being played out in the arena of classical voice. This area of contention is between perceptions of the microphone as masking authenticity as opposed to creating new aesthetics. Eidsheim[47] observes that classical vocal pedagogy is often considered normative and healthy as opposed to vernacular vocal styles.

The microphone has transformed the way singers sing and audiences listen. Proximity and detail have become key expectations of audiences schooled by recordings and broadcasts that simulate ideal or even impossible conditions. There is nothing natural about a rock singer being heard over a band comprising electrified guitars and drums any more than it is natural to hear *Madama Butterfly* staged on floats on Sydney Harbour. These changes in listener expectation are affecting and continue to affect the classical voice and its representation

Classical singers working with amplification and technology challenge many of the fundamental tenants of historical classical vocal technique. The belief that classical singing is based on an ability to power the voice solely with the breath and resonance of the singer's body is a central canon in classical singing pedagogy. This open letter written by singer Alice Coote represents some of the key beliefs held by many who are classical singing practitioners about what makes a classical voice unique:

> This magic happens when a voice, maybe of recognisable or greatness of tone, that has been trained for decades as an athlete and musician, launches its instrument – part of

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[45] Mustazza, Leonard. *Frank Sinatra and Popular Culture.* (USA: Praeger. 1998.)

[46] Antony, Craig "How meaning is rearticulated in vocal performance when stylistic conventions change around a musical text" Website. 3/04/2012. https://craigantonymusic.wordpress.com/2012/04/03/how-meaning-is-rearticulated-in-vocal-performance-when-stylistic-conventions-change-around-a-musical-text-through-comparison-of-two-contrasting-performances-of-my-way/ (Accessed 4/06/2019)

[47] Eidsheim, Nina. "Voice as a technology of Selfhood*."* 2.

the human body and identity- upon the greatest and most challenging music that has been written for the human singing voice.

> It is not about lights, it is not about costumes, it's not about sets, it's not even about sex or stature… It is ALL about the human voice. This is the Olympics of the human larynx attached to a heart and mind that wants to communicate to other hearts and minds. It is something that is done without amplification and without barriers. It is one human singing to another. LIVE.[48]

One example of the perceived threat of amplification to the ideal of the classical voice is the response to a broadcast of an opera at the Metropolitan Opera.[49] A body mic was clearly visible on one of the singers in the live streaming of the opera to which the New York Times responded by interviewing The Metropolitan Opera who, after initial confusion, confirmed that the mic was for broadcast purposes and not for amplification.

> A small number of opera houses and concert halls around the world have introduced sound enhancement systems, sometimes openly, sometimes stealthily. But the Met is and always will be an amplication-free zone, the company maintains, a place where opera can be experienced the traditional way with natural sound.[50]

The sound designer responsible for the use of sound technology in the production commented:

> I try to create the impression one would have, in an aesthetic and emotional and reactive way, if one was sitting in the house in a really good seat," he said. "This story," he said, referring to my pursuit of the matter, "started from something someone saw, not from something someone heard.[51]

Some commentators recognise that the use of technology in opera is inevitable, if undesirable, attributing it to the intrusion of commercial interests.[52] The use of sophisticated lighting, digital projections, architectural shaping of the sound, outdoor spectacles are less objectionable than the sight of a soprano wearing a wire at the opera:

> The authors here have no agenda as far as the controversial issue of amplification in opera is concerned-and if they did, it would probably be highly traditional….Nor are they naïve about the ways in which technological and media developments in opera in the last twenty years…have been related to and often a direct result of commercial pressures.[53]

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[48] Coote, Alice. "An Open Letter to Opera Critics". *Slipped Disc*. 19/05/2014.
<http://slippedisc.com/2014/05/alice-coote-an-open-letter-to-opera-critics>
[49] Tommasini. "Wearing a Wire at the Opera, Secretly, of Course." *The New York Times*. 28/06/2013.
https://www.nytimes.com/2013/06/30/arts/music/wearing-a-wire-at-the-opera-secretly-of-course.htm
[50] Ibid.
[51] Ibid.
[52] Henson, Karen. *Technology and the Diva*. (Cambridge: Cambridge University Press, 2016.) 18.
[53] Ibid.

The commentators go on to recognise that the use of technology is creative as well as a technological decision. They go on to consider the various technological interventions into the creation of the diva: including the star system, the use of the media, lighting, film and photography. Jonathan Sterne concludes that the diva's voice is a technological construct shaped by years of training of body and mind and that the classical voice was constructed to perform in an equally technologically enhanced performance space.[54]

The ability to be heard unamplified in large spaces was never a unique feature of classical singing prior to the widespread use of the microphone. The blues singer Bessie Smith was known to be able to perform unamplified in Carnegie Hall and Madison Square Gardens. Cullum quotes Clarinettist Buster Baily commenting on Bessie Smith's singing:

> For Bessie singing was just a living...She was certainly recognized among blue singers—a shouter they called her. They all respected her because she had a powerful pair of lungs. There were no microphones in those days. She could fill up Carnegie Hall, Madison Square Garden or a cabaret. She could fill it up from her muscle and she could last all night. There was none of this whispering jive.[55]

Similarly, the music theatre star Ethel Merman was famous for being heard unamplified over orchestras, with the ability to colour and inflect lyrics with meaning:

> Seemingly overnight, Merman legitimized belt singing for Broadway leading ladies and proved the belt technique could be used to make lyrics more clearly understood in unamplified theatres (a major acoustic concern at the time).[56]

Merman and Smith were the best known of a large number of singers using vocal techniques other than classical ones to be heard in large performing venues without amplification. They were also known as fine interpreters of songs, with a wide range of vocal expression and musical phrasing. Smith was praised for her use of microtones and her expressiveness and musicality. The ability to personalise and shape the song is inherent to the skill of the popular singer. Structure is rarely proscribed, with the singer expected to have the ability to create a personal interpretation using phrasing, melodic and rhythmic variations and other expressive techniques central to the performance.[57]

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[54] Ibid.

[55] Pick, Margaret. "Empress of the Blue: The Life and Music of Bessie Smith". Website. *Riverwalk Jazz Collection. http://rwj-a.stanford.edu/program/empress-blues-life-and-music-bessie-smith (*Accessed 29/05/2019)

[56] Jones, Kevin. *The Evolution of the Female Broadway Singing Voice.* Musical Theatre Resources. https://musicaltheatreresources.com/2015/11/05/the-evolution-of-broadway-female-singing-voice-part-1/ (Accessed 20/05/2019)

[57] Bratcher, Melanie. *Words and Songs of Bessie Smith, Billie Holiday and Nina Simone: Sound Motion, Blues*

Most popular singers of the past, including Merman and Smith, did not undergo formal voice training. They shaped their own voices and interpretative approaches through personal practice and exposure to other singers and musicians. Critiques of popular singers of the past as untrained are inaccurate as their training came through their own performing experience and listening to other artists. This is historically true of most popular singing styles. The dedication to extended periods of training is not unique to classical singers. It was the nature of the training and where it took place that differentiated popular and classical vocal styles.

The ability to be heard unamplified and use a wide range of expression to reach an audience are not unique features of classical singing. They never have been. Popular vocal styles underwent the transformation that the microphone invites in the first half of the last century. That transformation and experimentation continues. It will be shown that classical singing is being transformed now, with most new repertoire written for the classical voice using voice technology of some kind.

1.5 The Microphone and the (Im)Perfect Voice

The microphone can reveal (and obscure) the markers of humanity such as age, illness and emotional or physical frailty. The cartilage that facilitates the voice's ability to move through the vocal range flexibly can become less responsive with age. How much these changes affect the singing voice is highly individual and dependent at least in part by personal emotional and physical history and our own unique physiology. At the same time the voice as it ages can take on a greater tonal depth. Jazz singers such as Shirley Horne and Betty Carter were revered into their later years for the artistry and sophistication of their singing. What was heard was great artistry in a voice representing a lived life, but not what many may think of as its physical peak. A human being in a particular moment of their lives was heard. It was a fusion of a great musician, virtuosic singer and vulnerable human being with a complex real history.

Recent critical receptions of concerts by aging artists such as Brian Wilson, Johnny Cash and Bob Dylan raise questions about how the listener feels when proximity and detail reveal the

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Spirit, and African Memory" (New York: Routledge, 2007) 42.

lived history of the singer including illness and frailty. Some commentators embrace what these performances reveal and others reel in barely disguised disgust.

In 2016 Brian Wilson performed with The Beach Boys at the Sydney Opera House. There were scathing reviews. Brian Wilson was clearly not a well man, and the band sensitively compensated for his fragility. The beauty of seeing this on stage, and the undoubtable powerful musicianship and creativity of Brian Wilson shone through. He is a man in the latter stages of an at times difficult life, and this was heard in his singing. Tim Martin, a critic for The Telegraph, wrote:

> Matt Jardine, son of Al, contributes the soaring falsetto that Wilson's ruined voice can no longer manage. But by the time we got to the melancholy masterpiece Pet Sounds, the evening is clearly running as much on compassion as enthusiasm. …Honestly, though, this was the saddest gig I've ever seen.[58]

Another music critic saw Wilson's performance differently:

> Wilson's voice is a tad shot now, alternating between gruff and affectingly plaintive, and Jardine's son, Matt, does much of the vocal heavy lifting…. the strangely distant Brian Wilson takes a bow and slowly lollops off stage like a pensionable Baloo the Bear. It's a poignant close to a spectacularly moving evening.[59]

Wilson's performance of his final song, "Love and Mercy"[60] saw him seated behind the keyboard. Gone was the effortless sweet legato of his performance of the song thirty years ago. In its place was a difficult and halting vocal line indicating a reduced ability to sustain breath and a stronger speech quality and lingering on the words. This wasn't the upbeat, up-tempo version of previous times. In its place was a powerful poignancy that made the audience catch his every word. Here was Barthe's "grain of the voice": the history, the memories, and the body that holds the voice. Brian Wilson's words invite this use of intimate expression:

> *I was lyin' in my room and the news came on T.V.*
> *A lotta people out there hurtin' and it really scares me*
> *Love and mercy that's what you need tonight*
> *So, love and mercy to you and your friends tonight*

[58] Martin, Tim. "Brian Wilson's anniversary tour: The saddest gig ever?" *The Telegraph*. 16/05/2016. https://www.telegraph.co.uk/music/what-to-listen-to/brian-wilsons-anniversary-tour-the-saddest-gig-ever---review/ (Accessed 17/04/2018)
[59] Gittins, Ian. "Brian Wilson Presents Pet Sounds review-a spectacularly moving evening." *The Guardian*. 22/05/2016. https://www.theguardian.com/music/2016/may/22/brian-wilson-presents-pet-sounds-review-a-spectacularly-moving-evening (Accessed 17/04/2018)
[60] Wilson, Brian. "Love and Mercy."From the Album "I Just Wasn't Made For These Times.Amazon Digital Services.October 1,1995.

I was standin' in a bar and watchin' all the people there
Oh the loneliness in this world well it's just not fair'[61]

Johnny Cash's later recordings and performances were received in similar ways. Many of his recordings with Rick Rubin were done after the death of his wife June. They reveal the grief and despair of a man approaching the end of his life. The difficulty Cash had in sustaining his breath and the rasp in his voice, illuminate his story telling that has always been the core of his art. These recordings are close miked and transparent, avoiding many of the post-production techniques that could obscure Cash's heartbreaking fragility and masterful expressiveness. His voice and its interaction with the words are never less than arresting. It is the micro-nuances in his voice that reach into the listeners' breastbone and place an unrelenting weight on the heart. At times breath escapes through the vocal folds making sustaining the sound fragile and vulnerable. Each word begins with an effort as the breath fails to bring the folds completely together and a gasp or rasp begins the sound. Sometimes the vocal line fades as the phrase sustains, but at no time is the connection of the singing with the text and the body sacrificed. It is as though Cash's body inhabits the same space as the listener and whispers his last words into their ear. Chet Flippo, a critic for CMT News, makes the following observation about the nature of these recordings:

> His recordings in his last years — to me-represent some of the most inspired artistic choices of his career. Not everyone agrees, but I feel that the best of the American Recordings encapsulate his career and his musical worldview marvellously. They showed him at the peak of his song acumen. They didn't show him at the peak of his vocal strength. He never had all that much a great singing voice to begin with, but it was distinctive and oh-so expressive. But the Cash voice of his old age was a voice that reached out to you, beseeching and preaching and pleading, rather than daring you, as the young Cash did.[62]

A YouTube listener made the same observation about the ability of this aging voice to communicate the essence of the song:

> It's the sound of a man giving his last breathes (*breath*), for all of what his life was and had come to be, in song.[63]

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[61] Ibid.

[62] Flippo, Chet. "Nashville Skyline:Johnny Cash's "Last" Album Raises a Question." *CMT News*,18/02/2010. http://www.cmt.com/news/1632192/nashville-skyline-johnny-cashs-last-album-raises-a-question/ (Accessed 25/04/2019)

[63] Cash, Johnny. "If You Could Read My Mind".YouTube Video, 22/05/2012. https://youtu.be/xEx147n9G1A (Accessed 4/06/2019)

The performances and recordings of these aging, no doubt great singers show us the capacity of the microphone to open a window into the broadest range of human expression. These include aging, physical decline, despair, love and all of the intense and incidental experiences that make up a human life. The microphone challenges our perceptions of virtuosity and of what great or even good singing is. The microphone can act as a microscope looking into what joins us as human beings. It can create new worlds and experiences not possible otherwise. The microphone gives voice to those who may not be heard otherwise, be a vehicle for the creation of the spectacle. At the same time it allows the most intimate encounters. The microphone gives the reigns to the singer to begin to create their own voice.

The classical voice has historically adapted to changes in the performance context, repertoire, instrumentation and culture. There has never been a consensus on its nature, despite the classical voice historically maintaining a cultural primacy over other vocal genres. This cultural hegemony has now been eroded by the mediation of the singing voice. Audiences have become accustomed to the proximity and detail of sound in recording and broadcast. This expectation has changed live performance to the point where mediation of the classical voice is widespread and ubiquitous. Debates on the impact of this mediation on the expressive techniques and aesthetics of the classical voice and perceptions of its cultural decline are ongoing.

This thesis discusses the nature of this debate and considers a range of varied practices resulting from the amplification of the classical voice. It also considers works from other vocal genres, which intersect with this evolving practice. Amplification creates permeability between vocal genres. The research asks: what defines the classical voice in the 21st century given that most audience experiences of the classical voice are through mediation, subtle reinforcement or recording necessitating a microphone?

1.6 Chapter Overview
Chapter 1 lays the groundwork for the problem associated with amplifying the classical voice. It provided an overview of the widespread practice of amplifying the singing voice, with a focus on the classical singing voice and the arguments and commentary around it. It introduced an understanding of this practice as a part of the historical evolution of the aesthetics and techniques of classical singing, which have never been fixed but constantly adaptive to changes in instrumentation, performing context, repertoire and social and political context. It discussed how amplifcation of the classical singing voice has transformed the repertoire classical singers

perform, how they sing it, the nature of and the relationships between the musical ensemble, and the physical and virtual spaces that sound technology transforms into performing spaces. The microphone has created new expressive languages and new approaches to the interaction of text and music. Chapter 1 sets up the research question to be unpacked and developed in chapters 2 and 3.

Chapter 2 (Literature Review) develops a broader understanding of the ways the microphone allows an exploration of timbre not possible without it. The microphone invites greater choice and control over the representation of the singing voice. It itself is an instrument for the exploration of timbre and the singing voice is the most sophisticated instrument of timbre. Extra-vocal expressions inaudible without the presence of the microphone become part of this expanded understanding of vocal timbre. This expanded understanding of timbre is inclusive of the interaction of the performance with the performing space. A number of performers and works employing this extended vocabulary demonstrate this expanded expressive paletts. The amplification of the classical voice is facilitating a diverse range of practices.

Chapter 3 (Contextual Review and Case Studies) demonstrates that the engagement of classical singers and composers with microphone and sound technologies has resulted in many voices finding their way into this practice, with a further breakdown of consensus as to what classical voice(s) are. The case studies demonstrate that the aesthetics and techniques considered central to the classical voice become aesthetic choices rather than acoustic imperatives with the use of the microphone. These classical techniques include: balanced chiaroscuro, even transitions between vocal registers, an equally resonant voice across vocal registers, seamless legato, vowel shapes adjusted across the vocal registers to be equally resonant, the presence of singer's formant and the absence of extrinsic noise. Chapter 3 demonstrates that classical singers are finding a new performativity in the voice and the body when freed from prioritizing the need to be heard in a particular space with a particular musical ensemble. A renewed emphasis on vocal expression and the relationship of sound to word is explored. The nature of the voice and what is communicated when mediated by sound technology has resulted in the development of a range of expressive languages reliant on sounds and techniques not possible without amplification, and generally considered dysfunctional or unstylistic in the classical voice. Chapter 3 lays the foundations for a methodology to answer the research question.

Chapter 4 (Methodology) develops an evaluative framework for understanding the ways in which the classical voice interacts with the microphone and the new aesthetic choices that emerge from this practice. The methodology underpins the practice-led research discussions in chapters 5 and 6. Chapter 4 examines the evolution of new vocabularies of expression, construction of the music ensemble, the interaction with performing space and the performativity of the body and the incorporation of vocal micro-textures. The changes to the expressive techniques and aesthetics of the classical voice that result from its mediation are considered, and a framework is developed for evaluating the varying impacts and their effectiveness.

Chapters 5 and 6 are demonstrations of proof of concept. Chapter 5 is a case study investigating the only song cycle, *Songs of Liquid Days*, written by Philip Glass and the intrinsic use of amplification in its performance. It evaluates its performance using the framework developed in Chapter 4.

Chapter 6 examines a constructed song cycle, *A Body of Water*, and its performances by Stephen Adams and the author. It applies the methodology developed in Chapter 4 to evaluate the impact of amplification on these performances.

Chapter 7 (Conclusions) summarizes the findings of the thesis and the implications for incorporating sound technology in a classical vocal practice. It concludes that it is no longer reasonable, if it ever was, to speak of a singular classical vocal practice. A range of practices with varying repertoires, expressive techniques, musical ensembles, performing contexts and relationships between all these factors in performance are emerging. Historically underrepresented voices are using this interaction between classical voice and sound technology to be heard.

Appendix 1 applies the evaluative framework to a recording exercise in which the microphone was used in various ways in the concert hall.

Chapter 2: Literature Review

Everything we do is music, or can become music through the use of microphones.
(John Cage)[64]

This chapter explores issues and debates associated with the research question regarding the 21st century classical voice given that most audience experiences of the classical voice are through amplification, subtle reinforcement or recording necessitating a microphone. There has been little investigation into the impact of the use of the microphone and sound technology on the changing aesthetics and techniques of classical singing. Classical voice in the 21st century is evolving and developing new vocabularies of expression, just as popular singing has done for nearly a century. Much ambivalence exists from many commentators to this evolving practice. Nevertheless, as chapters 2 and 3 discuss, the practice is widespread and pervasive. The mediation of the classical voice creates intersections with vernacular vocal styles and these crossings are investigated to further explore the new expressive techniques emerging through this mediation. The classical voice has and is developing new expressive techniques and adapting old ones in response to the microphone. The permeability between vocal genres that is developing from these amplified classical vocal practices is also analysed.

The literature review investigates the following:

1. The differences emerging between amplified and non-amplified classical vocal practices.
2. The new emphasis the microphone brings into new areas of expression and ways of listening in a classical vocal performance.
3. The erosion by mediation of the classical voice of conceptions of it as a purely acoustic phenomenon.

2.1 Freedom of Listening

There is a profundity to this evolving practice of mediated classical voice. It opens up entirely new (to the classical voice) areas of expression, including ones that are traditionally backgrounded or inaudible in a non-amplified classical vocal performance. They require both a reconfigured listening to those aspects of sound the listener mostly sublimates and a reprioritizing of the voices that are not part of the dominant discourse.

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[64] Van Eck, Cathy. *Between Air and Electricity: Microphones and Loudspeakers as Musical Instruments.* (New York and London: Bloomsbury Academic, 2017.) 106.

Brandon LaBelle and Steven Connor investigate the extra vocal sounds that the microphone brings to the fore in an amplified classical performance and discuss the capacity of the extended vocabulary of the microphone to provide space for a wider range of voices:

> Freedom of listening is…essential for enabling a "plurality" of voices to be *heard…produces an extremely active relational space within which voices may* resound…. to aim for a broader and richer engagement with the range of voices and things to be heard.[65]

This listening is akin to *Dadirri,* the deep listening practice of the Indigenous Peoples of Australia.[66] A practice that has endured among Aboriginal peoples for thousands of years, by the peoples who are among the least listened to in Australian society. It is listening without judgement and taking time to give voice when necessary, sublimating the needs of the individual and becoming integrally part of the moment. This concept of listening makes space for both the sound of the performance and the environment that performance takes place in. Dominic Pettman argues for this focused listening to all the voices of the world, one that requires a different kind of breathing:

> One must breath differently and discount the visual stimuli that have become so fraught and compromised…in this sense, sound designers are at the cutting edge of this sonic project.[67]

Cersao has developed a framework for a listening practice and training that is optimal for approaching amplified works.[68] This framework recognises that listening is a full-bodied act, that reflects:

- an individual's own listening habits and responses to sonic experiences;
- context influences sound's meaning(s); and
- listening is a complex interplay between bodies, sounds and the physical environment.

> This listening practice is described as listening agility and involves the development of flexible listening practices that recognise that sonic situations are always fluctuating.[69]

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[65] LaBelle, Brandon. *Sonic Agency: Sound and Emergent Forms of Resistance.* (Cambridge, Massachusetts and London, England: Goldsmith Press, 2019.) 160.
[66] Ungunmerr- Baumann - Miriam Rose. "Dadirri Inner Deep Listening and Quiet Still awareness." Website, 2019. http://nextwave.org.au/wp-content/uploads/Dadirri-Inner-Deep-Listening-M-R-Ungunmerr-Bauman-Refl.pdf (Accessed 18/2/2019.)
[67] Pettman, Dominic. *Sonic Intimacy: Voice, Species, Technics* (*or How to Listen to the World*.) (Stanford, California: Stanford University Press.) Kindle. Loc.1534.
[68] Ceraso, Steph. *Listen. Sounding Composition.*148-152.
[69] Ibid.145.

The intersection of sound technologies and the classical voice invites a listening that does not necessarily prioritize the strong, the perfectly formed and the familiar. Yet, the practice of deep listening is embedded in the practice of much music, including within the classical tradition. The microphone invites a listening practice that is more open to listening to the sounds that are side-lined, backgrounded, weak, not authoritative but also can be strong, defiant and confronting.

> Listening is often tuning us into the meaningful layers that constitute the world, bridging the seen and unseen, foreground and background, things and bodies …listening…draw(s) out the underheard into greater volume.[70]

Not only can deep listening amplify those aspects of sound that are often muted, it can give signifiers to the environment that holds those sounds. Don Ihde investigates the multidimensional nature of listening and of the ability of sound to give clues of:

> Materiality, density, interiority, relations within experienced space, outward hollows and shapes: complex, multi dimensioned, often unheard in potential richness: but spoken in the voice of things.[71]

Ihde explores the ability of sound in general, and mediated sound in particular, to provide signifiers to the nature of the environment within which the performance is taking place. Other writers exploring the nature of voice and sound explore the non-verbal signifiers of the voice that reveal details about the body that sounds and the state of that body. These signifiers are generally only available to the intimate listener. Amplification foregrounds these sounds in any physical performing context in ways impossible for the unamplified singer. Dominic Pettman describes these signifiers as the "aural punctum",[72] the sounds we hear in the voice that are signifiers of the speaker and the environment that speaker is in. He also discusses the impact of sound technologies such as Auto-tune on erasing those very markers associated with intimate speech:

> It eschews the timber-like timbre of the grain of the voice, replacing it with reflective pastel-tinted chrome vector.[73]

Sound technology can take us deeper into examining the nature of humanity, the relationships of human beings to each other, animals, technologies and the natural and built environments

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[70] LaBelle. *Sonic Agency.* 161.
[71] Pettman. *Sonic Intimacy* Loc 192.
[72] Ibid.Loc.846.
[73].Ibid.

humans inhabit. Pettman argues for this reconfigured worldview that implies new ways of listening, while at the same time recognises that this relationship with technology can allow us to challenge conceptions of gender, class, race, ableism etc. Such a practice creates space for voices not traditionally heard in classical music.

A classical vocal practice that invites collaboration with sound technologies necessitates a development of a listening habit that hears behind, around the music and the words, and into the listening environment. Such a practice asks the listener to listen deeper and be open to new expressions and possibilities. What is heard and the response it elicits is full of unexpected possibilities. Glover, Gottschalk and Harrison explore the nature of the interaction between listening and response and discover a practice that: "Celebrates the diversity in listening capacities… and makes no assumption that specific musical works will necessarily evoke specific experiences for a listener…we have different capacities for perceiving, recollecting, and time ordering sound."[74]

2.2 Mediation and the Humanity of Singing

The movement away from fixed views of the classical voice also applies to the sonic environment the voice interacts with. Any physical (or virtual) space can be transformed into a performance space for the purposes of an amplified classical vocal performance. This manipulation of the physical space that interacts with the classical voice for aesthetic purposes has a long history, with mediation providing another dimension to this practice. The writings of John Potter[75], Jacob Smith[76], Jonathan Sterne[77] and Nina Eidsheim[78] explore the historical development of the classical vocal aesthetic, and the construction of the performing space that facilitates that aesthetic. In the same way as there is no impassive physical environment for the classical voice, Sterne posits that there is no real or true sound reproduction, only choices to be made. Every physical environment, whether mediated or acoustic, facilitates a representation of the singing voice with specific vocal, musical and performance aesthetics. He believes that this is regardless of whether such aesthetics are a result of an accidental confluence of factors or a product of sound design.

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[74] Glover, Richard, Gottschalk, Jenny, and Harrison, Bryn. *Being Time: Case Studies in Musical Temporality* (New York: Bloomsbury Academic, 2018.) Kindle. Loc. 115.
[75] Potter, John. *A History of Singing.*
[76] Smith. *Vocal Tracks.*
[77] Sterne. *The Sound Studies Reader.*
[78] Eidsheim, Nina. *Sensing Sound.*

Van Eck discusses the long tradition of the amplification of certain frequencies in human culture, citing the example of music performances in caves by early humans using the resonance to amplify particular frequencies.[79] She analyses the practices of a wide range of musicians and performers who are using microphones and loudspeakers as musical instruments and concurs with Jonathan Sterne that the intersection between music reproduction and musical production is so pervasive that the discrete differences between these two activities are in fact unrecognizable. It is now undeniable that new means like microphones and loudspeakers have resulted in new kinds of music.[80] They are: "multi-functional devices that cannot be limited to one kind of use".[81]

Ihde suggests a music that listens and responds to the environment it inhabits, is exploring the possibility of things, and the unique atmospheric dimensions of sound and of directionality. He proposes that this is the business of all music, and that mediation opens up more dimensions of potential interactions, of possibilities:

> Yet…there are those who will opt for the security of repetition and others who will opt for change. But he or she who discerns the possible, can "dance"… I prefer those who dance in all the realms that we inhabit.[82]

The construction of the classical vocal style has been integrally tied to the manipulation of both the performing space and the singing voice that sits within it. Electronic amplification opens up possibilities for constructing relationships between musical ensembles, the work, the audience and the space in ways not possible without it. The impact of mediation on these relationships will be explored in Chapter 3.

Amplification is also facilitating new experimentation with performing spaces, the performativity of the body and intersections between dance, movement, theatre and the visual. Works developing out of this amplified classical vocal practice value the concept of performance as not fixed, open to the interaction of all the performance elements including the performance environment. Many of these works embrace imperfection, spontaneity, invention and improvisation. The critic Andy Hamilton discusses these (not new) ways of thinking about

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[79] Van Eck. *Between Air and Electricity.*107.
[80] Ibid. 145.
[81] Ibid. 146.
[82] Ihde, *Listening and Voice.* 202.

music as an art form.[83] One that holds the humanity of music making at its core and proposes a music performance which links music to dance, movement and gesture and incorporates and values improvisation:

> I believe that the aesthetics of imperfection is right to focus on music as event- a position which subverts the standard perfectionist account whereby works are merely exemplified in performance.[84]

2.3 Sound Technologies and the Excavation of Timbre

An amplified classical voice uses an expanded range of techniques and aesthetics. This is also true of popular or vernacular styles of singing, the difference being that the development of these techniques happened much earlier and have been an integral part of the development of popular music vocal styles. Chapter 3 further investigates these different approaches to the classical voice that come about through its interaction with the microphone and sound technology. Such a diverse practice draws on a range of vocal techniques that provide the performer with the expressive freedom necessary for the work. The singer and/or composer working with sound technology uses expressive techniques from the classical vocal lexicon combined with techniques specific to the microphone for aesthetic reasons, rather than as a result of an acoustic imperative.

It is now broadly acknowledged that there are different vocal techniques and styles for different vocal genres. There is no consensus that there are different vocal approaches for amplified and unamplified classical singing. Voice scientist and vocal pedagogue Ingo Titse argues:

> Operatic sound production is not a style, but the outcome of acoustic requirements for unamplified singing in large halls, none of the (acoustic) requirements for (operatic singing) are requirements for electronically amplified singing… training the amplified singer focuses on a large inventory of predictable and controllable sounds at relatively low acoustic power, while training the unamplified singer focuses on the few combinations that maximize acoustic output.[85]

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[83] Hamilton, Andy. *Aesthetics and Music.*(London; New York: Continuum International Publishing Group, 2000). 215.
[84] Ibid.
[85] Ingo Titze. "Training the Electronic (Microphone) Singer. *Journal of Singing* Volume 72 no.5. (May/June 2015) 602.

Sound technology allows us to hear the love songs of mice inaudible to the human ear[86] and to the singing of stars from the beginning of our galaxy.[87] The ability of the microphone to precipitate an exploration of timbre creates a new palette of vocal expression for the classical singer, one that includes those aspects of vocal expression traditionally considered noise or signs of vocal dysfunction in classical singing. Brandon LaBelle calls these sounds "The Lexicon of the Mouth"[88] and Steven Connor[89] as the "Phantasmal Life". Rather than describing these expressions as extra-vocal or extended voice, they are referred to as vocal micro-nuances. Such sounds have been part of vocal expression arguably since human beings first vocalized and are integral to expression in popular and folk song.

The Grove Music Online defines timbre as:

> A term describing the tonal quality of a sound; a clarinet and an oboe sounding the same note at the same loudness are said to produce different timbres. Timbre is a more complex attribute than pitch or loudness, …the perception of timbre is a synthesis of several factors…the frequency spectrum of a sound...(is) of great importance in determining the timbre.[90]

The frequency spectrum of the singing voice results from the interaction of breath, body and mind, and is in itself a multilayered, fluid process. The analysis of the frequency spectrum of the singing voice gives an incomplete analysis of the timbre of the singing voice once it has been amplified, and also is an inadequate descriptor of the unamplified classical voice. Such measures cannot adequately capture the range of markers inherent in the experience of listening to the voice. Other factors that complete a more complex understanding of vocal timbre are discussed in this section:

> The cavities of the vocal tract possess natural notes of resonance which "pass" or reinforce certain harmonics of the vocal chord tone. These emphasized harmonics form concentrations of acoustic energy at frequency regions on the spectrum corresponding to the natural notes of resonance of the cavities. The term formant refers to the selective resonance in a particular frequency which characterize the timbre, or color, of vowels…

[86] Chabout, Jonathon, Abhra Sarkar, Dunston, David and Jarvis, Eric. "Male Mice song syntax depends on social contexts and influences female preferences." 1/04/2015. *Frontiers In Behavioral Neuroscience.* https://www.frontiersin.org/articles/10.3389/fnbeh.2015.00076/full. (Accessed 5/05/2019)

[87] Woolaston, Victoria. "Listen to ancient stars 'singing' in the Milky Way". *Wired.* 7/06/2016. https://www.wired.co.uk/article/astronomers-ancient-stars-singing-milky-way(Accessed 14/06/2019)

[88] LaBelle, Brandon. *Lexicon of the Mouth*.

[89] Connor, Steven. *Beyond Words*.

[90] Campbell, Murray. *Timbre.* (Oxford Music Online. Oxford University Press, 2019). https://www.oxfordmusiconline.com/grovemusic/view/10.1093/gmo/9781561592630.001.0001/omo-9781561592630-e-0000027973 (Accessed 19/04/2019)

the higher formants contribute mostly to the timbre, or quality of the individual voice.[91]

The resonant cavities of the vocal tract are not fixed, but responsive to the singer's intent and imagination. Smith[92] describes the ability of the human voice to manipulate timbre independent of pitch by changing these resonant chambers.[93] The singer is able to change tongue position, lip shape, larynx position, vowel shape as well as breath pressure and volume to change the shape of resonant chambers and thus the pattern of the sound overtones. Sound mediation and technology allows the singer to experiment more broadly with these elements without fear that such expressions may compromise the ability of the voice to be heard.

The human voice is capable of myriad modes of operation that facilitate a large range of expressive possibilities. Eric Heller [94]investigates the physiology, physics and acoustics of sound from a listening perspective, and uses the YouTube video of voice artist Mel Blanc to demonstrate the many possible modes of operation of the vocal folds and the thousand voices possible through experimentation with these variables:[95]

> There is no more remarkable sound production or musical instrument than the human voice. Adjustments of the vocal folds, air pressure and shape of the vocal tract make a huge variety of sounds possible.[96]

Nina Sun Eidsheim proposes an understanding of timbre that incorporates the habitual use of the voice and body (the body that is made) and the space that a particular performance takes place in. This concept reinforces the concept of vocal performance as non-fixed, responsive to all the elements present at the time of the performance:

> Vocal timbre is the sound of a habitual performance that has shaped the physical …timbre and body are shaped by unconscious and conscious training that are cultural artefacts of attitudes towards gender, class, race and sexuality.[97]

[91] Smith, Alexander Reed. "The Musical Semiotics of Timbre in the Human Voice and Static Takes Love's Body." PhD diss. University of Pittsburgh, 2005. 49

[92] Ibid.

[93] Ibid.

[94] Heller, Eric. *Why We Hear What We Hear. An Experiential Approach to Sound, Music and Psychoacoustics* (Princeton and Oxford: Princeton University Press, 2013.)

[95] Zwarren85. "Mel Blancs Vocal Cords" (Chords). YouTube Video, 2/03/2017. /https://youtu.be/ejVQEFbIfmI (Accessed 2/02/2019).

[96] Heller."Why We Hear What We Hear." loc. 7237.

[97] Eidsheim."Voice as a Technology of Selfhood." 2.

Lashbrooke discusses the application of Roland Barthes' concepts of 'Plaisir and Jouissance' to singing.[98] The concept of 'jouissance' applies to those forms of vocal expression that speak of the body and its processes. They are also discussed by LaBelle and Potter and incorporate the expressive vocabulary of the singing voice that the microphone allows the classical singer to explore. These vocal expressions include the sounds of breath, sighs and grunts.

These extra vocal sounds are generally excluded in Western classical singing and considered dysfunctional or bad singing. Singing is, according to voice researcher Thomaidis, a postlinguistic phenomenon that has strictures placed upon it that define certain sounds as good singing and others as unacceptable.[99] He writes that what is considered good singing is culturally bound and that such definitions are influenced by beliefs about good taste, status, race, gender, sexuality and a myriad of other elements.

The microphone challenges stylistic hierarchies and creates permeability between vocal styles. The resistance to the amplification of the classical voice is in part due to the challenge of mediation to concepts of virtuosity, truth, nature, honesty and functional voice that are central tenets of Western classical vocal traditions. Classical traditions are reliant on optimum acoustic efficiency, and the use of the extra vocal can compromise resonance and power and is consequently generally excluded.[100] Thomaidis discusses the Bel Canto tradition (a central classical vocal pedagogy) in relation to the vocal approaches of Korean Pansori and of performance artist Marina Abramovic. These approaches aim to construct a 'scarred' voice or a voice pushed to extremes to reveal different textures, aesthetics and expressive palettes. This exploration reveals a world of voices and singing that value different qualities and approaches to those of the classical tradition.

Music commentator Michael Denning discusses the key role that the exploration of timbre and "noise" has had in the development of vernacular musical styles.[101] He argues that sound technology caused these new expressions to enter into the music mainstream that were perceived as noise by the cultural elites of the time. Composers since Baroque times have

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[98] Lashbrooke, James. "The Grain of the Voice and Plaisir and Jouissance." Thesis, John Moores University, 2014. https://www.academia.edu/9156871/Roland_Barthes_The_Grain_of_the_Voice_and_Plaisir_and_Jouissance. (Accessed 25/03/2017.) 4.
[99] Thomaidis, Konstantin. *Theatre and Voice*. (London: Palgrave, 2017.) 71.
[100] There are exceptions in extended vocal compositions of composers such as George Crumb, Luciano Berio, and Fausto Romitelli among others.
[101] Denning, Michael. *Noise Uprising. The Audiopolitics of a Musical Revolution*. (London, New York: Verso, 2015.) Kindle. Loc. 371.

written in both the vernacular and classical traditions and this trend is continuing. Many of the composers discussed in this thesis work between vernacular and classical traditions and very often create permeability between these categories. Denning rejects the argument that this trend leads to a devaluation of 'serious' music: "The vernacularization of music is not the same as commercialization, nor is it the degeneration from serious to trivial music".[102] These arguments against the amplified classical voice are often based on a belief in the aesthetic superiority of an unamplified classical technique. Consequently, expressive techniques previously unique to contemporary vocal styles are considered to undermine healthy and virtuosic vocal technique. Notions of dysfunction are rejected by Thomaidis who challenges Western pedagogical concepts of normative and healthy conceptions of voice use:[103]He proposes a practice that encourages: "Listening intersectionally to the gender, race, ethnicity, regionality and class of voicing bodies as well as thinking of non-normative conceptualizations of the trained vocal body-such as the intersubjective or the 'unhealthy' one."[104]

Michael Chanan discusses the impact of recording on the development of new aesthetics in singing, where what was heard on the gramophone contravened the limitations of the auditorium and started to make its way onto the concert stage. He notes that recordings of the operatic singing of Maria Callas encouraged a number of singers to incorporate the "music of the Soul…complete with sobs and sighs and a mixture of emphasis and vibrato".[105] Such detail of Callas's use of these vocal affects are most clear in audio recordings.

The exclusion in classical vocal styles as unhealthy or dysfunctional of the "grain" of the voice negates the strong history of these vocal expressions in many popular music styles and the singings of other cultures. The embracing of these areas of expression as an element of vocal timbre in classical singing opens up all kinds of expressive possibilities and can create opportunities for more voices to enter this practice.

The interaction between the voice, the music, other instruments, the physical space and the technological mediation in the physical space is an underdeveloped aspect in our understanding

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[102] Ibid. Loc. 186.
[103] Thomaidis. *Theatre and Voice*.55-57.
[104] Ibid.56.
[105] Chanan, Michael. *Repeated takes: A short History of Recording and its Effects on Music.* (London, New York: Verso, 1995.) 135.

of timbre. The classical aesthetic emphasizes pitch, harmony and rhythm in contrast to popular vocal styles that value the exploration of timbre much more highly.

The mediation of the voice through technology facilitates a practice that is infinitely responsive to all the elements of the performance, including the space the music sounds in. Without this interaction with the performing space and the air that fills that space, there is no sound. As the advertisements for the movie Alien said: "In Space No-one Can Hear You Scream".[106]

> But it is sound in air, the sounded and sounding air, that our hearing has evolved to detect and that provides a reference for much of our thinking about music. In this sense, all musical compositions are airs, and all musical instruments wind instruments.[107]

The perception of timbre is a much less easily definable, quantifiable or measurable element of performance compared to pitch and rhythm, yet it is a fundamental language of the human voice and the microphone. Smith gives the example of the audio program "Cool Edit', which has abstract and evocative reverb settings for use in sound mixing. It has names such as "water closet" and "long hallway" as evidence of the complexity of describing or pinning down our experience of timbre. [108]Roland Barthes proposed that there are two levels that the singing voice operates on. The first he describes as "pheno-song", which describes those aspects of vocal production that classical vocal pedagogy prioritizes: the language and the formal structures such as rhythm and pitch. The second Barthes describes as the "geno-song": all the sounds that speak of the materiality of the singer performing the song. Geno-song describes the expressive qualities the microphone can facilitate the classical vocalist to explore. They also describe the wealth of expressive material explored in popular music. [109]

While the classical voice is more concerned with tone a la Bel Canto, the sophisticated and nuanced exploration of timbre has been part of the popular singer's repertoire for a century. Music producer and composer Brian Eno in his description of Rock music discuss the exploration of timbre and texture that the microphone facilitates:

> Of timbre and texture, of the physical experience of sound, in a way that no other music had ever been or could have ever been. It dealt with a potentially infinite sonic palette,

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[106] Soniak, Matt. In Space, Can Anyone Hear You Scream? *Mental Floss.* 3/03/2010. http://mentalfloss.com/article/24107/space-can-anyone-hear-you-scream (Accessed 3/06/2019.)
[107] Connor, Steven."Sound and Pathos of the Air". *Steven Connor.* Website. http://stevenconnor.com/pathos.html (Accessed 4/04/2019.)
[108] Ibid.
[109] Thomaidis. *Theatre and Voice.* 45.

a palette whose gradations and combinations would never adequately be described, and where the attempt at description must always lag behind the infinites of permutation.[110]

These differences in vocal techniques and aesthetics between musical theatre singers, classical singers, music theatre singers and popular singers of all styles have implications for the ways these singers are trained (or not). Vocal training is not the focus of this work. For a considered discussion of the implications of these changing vocal requirements, particularly in response to the use of amplification, the work of Salzman and Desi[111] gives a thorough overview of the historic development of new music theatre and its skill requirements for performers. Hoch[112] gives an expansive analysis of the historic development of contemporary commercial vocal styles and their respective training requirements, particularly in relation to the use of the microphone and compares the training requirements of musical theatre, popular and classical vocal styles.

Formal vocal training has historically only been available only for classical singers. In recent decades the need for specific training in popular vocal styles has been recognised by the growth in the range of courses catering to these styles. Musical theatre and popular singers were trained in a classical technique prior to the widespread use of microphones. Musical theatre singers were unamplified up until the 1960's when popular vocal styles began to be a major influence. It was generally accepted that amplification allowed for a stronger emphasis on acting and movement in musical theatre than on the singing voice and that in opera it was the singing voice that had primacy over all other aspects of performance. The growth of new music theatre, defined by Salzman and Desi as "outside these categories (of opera and musical theatre)… absorbed the musical and artistic revolutions of the early twentieth century as well as the technological innovations of stagecraft and stage design, machinery and light, audio and video"[113]led to music theatre adapting and augmenting the classical vocal style and embracing contemporary performance techniques and ideas.

Much of contemporary opera has more in common with music theatre than the grand operas of Puccini and Verdi in its embracing of theatrical and technological innovation and use of the amplified voice. Popular music singers up until relatively recently generally trained themselves through some combination of performing, listening and mentoring. The growing divergence between popular music styles and musical theatre and even within these musical genres means that there is no longer a single way of training commercial contemporary singers (the generic term used to replace the term non classical).

For classical singers working with sound technology, including those singers working in music theatre, there are few training options outside mainstream classical voice training. Such courses have broadly remained unresponsive to the changes in skills and knowledge mediation of the classical voice are precipitating.

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[110] Eno, Brian. "Scents and Sensibility". *Details Magazine,* July 1992. Online magazine. http://music.hyperreal.org/artists/brian_eno/interviews/detail92.html (Accessed 4/03/2017)
[111] Salzman, Eric and Desi, Thomas. *The New Music Theatre: Seeing the Voice, Hearing the Body* (New York: Oxford University Press. 2008.) Kindle edition.
[112] Hoch, Mathew. *So You Want To Sing CCM (Contemporary Commercial Music) A Guide for Performers.* (London: Rowman and Littlefield.2018)
[113] Salzman, Eric and Desi, Thomas. Op.cit.Loc 42

2.4 Humanity and the Side Effects of the Voice

A number of commentators argue that classical vocal traditions have become stagnant, fixed and uninspired. John Potter comments that while popular music has embraced technological mediation of the voice to experiment and expand the expressive possibilities of the voice, classical singing has become moribund and homogenized. He also comments that classical music has become too focused on reproducing an idealized performance rather than embracing the power of in the moment spontaneity. Some areas of popular music could have similar claims made in relation to a loss of "the randomness of inspiration:"[114]

> Listening to the first recordings opens the lid on an extraordinarily diverse universe which has receded so far and so fast that we can hardly grasp it at all. Our overly literal respect for pre-twentieth century scores is something that neither original composer nor performer would recognize. We can cope with a score-a controlled environment, standardized and quantifiable…we tend to prefer measurable excellence to the randomness of inspiration.[115]

Alex Ross assigns this static and homogenized performance aesthetic in part to the recording of the singing voice. He cites Robert Philip discussing this futile search for perfection that bleeds imagination and spontaneity from the creative process:[116]

> The vaunted transparency of classical recording is often a micromanaged illusion…technology fundamentally altered the tradition that it was intended to preserve… Feedback in classical performance is the sound of musicians desperately trying to embody the superior self they glimpsed in the mirror and, potentially, turning themselves into robots in the process.[117]

What is lost in this search for the holy grail of perfection are the very elements that make performance making human. Mladen Dolar discusses those features of the human voice that express its individuality and history:

> We can almost unfailingly identify a person by the voice, the particular individual timbre, resonance, pitch, cadence, melody, the peculiar way of pronouncing certain sounds. The voice is like a fingerprint, instantly recognizable and identifiable. [118]

These individual markers are the aspects of a classical vocal performance the microphone foregrounds. Dolar contrasts the markers of identity given by the human voice with the

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[114] Potter, John. *A History of Singing.* (Cambridge: Cambridge University Press. 2014.) 214
[115] Ibid.214
[116] Philip, Robert. *Performing Music in the Age of Recording.* (New Haven, USA: Yale University Press, 2004**.)**
[117] Ross, Alex. "The Record Effect How Technology has Transformed the sound of music" *New Yorker,* 29/05/2005. https://www.newyorker.com/magazine/2005/06/06/the-record-effect (Accessed 15/02/2018.)
[118] Dolar, Mladen. *More Than Just A Voice.*(Cambridge, Massachusetts: Institute of Technology,2006.) 23.

mechanical voice, the answering machines and computer-generated voices that humans interact with every day (and are often the gatekeepers to access an actual human). To paraphrase van Leeuwen, the mechanical voice gives us the pure norm without any of what he terms "side effects".[119] In doing so, it makes the voice unrecognizable in its humanity. It subverts the norm by excluding all those features of the voice we use as subliminal cues to the body of the speaker (or singer). Van Leeuwen discusses the "friction" of the voice that is anything other than the tone itself. These sounds he describes as increasing verisimilitude, the sense that what we are hearing represents something real and meaningful.[120]

Frances Dyson also identifies the key role of these frictions in identifying its humanity: "The voice without side–effects ceases to be a "normal" voice, it is deprived of the human touch…threatening that humanity itself will merge with the mechanical iterability, and thus lose its footing."[121]. These side effects of the voice are the business of the microphone, and at the same time the manipulation of these side effects or their erasure can also be part of a singing practice, as evidenced in the work of Holly Herndon and her work with "Spawn," the artificial intelligence she created to work on her project "Proto".[122]

These markers of identity and humanity are being foregrounded by classical singers working with the microphone either through the use of the proximity and detail the microphone affords or through the development of new expressive techniques entirely dependent on the microphone.

Popular singers have embraced sound technology for its facilitation of an infinite variety of expressions, however, the relationship between classical singers and amplification remains largely ambivalent and contested. The universe of possibilities the microphone brings with it includes new vocal techniques, theatrical possibilities, musical ensembles, performing contexts and explorations of embodiment. The "infinites of permutation" of this "music of timbre and texture" that Eno refers to are the business of classical singers working with mediation.

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[119] van Leeuwen, Theo. "Vox Humana" in Neumark, Nori, Gibson, Ross and van Leeuwen. *Voice, Vocal Aesthetics in Digital and Art Media.* (Cambridge, Massachusetts: Institute of Technology, 2010.) 13.
[120] Ibid.11.
[121] Dyson, Frances *The Tone of our Times: Sound, Sense, Economy and Ecology.* (Cambridge, Massachusetts. London, England, The MIT Press, 2010.) 88.
[122] Mandel, Leah. "Holly Herndon's New, AI Spawned Album Is Full of Humanity." *Noisey by Vice,* 11/04/2019. https://www.vice.com/en_us/article/kzmzxe/holly-herndons-explains-ai-spawn-new-album (Accessed 20/06/2019.)

It is common practice for popular artists to employ sophisticated use of sound technology to explore timbre and texture and to reproduce the kind of proximity and detail available in their recordings in a performance setting. Singer/ songwriter PJ Harvey toured her *Hope Six* album in 2017 and has been working with the same sound engineer for years both in recording and live performance. The live performances are supported by a sound design that reproduces the aesthetic of the album.[123] Knowledge of the elements of sound design and an ability to collaborate with the sound artist is a central skill of artists such as PJ Harvey as well as Björk and Laurie Anderson among others. It enables sophisticated and nuanced use of timbre and texture in live performance as well as in recordings. This is an aesthetic approach now being employed in relation to classical voice.

Sound technology does not always reveal more of the singer and their humanity, it can function to obscure or even erase it. The microphone is being used by artists working with the singing voice to delve into what the voice can reveal about nature, humanity, our relations to each other and the creatures and things we share the world with. At the same time the microphone and sound technology have the capacity to obscure everything that makes us human, presenting a cyborg in its place. Sound technology can obscure and transform the gender, culture and even humanity of a voice and construct an avatar in its place. Laurie Anderson's use of the vocoder in her music theater work *Homeland* uses a vocoder to construct the voice of male authority.[124] A group of linguists, technologists and sound designers are constructing a genderless voice for use in the rapidly growing use of artificial intelligence in the tech industry.[125] Technology commentator Matt Simon commented on the implicit cultural biases present in the construction of sound technologies:

> The danger of AI [artificial intelligence] and robotics is that human designers infuse their technologies with their own biases. But the beauty of AI and robotics is that if we start having honest conversations about those biases and stereotypes, we can shape a rapidly changing technological future to be not only more inclusive but thought-provoking. [126]

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[123] PSW Staff. "P.J.Harvey Chooses Sennheiser" Webpage. *Prosound*, 3/10/2016. http://www.prosoundweb.com/channels/live-sound/pj_harvey_chooses_sennheiser/#Accessed (Accessed 22/04/2019)

[124] McDaid, Carol. "Storytime with knobs on." *Guardian,* 4/05/2008. Online Newspaper. https://www.theguardian.com/music/2008/may/04/popandrock3 (Accessed 18/03/2018)

[125] Simon, Matt. "The Genderless Digital Voice the World Needs Right Now." *Wired,* 11/03/2019. Online Magazine. https://www.wired.com/story/the-genderless-digital-voice-the-world-needs-right-now/ (Accessed 4/05/2019)/

[126] Ibid.

2.5 Technologies and the Singing Cyborg

In juxtaposition to the microphone's ability to excavate the human state, the use of voice technology can also obscure the voice and construct a cyborg in its place. The term Cyborg is used to describe the effect on the singing voice of using sound technology to remove all the markers from the voice that give the voice its individuality and humanity, or to transform these markers so that gender, culture, age etc. are subverted.

Sound technology that alter the singing voice in ways perceived as less human or real is met with particular kinds of resistance among commentators and audiences even in popular music circles. For example, Hua Hsu discusses the responses to the use of voice technology in Bon Iver's album *22, A Million.* Iver had previously been known for his perceived self-revelatory, contemporary popular vocal style in albums such as *For Emma, Forever*. Hua Hsu writes:

> Speech synthesizers often make a song sound as though someone were running a leaky fluorescent highlighter across its lyrics. There are those who think that mediating voices through technology is somehow inauthentic, that when we sand away the coarse edges of our voice or speak into boxes that make us sound like robots, we lose touch with what makes us human. Rock music has generally remained hostile to these kinds of innovations. But there's nothing particularly natural about a singer's murmur or a soft cry rising above a full band. These, too, come out of recording studios, and are tricks of signal processing and amplification. Modified voices are the perfect sound for a moment when old orthodoxies about identity, gender, and authority are slipping away.[127]

Emma Johnston analyses the work of Diamanda Galás, Björk and Laurie Anderson in relation to works where the voice relinquishes the body and enters into a symbiosis with machines. She describes Galás's works as exploring the intersections between technology and humanity to their limits".[128] Galás is challenging the nature of what is organic and inorganic in this process. Her work is an embodied, impassioned synergy between her voice, the technology, personal expression and the organic relationship she forms withal the elements of her performance. Galás exploration of her voice is arguably an extension of Bel Canto singing, mining the depths of the expressive possibilities of her own voice and marrying it with the expanded vocabulary of the microphone and sound technology. An approach that has commonalities with Björk's

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[127] Hua, Hsu. "Bon Ivers's New Voice." *The New Yorker*, 3/10/2016.
https://www.newyorker.com/magazine/2016/10/03/bon-ivers-new-voice (Accessed 11/06/2019.)
[128] Johnston, Emma. "Between Liminality and Transgression: Experimental Voice in Avant-Garde Performance" (PhD Dissertation. University of Canterbury, 2014.) 99.

approach to the use of sound technology:

> I think that in popular music today people are trying to come to terms with the fact that they are living with all these machines and trying to combine machines and humans and trying to marry them in a happy marriage: trying to be fiercely optimistic about it. [...] But everything is with those regular rhythms and learning to love them, but still be human, still be all gritty and organic. (Björk) [129]

The infinite variety of frictions and degrees of absorption that van Leeuwen[130] identifies as key signifiers of human expression and impossible to reliably reproduce synthetically, are readily available to the artist working with the human voice. Miriama Young sees her voice's interaction with sound technology as one that is capable of revealing more of her humanity, rather than masking it. She writes:

> I am interested in what can be revealed by the internal body through the voice-all the vocal sounds I make are really close miked quiet sounds-like the exhale and the inhale of the breath, the sound of vocal fry, humming, exploring places of internal resonance in the soft and hard palates of the mouth, and in the tiny bones of the face…through direct bodily listening, we hear 'the grain' fully in our own ear, and we begin to inhabit the body that sings.[131]

Nori Neumark's work contributes to a new paradigm for the voice, one that perceives the voice as an organic, evolving, adaptive and relational construct that relies on complex and changing interactions with the virtual or physical space and the other beings and technologies in that space. Neumark's analysis of works by Australian Sound Artists Sonia Leber and David Chesworth focuses on their use of the extra vocal in their work *This is Before We Disappear from View.* Chesworth describes his approach:

> Our intention was to mostly exclude the vocalizations of "language" to largely utilize the vast range of what the voice can do beyond the sense of speech…While these non-speech sounds are recognizable vocal sounds…they can also be perceived as "sound objects" stripped of their original meaning and context.[132]

This Is Before We Disappear from View,[133] (created for the nineteenth Biennale of Sydney) is a performance piece using both a choir of female voices recorded and played through unseen

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[129] Newson, Amy. "A History of Björk in Dazed". *Dazed.* 21/11/2015. https://www.dazeddigital.com/music/article/28344/1/a-history-of-bjork-in-dazed (Accessed 23/05/2019)

[130] van Leeuwen."Vox Humana"11.

[131] Young, Miriama. *Singing the Body Electric: The Human Voice and Sound Technology.* (New York, London: Routledge. 2015) 161.

[132] Neumark."Enchanted Voices."141.

[133] Leber, Sonia and David Chesworth. "This is Before We Disappear From View.*"*(Performance Piece in the Nineteenth Biennale of Sydney: You Imagine What You Desire, Cockatoo Island, Sydney, Australia, 21 March to 9 June 2014).

loudspeakers over a wall to the listener. It is "primal and pre-linguistic"[134] incorporating a robotic and genderless voice broadcasting a spoken monologue that is "beyond the body and almost beyond human recognition."[135] This work draws inspiration from the construction of the voice in devotional music written for large cathedrals where the constructed acoustics produced a particular reverberation that:

> Employed ways of amplifying the voice beyond mortal possibilities, as if the unnatural mediation and lingering aspects of the voice in cathedrals were proof of the special powers of the priest and also "proof" of a life beyond death.[136]

Vocal timbre in Western sacred music is constructed through the complex interaction of the voices, and the composition for the voice that relied on slow tempos to allow optimum use of the reverberation available through the architecture of the space. This constructed vocal aesthetic reinforced the belief in an all-powerful deity and the consequent insignificance of humanity. The listener heard voices stripped of "the grain": disembodied, genderless, devoid of its history and even humanity. Positioning *This Is Before We Disappear from View* against devotional music written for the cathedral, Sonia Leber and David Chesworth reinsert the side effects of the voice (and its humanity) back into the voices.

2.6 The Extended, Noisy, Dysfunctional Voice and the Microphone

The use of extended voice in classical vocal works by Cage, Berio, Stockhausen, Reich and others has challenged the consensus on what is considered good classical singing. Also challenged is the role of virtuosity and noise in vocal performance (or music in general) in much the same way as Auto-Tune and synthesized voices have created discussion in popular music about authenticity and skill. These practices have mostly sat on the margins of mainstream classical vocal performance. Salsman and Desi explore the development of extended voice and its emerging influence on the performative voice in contemporary vocal practice. [137] They discuss the wide range of expressive vocal techniques used by influential experimental vocalist Roy Hart that incorporated all the possible sounds that a human could make:

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[134] Neumark. "Enchanted Voices."141.
[135] Ibid.142.
[136] Ibid.141.
[137] Saltzman, Eric and Desi, Thomas. "Extended Voice." in *The New Music theatre. Seeing the Voice, Hearing the Body.* (New York: Oxford University Press..2008).

It began with the cry and extended to sounds traditionally considered rude, animalistic, aggressive …5 octaves was not considered unusual, the ability to sing overtones and produce chorded sounds-multi phonics, use of vocal fry.[138]

The microphone allows the exploration of extra vocal sound previously considered the realm of "extended" vocal techniques or rejected as signs of vocal dysfunction or bad taste. New works for microphone, sound technology and voice are incorporating these vocal techniques and expressions. They are finding their way into the technique of classical singers working in contemporary art music, sound art and music theatre. One example of these extra vocal techniques is vocal fry, a common technique used in popular music styles by artists such as Britney Spears, Blind Willy Johnson and Ray Charles. It is a function of the sound the voice makes at its lowest pitch and can be described as creaky or raspy. It is also a feature of the singing of Diamanda Galás and others:

> You don't hear a classical opera singer who has to sing [without a] microphone to a 4,000-person audience using vocal fry…but someone who has a microphone next to their mouth does use it.[139]

John Carvalho describes this use of the grain of the voice in Billie Holiday's performance of *Strange Fruit*, her powerful witness to the lynching of black Americans in the United States. He writes: "The phonic metal in the throat, the signification breaking out in the facial mask."[140]

The use of these expressive vocal techniques has its roots in the music of Black America: blues, jazz, rhythm and blues. They have made their way into rock and other contemporary vocal styles and have long been decried as evidence of bad singing. This has overtones of racism and classism and seems to be particularly abhorrent in the speech and singing of young women. Marie Thompson rejects the categorization of "vocal fry" as a destructive vocal habit of young women and discusses its use in both the extended voice work of singers like Joan La Barbara and in metal vocal styles. She describes La Barbara's vocal practice as:

> work(ing) with "what counts in many official circles as noise…her work foregrounds and extends the corporeal –signifying vocal sounds that ordinarily suppressed and minimized in conventional classical and operatic singing practice (i.e. there are

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[138] Ibid. Loc 3310.

[139] Dovey, Donna. "Vocal Fry, Or Valley Girl Sound, Is An Important Singing Technique, But Should It Be Used Sparingly?" *Medical Daily*. 24/ 05/2016. http://www.medicaldaily.com/valley-girl-vocal-fry-singing-technique-387475 (Accessed 14/08/2017.)

[140] John Carvalho "Strange Fruit: Music Between Violence and Death" in *Song, Songs and Singing* edited by Jeanette Bicknall and John Andrew Bicknall, The Journal of Aesthetics and Art Criticism, Vol. 71, Issue 1. (February 2013).

squeaks, gargles, pops and creaks.)[141]

Steven Connor explores these sounds that are considered as scars, imperfections, and dysfunctions. He examines the historic attitudes to these vocalizations as signs of mental illness, leading a dissolute life, demonic possession and at times, moral deficit. In exploring the history of the stammer, he reflects on the association of the stammer with animals, and the attribution of speech impediments to animals in animated cartoons featuring Daffy Duck and Porky Pig.[142] Such practices have generally been on the fringes of classical voice, seen often as curiosities but not the main business of classical singing. These expressions are now finding themselves part of the expressive palette of singers interested in exploring further the nature of the voice and what it represents, and through this providing an opportunity for deep listening.

An example of a contemporary vocal work exploring this expanded vocabulary of the voice unearthed by the microphone is Alvin Lucier's "I am sitting in a Room." Lucier wrote and performed this piece featuring his voice with a pronounced stutter repeating a set of words aimed at exploring the resonant frequencies of the space the performance is recorded in. His speech and the words begin to meld until any semblance of their differentiation dissolves. In effect, the physical space is brought to the foreground as an active participant in the piece, in ways rarely done in performance. Lucier also uses his stutter as a key element in the musical composition and performance. "I am sitting in a Room" begins with Lucier explaining the piece:

> I am sitting in a room; different from the one you are in now. I am recording the sound of my speaking voice and I'm going to play it back into the room again and again until any semblance of my speech with perhaps the exception of rhythm is destroyed. What you will hear, then, are the natural resonant frequencies of the room articulated by speech. I regard this activity not so much as a demonstration of a physical fact, but more as a way to smooth out any irregularities my speech might have.[143]

The performance of this piece relies on the microphone and allows the performer to explore his voice, its mediation by sound technology and its interaction with the performing space. This mediation allows Lucier to foreground those features generally considered dysfunctional as expressive devices.

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[141] Thompson, Marie. "Creaking, Growling: feminine noisiness and vocal fry in the music of Joan La Barbara and Runhild Gamamelsaeter". *N. Paradoxa*. Vol. 37. 5-11.

[142] Connor, Steven. *Beyond Words.*28.

[143] Parkinson. Tom. "Sitting In a room with Alvin Lucier." *The Guardian*, 26/06/2014. https://www.theguardian.com/music/musicblog/2014/jun/25/sitting-in-a-room-with-alvin-lucier. (Accessed 3/06/2019).

2.7 Summary

The composers and performers mentioned in this chapter are challenging ideas about virtuosity and the functioning voice and creating space for listening to voices and aspects of voices mostly not heard or backgrounded. They are redefining delineations between composer, arranger, producer and performer. The microphone, amplification and the use of voice technology are a large part of their practice. Many of these performers are discussed in chapter 3. They have emerged from a classical tradition to produce their own works, design their sound, write and promote their own music.

The incorporation of the microphone into a classical singing practice challenges broadly held conceptions of what it is to be a classical singer. Elements of both vocal technique and aesthetic are open to transformation as a result of the microphone's use. The use of breath, resonance, articulation, vibrato, tone-colour, timbre, texture and the place of human utterance can all be re-examined as the microphone comes into play. The use of voice technology challenges what we believe to be authentic, human, honest and organic in human utterance, what we consider virtuosity in singing and the nature of our relationship with that technology. It challenges concepts of noise and dysfunction in classical singing. The singer working with the microphone can mine the depths of meaning and expression brought forward by the interaction of voice, breath, body and imagination. These singers can unearth and: "let the voice be the bearer of what cannot be expressed by words".[144] Connor explores what Barthes defined as the geno-song,[145] the aspects of singing that are not dependent on the formal structures of the song and are the language of the microphone. The microphone invites an exploration of the expressive possibilities of the voice beyond text, pitch and rhythm: Connor describes these side effects of the voice: "The voice is nourished by the parasites and imperfections that feed upon it."[146]

A more complex, organic and relational understanding of timbre emerges from the voice's interaction with sound technology and the performance space: one that acknowledges that timbre is an amalgam of the body, is constructed and inherited. The singing voice reflects history both in terms of culture and physicality. These voices are adaptive and responsive to the physical and emotional state of the singers, the other bodies in the space, the music, the instrumentation and its mediation in the physical space within which the performance takes place. There are permutations and crossings between the voice, the technology, the other beings

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[144] Connor, Steven. *Beyond Words.*28.
[145] Thomaidis,*Theatre and Voice.* 45.
[146] Connor, Steven. *Beyond Words.*32.

in the space and the physical performance space, and these relationships are allowing new aspects of vocal expression and the performative nature of the voice to emerge.

This literature review has developed an overview for understanding the various implications of a classical vocal practice that is mediated by various sound technologies. These implications include developing deeper listening practices, re-evaluating the central tenets of the classical singing voice and developing a broader understanding of timbre and the interaction with the performing space. A number of performers and works employing this extended vocabulary and practice are demonstrating the varying ways the microphone is being used to create an expanded expressive palette. They are creating intersections with other performing forms, moving towards the non-fixed and open. They provide a focus for the voices and aspects of voices that are underheard.

Sound technology is changing and will further change singing aesthetics, including classical ones. Classical singing's claim to be outside of this cultural shift is fraying at the edges. Artists and composers such as Shara Worden, Pamela Z, Nora Fischer, Gabriel Kahane, Ted Hearne, Jacob TV, Holly Herndon and the vocal ensemble Roomful of Teeth all use sound technology to explore an expanded range of vocal expression. Chapter 3 provides a range of examples of this evolving practice. It discusses a selection of artists and works where the mediation of the classical voice is featured. The varying impacts of this mediation include the development of new vocabularies of expression, the creation of new performing contexts and relationships with audiences, the incorporation of electronic instruments into musical ensembles and the construction of musical ensembles not possible without amplificattion.

Chapter 3: Contextual Review and Case Study of *The Howling Girls*

The notion of possibility is a philosophical canon which reflects a widespread tendency in contemporary science: the discarding of a static, syllogistic view of order…a corresponding devolution of intellectual authority to personal decision, choice and social context. (Umberto Eco).[147]

Chapter 2 reviewed literature on the interaction between the voice, sound technology and the space in which the performance takes place as important dimensions of timbre. The microphone allows an exploration of timbre not possible without its use. Becoming part of this expanded practice are a new primacy of text, explorations of sonic intimacy[148], expanded possibilities in the nature of the musical ensemble, new kinds of interactions with the performing space and extra-vocal expressions that are inaudible without microphone.

This chapter focusses on;
  i) creative works in context and explores parallel and divergent developments in the use of the microphone between classical singers and singers of other genres, and

  ii) the implications of these commonalities and differences for the development of new expressive techniques by classical singers working with the microphone.

It is inevitable that such an analysis will throw up areas of hybridity and permeability between vocal genres. Contemporary opera, music theatre and song works incorporating classical voice and sound technology reveal areas of vocal and musical aesthetics where divisions between genres are blurred. The tension between these new areas of expression and the traditions of the classical voice are increasingly becoming apparent.

Eco's concept of "the notion of possibility" can be applied to the changes taking place in classical music and more specifically in this thesis, to the ways in which the classical voice's embracing of sound technology creates new expressive possibilities for the classical voice: how the singer sings, what is sung, the nature of the musical ensemble and where that singing takes place are all transformed in varying ways by the mediation of the classical voice. There has been devolution of hierarchies of vocal style that coincide with the amplification of the voice. It is no longer possible to define what the classical voice is. It is more accurate to speak of classical voices. The discarding of static views of order is also happening in popular and

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[147] Eco. *The Poetics of the Open Work.* 245.
[148] Sonic intimacy refers to the those sounds of the voice that are only audible unamplified when the listener is in close proximity to the speaker or singer. They include the sounds of the breath, of the mouth, the tongue, the lips and the vocal processes. These sounds are not able to be projected without amplification.

vernacular vocal styles which preceded changes in the classical voice by half a century. Twenty first century music embraces amplification, voice processing, looping and other technologies. As a consequence, old conceptions of classical and popular singing styles are being redefined. [149]

The use of an eclectic musical and vocal language by all these performers and composers is a way of finding, as Meier describes, the "spaces in between" that disrupt "*the fixed codes and static grills of conventional configurations*".[150] In the words of sound artist Holly Herndon:

> How can we expect the diversity of the musical landscape to change when the archetypes we are presented with are intrinsically tied to an older, more segregated era? We need new fantasies, and until we demand them, we are not going to get them.[151]

It should come as no surprise that artists experimenting with the classical voice are inventing new forms and challenging the relevance of the classical voice as we know it.

The microphone challenges our perceptions of virtuosity, and of what constitutes great or even good singing. It invites the singer to explore an interaction with technology that involves learning new skills that may allow singers an enhanced choice and control over the representation of their voices. Popular singers are also expanding their skill sets. They are interacting with sound technology, learning new skills, collaborating with or acting as producers and sound designers, and developing new dimensions of virtuosity. Classical singers are beginning to explore similar territory.

Works included in this chapter were chosen for the purposes of demonstrating the breadth of this practice. The works chosen demonstrate the ways that sound technology mediation of the classical voice is opening the way for new areas of vocal expression, the facilitation of musical ensembles impossible without mediation, the use of performing venues impossible without mediation, and intersections with theatre and dance. The works encompass contemporary opera, music theatre, song cycles from a range of vocal genres and works that most accurately could be described as art songs.

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[149] For a detailed discussion of the problems with categorization of vocal genre see: Gilbert, Mathew. *The Invention of "Folk Music" and "Art Music".* (New York: Cambridge University Press. 2007.)

[150] Meier, Julia. "Diamanda Galás: Defining the Space In-Between." (Website.) http://diamandagalas.com/wp-content/uploads/Julia_Meier_Diamanda_as-Defining_the_Space_In-Between.pdf (Accessed 23/05/2019)

[151] Cdm. "Watch Holly Herndon Talk About Giving Laptops a Voice." *cdm,* 6/11/2014. http://cdm.link/2014/11/watch-holly-herndon-talk-giving-laptops-voice/ (Accessed 23/11/2016)

The categorization of these works is problematic due to the developments in permeability between vocal genres discussed. What is not in question is that these works reveal new techniques, languages and challenges to conventional ways of thinking about the classical voice - all of which are intrinsically tied to the microphone. The works examined include a mini case study on *The Howling Girls* (a new Australian opera written by Damien Ricketson), *Speechless* (a new Australian opera written by Cat Hope), *Homeland* (an opera by Laurie Anderson), *Invisible Cities* (A Headphone Opera), *La Passione de Simone* (a new music theatre work by Kaija Saariaho), *Josephine Baker: A Portrait*, (a new music theatre work by composer Tyshawn Sorey), works by Björk, Pamela Z, Sufjan Stevens, Yoko Ono, Roomful of Teeth, Holly Herndon, Diamanda Galás, rapper Saba, Gabriel Kahane and pioneering performances by Cathy Berbarian.

Intersections between voice and sound technology have created new dimensions of creative and vocal virtuosity. At the same time, this intersection between classical voice and sound technology raises questions about the primacy of virtuosity in defining great vocal performances. In the next section, the singer Kimbra and new work specialist Nora Fischer are discussed. They both use a looper as part of their practice, creating performances with new vocal expressions and musical ensemble possibilities.

3.1 Kimbra and Nora Fischer and Vocal and Technological Virtuosity
Popular music singer Kimbra regularly performs with a looper, allowing her to layer and manipulate her voice live. Her performance of *Settle Down* for Nowness, a global video channel,[152] demonstrates virtuosity in improvisation, the live composition of the musical ensemble, an intimate knowledge of the technology she is working with and great singing.[153] Through this interaction Kimbra is also developing new roles in producing her own work:

> (The) color of the voice is such an exciting thing and you can get so many different tones out of the voice as an instrument and the Voice Live …helps you do that on the fly… you want the focus to be on the raw tone and the connection between me and the microphone and the audience… I was excited about the idea of writing a song…but then producing it…(exploring) different ways of mapping out a song…I went on to co-produce the songs.[154]

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[152] Kimbra. *TC* "Helicon Presents: Kimbra-on Looping with VoiceLive Touch".YouTube Video, 6/12/2012. https://youtu.be/DgmoHtnoi7k (Accessed 23/11/2016).
[153] Heap, Imogen."Just for Now." YouTube Video, 20/06/2007. https://youtu.be/25VGdNU3nrU (Accessed 9/06/2019)
[154] Kimbra."TC Helicon Presents".

Nora Fischer works across classical and jazz traditions and has made the microphone an integral part of many of her performances. She uses the TC Helicon Live in *Headlines* from Jacob TV's Opera *The News* where she layers and manipulates her voice to create a rhythmically complex vocal ensemble. She uses sounds from the tongue, lips and voice to express the inanity (insanity) of the news cycle. In the song cycle *The Secret Diary of Nora* ,(by Lucky Fonz III and Morris Kliphuis),[155] Fischer introduces a repertoire of expressive sounds specific to the microphone: intimate speech, vocal fry, screaming alongside singing that reflects her skills as an interpreter of Monteverdi:

> In the song 'Rat in My Room', Ms. Fischer begins in a low speaking voice, then explodes in a volley of obsessively repeated phrases shot through with grunge-metal yelps. In performances of classical works, like Ravel's 'Kaddish', which is part of her recital tour this summer, she produces impeccably turned phrases in a soprano of mountain-stream clarity. But even then, the infusion of a little more air, or the tiniest hint of vocal fry on a low note, evokes other musical worlds. (Mr. Andriessen said, of one of her heated moments in his opera *Theater of the World*: "I was very impressed by the screaming. It was in tune and very professional."[156]

Nora Fischer performs on hand-held microphone. with the Ragazze Quartet and Remco Menting in the song cycle *The Secret Diary of Nora Plain*, by Lucky Fonz III and Morris Kliphuis. This use of technology allows her to use an intimate jazz style vocal delivery where every word is nuanced and comprehensible while maintaining a balanced ensemble with string quartet and drums.

Fischer regularly performs other new classical works with microphone. She sings Oswaldo Golijov's *Folk Songs* with hand-held microphone in a rhapsodic, embodied manner and uses authentic folk style approaches to the singing, unlike the disembodied, careful interpretations of folk songs we are used to classical singers giving. The microphone is seen and played with. This is in contrast to the mostly invisible and not spoken of sound technology mediation we are used to (not) seeing classical singers use:[157]

> Ayre is extraordinary, a song cycle exposing the tenuous relationship between Jewish, Christian, and Arab culture, using the similarities between the three to subtly color and

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[155] Fischer, Nora and Ragazze Quartet. "*Here Is My Arm.*" YouTube Video, 29/10/2017. https://youtu.be/QEWR1n32u_U (Accessed 3/06/2019).

[156] Fonseca-Wollheim, Corinna. "Nora Fischer Bursts the Classical Music Bubble". *The New York Times*, 27/04/2018. https://www.nytimes.com/2018/04/27/arts/music/nora-fischer-hush-national-sawdust.html (Accessed 1/06/2019.)

[157] Fischer, Nora and Ragazze Quartet. "Here Is My Arm." YouTube Video, 29/10/2017. https://youtu.be/QEWR1n32u_U (Accessed 3/06/2019).

transition passages throughout the work while incorporating the tension between the three in the conflict-ridden text of the songs.[158]

New languages and skill sets are being developed in conjunction with sound technology. Composers and performers are using this broader expressive palette to comment on contemporary culture and politics. Jacob TV's multi-media opera "Headlines*"* covers similar territory to Laurie Anderson's *Homelands*. Both use the technology of today to comment on how media technologies, and those who control them, can manipulate the lines between propaganda, ideology and truth. The composer poses the following question in "Headlines": "What is the role of political satire in the information age and when is its expression worth risking lethal backlash?"[159]

Fischer's ability to engage with the microphone and looper in this piece is an extension of a Bel Canto practice that explores the expressive possibilities of the voice to create character and communicate text. It is flexible, expressive and uses the full range of colour in the voice in a virtuosic display as demanding as a Bellini or Donizetti aria. Her training in a number of vocal styles has resulted in Fischer being a favoured interpreter of many contemporary composers including Louis Andriessen, Osvaldo Golijov, Steve Reich, David Lang and Nico Muhly. A classical vocal style is predominantly an acoustic phenomenon that excludes particular kinds of vocal expression and relies on the singer using defined vocal techniques and aesthetics in order to be heard. Fischer is demonstrating the flexibility of expression available to the classically trained voice when being heard is no longer the imperative.

3.2 Detail and Proximity of the microphone
Sound technology has enabled classical composers working with the voice to place a renewed emphasis on text and the intimate expressions of speech. Classical music listeners are accustomed to the proximity and detail given to the voice (and music in general) in recording and broadcast. The microphone reveals the nuance of human expression that is only audible in intimate expression. The features and signages of intimate speech can be revealed to the listener in acoustic spaces where this would not be possible otherwise. Amplification manipulates social distance between performer(s) and audience and implies a relational space. Experience affords social meanings to these distances and to the features of communication associated with

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[158] Schiller, Mike. "Oswaldo Glijov/Luciano Berio: Ayre. Folk Songs". *Popmatters*. 9/10/2005. https://www.popmatters.com/golijovosvaldo-ayre-2495921318.html (Accessed 18/2/2019).
[159] JacobTV. "The News." Website. *Metropolitan Museum, Streaming Museum*, 2013. http://streamingmuseum.org/jacob-tv-the-news/ (Accessed 18/02/2019)**.**

them. Word stresses are more apparent when the microphone negates the need for a continual legato. Legato becomes an expressive choice. The sounds of consonants can be explored for expressive meaning. A myriad of other signages are foregrounded by the microphone, giving a rich matrix of sonic information for the listener to interpret.

This intimacy and expressivity have fostered a similar expectation for live performances that sound technology is able to provide. Michael Chanan describes the impact of the microphone and recorded music on audience expectations in classical music: "Recording has developed conventions that contravene the acoustical limitations of the public auditorium."[160] Chanan refers to the noted classical pianist Glenn Gould who preferred the recording studio to the recital hall as a place to explore performance aesthetics. Chanon comments on the impact of amplificattion on audience expectations:

> The sound the listener hears possesses characteristics that two centuries ago were neither available to the profession nor wanted by the public, like analytical clarity and almost tactile proximity. We have come to expect a Brünnhilde, blessed with amplification, who can surmount without struggle the velvet diapason of the Wagnerian orchestra.[161]

Alongside an exploration of detail and proximity and an enhanced freedom in the way the voice is embodied, the classical singer working with a microphone is able to explore a new landscape of expression where all the elements of vocality become transparent to the microphone. This includes breathing, gasping, wailing, speaking, singing, sighing, laughing, grunting and the sounds of the mouth and the mechanisms of the larynx. There are a range of aesthetics and techniques that are considered central to the classical voice. They include:

- balanced chiaroscuro,
- even transitions between vocal registers,
- an equally resonant voice across vocal registers,
- seamless legato,
- vowel shapes adjusted across the vocal registers to be equally resonant,
- the presence of singer's formants,
- the absence of extrinsic noise.

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[160] Chanan, Michael. *Repeated Takes, A Short History of Recording and its Effects on Music*. (New York, London :Verso, 1995) 133.
[161] Chanan. *Repeated Takes*. 143.

These expressive techniques become aesthetic choices rather than acoustic imperatives once the microphone comes into play.

3.3 The Song Cycle and the Microphone
David Garland, a New York based, self-described classical composer describes the changes in vocal aesthetics. He writes that these changes are due to the interaction between art song composers and technology and the resultant permeability between genres:

> They're creating and performing songs that achieve a kind of intimacy so unattainable in traditional art song recitals. They are merging the benefits of their classical training—the ability to read and notate music, audiences that are practiced at careful and thoughtful listening, an appreciation of subtle formal and structural techniques—with the tools and frameworks of pop music—studio production, amplification, performances in bars and clubs rather than concert halls…These composers are developing a new and unique style of creative song writing that does not fit comfortably into any pre-existing genre.[162]

The song cycle has at its heart the intimate connection between words and music. The performance of the classical song cycle has been a shrinking art form in the already declining classical music culture since the second half of the last century. Vernacular songwriters are producing the most popular song cycles of the twenty first century, using sound technology to explore text, timbre, atmosphere and intimacy with thematic and atmospheric coherence.

Performers and composers are using the microphone to explore text in ways either impossible or much more difficult without sound technology mediation. There are a number of singers using sound technology to explore layers of meaning and the relationship between text and music in ways that have, until now, sat outside the classical vocal tradition. These include new music interpreter Ted Hearne, Laurie Anderson, Nora Fischer, singer composer Pamela Z, sound artist Holly Herndon, singer/ songwriters Gabriele Kahane, Kate Bush and Sufjan Stevens and rapper Saba, all of whom are discussed in this chapter.3.4 Discussion of Selected Works
The following works demonstrate the broad application of the microphone to song cycles, music theatre and opera works across a wide range of vocal genres. The works created range from intimate works such as *Carrie and Lowell by* Sufjan Stevens to epic operas such as *Invisible Cities*. The discussion explores the ways these artists use the microphone and playback systems to explore vocal and performative territory either impossible or more difficult unamplified.

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[162] Dargel, Corey. "More song, Less Art(ifice): The New Breed of Art Song." *New Music Box. 22/02/2006.* http://www.newmusicbox.org/articles/More-Song-Less-Artifice-The-New-Breed-of-Art-Song/Accessed (Accessed 5/06/2019.)

3.4.1 *Book of Travelers* by Gabriel Kahane
<https://www.youtube.com/watch?v=6DHaKTJ_Jqs>

Gabriel Kahane is an example of a singer/songwriter working with mediation to explore enhanced expression of text. He is a classically trained singer familiar with classical vocal repertoire, composing and performing his own works, and reinterpreting older repertoire using sound technology. The election of Trump created the impetus for Kahane to compose a song cycle around conversations he had on a train journey travelling around the USA. The song cycle has a thematic and musical coherence that places it alongside other iconic classical song cycles such as Franz Schubert's *Die Winterreise* and Ralph Vaughan Williams *Songs of Travel*:

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> Sometimes verbatim, like an anthropologist … Kahane relays the stories of the people he met and the patchwork portrait of the United States they form as if singing out his daily journal to the sounds of his piano. It is the rare piece of art that aims… to interlock those categories inextricably, until the social systems and the discrete stories they have created become extensions of one another.[163]

Book of Travelers is composed for voice and piano. It has a directness and lyricism that is allied to American composer Charles Ives, who also had a strong interest in American politics. Kahane performs Charles Ives's song *Tom Sails Away* with Timo Andres in a vocal style that gives absolute primacy to the text and echoes the traditions of American folk singing:[164]

> It is impossible to listen to Kahane's Book of Travelers without referencing Reich's Different Train… both use the train as an organizing principle. Both, as well, present other, found or encountered voices to present their narratives.[165]

Kahane has also performed a version of Schuman's *Dichterliebe* that breaks with tradition and sees him accompanying himself on piano and using a microphone:

> By approaching "Dichterliebe" as intimate salon music (and using a microphone), I'm able to explore a set of vocal colors that will be familiar to listeners of contemporary folk or art-pop music, but perhaps less familiar to connoisseurs of art song.[166]

3.4.2: *Carrie and Lowell* by Sufjan Stevens
<https://youtu.be/9FX34TjJe-c>

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[163] Haver Currin, Grayson. "Gabriel Kahane Book of Travelers" *Pitchfork,* .23/08/2018. https://pitchfork.com/reviews/albums/gabriel-kahane-book-of-travelers/ (Accessed 3/06/2019).
[164] Kahane, Gabriel and Andres, Timo. "Ives: Tom Sails Away" *Bandcamp.* https://gabrielkahane.bandcamp.com/track/ives-tom-sails-away (Accessed 9/06/2019).
[165] Whitelock, Ed. "Gabriel Kahane's 'Book of Travelers' Offers Glimpses of the American Psyche" *Popmatters.* 30/08/2018. https://www.popmatters.com/gabriel-kahane-book-of-travelers-2599904669.html (Accessed 6/06/2019.)
[166] Platt, Russell. "Gabriel Kahanes' Emo "Dichterliebe". *The New Yorker,* 9/03/2017. https://www.newyorker.com/culture/culture-desk/gabriel-kahanes-emo-*dichterliebe* (Accessed. 9/06/2019).

Carrie and Lowell[167] is an amplified song cycle composed by a popular singer songwriter exploring the theme of the death of his mother after a lifetime of mental health and addiction issues. The musical language combines a pop sensibility with post minimalism that creates a contemplative, dark and yearning atmosphere with a powerful use of space and duration:

> *Carrie & Lowell* might be sad, it might be the work of a man in pain, but it is too beautiful to cause grief. Grief and depression can result in music that can be cruel, even as it is beautiful… but there's no cruelty on *Carrie & Lowell*. Instead there's humanity and acceptance. It's a record not just of sadness, but wonder. It's the sound of the space between the stars.[168]

The work has been presented in concert in the same performing format as a traditional recital of Schuman's "Dichterliebe" (i.e. a seated audience in a traditional concert hall). The performance was presented as one connected work without introduction and created a powerful sonic intimacy; an embracing space allowing the listener to experience human emotion through a deep listening that is also characteristic of other genres such as jazz and classical music.

3.4.3 *Katrina Ballads* by Ted Hearne
< https://www.youtube.com/watch?v=QMLIRJXnYjA&feature=youtu.be>

Ted Hearne's *Katrina Ballads* is a song cycle/music theatre work examines the crisis created by the lack of adequate Governmental response to the humanitarian crisis created by Hurricane Katrina in New Orleans in 2005. The song cycle uses verbatim responses to this crisis including Kanye West's powerful rage-filled impromptu exposure of racism and inequality in contemporary America (George Bush doesn't care about black people.) This song is juxta-positioned with a song using George Bush's own words - ("Brownie, you're doing a heck of a job").

The work uses a range of vocal and musical approaches that reflect the musical history of New Orleans: blues, jazz, gospel and rock and is fully scored for an ensemble of singers, classical chamber ensemble and electronic and electrified instruments. The performance is amplified, and the singers are all on microphone. "Hurricane Katrina" uses mediation to give immediacy

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[167] Stevens, Sufjan. "Carrie and Lowell". Asthmatic Kitty Records. 5/05/2017. https://youtu.be/9FX34TjJe-c (Accessed 7/07/2019).
[168] Hann, Michael. "Sufjan Stevens : Carrie and Lowell". *The Guardian,*27/03/2015. https://www.theguardian.com/music/2015/mar/26/sufjan-stevens-carrie-and-lowell-review (Accessed 24/06/2019)

and detail to the performance and to construct and balance the musical ensemble and its relationship to the space and the audience.

Rene Marie sings the "Prologue" using a jazz/ blues influenced style, allowing her to give precedence to the text. It is predominantly a speech-dominated delivery, in a straight tone accentuating the different timbres in the registers of the voice. This is instead of an unamplified classical vocal performance that would have included a preponderance of upper harmonics and an evenly produced registration of the voice.[169] Isaiah Robinson performs Kanye West's condemnation of George Bush's inadequate response to the crisis in a voice that is strongly gospel influenced, passionate and an example of fully embodied and meaningful singing. Robinson often uses a strongly speech-dominated delivery. In the climactic ending he belts out the words "George Bush doesn't care about black people", using melismatic calling out qualities to communicate the depth of his anger.[170] In the setting of George Bush's own words, Hearne himself sings a frenetic, scat-influenced dissection of the words Brownie you're doing a heck of a job. Nonsense syllables on the uttered "BBBB" of Brownie have echoes of Cathy Berbarian's performance of "Stripsody" with its inflections of desperation, vocal growls and register breaks, as Hearne paces the stage with microphone in hand, rendering the performance as much physical as it is vocal. The performance leaves no doubt about the attitude of performer and composer as to what Brownie did.

3.4.4 *The Ninth Wave* by Kate Bush[171]
Kate Bush has produced a number of albums that function as song cycles (having thematic and musical coherence). [9] Over 40 or so years, Bush has created works that sit outside conventional ideas of genre and explored the interaction between the visual and the aural. She has spent a lifetime exploring the possibilities that recording technology can offer to create layered works, the form of which is somewhere between song cycle and music theatre:

> The Ninth Wave was a film…. It's the idea of this person being in the water… they've been on a ship and they've been washed over the side so they're alone in this water. And I find that horrific imagery…and they've got a life jacket with a little light so that if anyone should be traveling at night they'll see the light and know they're there. And

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[169] Saariah, Kaija "La Passions de Simone". YouTube Video, 23/06/2016.
https://www.youtube.com/watch?v=Ljqdpo2ABXs (Accessed 4/06/2019.)
[170] Robinson, Isaiah. "Kanye West.YouTube Video, 20/12/2011. https://youtu.be/QMLIRJXnYjA (Accessed 3/06/2019.)
[171] Bush, Kate."Hounds of Love". iTunes audio, 1985.

they're absolutely terrified, and they're completely alone at the mercy of their imagination.[172]

Bush performed the suite of songs that make up *The Ninth Wave* in a concert series in 2014 which was part music theatre, part pop spectacle. It includes spoken passages, pre-recorded tracks, male choirs, Gregorian chant and Celtic song. It is a suite of songs full of invention, with structural and thematic coherence:

> An extraordinary mélange of styles, melodic invention, and timbres. But the musical symmetry of the cycle's opening and closing notes complements the lyrics' repeated use of oppositional imagery, such as under/over; in/out; up/down; microcosmic/macrocosmic; and so on.[173]

3.4.5 *Care For Me* by Saba.
<**https://youtu.be/LTzmjU8aOR4**>

Care For Me deals with the stabbing death of Saba's cousin. It is musically coherent, full of emotion and uses rap and song to explore the impact of this death on Saba. The song cycle explores more broadly the position of young black men living in contemporary USA dealing with racism and police violence. It demonstrates the continuation of the history of vernacular singers performing and recording relevant, thematically and musically coherent works that can be considered contemporary song cycles. The use of mediation allows Saba to create a work that has a strong intersection between his every-day vocal expression and his singing. He can move seamlessly between rap and singing, use his own accent and style of delivery in the lyrics without compromising any of these individual vocal expressions that speak of who he is in order to *be heard:*

> The grief-stricken Chicago rapper's latest is a marvel of craft, musicality, and emotion. Through Saba's inner turmoil, he finds his most powerful and diaristic storytelling.[174]

The album is also given live performances that have all the nuance and emotional impact of the recording. NPR's Tiny Desk Concert Series commented on his pared back live performance: "In a live set ...Saba and his band showcased the album's emotional depth and

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[172] r.j.someone. "Close the Window. It's Too Beautiful." *AM blog.* 25/06/2018. https://10-am.blogspot.com/2018/06/close-window-its-too-beautiful.html (Accessed 2/06/2019)

[173] McCooey, David. "My Favourite Album". *The Conversation*. 8/09/2017.http://theconversation.com/my-favourite-album-kate-bushs-hounds-of-love-79899 (Accessed 9/06/2019.)

[174] Pearces Sheldon. "Saba Care For Me". *The New York Times,* April 12 2018. https://pitchfork.com/reviews/albums/saba-care-for-me/ (Accessed 4/04/2019)

range with stark juxtaposition… It's a Tiny Desk testament from an artist whose future feels as promising as his pen"[175]

In the next section, a number of examples of the incorporation of the microphone into classical vocal chamber works exemplify the exploration of the expanded vocabulary of the microphone, and the melding of singing with other art forms and disciplines including dance, movement and gesture.

3.4.6 *Josephine Baker A Personal Portrait* by Tyshawn Sorey
<https://youtu.be/QDhq860pTuA>
Julia Bullock premiered *Josephine Baker: A Personal Portrait* at Ojai Music Festival in 2016.[176] Mediation allowed Bullock to seamlessly move between the spoken and sung voice and to incorporate choreographed movement in this theatre piece. The incorporation of dance into this musical portrait of Josephine Baker, a singer famed for her dancing and equally revered for her part in the Civil Rights Movement, added an important dimension to a multi-faceted performance.

This work written for Julia Bullock is based on the songs and story of legendary singer Josephine Baker. It is placed firmly within this emerging tradition of composition that explores mediation in relation to notated vocal and chamber music works. It is largely improvised, as in the jazz tradition from which Sorey has emerged. Sorey is also equally familiar and comfortable with avant-garde, contemporary chamber music. It disrupts expectations of the form (i.e. music theatre and opera) and encourages a deeper listening. In *Josephine Baker: A Personal Portrait*, this disruption takes place through the combination and cross-referencing of music genres; the introduction of the extra vocal; and the incorporation of instruments often outside classical ensembles that are more associated with vernacular musical styles.

As discussed in the work of Gabriel Kahane, amplification of song facilitates the following:
- use of more vernacular vowel shapes;
- exploration of vowel colour and the textures of vowels in more nuanced ways;
- use of vocal registers closer to the speaking register; and
- the movement between speech and singing without compromising audibility or intelligibility.

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[175] Ibid.
[176] Sorey, Tyshawn. "Josephine Baker: A Portrait." YouTube Video, 22/06/2016.
https://youtu.be/QDhq860pTuA (Accessed 21/04/2019).

These help to give stylistic authenticity to the piece, although singer Julia Bullock and composer Tyshawn Sorey in no way create an impersonation or imitation of Josephine Baker. The ensemble for the piece includes instruments such as guitar and drums and fuses jazz, early 20th century popular American and French song influences and twenty first century chamber music. Zachary Woolfe states in his review:

> *Josephine Baker: A Personal Portrait,* an evening of Baker songs …the tempo has been slowed and the mood hushed to unsettled melancholy. It's a ritual of mourning, a reminder of Baker's racial struggles and civil rights activism, and of the era of police brutality and Black Lives Matter in which we currently live.[177]

The microphone facilitated Bullock's fusing of a classically balanced timbral delivery with blues and gospel elements, while maintaining a classical approach to vocal resonance (where the voice is evenly resonant across the registers and maintaining a strong and consistent legato). Bullock explored a variety of timbral differences between the vocal registers and used improvisation as a central element of the performance:

> It's kind of a mix-up of composition and spontaneous composition, which is how I usually work. Even though there's a lot of information that's written out …the element of spontaneity is going to be in every performance. The question of how much, it varies from performance to performance. I wanted everyone to have the freedom, the liberty to do whatever they wanted to do with the music.[178]

Novac describes the disruption of conventions and the development of new languages to allude to the contemporary world in Laurie Anderson's *Homeland*. She describes this work as destabilizing conventional perceptions of musical genre, finding itself between rock, performance art and post-opera.[179] In so doing, new musical and performative forms are invented. The destabilizing of accepted classical vocal conventions is reflected in the composition and performance of *Josephine Baker: A Personal Portrait*.

3.4.7 *Invisible Cities* by Christopher Cerrone
<https://www.youtube.com/watch?v=GyceQFpSOjI&t=138s>
La Passione de Simone by Kaija Saariaho
<https://youtu.be/1auH7AtE7Fg>

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[177] Woolfe, Zachary. "Reimagining Josephine Baker's Music in the Era of Black Lives Matter."
[178] Ibid.
[179] Novak, Jelena, Dr, Roberta Montemorra, Professor. "Vocal Drag, Counter –Castrato, and the Scandal of the Singing Body*"* in *'Post opera: reinventing the Voice-Body.* (Farnham: Ashgate Publishing Ltd, 2015.)

The use of headphones in the opera, *Invisible Cities*, allows the performers to move through the Union Railway Station in San Francisco and the audience to move through the space with them. *Invisible Cities* is a new opera from the industry, the LA Dance Project and Sennheiser and is based on Italo Calvino's 1972 novel of the same name. The work is a fictional dialogue between Kublai Khan and Marco Polo.[180]

The use of headphones facilitates each audience member to design their own experience within the context of being a part of a larger audience. "Everyone will miss something; everyone will have a perfect view", explains director Yuval Sharon cryptically before the final dress rehearsal.[181] "It's an ambulatory experience; the audience is moving freely and having a highly subjective experience…When you can divorce the voice from the person singing… the ear can watch and the eyes can listen."[182]

The sound design required a close collaborative relationship between the sound designer Gimenez and Sennheiser microphones. The sound was not compressed (dynamic highs and lows were left intact). Analog FM is so that the musical ensemble hear each other with a minimum degree of delay in the sound transmitted to the singers through in ear monitors. Signals from the orchestra are delivered over 1000 feet of fibre and an engineer generates specific mixes for the performers as well as a general mix for the audience. The collaboration between various parts of the artistic team (including sound) results in a transparent, detailed and immediate sound. The performers are able to move through the space without relying on the space to facilitate how they are heard by the audience. (Audience hear the performance through headphones). The singers are using traditionally accepted classical vocal technique. As a result of the mediation, much more detail in the singing and its relationship to the musical ensemble is available to the audience, without interference from the acoustics of the Railway Station or the ambient noise of the space.[183]

A live orchestra plays in an ancillary part of the station. Singers move throughout courtyards, waiting rooms, and ticket halls. Sixteen "floor" microphones are mixed with the orchestra's

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[180] Artbound. Invisible Cities. Link TV, 5/01/2015. https://www.linktv.org/shows/artbound/artbound-special-episode-invisible-cities (Accessed 25/04/2019)

[181] Gamboa, Gavin. "Invisible Cities in LA: An operatic tour de force." I Care If You Listen. 5/12/2013 Website. https://www.icareifyoulisten.com/2013/12/invisible-cities-la-operatic-tour-de-force/(Accessed 9/06/2016.)

[182] Gamboa. *Invisible Cities*

[183] Artbound "Invisible Cities."

output and beamed to the headphones through radio waves from four "antennae farms".[184] The performance uses the same airways (analogue FM) to send sound to the performers and the audience as law enforcement and radio stations use. The use of the sound technology facilitates the immersive sensory experience of the performance: "There is a risk that these sounds will interfere with the contemplative, personalized experience at any moment. To minimize the chance of disruption…the frequency is tuned in and adjusted before the show".[185]

Kaija Saariaho's *La Passion de Simone* was premiered at Ojai Music Festival in 2016. The work chronicles the life of Simone Weil, a French Jewish philosopher with a passionate concern for the thousands of peoples starving during WW11. Weil converted to Catholicism and fled France during WWII, immigrating to New York and then London. She died there of either anorexia or from a hunger strike. Soprano, Julia Bullock, embodies Weil through the use of her voice and body. Bullock's voice is amplified by a body mic. She is able to move freely around the stage, including having her back to the audience and performing physically demanding choreographed movement while singing. Bullock also moves in between speech (often very intimate) and singing seamlessly.[186]

As with *Invisible Cities*, this chamber work also demonstrates the capacity of the microphone to transform any physical space into a performing space. The work was also performed with Roomful of Teeth and chamber ensemble and directed by Peter Sellars. The microphone is used to construct and facilitate the acoustic balance and the relationships between the ensemble members in ways that are impossible without it. *Roomful of Teeth* sing across the stage into the large instrumental ensemble with Bullock situated between them.

> The performance rested on the shoulders of Julia Bullock, who sang amplified and had to deal with Sellars' stage direction, which asked her to circle between lying on the floor, standing up, and leaning her forehead against a six-foot-tall light box.[187]

Amplification allowed Bullock to add considerable physical performative elements to her interpretation, while not having to compete with the instrumentation or sacrifice vocal expression for acoustic necessities. The staging of the piece would not have been possible

[184] Gamboa, Gavin. "Invisible Cities in LA: An operatic tour de force."
[185] Marlow, Jeffrey. "Is This The Opera Of The Future?" *WIRED.* 22/10/2013. https://www.wired.com/2013/10/is-this-the-opera-of-the-future/Accessed (Accessed 9/06/2019).
[186] Ojai Music Festival. "La Passion de Simone." *SFist,* 23/06/2016. http://sfist.com/2016/06/27/cal_perfomances_la_passion_de_simon.php (Accessed 9/06/2019.)
[187] Ojai Music Festival. "La Passion de Simone."

acoustically without the use of body mics. The sound design facilitated a relationship to the audience that would not have been possible without amplification.

The use of sound technology in *Invisible Cities* and *La Passione de Simone* facilitates entirely new operatic and music theatre forms respectively. Aspects of the performance and works that sound technology enhance or construct include new relationships between members of the ensembles; musical ensembles impossible without sound technology; new relationships with the audience, space, performance and the performing environment. It results with a new performativity of the body freed from the earlier constraints of constructing a voice that must be heard acoustically.

3.4.8 "*Homeland*" by Laurie Anderson[188]

<https://youtu.be/cQK5HDTwO5M>

Laurie Anderson's *Homeland* is a song cycle consisting of twelve songs that combine studio and live sound to create a lament to contemporary American politics: from the war in Iraq, to the economic and environmental crisis, to growing inequality in American society, to the loss of a sense of home. Anderson at times speaks, chants and sings in a restricted range with little dynamic variation. In "Only an Expert Can Deal With the Problem"[189] from *Homeland* Anderson performs a half spoken/half sung monologue on contemporary society's reliance on the 'impartial' expert in every facet of life. The work critiques the lack of any solution to American poverty, homelessness and global climate change:

> *And sometimes it's really hot*
> *And it's July in January*
> *And there's no more snow and huge waves are wiping out cities*
> *And everyone knows it's a problem*
> *And other experts claim it's no problem*
> *Then it's simply not a problem….*

Anderson has a long history of experimenting with sound technology including the harmonizer, vocoder and the use of filters to create new voices and instruments.[190] She is credited as a producer on *Homeland* and is involved in all stages of production. The album is an amalgam of three years of touring of the project.

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[188] Anderson, Laurie. "Homeland." YouTube Video, 6/11/2017. YouTube. https://youtu.be/cQK5HDTwO5M (Accessed 5/06/2019)

[189] Anderson, Laurie. "Only an Expert." YouTube Video, 8/02/2008. YouTube. https://youtu.be/XwzYtdA6y_U (Accessed 21/05/2018)

[190] Brown, Janice. "On the Record: Laurie Anderson, Mario J McNulty on the making of "Homeland". Online Magazine. *Sonic Scoop*, 25/06/2010. https://sonicscoop.com/2010/06/25/on-the-record-laurie-anderson-mario-j-mcnulty-on-bringing-us-homeland/ (Accessed 23/05/2019)

A range of characters emerge from the use of these voice technologies in "Homeland." Novac[191] describes these characters as vocal drag. For example, Anderson uses the harmonizer and vocoder to create the character of Fenway Bergamot, the voice of authority. In "Another Day in America" from *Homeland,* Fenway asks us:

> *Your silence will be considered consent…*
> *And all my brothers. And all my long lost sisters*
> *How do we begin again?*
> *How do we begin?*

Novac quotes Anderson on the function of the drag voice:

> I wear audio masks in my work- meaning electronically, I can be this shoe salesman, or this demented cop or some other character. And I do this to avoid the expectations of what it means to be a woman on stage.[192]

Anderson creates drag voice through the use of vocoders to filter her voice, which is then layered through loops and sequencers. Despite the predominance of the mediated voice, or as a result of it, there is a remarkable transparency and immediacy in these performances as Anderson murmurs stories into our ears, allows us to hear the voices of the powerful elites in American society and comments on the politics of war and poverty:

> *It's a good time for bankers and winners and sailors*
> *With their stories of jackpots and islands of pleasure*
> *They keep their treasures locked in Iron Mountain*
> *Locked in Iron Mountain*
> *They're sailing through this transitory life*
> *They're moving through this transitory life.*[193]

3.4.9 *Proto* by Holly Herndon
< https://youtu.be/r4sROgbaeOs>

"Proto" consists of a series of songs developed between Holly Herndon and collaborators Mat Dryhurst and Jules LaPlace. Herndon developed an artificial intelligence software and trained it to sing. She invited 300 people to sing for Spawn and help it to develop an expressive repertoire. This repertoire is based on Herndon's own voice and these 300 people from a range of musical traditions interacting with Spawn's own responses and preferences. The relationship between Spawn's singing ensemble and it (her) singing was fluid and interactive:

> Spawn really responds to transience…it's a difference in energy and spectrum. Sometimes we found ourselves doing things to please her. We would have audience

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[191] Novak, Jelena, Dr, Roberta Montemorra, Professor. "Vocal Drag, Counter –Castrato, and the Scandal of the Singing Body*"* in *'Post opera: reinventing the Voice-Body.* (Farnham: Ashgate Publishing Ltd, 2015.) 138.
[192] Ibid.
[193] Anderson, Laurie. "Transitory Life" from the album *Homeland*.

snapping their fingers or tapping their beer bottles with keys. Things like that she really likes. But also people were singing and reciting texts.[194]

Herndon describes her approach to this project as rejecting consumer and market driven approaches to the use of AI in music. She is developing an approach to the use of this technology that is not based on recreating the past but rather, finding new ways of collaborating and thinking about the intersection between humans and technology. Herndon drew on the folk traditions of the singers in the ensemble and her own background in folk singing in the development of the expressive language of *Proto:*

> I got really interested …(in) all these different vocal traditions all around the world as this almost inherent technology inside us…and just part of human intellectual evolution…as being part of this collective project through the ages, and artificial intelligence as the next phase of this collective project.[195]

The recording and the live performances could be described as a rhapsodic elegy to the human and the non-human. It is in the form of an oratorio and includes solo and choral voices that are all indistinguishable as human or technological with synthesizer accompaniment. "Extreme Love" (one of the songs in *Proto*) uses the voice of a child to describe the end of this world and the morphing into another. Underneath the child's monologue is a chorus of machine/human voices breathing/sighing in unison, in rhythm while a low amplitude synthesizer performs a ground bass underneath the ensemble. The voice of the child impassively states: "

> *Here at the edge of the world, we're calling you to join us, Ancestor. In the communion of Open Pores, existence is no longer enclosed in the body. We are no longer a collection of individuals, but a microorganism, living as an eco-system. We are completely outside ourselves, and the world in completely inside us."[196]*

The song following "Extreme Love", titled "Frontier", has an echo of Bulgarian chest-dominated folk singing fused with transcendent, joyful communal singing. It is embodied and free and communicates a sense of a community of humans and machines singing across vast

[194] Mandel, Leah. "Holly Herndon's New, AI Spawned Album Is Full of Humanity." *Noisey by Vice.* 11/04/2019. https://www.vice.com/en_us/article/kzmzxe/holly-herndons-explains-ai-spawn-new-album (Accessed 20/06/2019).
[195] Mackay, Emily. "Holly Herndon: Making music with her child Spawn". *BBC Music.* 11/04/2019. *http://www.bbc.com/culture/story/20190511-holly-herndon-making-music-with-her-ai-child-spawn* (Accessed 15/06/2019)
[196] Herndon, Holly. "Proto." Itunes Audio. 4ad Ltd. 2019.

fields or even universes. "Frontier" is followed by "Fear", "Uncertainty", "Doubt" where a harpsichord-like synthesizer accompanies fragile breathy fragments of what might be voices disappearing into the air and becoming one with their environment. *Proto* is indeed a rhapsodic, grieving, hopeful and ultimately human elegy for contemporary times.

> I also think that artists…have this duty to come up with new ways of thinking about how things might be…otherwise it's handing over human agency to the powers that already have so much control. If we are distracted by existing narratives or are unable to formulate a new fantasy of what we would like to see happen.[197]

3.4.11 "Breathing" From *Carbon Song Cycle* by Pamela Z
<https://youtu.be/L9TmfX8BP4w>

Pamela Z is an artist with a diverse practice, working with sound and voice in a range of ways including: incorporating processed voice, classical soprano voice, spoken voice and a range of other approaches in her works. She also uses gesture-controlled MIDI instruments. She creates contemporary chamber music incorporating operatic bel canto and experimental voice with live looping techniques to create dense layering of her voice with live electronics. Coming from a different tradition to Laurie Anderson, there are strong parallels between these two sound and performance artists who compose, produce and perform their music and are pioneers in the development and use of voice technologies.[198]

Carbon Song Cycle is an example of a cycle created by Pamela Z that demonstrates the parallels between her artistic practice and that of Laurie Anderson. Pamela Z created *Carbon Song Cycle* in response to the upheavals in the earth's eco-system and the carbon cycle. The cycle explores concepts of balance and imbalance.[199] The ensemble includes acoustic instruments: bassoon, viola, cello and percussion with a live video performance by Christina McPhee. The voice moves between the recitation of text and keening, urgent classical singing. Looped voice, whispering and rhythmic murmuring accompany the instrumental ensemble, electronic sounds and voice. The sound mix creates space and clarity for all the elements including low amplitude sounds like speech and whispering.[200] The permeability between vocal genres emerging from the mediation of the classical voice is evidenced by this comparison between Laurie Anderson's *Homeland* and Pamela Z's *Carbon Song Cycle*.

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[197] Mackay. *Holly Herndon.*

[198] Z, Pamela. "Transforming elegant physical gestures into complex aural and visual landscapes". *Arts Center for Art, Science and Technology at MIT.* 2016. https://arts.mit.edu/artists/pamela-z/#about-the-residency (Accessed 4/06/2019)

[199] Z, Pamela. "Carbon Song Cycle: a work for chamber ensemble and expanded cinema." Website. Pamelaz.com, 22/1/2014.. http://www.pamelaz.com/projects.html. (Accessed 4/06/2019)

[200] Z, Pamela. "Carbon Song Cycle". Vimeo, 12/04/2013.. https://vimeo.com/64797629 (Accessed 4/05/2019)

3.4.12 *Stripsody* by Cathy Berberian (1925-1983)[201]
<https://www.youtube.com/watch?v=pmPbyyZwh4s>

Cathy Berberian was the first classical vocalist to break out of the strictures of the opera theatre, recital hall and church and explore the concept of vocality. She experimented with the sung and spoken word, explored the delineation between noise and singing, used voice technology as part of her art, challenged the concept of private and public voice, promoted the singer as creator and collaborator and embraced a wide range of vocal expressions without reinforcing the vocal style hierarchies of her time. She was a pioneer in developing the performativity of the classical voice and breaking the centuries old association with virtuosity, beauty and volume. Berberian, like Anderson, was a singer-composer who was instrumental in bridging the gap between performance and music in the 1970's.[202] She was a pioneer with the voice technology of her time: the microphone, voice processing and splicing. Her use of close-miking explored a range of vocal expressions not previously associated with a classical singer. This included the sounds of the vocal mechanism such as the breath, the lips, the tongue and the sounds of swallowing and gagging.

Berberian was interested in "the sonic qualities of every aspect of voice production"[203] at a time where many saw her work as of peripheral interest to the real singing done on the operatic stage (which she never did). The sounds explored by Berberian were considered noise at best and at worst, damaging and a sign of vocal dysfunction. She challenged the vocal aesthetic of the classical voice including:

- the prescribed balance between light and shade,
- evenness across vocal registers,
- even vibrato of a particular amplitude and frequency and
- the absence of any extrinsic noise including that of the breath or sounds of the actual vocal process.

Stripsody allows us to listen to the many voices of the world: animal, mineral, plant, water and human. The piece is dominated by non-verbal expressions such as quiet sobs, cartoon voices, imitations of sounds such as springs, the sounds of the mouth, whispering and phones ringing.

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[201] Berberian, Cathy. "Stripsody". YouTube Video, 18/09/2016..
https://www.youtube.com/watch?v=pmPbyyZwh4s (Accessed 24/05/2019)
[202] Placinaca, Francesca, Dr., Verstraete, Pieter, Dr. Sivuojo-Kauppala, Anne, Prof., Dr., Karantonis, Pamela, Dr. "Cathy Berberian and the Performative art of the Voice" in *Vocal Performance as Meta-Commentary: Artistry and Cultural Politics*. (Farnham :Ashgate Publishing Ltd, 2014).159.
[203] Ibid.

Through the performance of works such as *Stripsody* Berberian challenged the exclusion of experimentation from the canon of the classical singer. She rejected the concept of an ideal performance which should be replicated as closely as possible, as often as possible. She aligned herself instead with the experimental, folk and popular artists of her time who valued spontaneity, performativity and improvisation.

In her performance of *Stripsody*, Berberian alternates the sounds of speech, everyday life, opera, comic characters, sounds of her mouth, lips, animal noises, and improvised vocalizations, challenging the classical singer to be more than a carrier of the intensions of the composer to be judged solely on how accurately she reproduced the composer's perceived intentions. Berberian was a composer and a collaborator of Luciano Berio and John Cage. She was committed to melding the role of singer with that of creator, active interpreter and improviser.

3.4.13 *Warzone* by Yoko Ono
<https://youtu.be/D750pEKhfd0>

Yoko Ono provides an example of a singer, like Berberian, who explores the extremes of vocal expression and the performative voice. Ono uses extra vocal techniques traditionally excluded from classical vocal technique as a dominant part of her expressive language. Her latest album *Warzone* is a reinterpretation of songs from her 40 (or more) year catalogue. *Warzone's* themes mirror the concerns of Laurie Anderson's *Homeland*. It addresses:

> …the current backdrop of out-of-control hostility, destruction of nature, political lies and chicanery, repression of human rights, and corruption.[204]

Like Anderson and Berberian, Ono explores the vocal expressions emerging from the mediated voice. Ono is credited as a major influencer of Anderson's work. Reviewer Bartlett describes Ono's latest project as an intimate recital featuring "Her familiar yelps, gulps, chortles, Whoops, yodel-like cries, and full-throated caterwauls."[205]

Such expressions have had their detractors in popular as well as classical vocal genres. "If cancer could sing, this is what it would sound like" commented one listener on a YouTube recording of Yoko Ono.[206] Yoko wails, screams, and laughs, yodels and cries out in her

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[204] Gomez, Edward M. " Yoko Ono Sings As If Our Lives Depended On It." Online magazine. *Hyperallergic*.27/10/2018. https://hyperallergic.com/467704/yoko-ono-warzone-2018/(Accessed 4/05/2019)
[205] Ibid.
[206] Yoko Ono Plastic Band."Cheshire Cat." YouTube Video, 10/02/2013. https://www.youtube.com/watch?v=D750pEKhfd0 (Accessed. 9/06/2019).

performance with the *Flaming Lips* on the David Letterman show in her performance of *Cheshire Cat*. The electro acoustic composer Karlheinz Stockhausen experienced similar outraged responses to his vocal works, which he then incorporated into further works:

> "I have used quite a lot of words and syllables, shouts that I have heard during performance of my music. Remarks like "Stop it! "Ugly", "Beautiful", "Terrible", or "Be Quiet!"- These are all incorporated, and I have indicated how these syllables should be delivered, sometimes strictly in rhythm, sometimes chanted as in church."[207]

3.5: The Use of Vocal Micro-Textures

The microphone and playback system's ability to manipulate projection relates to the microphone's ability to act as "an acoustic lens.[208]

Vocal techniques and styles are being transformed through voice and technology These new and reinvented singings create new relationships between what is revealed and what is represented by the voice. Adriana Cavarero has said: "Nothing …communicates uniqueness more than the voice".[209] And new sound technologies, including the microphone, reveal more facets of the voice and the body it inhabits than ever before. At the same time vocal processing can obscure and disguise this very uniqueness.

Chanan notes, a singer performing with a close-miked clarity of expression reveals those vocal expressions we use in intimate relationships, creating a sense of proximity and knowing between the singer and the listener. Conversely, technologically mediated voice can create a phantom; transforming gender, age and even humanity and blurring the boundaries between human and technology.

New dimensions of vocal expression are finding their way into popular and classical vocal styles. These vocal expressions have been part of spoken and sung voice since before human beings had language. The microphone is providing these vocal sounds with a new platform. This platform is one through which the performers can reveal a detailed, transparent and immediate experience to the listener. It is as if they were in intimate conversation. This thesis would argue that it is not all about being beautiful, or perfection, but about being human - and then again from a cyborg perspective, not.

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[207] Connor, Steven. "The Decomposing Voice of Postmodern Music." *New Literary History,* Vol. 32, Number 3, Summer 2001.
[208] Emmerson. "Living presence*"* in *Living Electronic Music*. 9.
[209] Cavarero, Adriana. *For More than One Voice.* (Stanford, California: Stanford University Press, 2005.) 197.

The ability of the microphone to act as "an acoustic lens" (above quotation) enables an expanded expressive vocabulary for the voice to be explored. Steven Connor describes this vocabulary as: "the phantasmal life…the mouth …a meditation on the kinds of magical thinking attached to the sounds of the voice and the imaginary mechanics of their production."[210] These sounds, rather than being considered extraneous noise or signs of vocal imperfection have now crossed the divide between classical and contemporary singing. In doing so, they have forever changed the nature of vocal styles and their associated authority.[211] This vocabulary of vocal expressions is termed vocal micro textures in this thesis. They are the sounds that in classical vocal pedagogy are considered noise and signs of dysfunction: the sounds of the breath, the articulatory mechanism (lips, tongue, palate) and the process of the larynx.

The performance of Ilana Davidson[212] in *Tancas Serradas a Muru* and *Ayre* from Oswaldo Golijov's *Folk Songs*, demonstrates the microphone's role the exploration of the use of vocal micro-texture in classical vocal repertoire. Her performance features the use of vocal fry, nasal resonance and a chest-dominated vocal style to produce a more authentic vocal performance of this folk song.[213]

The microphone is bringing a new palette of whispers, sobs, gulps, grinds, sighs and giggles to the singer. At the same time, this technology has helped to shape a listener that is desirous of an immediate relationship with the singer: a direct and tactile experience where every inflection, texture, word and colour is heard and felt.

3.5.1 *Partita for Eight Voices* by Caroline Shaw

<https://youtu.be/NDVMtnaB28E>

Medulla by Björk

<https://youtu.be/wKNGL3ab-3k>

Movement by Holly Herndon

<https://youtu.be/kanNN4RPrgY>

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[210] Connor, Steven. *Beyond Words.* (London, UK: Reaktion Books Ltd, 2014) 15.

[211] For a discussion of the politics and evolution of vocal style see: Potter, John, *Vocal Authority, Singing Style and Ideology.* Cambridge University Press, Cambridge, New York. 1998.

[212] Golijov, Oswaldo. "Ayre" YouTube Video, 3/10/2015. https://youtu.be/xNPFAgjR0gY (Accessed 7/06/2019.)

[213] Schiller, Mike. "Oswaldo Golijov/Luciano Berio/ Folk Songs." *Popmatters.* 9/10/2005.Website. https://www.popmatters.com/golijovosvaldo-ayre-2495921318.html (Accessed 15/06/2019)

Caroline Shaw's Pulitzer Prize winning composition *Partita for Eight Voices* demonstrates the new directions the interaction of microphone and modern composition is taking the voice. The eight-member ensemble (of which Shaw is a member) perform exclusively on microphone. They have studied a variety of vocal styles to explore the expressive potential of voice with microphone including yodeling, belting, Inuit throat singing, Korean P'ansori, Georgian singing, Sardinian cantu a tenòre, Hindustani music and Persian classical singing.[214] *Partita* uses virtuosic multi-part harmonies that move anywhere from whispered hums, grunts, gasps to full–bodied, rich and powerful yells, balanced chants and multi-phonics.[215] It is intricately scored in the tradition of classical chamber music, involving fine musicality and expressive control by the singers while using vocal techniques outside the classical vocal tradition.

Björk's album, *Medúlla*, also delves into the voice's capacity to traverse large swathes of territory. It includes whispering, sobbing, panting, ingressive and egressive breath and the layering of voices both physically present and technological constructs. These intimate vocal expressions create a visceral relationship with the listener. Björk uses a repertoire of extra vocal sounds on the recording reminiscent of Meredith Monk, whose "Gotham Lullaby" she has covered. Music journalist Michael Beaumont describes *Medúlla*:

> (It) Starts with a panting in the left ear, a crooning Björk all over, a wall of Icelandic choir and human beat box Rahzel (The Roots) providing the bottom end…. It's (the track, "Pleasure is All Mine") made entirely of vocals; some spliced, some programmed, all apparently originating from human beings, but warped, twisted, and spit out like spattering raindrops… push(ing) us crashing into realms we'd overlooked or never imagined.[216]

Holly Herndon, a composer studying for her PHD at Stanford University, uses a laptop to create works described by music journalist Ben Beaumont-Thomas as vocal-led dance tracks "buffeted by weird sighs, breaths and mumbles."[217] On her breakthrough album *Movement* the track 'Breathe' uses the sounds of the breath as the dominant compositional tool. The throat and its associated processes, alternately gasping and strangled are interspersed with

[214] Roomful of Teeth. "Biography." Website. http://www.roomfulofteeth.org/biography-1/ (Accessed 9/06/2019.)

[215] Roomful of Teeth. "Caroline Shaw's Partita." YouTube Video, 9/03/2019. https://youtu.be/NDVMtnaB28E (Accessed 9/06/2019.)

[216] The band Kraftwerk were one of the first groups to use the vocoder and it was Laurie Anderson's track 'O Superman" and its use of this technology that helped to make its use popular in the early 1980's.

[217] Beaumont-Thomas. "Holly Herndon: the queen of technotopia", *The Guardian.* 27/04/2015. https://www.theguardian.com/music/2015/apr/26/holly-herndon-platform-interview-queen-of-tech-topia-electronic-music-paradise-politics (Accessed 4/06/2019)

suspensions of silence. The listener anticipates the release of the breath and is as a result invited to join the rhythm of the track's breath in an intimate and tension-filled dance. Ben Beaumont-Thomas nominated her album *Platform* as one of the best electronic albums of 2015. 'Unequal', a track from this album, layers synthesized voice over her own, creating a yearning digital requiem for our time. Commenting on her work, Herndon shares a desire to influence contemporary politics through her work with Laurie Anderson and Ted Hearne:

> The right is really good at coming up with a paradisiac alternative to whatever the current condition is, and it's usually pretty racist and nasty, but the left sometimes fails to come up with their own paradisiac alternative. That's where music can come in. Because one thing music is really good at is getting strangers in a room together to emote.[218]

Her laptop collects the sounds of everyday life, woven with electronic sounds like Skype, the sounds of her computer which she seamlessly weaves with her own voice and synthesized voices into music that is alternately mesmeric, frightening, seductive, comforting and terrifying. She embraces her interaction with the laptop and its associated processes to challenge the concept of the female voice, and ultimately the human voice and its relationship to technology. Herndon challenges:

> How can we expect the diversity of the musical landscape to change when the archetypes we are presented with are intrinsically tied to an older, more segregated era? We need new fantasies, and until we demand them we are not going to get them.[219]

3.6 Case Study: *The Howling Girls*- 21st Century Bel Canto
 <https://curiousnoise.com/live>

The Howling Girls (2018)[220] is a recent example of an Australian Opera that uses amplification to explore expressive vocal techniques only available and audible through the microphone. It uses choking, gasping, the sound of a pitched in-breath and out-breath, sounds of the breath, chest dominated singing, vocal fry alongside singing that more traditionally reflects ideals of

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[218] Ibid.

[219] CDM. "Watch Holly Herndon Talk About Giving Laptops a Voice". CDM. 6/11/2014. http://cdm.link/2014/11/watch-holly-herndon-talk-giving-laptops-voice/ (Accessed 4/06/2019)

[220] Carriageworks. "The Howling Girls Pt. 1 The Voice." YouTube Video, 13/03/2019. https://youtu.be/kmF_QZICGDI (Accessed: 4/06/2019)
"The Howling Girls Pt 2 Sounds". YouTube Video, 15/03/2018. https://youtu.be/Ogy6_oikZzg (Accessed: 4/06/2019)
"The Howling Girls Pt. 3 Direction". YouTube Video, 22/03/2018 https://youtu.be/GtzLUPplxEg (Accessed 4/06/2019)

classical singing.[221] The impetus for the piece came from the post 9/11 reporting by a number of young girls of symptoms of choking ascribed by them to having body parts and debris lodged in their throats. The piece is intricately scored and much of the vocal approach was developed in consultation and workshopping with soprano Jane Sheldon. It is divided into four parts: Summoning, The Blockage, Howling and Broken Aria.

Composer Ricketson says he went down the path of non-verbal vocalizations that clearly communicate high emotional arousal[222]. The cast is small, comprising soprano Jane Sheldon and five young women from the performing group *The House that Dan Built* and is accompanied by Theremin, keyboards and an intricate use of a myriad of audio cues. The exploration of this non-verbal language necessitates the use of the microphone and sophisticated sound design by Bob Scott. Such sound design involves a collaborative process with the director and composer to ensure the sound design is in sympathy with the aesthetic of the production.

The use of the extra vocal sounds continues to be contentious among some classical commentators, even those engaged in commenting on the use of technology in opera in the twentieth first century. Commentator on technology and the classical voice Karen Henson discusses the challenge amplification poses to operatic singing traditions. In particular:

> (The) commitment that the operatic world has developed to the idea that the identity and essence of the art is live and technologically unmediated song…needs to be protected from the "fakery", "electronic intrusion" and vocal "hoarseness, tremulousness and rasp" that risks being introduced into the art if the use of amplification continues to grow…the authors have no agenda as far as the controversial issue of amplification in opera is concerned and, if they did, it would probably be highly traditional.[223]

Part one of *The Howling Girls* features pitched inhaling and exhaling (egressive and ingressive singing), the sounds of the breath, sighing, of vocal folds and their processes, chest dominated singing reminiscent of the use of the female voice in mourning rituals, and rapid changes in vocal registers. These are all sounds that either do not exist in the traditional classical style or are incidental to unamplified classical singing. Here they are given primacy in the soundscape.

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[221] For an exhaustive description of extra normal voice see: Edgerton, Michael Edward. The 21st Century Voice, Contemporary and Traditional Extra Normal Voice.(London: Rowman and Littlefield, 2015.)
[222] Carey, Patrick. Australian Opera The Howling Girls takes inspiration from haunting 9/11 anecdote. http://www.abc.net.au/news/2018-03-27/australian-opera--howling-girls-explores-the-human-voice/9587302 (Accessed 4/02/2019)
[223] Henson. *Technology and the Diva,*18.

The audience breathes and experiences the sensations of these sounds in sympathy with the body of the singer. LaBelle describes the sigh:

> As a vocalization that literally lets out what is held in, as an oscillation between tension and release, it leaves the mouth as a sudden exhalation that …lets out what cannot be held onto…the resignation of a breathing body…the sensation of a creeping loss.[224]

Part two, *The Blockage*, features a choking cadenza "which is meticulously notated with very complex rhythms…she's essentially there in front of us having this blustering choking fit".[225] Sheldon sings an almost unbroken note for 36 minutes, singing on both the in and out breaths.[226] Part three, *Howling* features the female chorus calling out to be heard in a series of vocalizations that are invented languages. They are demanding to be heard while the soloist uses a giant megaphone accompanied by Theremin. Part three is a protest, a revolt, a coming together while maintaining the very separate experiences of all the actor/singers. The audience experiences parallel but unique experiences unfold before them. Pressed phonation (the sounds of the vocal folds and throat constricting and being held) are used as part of the expressive language of the piece. Brandon LaBelle describes the communication of pressed sounds as:

> A subject in the throes of labor, sexual excitement, beastly expression…nervousness or longing; a subject on the verge of transgression, loss or rapture…In their sounds we might locate the point at which the body is impressed upon by *the weight of the world* (my emphasis).… I hear all these small breaths and guttural vibrations as currents that ride under the voice and that communicate so fully without becoming a syllable.[227]

At one point in the piece, the young women come together and play Aztec Death Whistles, evoking archetypal rituals of death and mourning. The ear-shattering shriek of this instrument is created by shaping the clay into an instrument that produces a shriek when it is blown into.

The ambiguous Part four, *Broken Aria*, reveals a moment of transitory beauty that fragments into a chorus of young women facing the audience, speaking each in their own language. They implore, demand and gesture at the audience. They want to be heard, but there is no easy resolution here.

The use of this extended vocabulary in *The Howling Girls* is an intrinsic part of the expression of lament and protest in the work. Director of the opera, Adena Jacobs, sees the work as

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[224] LaBelle. *Lexicon of the Mouth.* 85-86.
[225] Carey. Patrick. "Australian Opera The Howling Girls.
[226] Ibid.
[227] LaBelle. *Lexicon of the Mouth*. 85-86.

necessarily challenging. The trauma it deals with is strongly associated with oppressive and antagonistic forces directed towards women that has been on the rise since 9/11. She says:

> It's proposing a sort of utopian ideal of a remaking of the voice, or a purification of the voice…I think it ultimately heads into a place of beauty.[228]

Depictions of female hysteria and madness have a long history in Western Opera from Thomas's depiction of Ophelia in *Hamlet* and Donizetti's famous mad scene in *Lucia di Lammermoor*:

> There was a kind of double portrayal being required of them…an almost scientific pushing of coloratura to its limits, and an almost naturalistic approach to the larger expression of character…exploring a new kind of vocal virtuosity...extreme high notes, passages of complex coloratura, rigorous expressive demands…combined with the style of the coloratura itself, this gracefulness perhaps even made these sopranos' voices detached from their bodies and transformed into something impersonal and abstract, even "purely musical.*[229]*

Within the constraints of the non-amplified classical voice, the depiction of madness was explored through other kinds of extreme vocalization. These included exploring the limits of the vocal range and the voice's agility, paradoxically making the relationship between the vocalization and the body "detached". *The Howling Girls* explores vocalizations that intimately explore the voice of the body.

This expressive language of sighs, grunts, the catch and constricting of the throat creates new sound worlds for the classical voice. Pettman notes that the amplification of the voice has opened up expanded areas of expression that also demand an expanded listening practice:

> As our existence is increasingly experienced within digitalized networks, the challenge is not simply to rescue "the grain of the voice"… but also to be attuned to "the voice of the grain" (in the sense of listening attentively to the environment)-an environment that includes both paradises and parking lots.[230]

The experience of witnessing *The Howling Girls* is as if to enter a universe of sound and sight where one's body and imagination are taken into the visceral experience of lament, but also of protest. This is not the lament of an operatic heroine who sighs and weeps at her inability to

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[228] Program for Performance: "Carriageworks and Sydney Chamber Opera Present The Howling Girls World Premiere."April 2018.
[229] Ibid.
[230] Pettman, Dominic. *Sonic Intimacy:*Loc.767

influence the world she lives in. "Lasciate Mi Morire" in Monteverdi's *Orfeo*, Purcell's "When I am Laid in Earth" in *Dido and Aeneas* or "Con Onor Muore" in Puccini's *Madama Butterfly* are all examples of operatic heroines crying and railing against fate. The women in *The Howling Girls* inhabit their experience through their vocalizations and demand to be heard. In the final scene, each woman faces and speaks to the audience in her own language, asking for us to interrogate our own response to what we have heard and seen, to delve deeper. Simultaneously, the sub-sonic sounds of the synthesizer resonate through the audience in waves, linking listener to listener as our bodies collectively respond to the visceral onslaught.

The Howling Girls is an exploration of sonic intimacy, which Pettman describes as a turning inward, away from the wider world, to more private and personal experiences and relationships.[231] This internal exploration in *The Howling Girls* leads back to the external, material world with a demand to be heard. Whether the voices of the *The Howling Girls* are heard or understood is left unresolved by the ambiguous ending.

Pettman describes the at times cacophonous nature of the voices of the world: "the voice of the world has an endless array of ambassadors to speak to us…. but to listen to the warnings, admonishments, prayers, protests, solicitations, invitations, and commentaries of other "voices" is…a shortcut to mental breakdown."[232] Human beings make decisions on what sounds hold our attention among the overwhelming layers of choice available to us. The musical scoring in *The Howling Girls* provides space to listen to the subliminal sounds of everyday human life that become powerful markers of experience in *The Howling Girls.*

*The Howling Girl*s uses the microphone to return the grain of the voice to the body. Ricketson writes:

> I was trying to create a sonic world…that would bypass the brain and work directly on the nerves and the body…it starts in the lungs-that very long ingressive and egressive singing-then it moves up into the throat-the choking cadenza…then the throat fully activates in the howling section…and then, finally, in the last section onto the mouth.[233]

Not only does *The Howling Girls* explore the language of the breath, lungs, throat and mouth, it firmly places the experience in the listener's body/mind. The visceral impact of operatic

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[231] Ibid. Loc 1285.
[232] Ibid*.* Loc 1337.
[233] Ibid. Loc.1337.

singing on the listener has long been celebrated, but the microphone here allows performer and listener a relationship that explores "jouissance"[234] in entirely new ways. The extended use of the ingressive and egressive vocalizations in the beginning of the piece, leads the listener to finding the rhythm of the breathing entering their own body. They experience the moments of blockage both in their own body and in the body of the singer.

Pettman and LaBelle point to the ability of this expressive vocal language to appeal directly to the senses, to challenge not only fixed vocal conventions, but also our own relationships to the work.[235] The deeply rooted associations of these extra vocal sounds create a bodily connection where breath and resonance are shared between performer and spectator. Brandon LaBelle describes the intensities we feel when confronted with the language of the lungs and mouth, the primal fear we experience of contagion, and our associations with the uncivilized. The uncivilized is often strongly aligned with the emotional, the primal and female hysteria. Marie Thompson proposes that vocal fry is considered "feminized noise… that is, unwanted, irritating, meaningless and damaging."[236] Although there has been much debate about the prevalence of vocal fry in young women's speech and singing, Thompson makes the point that it is as prevalent in male speakers and singers. Rock, metal and blues singers and upper-class English males all use this vocal quality.[237] Yet, as the program for *The Howling Girls* states: it is the female speaker and singer who experiences most of the criticism for its use:

> Within feminist discourse, it (hysteria) has been understood both as a means of controlling the female subject, and as a subversive force, a space of resistance which can disrupt and undermine the patriarchal order. [238]

This attribution of the use of extra vocal sound to "hysteria" and a particularly individualistic female experience is evidenced by music reviewer Peter McCallum's description of the work:

> It becomes a metaphor for the inner blockage of self, particularly the feminine self….like a collective psychosis that passes into dim light.[239]

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[234] Roland Barthes's concept of Jouissance is discussed in the literature review

[235] Pettman. *Sonic Intimacy.*

[236] Thompson. *Creaking, Growling:* 5-11.

[237] Ibid..

[238] Program for Performance: "Carriageworks and Sydney Chamber Opera Present The Howling Girls World Premiere." April 2018.

[239] McCallum, Peter. "The Howling Girls review: A Collective Psychosis Looking for the Light". *The Sydney Morning Herald.* 3/04/2018. https://www.smh.com.au/entertainment/music/the-howling-girls-review-a-collective-psychosis-reaching-for-the-light-20180403-h0ya2e.html (Accessed 9/06/2019).

Such an analysis of trauma falls into what commentator Helene Vosters argues is a de-historicized past and a decontextualized present.[240] It fails to recognise the societal and cultural context of these incidents, and the particular place of young women in it. Susan Faludi, who used the post 9/11 traumatization of these young girls as the introduction to her book "The Terror Dream, Fear and Fantasy in Post 9/11 America," considers the roots of this trauma as entirely something other than "collective psychosis" of the "feminine self" but rather:

> When an attack on home soil causes cultural paroxysms that have nothing to do with the attack, when we respond to real threats to our nation by distracting ourselves with imagined threats to femininity and family life, when we invest our leaders with a cartoon masculinity and require of them bluster in lieu of a capacity for rational calculation…we should know we are exhibiting the symptoms of a lethal, albeit curable, affliction[241]

Vosters cites the work of Cvetkovich who argues that trauma is to be understood as a social and cultural discourse that emerges in response to the demands of grappling with the psychic consequences of historical events.[242] The evolution of this extra-vocal lexicon owes at least part of its history to the explorations of German singing teacher Alfred Wolfsohn. Wolfsohn began to experiment with the voice as a way of healing himself of his own trauma and recovering his voice. He was haunted by the screams of men dying in the trenches during his experience as a stretcher-bearer in WW2. He used these vocalisations in his own work and went on to teach his techniques to singers and actors as a means of connecting voice and body.

Brandon LaBelle has provided an expanded understanding of the language, meaning and politics of these sounds that are explored in *The Howling Girls*:

> The mouth is that physical organ responsible for the project of the self- its presentations, its liberations, and its struggles. It navigates the line between centre and margin, proper and improper, to catapult us forward… or to sabotage our integration.[243]

Ricketson exploration of this ambiguous and volatile place is shared by many vocal performers, including Diamanda Galás,[244] who search for a musical language that comes as close as possible

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[240] Vosters, Helene. Diamanda Galás and Amanda Todd: "Performing Trauma's Sticky Connections". *Theatre Research in Canada*. Spring 2015, Vol. 36 Issue 1, 89-105.
[241] Faludi, Susan. *The Terror Dream. Fear and Fantasy in Post 9/11 America*. (New York: Metropolitan Books, 2007.) P 295.
[242] Vosters, Helene. *Performing Trauma's Sticky Connections*. 89-105.
[243] LaBelle. *Lexicon of the Mouth*. 82.
[244] There are parallels between the work of Diamanda Galás and *Howling Girls* Galás was the first to combine completely different genres of music: operatic production, blues and Maniat lament. Meier describes Galás'

to communicating the trauma so common in contemporary history. This exploration of vocal micro textures is also used by Australian composer/performer Cat Hope to explore the trauma experienced by children in Australian offshore detention centres. She recently premiered *Speechless* at the Perth Festival. The opera is a response to the 2014 Human Rights Commission report "The Forgotten Children: National Inquiry into Children in Immigration Detention:"

> Through a vocal language beyond words, Speechless is a channel for Hope to come to terms with the things she sees perpetrated in her name by those in positions of power.[245]

Works such as *The Howling Girls* and *Speechless* are making boundaries between genres and art forms permeable and exploring the indeterminate space in between. *The Howling Girls* explores these places in between lament and protest, collective and individual experience, the spaces in between in and the out breath, the desire to express and the pressure to stay silent. Pettman writes that there is always a danger, however, when urging people to 'pay heed' to something numinous or nebulous…"the voices of the world can be encouraged to emerge from within the silent places… into a frequency we can hear." [246]

The amplified singers in *Speechless* used a range of styles from contemporary to throat singing:

> The visceral quality of the sound and the power of the emotions expressed through voice and instruments amply made a point about children in immigration detention. Speechless allows their plight to be heard. Words were superfluous.[247]

The Howling Girls asks us to bear witness to this protest by using an expressive vocal language that the human body and ear recognise as communicating most directly the experience of trauma and its cultural and political context.

Although not a literal representation of the young girls' experiences, *The Howling Girls* recognises that the girls' experiences are not isolated experiences of trauma or hysteria. They are an outcome of the way those events have been used to bolster conservative forces and

Plague Mass as "a critical communication between heterogenous blocks… creates tension, vibration and intensity…but it is unique…achieved by undoing the structure of fixed codes and static grills of conventional configurations[244]

[245] Hope, Cat. "Speechless" Tura New Music. Perth Festival. Website.
https://www.perthfestival.com.au/event/speechless (Accessed 5/06/2019)

[246] Pettman, Dominic. *Sonic Intimacy, Voice, Species, Technics* loc. 1372.

[247] Chinna, Stephen. "The sounds of *Speechless*, where words are superfluous". *The Conversation*. 4/03/2019.
https://theconversation.com/the-sounds-of-speechless-where-words-are-superfluous-112760 (Accessed 5/06/2019)

voices post 9/11. We are hearing the girls' outcry and suppression, but we are also feeling the environment those cries take place in. Nina Sun Eidsheim paraphrased by Jonathan Sterne:

> The voice is never just the voice, it is radically embodied and tied to regimes of power and discipline, and it is tied to its environment.[248]

The Howling Girls reflects the rich tradition of lament as protest, particularly of women who most often were without voice. Diamanda Galás' epic work *Defixiones* provides an example of the use of the lament tradition in a music theatre work. The roots of Galás' works *Defixiones*, "*Will and Testament: Orders from the Dead* and *Plague Mass* are in the operatic, blues and Mariot lament traditions.[249] The Mariot lament tradition Galás draws on is described by Emma Johnston as being socially and politically powerful, allowing the usually silenced voices of women to express pain, anger and protest. Johnston describes the Galás work *Hereafter* as "mourning as incitement…incited people to be so angry they would fight."[250]

The voices of the world include the weak, the subliminal, the imperfect, and the not fully formed. These sounds become part of the vocal language of *The Howling Girls* which are in contrast to the sounds of the static, strong and perfectly formed voices that have been accepted as the language of opera. While these traditional vocalizations have their own power and place in a classical vocal lexicon, technology is uncovering a range of expressions that are part of the evolving classical voice. This range is full of expression and humanity and pointing towards a new kind of openness and communication. Pettman neatly sums up this perspective with the following:

> It is not too late to listen to the voices of the earth, whether they be mineral, animal, natural or technological. And let us share the results of what we learn with each other, in curiosity and generosity of spirit, in the hope of no longer appearing to the rest of the world as what Nietzsche called " the insane animal, the laughing animal, the weeping animal, the miserable animal.[251]

3.6 Summary
Singers such as Laurie Anderson, Holly Hendon, Nora Fischer, Gabriele Kahane, Diamanda Galás, Shara Worden and Björk, are among those singers exploring the way the voice and technology can transform a singing practice. They are creating new relationships with technology and with their own bodies. They are also opening up new vocabularies of

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[248] Sterne. *The Sound Studies Reader..*
[249] Johnston. *Between Liminality and Transgression*. 33.
[250] Ibid.
[251] Pettman. *Sonic Intimacy*. loc.1547.

expression, new connections with the listener, new collaborations, skills and performing spaces. The old paradigms prescribing popular and classical vocal styles become irrelevant as we move into the twenty first century. Steven Connor's writing reveals new possibilities in the complex interrelationships between voice, technology and music.[252]

All the examples discussed in this chapter are challenging the idealized voice that has been classical voice. Divisions between speech and singing, machine voice and organic voice, classical and contemporary voices are becoming more permeable. And with this erosion of vocal specialization, a small chink has appeared in the standardization and commodification of the voice that has been dominant since the radio and the gramophone first arrived.

The works by Laurie Anderson, Holly Herndon and Pamela Z provide a window into the possible collaborations between technology and human being that in no way rob the artist of agency, but rather give a whole range of new tools and expressive techniques to have a stronger voice in responding and critiquing contemporary politics. These new techniques are developing exponentially.

Invisible Cities (a headphone opera) allows the construction of relationships between singers and ensemble that are not in the same physical space The work allows performers and audience to move through the Railway Station in a way impossible without mediation.[253] *Katrina Ballads* and *Invisible Cities* take place in physical spaces not designed or sympathetic to unamplified singing of this type: a night club and railway station respectively. *Katrina Ballads* and *Josephine Baker: A Portrait:* use sound technology to create a musical ensemble that could not function without it. *The Howling Girls* and Speechless use sound technology to develop new vocabularies of expression, as do Laurie Anderson, Björk and Yoko Ono. They build on the groundwork laid by Cathy Berberian. Gabriele Kahane, Sufjan Stevens, Kate Bush and Tyshawn Sorey are all using sound technology to explore the relationship between text, music and storytelling in the song cycle.

Chapter 4 takes what has been learnt about this evolving interaction between classical voice and sound technology. It develops a framework for describing the impact of mediation of the

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[252] Connor. *Beyond Words*.
[253] Invisible Cities- Union Station Opera. YouTube Video, 30/10/2013. YouTube. https://youtu.be/EzwNUzPwIBM *(*Accessed 3/06/2019).

classical voice. Chapter 4 then develops criteria for evaluating the effectiveness of this mediation.

Chapter 4: Methodology

There is no simple answer to the question "what is good sound?" The best answer might be along the lines of whatever is stylistically and artistically appropriate. Good sound is subjective.[254]

Rather than considering the use of amplification as lying outside a classical vocal practice, the previous chapters showed a new paradigm is emerging of a twenty first century classical voice that is flexible and interactive as opposed to fixed and historically bound. Twenty first century voice (whether in classical or vernacular vocal styles) refuses to be pinned down and is constantly evolving, finding new territories in the interaction between the musical work, the voice, the repertoire, technology, performing space and the beings in that space.

Chapter 2 and Chapter 3 provide an overview of the interaction between the singing voice (with a particular focus on the classical singing voice) and the microphone and sound technology. This investigation compares the nature of the classical voice with and without mediation and demonstrates a wide variety of impacts reflecting the strong dialogue and permeability between classical voice, contemporary art music and vernacular (popular) musical styles.

The contextual reviews and case study in Chapter 3 demonstrate that the engagement of classical singers and composers with the microphone and playback systems and other voice technologies have resulted in many voices finding their way into this practice. A further breakdown of consensus as to what classical voice(s) are is ensuing. The use by performers and composers working with voice technologies of an eclectic musical and vocal language is finding, as Meier describes, the "spaces in between" that disrupt "the fixed codes and static grills of conventional configurations".[255] The historic hegemony of the classical voice has collapsed in the twenty first century.

These evolving expressive languages and relationships developing from the mediation of the voice lack an adequate vocabulary for discussion and analysis. There is little investigation into the way amplification enhances, reduces or otherwise changes musical meaning, despite the ubiquity of its presence in music regardless of genre, according to Mulder.[256] This chapter aims

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[254] Corbett, Ian. *Mic it! Microphones, Microphone Techniques and their Impact on the Final Mix.* (Berlington, MA: Focal Press, 2015) 48.

[255] Meier, Julia.. *Diamanda Galás: Defining the Space In-Between.*

[256] Mulder, Johannes. "Making Things Louder: Amplified Music and Multimodality*".* PHD Thesis. University of Technology, Sydney. April 2013. 265. https://opus.lib.uts.edu.au/bitstream/10453/21903/5/02whole.pdf (Accessed 13/04/2019)

to create a framework and vocabulary for understanding the ways amplification changes the aesthetics and meanings of the classical voice. It is anticipated that the framework and the contextual review will provide singers working with classical voice a way of thinking about the application of amplification to their work. For those singers already working with amplification this work may provide new ways of extending their work. Such engagement with sound technology mediation may lead to experimentation with an extended expressive vocabulary, new kinds of ensembles, different relationships with text, different performing venues and an enhanced exploration of bodily expression.

The methodology in this chapter identifies five markers that describe the impact of sound technology mediation on classical vocal performance(s) and then synthesizes them with the seven markers of amplification developed by the UK electroacoustic composer Simon Emmerson.[257] Frameworks are developed for analysing the ways in which an amplified classical vocal performance diverges from one that is unamplified and for analysing the impact of that mediation. These frameworks help to understand the changing aesthetics and cultural meanings emerging from this evolving and diverse practice. The mediation of the classical voice gives a range of aesthetic choices in the representation of the voice that were unimaginable prior to these technological developments.

None of these elements of the amplification system are neutral in their impact on the voice, or the performance aesthetic. The conversions of acoustic energy into electrical signal in all the stages of the microphone and playback system affect the sound of the voice and its relationship to the ensemble, the audience and the performing space. Evans confirms that decisions about the nature and use of technology are at every stage, aesthetic ones:

> While current technology makes signal "transparency" more achievable than in the past, virtually every stage a signal passes through affects the tonal quality, timbre, or colour of the sound for better or worse.[258]

4.1 Emmerson's Seven Functions of Amplification
The framework to be discussed in this chapter builds on the work of Simon Emmerson.[259] He addresses the various impacts of amplification on performance aesthetics and meaning. He has

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[257] Emmerson, Simon. *Living Electronic Music.* Ashgate. Hampshire, England. 2007.124-134
[258] Evans, Bill. *Live Sound Fundamentals Course Technology.* (Boston, USA: Cengage Learning, 2018.)
[259] Emmerson. *Living Electronic Music.* 124-134

identified seven functions of amplification[260]: balance, blend, projection, spatialization, perspective, colouration and resonance-feedback.[261] The ways in which the performance aesthetic is shaped and constructed are explored using these seven functions and are applied more specifically to classical vocal practices, with corresponding examples from the contextual review.

4.1.1 Balance: The use of amplification can create balance between instrumental and vocal performance elements (and between vocal performances of very different acoustic power) which otherwise may not work in ensemble. This is described as "equivalence in presence".[262] This also applies to the combination of voices with electronic instruments and recorded sounds: the microphone allows the combination of electrophones …with acoustic instruments, percussion and voices.[263] An example of this presence of this function of amplification in the contextual review is *Katrina Ballads* where amplification facilitates the inclusion of electronic instruments.

The use of amplification to create balance can also apply to creating a musical ensemble between sound sources that are physically distant from each other or cannot hear each other in real time. The microphone and playback system allow the performers to hear each other in real time and as a result facilitates balance. An example of the construction of sound between physically distant sources that cannot hear each other in real time is in *Invisible Cities*, an opera performance where the performers moved through a working railway station hearing the musical ensemble (that was performing in a different building) through headphones. Each performer had an individual mix put through their earphones and the whole sound was constructed using mixing and transmitted to the audience through headphones.[264]

4.1.2 Blend: Timbres from different sources are dislocated and relocated so that they can be blended together for a particular aesthetic. Different sound sources are brought into a constructed relationship creating new timbres that are independent of the original elements.[265] Emmerson discusses Reich's long rehearsal period and the individual miking of each

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[260] Emmerson groups Balance and Blend together but in the application to classical voice they have been treated as two independent but related factors.
[261] Emmerson. *Living Electronic Music*.124-134
[262] Ibid.
[263] Ibid.
[264] Artbound Special Episode. "Invisible Cities"
[265] Emmerson, Simon. *Living Electronic Music.* 126.

instrument in *Music for Mallet Instruments*, *Voices and Organ*[266] as an example of the use of amplification to facilitate blend. Reich was working with three very contrasting sound sources (one was loudspeaker produced). He meticulously constructed through experimentation (including singing the parts himself) a blend of the voices (male and female) and a wide range of instruments into one dominant timbre.[267]

This feature of amplification includes the creation of psycho-acoustic effects and reinforced harmonics: Emmerson quotes Glass speaking about this feature of amplification:

> What I found happening when we amplified…was that we were getting psycho acoustic effects-overtones and things that would happen as a result of the repetitive structures played rapidly at high volume. You actually hear sounds that nobody is playing.[268]

Blend is differentiated from balance because the function of one source may be to reinforce the characteristics of another source.

4.1.3 Projection is the foregrounding of the low amplitude elements of an ensemble, which may involve making the sound louder but could also mean making quiet sounds present through low amplification using a number of speakers. Emmerson [269]gives the example of John Cage's *Cartridge Music* as a demonstration of the amplification of small sounds for aesthetic purposes in a musical work.[270] In this work Cage uses non-air-medium transducers that allow high levels of amplification without feedback.

Emmerson notes that this reinforcement of particular harmonics is done by Tibetan Monks without amplification and contrasts this with Stockhausen's *Stimmung*,[271] where each singer is amplified to a specific speaker for a similar effect.

Microphone choice is critical for the effective use of this technique. Emmerson notes that amplifying small sound detail requires close microphone proximity and a combination of high frequency presence and bass lift, giving a feeling of close intimacy. This use of technology and

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[266] Reich, Steve. "Music for Mallets, Instruments Voices and Organ" YouTube Video, 8/09/2012. https://youtu.be/rCiGDdEdrks (Accessed 3/06/2019

[268] Ibid.127.
[268] Ibid.126.
[269] Ibid.127.
[270] Cage, John."Cartridge Music".YouTube Video, 18/02/2013. https://youtu.be/VaNHAswN2hU (Accessed 6/06/2019)
[271] Ibid.126.

the resulting aesthetic is critical to the use of vocal micro-textures in the singing of works such as *The Howling Girls*[272],*Speechless*[273] and *Movement.*[274]

4.2.4 Spatialization: Sound technology can be used to construct different relationships between the sound source and the audience/listener. The sound is constructed so it is perceived to be originating from anywhere in the performing space. The positioning and type of speaker are key elements in this technique. This function applies to the headphone opera *Invisible Cities.* In this opera the orchestra played in a different physical space from the performers but was heard in virtual ensemble through headphones by the audience. In the music theatre work by Kaija Saariaho, *La Passion de Simone,* the vocal ensemble *Roomful of Teeth* sang across the stage into the amplified instrumental ensemble. Without the use of spatialization to construct the relationships between the sound sources the musical ensemble would have been impossible.

4.2.5 Perspective: Amplification can allow the creation of illusory spaces, constructing depth and breadth that does not reflect the acoustic sound and the visual characteristics of the space. The listener has an expectation as to the nature of the sound in relation to a particular physical space. Amplification allows the construction of a virtual space that does not match the projected sonic qualities of a physical space. For example, an intimate performance can be constructed in a stadium and an epic operatic performance can be created outdoors through sound technology. Emmerson refers to this feature of amplification as spatial consonance and spatial dissonance.[275]

This function applies to the many of the performances, where the sound qualities did not match the perception of the unamplified acoustics of the physical performance space, and new relationships with the audience were constructed. Some examples of this use of amplification are *Josephine Baker: A Portrait*,[276] where the intimacy of the speech and singing suggested a closer physical relationship between listener and performer than was actually present and *Invisible Cities* where the proximity and detail of the performance heard through headphone bore no relationship to the working Railway Station the performance took place in. In *Voices*

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[272] Sydney Chamber Opera. "The Howling Girls".
[273] Hope, Cat. "Speechless."
[274] Herndon, Holly. "Movement."
[275] Emmerson. *Living Electronic Music*.148.
[276] Ojai Music festival 2016. "Josephine Baker: A Portrait-World Premier." YouTube Video, 21/06/2016. https://youtu.be/QDhq860pTuA (Accessed 10/06/2019.)

from the Killing Jar composer and vocalist Kate Soper demonstrates the construction of illusory spaces through the use of amplification. Soper wears a headset microphone in her performance with *Wet Ink Ensemble.*[277] The nuance and presence of vocal micro textures in the vocal performance (which included spoken text and singing of low acoustic power) and the construction of the ensemble suggest a more intimate relationship with the audience than the physical relationships between performers and audience would suggest.[278] One reviewer commented on the unsettling nature of this portrayal of women trapped in a variety of situations not of their making. The disjunct in created by the at times claustrophobic atmosphere of the piece. This atmosphere is enhanced by the amplification that allows the detail of the ensemble and the vocal performance to be heard by the listener:

> As an audience member, you're asked not to "enjoy" *Voices from the Killing Jar,* so much as allow yourself to feel unsettled and disturbed … then remember that feeling when you encounter #MeToo moments out in the world at large.[279]

4.2.6 Colouration: All amplification colours the source. Mixing of the sound and the singer's proximity to the microphone colours the voice, foregrounding particular harmonics over others and allowing greater presence of vocal micro-textures (the sounds of vocal processes such as breath, action of the vocal folds and sounds created by the tongue and mouth for example).. The voice is also independently able to apply colouration to the voice, being a unique instrument of colouration and timbre. The manipulation of the internal resonating spaces, larynx position, lips, mouth and tongue are integral to changing the colouration of the voice combined with the integral connection between the expression of the intent and meaning and timbre. The microphone facilitates the ability of the singer to prioritise expression, nuance and intimacy (if appropriate to the performance) over the acoustic imperative of audibility. Most of the performances referred to in the contextual review demonstrate a broader use of vocal expression than in an unamplified classical vocal performance. Examples include the performance of Isaiah Robinson in "Kanye West." [280] Robinson was able to incorporate vernacular vocal styles in this performance as a result of the use of amplification in this work.

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[277] The ensemble of this work comprises amplified flutes, violin, trumpet, saxophone, percussion, piano, recorder, live electronics and spoken and sung voice.
[278] Soper, Kate. "Voices from the Killing Jar" YouTube Video, 21/06/2019. https://youtu.be/YPmNwjcseB4 (Accessed 16/06/2019).
[279] Skelly, Eric. "Review: Trapped in the experience of Kate Soper's 'Killing Jar," *Houston Chronicle.* 14/04/2018. https://www.houstonchronicle.com/entertainment/music/article/Review-Trapped-in-the-experience-of-Kate-12834566.php (Accessed 6/05/2019)
[280] Robinson. "Kanye West."

4.2.7 Resonance/Feedback: any object may be said to have a natural resonance and the voice is able to manipulate resonance using a range of methods apart from the microphone, foregrounding certain frequencies dominant over others. The microphone can provide a further intervention into the nature of the resonance through microphone choice, mixing and proximity of the performer to the microphone, for example. Spaces and objects also have resonance and colour as sound moves through them. Microphones and speakers add their own colours. The interaction of the performance, the microphone and the loudspeaker and the room create a unique aesthetic that is an amalgam of these elements. All the performances discussed demonstrate this feature of amplification.

4.3 The Five Aesthetic Markers of Amplified Classical Voice

The wide selection works discussed in chapter three demonstrate the impact of the microphone to the classical voice. These works can be grouped around central themes that I call aesthetic markers. It will be shown how they build on Emmerson's work summarized above. The aesthetic markers are:

Marker	**Examples**
1. The enhancement of proximity and detail.	*The Secret Diary of Nora Plain,* *Travelers*
2. The construction of the musical ensemble.	*Katrina Ballads* *La Passion de Simone* *Howling Girls*
3. The foregrounding of vocal micro-textures.	*Speechless.* *Howling Girls* *Spawn*
4. The construction of the relationship with the performing space.	*Invisible Cities* *La Passion de Simone*
5. The construction of the relationship between text and singing.	*Katrina Ballads* *Travelers* *Homeland*

These markers explicate new areas of vocal expression and performativity facilitated by singing with the microphone (and sound technology).

The five aesthetic markers explore the ways in which a singing practice incorporating sound technology differs from one that does not. The markers will be used to examine the works

discussed here and move towards developing a framework for understanding the classical voice's interaction with sound technology. They delineate the differences in an amplified classical vocal performance in relation to what is sung, how it is sung, where it is sung and with whom it is sung. For an amplified performance to be effective, at least one of these aesthetic markers needs to be present. The seven functions of amplification developed by Emmerson correlate with the aesthetic markers developed to enhance understanding of the ways in which an amplified classical vocal performance diverges from one that isn't amplified. Some of Emmerson's categories inform more than one of the aesthetic markers.

Table 1: The Five Aesthetic Markers of Amplification correlated with Emmerson's Seven Functions.

Five Aesthetic Markers of Sound Technology on Classical Voice.	Emmerson's seven functions
The enhancement of proximity and detail	Resonance/feedback, Projection and balance
The construction of the ensemble	Blend, balance and projection.
The foregrounding of vocal micro-textures,	Colouration and projection
The relationship with the performing space.	Spatialization and perspective
The relationship between text and singing.	Colouration and projection.

The five aesthetic markers are discussed here and examples of works incorporating amplified classical voice are discussed.

4.3.1 The Enhancement of Proximity and Detail

The microphone can act as a microscope on the voice's many nuances and layers of meaning. It has the ability to construct social distance and the relationship between singer and listener(s) and reveal those aspects of the voice audible only to the intimate listener. It facilitates the ability of the singer to place a greater emphasis on expression over projection. Resonance/feedback, projection and balance (Emmerson's functions of amplification) help to describe how sound technology can facilitate this.

This ability of microphone to reveal small sounds is reflected in the origin of the term in the Greek words *mikros* (small) and *phone* (sound*).* Thus, it is the job of the microphone to reveal what we might not otherwise hear or could dismiss as insignificant. To act as a microscope revealing the detail of the voice and sound in general leading to the foregrounding of vocal

micro-textures in particular and the nuance of human expression in general. The features and signages of intimate speech can be revealed to the listener in acoustic spaces where this would not be possible otherwise. This feature of amplification is referred to as social distance and implies a spatial relationship between performer and audience. Experience affords social meanings to these distances and to the features of communication associated with them. Word stresses are more apparent when the microphone negates the need for a continual legato. Legato becomes an expressive choice. The sounds of consonants can be explored for expressive meaning.

Most of the works referred to in the contextual review demonstrate this feature of amplification and its environment to make particular frequencies more dominant over others. This can facilitate certain features of the voice being dominant in the overall mix in relation to the vocal performance; it can construct the relationship between all the elements of the ensemble and how the performance is communicated to the listener(s) through the performing space. Projection refers to low amplitude sounds being able to be foregrounded, allowing the full range of vocal expression being able to be heard by the listener according to the performance aesthetic. Balance can be constructed between elements of a performance that would not be possible unamplified. The interaction of these features of amplification gives the capacity to provide a performance where expressive details can be heard regardless of acoustic power, and this foregrounding of detail gives the listener a sense of proximity to the performance.

Albertine Zehme, the actress/ singer who premiered *Pierrot Lunaire* in the early 20th century, describes the vocal aesthetic she is striving for, and calls it "freedom of tone (not) fixed in its ascetic bondage":

> The singing voice, bound in otherworld chastity, fixed in its ascetic bondage –is not suitable for intense emotional outbursts… I want to restore the ear to its position in life. Meaning should be conveyed not only by the words we speak; the sounds should also participate in relating the inner experience. To make that possible, we must have unrestricted freedom of tone (Tonfreihe). Emotional expression should not be denied any of the thousands of oscillations. I demand not freethinking, but freedom of tone. [281]

Although amplification was not used in these early performances, this quote reveals that the search for a singing language unhindered by tradition, but bound to expression and connection

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[281] Latham, Clara. "Listening to the talking cure: Sprechstimme, Hypnosis, and the Sonic Organization of Affect". In Biddle, Ian and Thompson, Marie. (Editors) *Sound, Music, Affect. Theorizing Sonic Experience.* Bloomsbury. New York. London. 2013.105.

with the listener, is not new. *Pierrot Lunaire* was a revolutionary song cycle in 1911, developing a hybrid language of the voice that was neither singing nor speech (Sprechstimme). It was intended to explore the "spirit of the poem…rather than their meanings."[282] Initial performances were not amplified,[283] and discussion of the early receptions of this piece in New York and Berlin focus on the controversy the new musical language precipitated. A recent performance of the piece by Patricia Kopatchinskaja featured the singer wearing a body mic and moving around the stage, lying down, moving in ways that would not have been possible without amplification.[284] Contemporary performances of this song cycle are commonly amplified to allow the broadest vocal freedom in relation to the acoustic power of the singing and the vocal expression. Amplification also facilitates greater freedom in the expressive and performative use of the body. The differences in expressive range between the early-unamplified performances of *Pierrot Lunaire* and contemporary amplified ones can only be imagined and constructed. It would be anticipated that, at the very least, there would have been differences in:

- Performing venue.
- Expressive language.
- Performativity of the body.
- Balance between members of the ensemble.
- Use of vocal micro textures.

A review of a recent performance in Washington noted the use of the microphone and the vocal expression it supported:

> Soprano Lucy Shelton, who made an excellent recording of the work 20 years ago, gave an authoritative, engaging, even fun rendition of the vocal part, entirely from memory and aided by a microphone. In Schoenberg's signature Sprechstimme, a rhythmically notated form of recitation, Shelton purred, pattered, hissed, hooted, screamed and growled her way through 21 symbolist poems by Albert Giraud with polished German diction, in a translation by Otto Erich Hartleben.[285]

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282 Ibid. 106.

283 Metzer, David. "The New York Reception of "Pierrot lunaire": The 1923 Premiere and Its Aftermath" In *The Musical Quarterly,* Vol. 78, No. 4 (Winter, 1994), 669-699: http://www.jstor.org/stable/742506. (Accessed 25/06/2019)

284 Kopatchinskaja, Patricia. "Pierrot Lunaire." YouTube Video, 2018. https://youtu.be/48WnNgrH57E (Accessed 5/06/2019)

285 Downey, Charles. "21st Century Consort's Pierrot Lunaire lacked only an audience". *The Washington's Post.* 26/02/2013. https://www.washingtonpost.com/lifestyle/style/21st-century-consorts-pierrot-lunaire-lacked-only-an-audience/2013/02/26/eec212d8-7e83-11e2-a671-0307392de8de_story.html?utm_term=.e25f169bc5e4 (Accessed 3/04/2019)

There is overlap between the ability of the microphone to enhance proximity and detail in a classical vocal performance and the microphone's ability to allow the exploration of vocal micro-textures. Proximity and detail will reveal aspects of vocal production inaudible without amplification, and thus not part of the unamplified classical singer's repertoire. These include the sounds of the breath, the mouth and the vocal process in general. The degree which these sounds are scored as the primary expressive language of a piece (such as in *Howling Girls)* or they are part of the side effects of the voice, the every-day extra vocal sounds of communication, will be dependent on the writing of the particular piece. The important issue that the ability of the microphone to give proximity and detail also allows the use of this expressive vocabulary.

This expanded expressive vocabulary facilitated by the microphone's ability to give proximity and detail (also described by some commentators as presence) includes vocal techniques facilitated by the microphone that diverge from practices broadly known as Bel Canto technique. These techniques are newer to classical singing, but less so to vernacular or popular singing styles. Permeability is emerging between vocal genres as a result of this interaction with sound technology. These techniques facilitate the perception of proximity and detail in a performance:

Vocal onset: the use of simultaneous onset, breathy or glottal onset become expressive choices. Example: *The Howling Girls*.

Balance between vowel and consonant: Consonant can be explored for expression. Vowel does not need to be elongated for acoustic energy. Example: "Brownie You Are Doing a Heck of a Job" from *Katrina Ballads*.[286]

Breath pressure: Breath does not need to do the work of amplifying the voice. Breath pressure can be varied without audibility being compromised. Examples: *I am Sitting in a Room* (Alvin Lucier)[287] and *Here is my Arm* (Morris Kliphuis).[288]

Register transitions: Differences in registers can be explored and uneven register transitions become expressive devices. Example: *Cesca's View* (Rinde Eckert)[289].

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[286] Hearne, Ted. "Brownie, You're Doing a Heck of a Job." YouTube Video, 12/02/2019. https://youtu.be/L_8IeYmFbvA (Accessed 10/06/2019).
[287] Lucier, Alvin. "I Am Sitting in a Room." YouTube Video, 24/06/2017. https://youtu.be/bhtO4DsSazc (Accessed 10/06/2019).
[288] Fischer, Nora. "Death Speaks." YouTube Video, 17/06/2017. https://youtu.be/yuUHj9KWrRM (Accessed 10/06/2019)
[289] NPR Music Tiny Desk Concert. "Roomful of Teeth." YouTube Video, 12/11/2014. https://www.youtube.com/watch?v=iKuFujJq6zU (Accessed 10/06/2019)

Tessitura: Singing in any part of the vocal range is possible without consideration of audibility: Example: "Penelope no. 1. The Stranger with the Face I Love". (Sarah Kirkland Snider)[290]

Accent: Vowels do not need to be optimally resonant and the singer's own accent (or any accent) can be used. Example: "Kanye West" from *Katrina Ballads*.[291]

Timbre: The concentration of upper harmonics necessary for unamplified classical singing becomes an aesthetic choice. Varying mixes between head and chest registers possible. Examples:" By and By" in *Partitas* (Caroline Shaw)[292] and "Pain Changes Everything"[293] (David Lang).

4.3.2 The Construction of the Ensemble

The microphone and sound playback system can also facilitate a musical ensemble that would not otherwise be possible. Amplification can facilitate musical ensemble between electronic and acoustic instruments, including voice. *Katrina Ballads* demonstrates this use of amplification to facilitate ensemble between electric guitars, drums and voice alongside acoustic instruments. Andree Greenwell's music theatre works combine voices of different genres and acoustic power and ensembles that include electronic and acoustic instruments. "Gothic"[294] is an example of one of Greenwell's works that features this combination of classical and vernacular vocal styles in ensemble and an instrumental ensemble including electronic and acoustic instruments including electric guitar, synthesizer and cello, harp, viola and violin.[295]

The features of amplification that can facilitate ensemble are referred to by Emmerson as blend, balance and projection. Emmerson describes amplification as providing the opportunity to blend timbres for a particular aesthetic. The capacity to facilitate ensemble between elements of varying acoustic power is referred to by Emmerson as balance. The foregrounding of low amplitude elements of the ensemble he refers to as projection.

[290] Snider, Sarah Kirkland. "Penelope No.1." YouTube Video, 29/04/2014. https://youtu.be/_jghbrNnGgk (Accessed 10/06/2019)

[291] Robinson, Isaiah. "Kanye West."

[292] Shaw, Caroline."By and By." YouTube Video, 15/08/2014. https://youtu.be/EyDvnUYB0sk (Accessed 10/06/2019.)

[293] Lang, David. "Pain Changes Everything."YouTube Video, 18/11/2013. https://youtu.be/8cgGP6xKpA0 (Accessed 10/06/2019.)

[294] Greenwell, Andree. "Gothic." *1/11/2015*. https://youtu.be/i9tej94f5fU loc. 2.51 (Accessed 10/06/2019).

[295] Greenwell, Andree." Listen to me.*"* Bandcamp, 2019.. https://andreegreenwell.bandcamp.com (Accessed 10/06/2019.)

Mulders argues that the function of the microphone in manipulating social distance between performance and audience are important signifiers of musical meaning.[296] Performances that deliberately engage with constructing the relationships between performers, audience, musical work and physical and social context move away from fixed idealized reproductions to ones that are fluid and interactive. Context and social meaning is changeable and the ways in which both audiences and performers respond to a performance event is a living, breathing, changeable relationship.

4.3.3 The Foregrounding of Vocal micro-textures.

Chapters 2 and 3 discuss the role of the microphone in facilitating an exploration of timbre. The microphone encourages an exploration of timbre that incorporates those aspects of vocal expression most often backgrounded or absent in classical singing. These expressions have been classified here as vocal micro-textures**.** This function coalesces with Emmerson's concept of projection. This refers to the foregrounding of low amplitude sounds through amplification. Colouration has some application here, as sound technology colours the sound source and can bring particular elements of a vocal performance into focus, including vocal micro-textures.

This subset of the microphone and playback system's ability to manipulate projection and colouration relates to the microphone's ability to act as an acoustic lens[297] The set of sounds that the microphone has the capacity to foreground is termed vocal micro-textures. They are the sounds that in classical vocal pedagogy are considered noise and signs of dysfunction: the sounds of the breath, the articulatory mechanism (lips, tongue, palate) and the process of the larynx. *Speechless*[298] and *Howling Girls*[299] are examples of the application of these extended vocal expressions emerging from the interaction of the classical voice and the microphone to contemporary operas.

The term vocal micro-textures refer to those elements of vocal expression excluded or backgrounded in classical vocal performances (with the exception of the often-marginalized area of extended vocal techniques.)[300] The microphone can foreground these human expressions and treat them as important expressive elements in singing. They are either inaudible or considered signs of vocal dysfunction in classical singing, but with the use of the microphone these human expressions become part of the singer's expressive palette. They

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[296] Mulder, Johannes. *Making Things Louder: Amplified Music and Multimodality.* 273.
[297] Emmerson, Simon. *Living presence* in *Living Electronic Music*.9.
[298] Hope, Cat. "Speechless."
[299] Carriageworks.The Howling Girls.
[300] Edgerton. *The 21st Century Voice.*

include the sounds of the vocal folds opening, closing and constricting, the sounds of the lips, the mouth and the palate, the sounds of inspiration and expiration, and other expressions often backgrounded in an unamplified performance such as stutters, giggles, hums and sighs. Below are the expressive techniques referred to as vocal micro textures and the case study examples that demonstrate their use:

- Constriction and release/choking and vocal fry/creak: Examples: *The Howling Girls*[301], *Breathe*[302] and *Were you a witness?*[303]

- Ingressive and Egressive breath (in-breath and outbreath) that can be pitched. Example: *Partitas* (Caroline Shaw)[304] and "Little Breath" (Meredith Monk)[305].

- Sounds of the Lips, Mouth and Tongue: *Vessell Suite* (Meredith Monk) (Tongue)[306] and "Brownie You're Doing a Heck of a Job*"* (Ted Hearne) (Lips and mouth)[307].

- Screams,howls,sobs,giggles etc.: *Stripsody* (Cathy Berberian) performed by Ensemble!Kebataola!.[308]

Slovenian company Ensemble!Kebataola! perform *Stripsody*[309] with headset microphones and demonstrate the ability of amplification to facilitate expanded vocal expressions and create opportunities to develop new performance paradigms for classical singing.

Pamela Z explores the nature of memory and its loss using her voice, electronics and projections in her live performance of "Memory Trace"[310]. She uses fragments of whispered and spoken words, hums and sighs in this piece. *The Howling Girls*[311] almost exclusively uses an expressive palette of non-verbal expressions including screams, the sounds of the breath, choking and the processes of the larynx to explore the connection between trauma and loss of

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[301] Carriageworks. "Howling Girls."
[302] Herndon, Holly. "Breathe". YouTube Video, 13/12/2013. https://youtu.be/xC9XRpCOO6g (Accessed 10/06/2019).
[303] Galás, Diamanda. "Plague mass. Were you a witness." YouTube Video, 19/04/2011. https://youtu.be/RzTrDbs0n08(Accessed 10/06/2019).
[304] Shaw, Caroline, Roomful of Teeth. "Partita." YouTube Video, 9/03/2016 https://youtu.be/NDVMtnaB28E (Accessed 10/06/2019).
292. Meredith Monk. "Little Breath" From *Impermanence*. ECM. 2008. Audio Recording.
[306] Monk, Meredith and Vocal Ensemble. "Vessel Suite." YouTube Video, 1993. https://youtu.be/fXLHjBFW2j8 (Accessed 10/06/2019).
[307] Hearne, Ted. "Brownie You're doing a Heck of a Job". YouTube Video, 2011. https://youtu.be/L_8IeYmFbvA (Accessed 10/06/2019).
[308] Ensemble! Kebataola! "Stripsody." YouTube Video, 26/10/2009. https://youtu.be/KuUraJKl4jM (Accessed 10/06/2019.
[309] Ibid.
[310] Z, Pamela. "Memory Trace". YouTube Video, 27/03/2012. https://youtu.be/V1ZSMlMk6eQ Accessed 10/06/2019.
[311] Carriageworks. "Howling Girls". YouTube Video, 2018. https://youtu.be/kmF_QZICGDI

voice. The compositions "Sybil Song"[312] (Meredith Monk) and "Badagada" (Pamela Z)[313] use the microphone to give prominence to the sound of consonants formed by the lips and tongue.

4.3.4 The Relationship with the Performing Space.

The nature of the musical ensemble, the spatial relationships between the ensemble, the nature of the performing space and the performativity of the body in relation to all these musical and performance elements are transformed by the use of the microphone and playback system. Sound mixing facilitates the incorporation of electronic instruments into musical ensembles of any level of acoustic power. The spatial relationships between the parts of the musical become malleable for their performative functions once amplified.

Emmerson's concepts of spatialization and perspective apply to the construction of the relationship between the performance elements and the performing space. Projection (and Spatialization) refers to the capacity of amplification to facilitate the foregrounding of low amplitude sounds. This allows elements of an ensemble such as electronic instruments to be in musical ensemble with ensemble elements that would be acoustically overpowered in an unamplified setting. Spatialization refers to the "acousmatic dislocation of sounds.*"[314] The performer is able to "conjure up a soundscape that ...(is possibly not) related to the instrumental gesture as seen can be powerful in its ambiguity."[315] Perspective is referred to by Emmerson as "the possibility of playing perspectives and…changing the normal relations of objects."[316] Elements of an ensemble can be in any spatial relationship and the mixing of the sound will facilitate a musical ensemble. This can have both sonic and theatrical implications.

Ensembles not possible without sound technology mediation are made possible because of the use of sound technology. The new possibilities sound technology mediation facilitates include:

- Electronic Instruments: Electronic instruments can be part of the musical ensemble as ensemble can be constructed through mixing. Example: "Kanye West" in *Katrina Ballads*[317]and *Josephine Baker: A Portrait.*[318].

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[312] Monk, Meredith and Vocal ensemble*:* "Vessel Suite" YouTube Video, 1993. https://youtu.be/fXLHjBFW2j8 Accessed 10/06/2019.

[313] Z, Pamela. "Quatre Couches/Badagada. YouTube Video, 16/02/2018. https://youtu.be/9_d6UFZZ8ck (Accessed 10/06/2019.)

[314] Emmerson, Simon. *Living presence* in *Living Electronic Music.*129.

[315] Ibid.

[316] Ibid.30.

[317] Hearne, Ted. "Kanye West." YouTube Video, 2011. https://youtu.be/QMLIRJXnYjA (Accessed 10/06/2019).

[318] Ojai Music Festival 2016. "Josephine Baker: A Portrait". YouTube Video, 2016. https://youtu.be/QDhq860pTuA (Accessed 10/06/2019.)

- Spatial Relationship between Ensemble: Elements of the ensemble do not need to be audible to each other acoustically. Relationship can be constructed. Example: *Invisible Cities*.[319]

- Performativity of the body: The acoustic power of the voice and its dependence on breath pressure is no longer a precondition to being heard. The body is freed to be a more expressive element of the performance. (Body expressivity is not confined to movement, which is restricted by the kind of microphone used. A microphone on a stand introduces more constraints than a radio mic or a handheld one. However, the prescribed methods of breath use necessary for unamplified classical singing are modified or not present when sound technology mediation is present. This can allow the singer greater freedom over the expressive use of the body, including the necessity to face the audience). Example: *La Passione de Simone*.[320]

- Singers performing in vocal styles with radically different acoustic power are able to sing in ensemble as the performance sound aesthetic can be constructed through the use of sound technology. Both works by Andrée Greenwell, *Lacquiem* and *Gothic*, use classically trained singers singing in ensemble with her folk/contemporary style. Sarah Kirkland Snider's "Unremembered" also uses sound mixing to create ensemble between singing parts that arguably would not balance acoustically. Both vocal ensembles would, if not impossible, significantly less effective, without amplification.

Amplification allows for the foregrounding of elements of a musical ensemble of low acoustic power, therefore facilitating musical ensembles impossible without amplification and also constructs spatial relationships between ensemble members and the physical performing space that facilitate the "acousmatic dislocation of sounds."[321]

Invisible Cities is performed in a working railway station with the singers moving through the space. Without the use of headphones and sound technology, the piece could not exist. *Invisible Cities* demonstrates the possibility of sound technology to construct the musical ensemble and to conjure up a soundscape[322].

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[319] Artbound Special Episode. "Invisible Cities."
[320] Ojai Music Festival 2016. "Passion de Simone". YouTube Video, 23/06/2016. https://youtu.be/1auH7AtE7Fg (Accessed 10/06/2019).
[321] Emmerson, Simon. *Living presence* in *Living Electronic Music*. 129.
[322] Ibid.

The singer is freed to explore the performativity of the body in ways not possible unamplified, and the relationship with the musical ensemble can be constructed in any way that meets the performance objectives. *Invisible Cities*, *Josephine Baker: A Portrait* and *La Passione de Simone* are all discussed in Chapter 3 in relation to the performativity of the body that amplification facilitates.

4.3.5 The Relationship between Text and Singing

The microphone has the capacity to give a primacy to text that is not possible unamplified. Emmerson's concepts of colouration and projection intersect with the concept of proximity and detail in facilitating the capacity of the singer to use amplification to colour the text. The capacity of amplification to foreground low amplitude sounds gives the singer a much wider range of expression in relation to text than is afforded the unamplified singer. Freed from the necessity to configure the voice acoustically the singer is able to choose to what extent intelligibility of text is important and how best to express the text using an infinite range of expressive choice. This includes the incorporation of expressive techniques not generally used in classical singing because they would compromise the ability to be heard. They include: the use of vernacular vowels which may not be as resonant as the more open vowels preferred in a classical vocal technique, singing in a register close to the speaking voice that has less acoustic power, emphasis on the colour and texture of consonants which are mostly not audible unamplified, an emphasis on the text and the speech rhythms of text and generally using a lower acoustic power. The expressive choices in relation to the use of text alongside examples of their use are below:

- Vernacular vowel choice 'Kanye West' from *Katrina Ballads*.[323]

- Use of speech register: "Prologue" from *Katrina Ballads* [324]and Luciana Souza "Call" from *Oceana* (Oswaldo Golijov.)[325]

- Emphasis on consonant: "Last Song" by Meredith Monk.[326]

- Emphasis on speech rhythms and intelligibility of text: "Protection" from *Outlanders* composed and performed by Ted Hearne.[327]

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[323] Hearne. "Katrina Ballads"

[324] Marie, Rene. "Prologue from Katrina Ballads". YouTube Video, 20/12/2011. https://youtu.be/Ljqdpo2ABXs (Accessed 10/06/2019).

[325] Golijov, Oswaldo. "Oceana." *Deutsche Gramophone,* 1996. *https://www.deutschegrammophon.com/au/cat/4776426* (Accessed 21/05/2019)

[326] Monk, Meredith. "Last Song." YouTube Video, 29/09/2010. *https://youtu.be/Zu2--PbQFdc* (Accessed 10/06/2019).

[327] Hearne, Ted. "Protection." YouTube Video, 6/02/2016. https://youtu.be/G_0b0XoX6vo (Accessed 10/06/2019).

- Low acoustic power: Tore Augestad "Come again" (Dowland) arrangement with microphone[328] and Holly Herndon "An Exit" from *Platform*.[329]

The presence of some combination of the five aesthetic markers in amplified classical vocal performances is facilitated by the choice of appropriate technologies. The contextual review and the case studies demonstrate the emerging body of knowledge in relation to the amplified classical voice. This has not been a major focus of this work, but some acknowledgement of its importance in understanding this emerging practice, and the factors that come into play in developing a sound design for an amplified classical vocal performance follow.

4.4 Microphone Choice and Amplification of a Classical Vocal Performance

The sound design for any piece will involve the interaction between the choice of microphone(s), the mixing of the sound, the type of speakers and the interaction of all these three elements with the acoustic space.

Acoustic spaces are not neutral and have (through design or accident) particular sonic characteristics. The sound design will consider the interaction of the microphone, the mix and the positioning and features of the speakers to support the desired aesthetic of the performance.

Generally, a microphone that can respond to a wide frequency range and intensity of sound while being able to give detail and proximity is desirable for many classical vocal performances. Clarity of text can also be desirable or irrelevant. Compression of the dynamic highs and lows may be either desirable or undesirable.

Choosing a microphone for a particular kind of performance is part science and part aesthetic.[330] Commentators refer to the microphone as having a personality, reflecting the individuality of the response of the microphone to particular voices. [331] The nature of the sound the microphone transmits is dependent on the specific microphone, its distance from the sound source, the angle of pick up, the listening space and its acoustic properties and the

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[328] EnergiMolla. "Music for a While." YouTube Video, 17/09/2012. https://youtu.be/Df_HVi1-g8k (Accessed 3/03/2019)

[329] Herndon, Holly. "An Exit." YouTube Video, 21/05/2015.https://youtu.be/gNOhCc7fYxI (Accessed 10/06/2019).

[330] Corbett, Ian. *Mic it!* 144.

[331] See, for instance, this blog by prominent contemporary voice teacher, Jeannie Deva. Deva, Jeannie. "Finding the Right Mic.*" The Deva Method*. https://jeanniedeva.com/free-vocal-tips/right-microphone/ (Accessed 4/03/2019)

interrelationship with the microphone and the microphone's position in relation to any other sound source.

Close proximity to a microphone allows focus to be given to those features we may not hear in the room. The example Corbett [332]gives is in relation to a piano. Close proximity will allow the listener to hear the sound of the hammers on the string. A vocal analogy would be the sound of the vocal folds coming together and the sound of the breath coming in and going out, vocal micro-textures that have traditionally been excluded from the classical vocal lexicon. If warmth and depth and a sound that is back in the mix are desired, a positioning further away will achieve this result and in addition the sounds of the room would be incorporated in the mix.

A strong determinant of microphone choice is the vocal aesthetic desired by a particular singer and this is malleable depending on the interaction of voice, the repertoire, the ensemble and the performing space. Below is a range of aesthetic choices and some of the implications for the sound technology used determined by the analysis of the case studies: [333]

- *High frequencies, brightness of the voice*: Condenser microphones are preferred for a sound source with essential high frequencies, making it a preferable choice for a classical vocal performance incorporating this feature. All microphones become more directional at higher frequencies, so microphone position becomes more important at higher frequencies. Corbett recommends experimentation as the key factor in success and the ability to listen.[334] The incorporation of high frequencies can be an aesthetic choice with a microphone. A closer proximity of the singer to the microphone will produce a brighter sound with the most in your face sound.[335]

- **Low frequencies, warmth of the voice:** A large diaphragm condenser microphone is most responsive to these vocal qualities.

- **Detailed production: sounds of the breath, vocal processes:** Condenser microphones are preferred where detail of the voice needs to be captured. Ribbon microphones are increasingly used to capture intimate and intricate details in live performance.[336]

- **Sounds of the room incorporated in the sound:** A ribbon mic or a large diaphragm microphone is useful for capturing the "ambience" of the room. Omnidirectional

[332] Corbett, Ian. *Mic it!* 144-145.
[333] Ibid.
[334] Corbett, Ian. *Mic it!* 148-149.
[335] Ibid.
[336] Evans, Bill. *Live Sound Fundamentals. Course Technology.* (Boston, USA: Cengage Learning, 2011.) 12.

microphones can allow an integration of the sound of the voice in the acoustic space with the vocal mix. This can be perceived as a more open and transparent sound. Microphone position is a key element: "The closer a mic is to a sound source, the greater the ratio of direct to reflected sound". A greater distance from the sound source will incorporate more room sound.[337]

- **Dynamic highs and lows:** Condenser microphones are preferred for quiet sounds and for dealing with a wide dynamic range.

- **Audible lyrics:** Large diaphragm condenser mics are being used by rap artists because of their ability to capture the detail of lyrics and respond to a large dynamic range.[338] Proximity and the use of cardioid microphones also enhance clarity and diction.

- **Exclusion of the ambient sound of the space from the vocal mix:** Cardioid microphones are most sensitive to sound arriving at 90 degrees. Closer proximity of the singer to the microphone will give less of the sound radiation in the room.

- **Warmth and fullness/clarity and diction:** The closer the proximity of the singer to the microphone: the more clarity and diction. The further from the microphone: the more warmth and sound of the room. Large diaphragm microphones are preferred because of their warmth and detailed sound.[339]

The function of microphone choice in helping to shape the performance aesthetic is demonstrated above. An effective amplified classical performance requires a consideration of a series of technical factors that interact as a system to achieve a particular performance aesthetic. All technical decisions have aesthetic, theatrical and cultural implications. The framework developed in this chapter, which included the five features of amplification developed in this work correlated with the seven functions of amplification identified by Emmerson, is used to develop considerations for designing a microphone and playback system for a classical vocal practice.

4.5 Considerations for a Classical Vocal performance

The development of a sound design that has clear and achievable aesthetic objectives for the performance(s) is an important precondition to designing sound. Considerations for developing a sound design for a classical vocal performance are outlined next. The sound design will

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[337] Corbett, Ian. *Mic it!* 149.
[338] Techsounded. "Best Microphones for Recording Rap." *Techsounded*, 2/01/2019.
https://www.techsounded.com/best-microphones-for-recording-rap-vocals/ Accessed 28/02/2019)
[339] Corbett, Ian. *Mic it!* 178.

include the musical work, the construction of the musical ensemble in the space and the interaction of the work and its performance with the space and the application of sound technology. The considerations in the sound design will include:

- The features of the voice that are foregrounded in relation to the musical ensemble. This foregrounding and backgrounding of voice and other elements of the musical ensemble will have a part in constructing the social distance (the perception by the listener of the implied relationship between the performance and the listener).

- The microphone choice: hand-held, radio mic, headpiece etc.

- The choice of speakers and their placement in relation to the audience and the space.

- The technology used to allow the members of the ensemble to hear each other in real time: in ear monitoring, on stage wedges and side fills and head-phones for example.[340]This will include a consideration of the relationship between the physical configuration of the members of the ensemble and the most efficient strategy for the performers to work in a musical ensemble.

- The nature of the sound mix that each performer receives.

- The mixing of the ensemble to incorporate elements of low acoustic power.

- Recognition of the acoustic properties of the performance space and the ways in which the elements of the performance interact with these.

- The technology used to transmit the performance to the audience, and the way the sound mix incorporates live, electronic and pre-recorded sound.

It needs to be recognised that there are unsuccessful amplified classical performances alongside successful unamplified ones and the reverse. Below are a range of evaluation criteria for the impact of the use of the microphone and playback technology with a classical vocal practice.

4.6 Three types of Impact of Amplification on the Performance
Amplification of any performance can have a deleterious impact on the performance, a negligible one or an effective one that met the aesthetic and other objectives of the performance. Below are three impacts as a result of amplification on the classical vocal performance:

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[340] Sound on Sound. "On Stage Monitoring". *Sound on Sound.* March 2004.
https://www.soundonsound.com/techniques/stage-monitoring (Accessed 18/05/2019)

1) No change other than increased volume. The same features of the voice are heard amplified and unamplified. Amplification did not facilitate any new expressive elements in the vocal approach.

2) The performance enabled new vocal techniques to be heard and/or the construction of different ensemble relationships that enhanced the performance aesthetic.

3) The amplification radically changed the performance to produce unintended effects on the performance aesthetic.

Once it has been considered that amplification enhanced the performance aesthetic, the next step is to consider the aspects of the performance aesthetic amplification enhanced.

The five aesthetic markers are applied to the three states to identify the aspects of the performance that were enhanced by amplification. If there is no change to the performance other than being louder, the five aesthetic markers would all indicate no impact. Therefore, the more the five markers come into play, the more impact the microphone will have on the vocal performance.

Having identified which of the five markers applied to the performance, consideration of whether different choices in technology would have been more effective would be an important evaluation element. Every element of the sound design has an active part in determining the performance aesthetic. For the sound design to be effective the choices of technology in the component parts of the sound system should provide a stronger correlation between what was intended and what happened in performance.

4.7 Demonstration of framework: *Kanye West* in *Katrina Ballads*
The evaluation elements from section 4.5 are applied to the performance of 'Kanye West' in *Katrina Ballads* to investigate the impact of amplification in this work. This music theatre work was discussed in Chapter 4: Case Studies.

4.7.1 The Impact of Amplification on the Performance.
Amplification of this performance enabled vocal techniques to be heard that would not be present unamplified. The following aesthetic markers are involved:

Aesthetic Markers 1 and 3: the enhancement of proximity and detail and the foregrounding of vocal micro textures respectively.

Aesthetic Marker 2: the construction of the musical ensemble and the construction of different ensemble relationships enhance the performance aesthetic.

Aesthetic Marker 4: the construction of the relationship with the performing space and the relationship between the elements of the musical ensemble and the performance space were facilitated by amplification.

Aesthetic Marker 5: the construction of the relationship between text and singing
The vocal techniques and style used in this performance are appropriate for the verbatim documentary style of this song within this song cycle. This emphasis on text and on a gospel style delivery in the last third of the song, and the dominance of what would be described as belted high intensity singing would not be possible without amplification, and enhanced the connection between the text, meaning and the vocal expression.

4.7.2 Aspects of the Vocal Performance Changed by the Sound Technology.
The vocal expressive choices singing made by Isaiah Robinson in "Kanye West" would not be possible in this performance space with this instrumentation without amplification. The vocal performance shares elements of an unamplified classical performance (legato, even vocal timbre across vocal registers, a vocal timbre that would be described as chiaroscuro in the first two thirds of the song) but amplification facilitated the use of a range of vocal techniques not possible in unamplified singing. Some examples include: the use of an accent that did not need to be modified to consider the acoustic qualities of the vowel and the use of chest dominant singing and the incorporation of a gospel vocal style (aesthetic marker 1 & 5: the enhancement of proximity and detail; and the construction of the relationship between text and singing).

The voice would not have able to be heard over musical ensemble without amplification. The performance took place in an amplified performance space designed to flexibly deal with a range of musical genres.[341] The ensemble for the piece comprises 5 singers (SATTB), 11 instruments (flute, clarinet, trumpet, horn, violin, viola, cello, electric guitar, electric bass guitar, piano, drums/percussion). Unamplified voices are not part of ensembles with electronic

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[341] Eigenmann, Jay. "Le Poisson Rouge Reimagines the Possibilities of a Sound System with Martin Audio." *The Martin Audio Experience*. 26/03/2018. https://martin-audio.com/news/press-release/le-poisson-rouge-reimagines-the-possibilities-of-a-sound-system-with-martin-audio (Accessed 5/06/2019.)

instruments. In this piece the voice(s) would not be audible unamplified. The performance venue is designed for amplified performances. (Aesthetic markers 2 and 4: the construction of the musical ensemble and the construction of the relationship with the performing space.)

4.7.3 The Performance Aesthetic and Evaluation of Amplification

The performing venue (Le Poisson Rouge) is a seven hundred seat venue with bar which had a sound re-fit in 2018 to optimize its ability to produce good sound for a wide range of musical styles. The approach of having an integrated sound system for the venue is increasingly commonplace in performing venues catering to classical music (and voice).

> LPR (Le Poisson Rouge) does everything from spoken word or solo piano recitals all the way up to death metal, EDM and everything in between. Basically, anything you can imagine we've probably had and we wanted our in the round PA to be able to handle the same breadth and scope as our main PA.[342]

Katrina Ballads has elements of rock, gospel, classical art music and spoken word, so the venue catered well for the particular sonic demands of this piece:

> As musician-founders we know there is no more important thing to an artist and an audience than the sound of a performance...I was struck by the warmth and natural breadth of the Martin sound signature. The system we chose gives us the audio versatility to match our eclectic programming, the integration we were looking for, and of course a sonic result that we feel is second to none in our space.[343]

This chapter introduces five aesthetic markers and three impact states to conceptualize the ways in which a classical vocal practice incorporating the microphone and sound technology can diverge from an unamplified classical vocal practice.

Examples of the application of the five aesthetic markers to a range of amplified vocal performances have been examined here. These examples of amplified classical vocal performances uncover the ways in which an amplified classical vocal performance diverges from a non-amplified one. The more difficult judgement is to determine what impact the amplification of the classical vocal performance had overall, and whether this use of technology can be judged to be successful or otherwise. There will be areas of disagreement in this judgement among commentators, as the amplification of the classical voice associated has social, political and cultural implications. Chapters 1 and 2 outlined these areas of debate.

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[342] Ibid.
[343] Ibid.

One fundamental area of debate surrounds whether a classical voice can still be considered a classical voice if it is amplified. Some of the commentators discussed in the previous chapters believe the unamplified nature of the classical voice to be a defining characteristic, alongside a particular vocal aesthetic associated with the bel canto style. If amplification is acceptable to compensate for a poor acoustic environment (which many commentators accept) at what point in the application of sound technology to a classical voice can it no longer be called a classical voice? The progress of this investigation has demonstrated that there is a pervasive and varied practice involving the amplified classical voice that has fragmented the fragile consensus on the nature of the classical voice and created crossings and permeations between other vocal styles. Amplification has changed the way classical singers sing, what they sing, the nature of the musical ensemble and where they perform. There are areas of what has historically been considered a classical vocal practice that have remained static, but they are shrinking before our eyes.

This framework builds on the rich and varied practice growing from the use of sound technology mediation in relation to the classical voice in performance. The framework demonstrates that such mediation gives the capacity to reconfigure the how, what, where and with whom of such performances. The range of vocal expression available to the classical voice through sound technology mediation is expanded, the nature of the musical ensemble is reconstructed and the performing contexts are dramatically expanded and seemingingly infinite. Intersections with other performing art forms are facilitated by this practice. Theatre makers, composers and performers are emboldened by this greater expressive freedom to create works that represent points of view not often seen in classical musical works in the contemporary context. Sound technology mediation is facilitating the composer's and/or theatre maker's points of view to be expressed in ways impossible unamplified. Powerful new works are emerging that speak to different audiences as a result.

Practitioners can use this framework as a way of analysing and understanding the breadth of this practice up to the point of writing, and to apply the concepts and practices that appeal to them in their own practice. There is no doubt new permutations of this practice will emerge to challenge, enrich and transform this framework. It is as yet early days in this practice and there is much room for new voices and ideas.

Chapter 5 presents a case study on Philip Glass's *Songs from Liquid Days*. It applies the

analytical and evaluative frameworks to the performance.

Chapter 5 : Creative Work 1: Performances of *Songs From Liquid Days.*

In this chapter the background to Philip Glass's approach to amplification and his musical aesthetic are discussed. The performances of two songs from *Songs from Liquid Days* are analysed using the evaluation measures introduced in Chapter 4. Initially the two songs are examined to determine which aesthetic markers applied to the performance. Section 5.4 evaluates whether amplification introduced a positive and significant change to the performance and Section 5.4 determines which of the five aesthetic markers applied to this positive and significant change overall.

Emmerson's[344] identification of seven functions of amplification[345]: balance, blend, projection, spatialization, perspective, colouration and resonance-feedback are used in conjunction with the five identified aesthetic markers in this paper.[346] These aesthetic markers are applied more specifically to the amplified classical vocal practices of the two Glass works from *Songs from Liquid Days*, with corresponding examples from the contextual review.

The two songs are:
Song 1. *Changing Opinion* (Text by Paul Simon) duration: 9.50
<https://soundcloud.com/karen-cummings-441735240/changing-opinion-songs-from>

Song 3. *Freezing* (Text by Suzanne Vega) duration: 4.00
<https://soundcloud.com/karen-cummings-441735240/freezing-from-songs-from>

The performance aesthetic is evaluated according to the three impacts discussed in Chapter 4.

5.1 Background to *Songs from Liquid Days*

Philip Glass composed this work in 1986. *Songs from Liquid Days* is his sole song cycle. Glass used four prominent songwriters of that time to write lyrics: Paul Simon, Suzanne Vega, David Byrne and Laurie Anderson. It has rarely been performed live and the one available recording features predominantly contemporary popular singers who were chosen by Glass. Reviews of the recording were ambivalent:

> Mr. Glass subverts the narrative implications of a lyric by setting them in short, arbitrary bursts that ignore the dynamics and inflections of colloquial speech.[347]

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[344] Emmerson, Simon. *Living Electronic Music*. 124-134
[345] Emmerson groups Balance and Blend together but in the application to classical voice they have been treated as two independent but related factors.
[346] Emmerson, Simon. *Living Electronic Music.* 124-134
[347] Holden, Stephen. "Phillip Glass Turns to the Song." *New York Times*, 20/04/1986.
https://www.nytimes.com/1986/04/20/arts/philip-glass-turns-to-the-song.html

The NY Times Review described the vocal style as having an oratorio-like style similar to the singing in Glass' operas. The seamlessness of tone is given privileged status over what would be considered appropriate expressivity of text and use of speech rhythms in traditional song cycles. The prescribed rhythmic and pitch precision in the score preclude the rhythmic and melodic variation that is a feature of most popular singers. Consequently, the composition and the performances on the recording of *Songs From Liquid Days* often sound at odds with the vocal delivery. One example of this uneasy relationship is the performance of Linda Ronstadt in "Freezing". Ronstadt is a popular singer of the early 1970s and 1980s whose repertoire traversed jazz, country, folk, popular song, Spanish song and operetta. She was known for the expressivity and musicality of her singing, but in this performance sounds constrained and stilted. The NY Times reviewer finds the song cycle "minor Glass" and Linda Ronstadt's singing unconvincing.[348]

5.2 Amplification and *Songs From Liquid Days*

For his doctoral dissertation, Jonathon Michael Ray attempted to resurrect this song cycle and encourage its performance by classical singers.[349] Although this dissertation is a thorough and exhaustive overview of the score and the recording, it does not deal with the question of amplification and the impact it has on the style and technique of the singing of the works. Amplification is a central aesthetic component of the works of Philip Glass, and is a key element in the performance of this song cycle that incorporates both live instruments and an electronic track. This makes amplification of the voice essential. If acoustic instruments are used, as has been in the performances analysed here, amplification is an essential component of the performance aesthetic. The nature of this aesthetic is discussed later in this chapter.

The aesthetic of the Phillip Glass ensemble's approach to amplified sound was strongly influenced by Kurt Munkacsi,[350] who is a core member of the ensemble. He was responsible for developing most of the sound design in the performances of Glass' early works, which took place in art galleries and small spaces. The incorporation of electronic instruments and the need to project the whole ensemble made amplification an essential element of the performance aesthetic. In addition, there was the need to deal with the idiosyncrasies of the acoustics of the

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[348] Ibid.3.
[349] Ray, Jonathon, "Michael. Songs from Liquid Days by Phillip Glass: A Performer's Guide." LSU Diss. Louisiana State University. 2017. https://digitalcommons.lsu.edu/gradschool_dissertations/4261/ (Accessed 3/06/2019)
[350] Philip Glass Centre for the Arts, Science, and the Environment. "The Philip Glass Ensemble". 2019. http://philipglasscenter.org/festival/artist_bios/philip_glass_ensemble/

performing spaces.[351] Glass developed live mixing of the sound of his musical ensemble in these early performances and this became an essential component of his performance aesthetic. In the performing edition of Glass' early works amplification is considered integral, as is the accurate and consistent playing within the acoustics of the performing space.[352]

Amplification was an integral part of much of Glass' early work, particularly in works that included electronic instruments. Glass was concerned with the concept of presence and the relationship of the performance to the performing space, the performers and the audience. Chapman refers to Wurlitzer's discussion of the concept of presence in Glass' music and its ambiguities:

> The music is "presented", the performance takes place in the "present", the experience is that of encountering "presence." The non-narrative time implied by the music, which engages neither memory not anticipation, makes no attempt to go anywhere, and undermines both past and present, leaving only the present moment of hearing as the focus of attention".[353]

Glass's work is considered by Chapman as very connected with the spatial, making the investigation of the connection between *Songs from Liquid Days* and Grosvenor Place sympathetic to the aesthetics of both the musical work and the interaction with the performance space.

Glass commented on his use of sound technology:

> In the world of concert music, I am the maverick who has adopted the technology of the rest of the music world and used it in the creation of operas, ballets and symphonies…In the world of film music or the different kinds of commercial music — and there are lots of different kinds of it — people are working directly in the studio.[354]

Glass approaches the voice in much the same way as he writes for instruments: his emphasis is on creating vocal lines with a sustained dynamic and minimal inflection:

> The thing about vocal music is that it's pouring the sound right out of the body and because of the way I deal with it orchestrally, in the way I score, arrange the parts, I produce the kinds of sounds that are very close to the sounds I get out of amplified

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[351] Potter. Keith. *Philip Glass: First Classics 1968-1969*. (London: Chester Music, 2018.) 5.
[352] Ibid.
[353] Chapman, David Allen. "Collaboration, Presence, and Community: The Philip Glass Ensemble in Downtown New York," 1966-1976. PhD Diss. Washington University in St Louis, 2013. https://openscholarship.wustl.edu/cgi/viewcontent.cgi?article=2098&context=etd (Accessed 6/06/2019).
[354] Reesman, Bryan. *Philip Glass.* Mix Music Production. 15/11/2017. https://www.mixonline.com/recording/philip-glass-365220 (Accessed 14/06/2019)

instruments.[355]

Munkacsi became a key collaborator with Glass in developing the role of amplification in the performance aesthetic. Amplification was used to enhance presence and bringing the proximity of the aural experience closer to the audience.[356] His role in the ensemble became so central that Munkacsi sat on the stage with the ensemble:

> He came to play a crucial role in shaping the specific ways that space, psychoacoustics, and "presence" found expression in Glass' music.[357]

Glass' concern with presence in live performance led him to investigate and engage with the specific qualities of each performance space[358]and its interaction with all the elements of the performance. He experimented with the placement of speakers and their relationship to the audience and the performers, aiming to immerse audience and performers alike in the sound. Munkacsi used what he termed 'ultra-present" mixing techniques to reinforce these placement effects. He boosted the upper harmonics to compensate for the deterioration of sound over distance.[359] High-capacity sound equipment was used that could deal with loudness in pursuit of quality of sound as well as presence, without distortion.[360]

The use of amplification in performance by Glass was initially met with some hostility but is now accepted as a key component in his compositional and performance aesthetic. However, depending on the interaction between the performing space and its acoustic properties, the interaction of the other elements with the voices and the performance aesthetic, Glass did not always amplify voices. A purely acoustic performance of *Songs from Liquid Days* was experimented with in Grosvenor Place, and found to be possible because of the qualities of the performing space. There was a clear differentiation between the voice and piano. The space enhanced the upper harmonics of the voice creating an all-enveloping sound that had balance, projection and spatialization. These elements were enhanced with the presence of amplification, as was the theatricality of the interaction between the performers and the space:

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[355] Chapman, David Allen. *Collaboration, Presence, and Community.* 86.
[356] Ibid,. 88
[357] Ibid.
[358] Ibid.
[359] Ibid. 89.
[360] Ibid. 90.

I feel the music, as a performance, activated a social space. As such, the building became responsive to people and performances. The operatic performance was well suited to the scale of the foyer, and in many ways tied all the artworks together.[361]

5.3 Grosvenor Place Performance of *Songs From Liquid Days*

Songs of Liquid Days was performed using one amplified voice and an amplified grand piano. Two Bose Speaker Systems were used as amplification into the space and functioned as foldback for the performers. The construction of the performance and the amplification and placement of the performers explored the use of the space and its relationship to the audience. Harry Seidler, the architect of the performing venue, promoted the synthesis of art, the imagination, technology and construction. The performance of this work by Glass in this particular acoustic space was in sympathy with the philosophies of both Seidler and Glass. One audience member commented:

> The music is structured through repetitive blocks or modules, producing a playful monumentality via small shifts between blocks… (This structure) provides and aesthetic resemblance to the geometries and patterns Harry Seidler chose for Grosvenor Place.[362]

Grosvenor Place is a large office building in the financial district of Sydney that makes use of soaring spaces and hard marble surfaces, in many ways similar to a grand concert hall:

> The architecture allowed for the performance to take place…Acoustically, visually, aesthetically, socially, it also created part of the performance. (Audience member)[363]

The programming of this piece in the public foyer of a commercial office block at night transformed the public perception of the nature of this space and its atmosphere. Two audience members gave the following responses to the performance:

> This Bauhaus inspired happening provides an immersive moment in which a heightened spatial awareness provokes the forging of new relationships between the immediate environment, performance and the socio cultural and historical contexts of site and space.[364]

Balance between the voice and piano was facilitated by sound mixing in the space, but also in ensemble rehearsals that were done acoustically. Traditional chamber music skills were enhanced by the interaction with sound technology.

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[361] Perren, Claudia and Lovett, Sarah Breen. *Expanded Architecture. Temporal Spatial Practices.* (Baunach, Germany: Bauhaus Dessau Foundation, 2016.)120.
[362] Ibid.
[363] Ibid.
[364] Ibid.

The choice to sing the piece in a predominantly classical soprano tessitura created socio-political associations of "high art". The physical space gave the voice and the piano a similar acoustic to that of a concert hall. The height and scale of the building reinforced this atmosphere. This was subverted to a certain extent by the separation of the performers who were amplified and could not see each other or hear the ensemble acoustically. Other performances took place in the space concurrently and the audience was free to walk or sit anywhere in relation to the performers.

This approach to amplification was in sympathy with Glass' approach. David Chapman describes Glass' performance aesthetic:

> The metaphor of the river speaks once again to the sense of immersion— the experience of ultimate immediacy and proximity, of "here-and-now," of "presence"— afforded by high-volume amplification and facilitated by the ensemble's in-the-round concertizing.[365]

The movement between vocal tessituras where high, sustained phrases were alternated with phrases in much less resonant parts of the voice necessitated the balance in presence given by the microphone and playback system. The musical aesthetic of the piece was non-narrative and the atmosphere created by the performance was a dialogue between the physical space, its acoustic and visual characteristics, and the composition. No word or part of the score required greater presence than another. Acoustically this was impossible to achieve. The exploration of psychoacoustics created by the interaction of the piece, the performers, the listeners and the space was enhanced by the use of sound technology. The performers were physically separated by different levels in the space and could not hear each other acoustically. Sound technology operated as a real time feedback device facilitating the musical ensemble in this context.

5.3.1: The Sound Technology Used

Speaker System
The speaker system used was a Bose L1 Model IS system with B1 bass speaker system. This system is specifically designed for acoustic instruments and was chosen because of its suitability for smaller venues and audience sizes. It dramatically reduces the effects of the room and has a consistent tonal balance regardless of how far the audience member is seated from the speaker. It is also easily transportable.

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[365] Chapman, David Allen. *Collaboration, Presence, and Community.* 92.

The system is designed for audiences up to 300 and provides a 180-degree sound coverage, with no reverberation issues. It constructs a sound with a consistent tonal balance and little volume drop-off over distance. The tone-match mixer allowed microphones and instruments to be connected and sound mixing. Mixing settings could be stored individually for each piece. In summary, this system constructs a sound where the quality of the sound is consistent regardless of where the listener is in relation to the performance, and where distortion due to the interaction with the room acoustics is minimal.

Schoeps V4U Vocal Condenser Microphone

This microphone interacted well with the wide pitch and volume range used in *Songs from Liquid Days*. It was also useful for the static nature of the performance (the microphone was on a stand). The V4U is a condenser (capacitor) microphone giving more expressive detail to the vocals. It has a figure 8 pattern and side address, it picks up well across the vocal range, and in particular responds well to high frequencies. As discussed previously, Munkacsi used what he termed "ultra-present" mixing techniques in his work with Philip Glass to boost the upper harmonics to compensate for the deterioration of sound over distance.[366] The Schoeps V4U has a very high maximum sound pressure level so responds well to high and low volumes. It thus functioned well for the wide pitch and dynamic range of these works, including the prominent sustained high singing.

5.4 Analysis of the Performance Using the Five Aesthetic markers:

The performances in Grosvenor Place are analyzed according to the five aesthetic markers to determine the aesthetic impact of amplification.

5.4.1 Aesthetic Marker 1: The Microphone and Proximity and Detail

The audience was moving in and around the performers. The use and placement of the speakers resulted in a sound that was largely uniform in the space; consequently the audience was able to hear the detail and balance of the sound regardless of where they moved in the space.[367] This was reinforced by the use of a microphone that boosted the upper harmonics, helping to maintain uniformity of sound over distance. As previously mentioned, this is the practice of Munkacsi, the sound engineer in the *Philip Glass Ensemble*. The upper harmonics are more directional and reach the audience without necessarily interacting with the room acoustics

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[366] Chapman. *Collaboration, Presence, and Community* 89.
[367] As discussed later, three performances including a rehearsal in the space had different mixing. The first two were successful, the third unsuccessful in terms of the intended musical and vocal aesthetics.

(which lead to unintended reverberations and distortions of the original sound).[368] The microphone and sound playback system are designed to interact less with the acoustics of the performance venue and consequently have more fidelity of sound over distance.

Projection between the singing in the higher register (C5 to A5) and the singing in the middle and lower register B3 to B4 were equally present and was facilitated by the microphone and playback system. This allowed the detail of the sound to be heard regardless of the vocal pitch and its acoustic properties.

Sustained singing above the stave (F5 and above) is a feature of both songs. This vocal line was often sustained for 6 bars at a moderate tempo. This required singing with consistency of vowel, resonance and dynamic, and as little of the room acoustic as possible. The lesser breath pressure needed for amplified singing made this sustained high singing with these features easier. The use of a microphone that gave 'lift' to the high register also assisted the technical ease of the sing. It could be argued that this style of writing in Glass' vocal works generally presupposes amplification. This sustained, high tessitura writing for the voice is also a feature of Glass' operas, which are always amplified.

In rehearsal the event organizers moved around the space and reported that the amplified sound had balance in the ensemble and presence and detail in the space. (Reported from various positions in the performance venue)

5.3.2 Aesthetic Marker 2: Amplification and the Ensemble
The aesthetic of this work, and Glass's writing in general aims at a consistent dynamic relationship between the vocal and the piano (or other instrumentation) parts. This would have been impossible without amplification. The vocal line featured sustained high singing that had potentially high levels of projection, and also singing that featured parts of the voice with less presence when unamplified. Balance and blend between the piano and the voice was enhanced by the amplification. Amplification facilitated the balancing between the different levels of presence in the vocal registers when unamplified

The ensemble between the piano part and the vocal part was facilitated by amplification. The piano part was constant in dynamic whereas the vocal line unamplified would have had large peaks and troughs in presence and audibility without amplification.

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[368] Chapman. *Collaboration, Presence, and Community*. 89.

If the two performers had been physically near to each other, the space was conducive to an acoustic performance, but not one that achieved Glass' or the performers' aesthetic objectives. The performers were physically separated in the space and couldn't hear each other acoustically. The speakers were used as foldback and performers could hear each other in real time, facilitating musical ensemble.

The event organisers, including an acoustic engineer, sat in on rehearsal and were very satisfied with the performance. Once the sound engineer changed the mix in performance, the performance aesthetic was lost. The sound engineer changed the mixing settings to construct an ensemble dominated by a very high presence vocal line and an insignificant piano part. Ensemble balance was lost. This was despite clear instructions to the engineer and a detailed map of the required settings for the mix related to the performance aesthetic.

Many listeners commented on the "operatic" singing that had never been the desired vocal aesthetic. [369]The issue with the performance aesthetic was not with the technology, but rather with the humans operating it. This experience revealed the importance of either having a relationship with a dedicated sound engineer as pop artists do (e.g. PJ Harvey and Philip Glass) or managing the technology as an ensemble. Detailed knowledge and experimentation would be necessary to take this path, but an easily achievable goal for performers wanting to incorporate sound technology.

5.3.3 Aesthetic Marker 4: Interaction with the Performing Space
The performers were physically separate and unable to hear each other acoustically in real time. Ensemble was possible with the use of sound technology.

The theatricality of the placement of the performers and their relationship to the space was impossible without amplification. The amplification system constructed the musical ensemble in this performance. The headphone opera *Invisible Cities*[370] referred to in Chapter 4 demonstrates the use of amplification systems to construct musical ensemble when the performers are not able to hear each other in real time.

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[369] Perren,et.al. *Expanded Architecture.*120.
[370] Artbound. "Invisible Cities". YouTube Video, 16/12/2016.
https://www.youtube.com/watch?v=GyceQFpSOjI&t=138s (Accessed 9/06/2019).

5.3.4 Aesthetic Marker 5: The Impact of the Microphone on the Interaction of Text and Singing

The microphone facilitates a focus on the sonic properties of the words and the sustaining of a vocal line that keeps a constant dynamic regardless of its pitch or tessitura. "Freezing" (text by Suzanne Vega) is a question and answer: *who would you be if you had no one and nothing and were naked on the grass? Answer: cold*. The atmosphere of the song is restrained and contained with a soaring wordless obligato vocal line performed concurrently while another singer sings the text. The setting and treatment of the text by Glass is non-narrative but focused on an atmosphere where sound and its movement through time became the focus.

The sustained high singing in "Freezing" makes it very difficult to hear or keep track of the text. This was also a feature of "Changing Opinion". Linda Ronstadt performs the song in an alto register, whereas this performance and recording used the soprano register (an octave above the recording but the same register as set out in the written score). The microphone facilitated the expressive use of text without effecting audibility.

An example of the non-narrative approach to the setting of text is the opening phrases in "Changing Opinion":

Gradually (3 beats rest)
we became aware (3 beats rest)
of a hum in the room. (sustained setting of room(G5 sustained over 5 bars). 5 bars rest
An electrical hum (sustained over 8 beats) 3 beats rest
in the room (sustained G5 over 6 bars) 3 beats rest
it went mmmm (hum sustained 6 bars)
hum sustained 5 bars descending in pitch to B4

Dominance is given to the words *room* and *hum* in the vocal writing because of their duration.

This writing demonstrates the close relationship between the singing and the microphone and playback system. The sustained singing of the word *room* balances against an instrumental part that does not vary in dynamic. In order for this to balance the singer used a lighter, more head-dominant sound with minimal vibrato so that the relationship between the parts was as transparent as possible. The microphone assisted projection and sustain. In order to sing a sustained G5 over 5 bars less air pressure was necessary and the microphone did some of the work of projecting the sound and reinforcing the upper harmonics of the voice. A hum is not audible (except in exceptional acoustics and with particular instrumentation). In this piece amplification was necessary in order for the audience to hear this critical vocal expression.

The relationship between the use of the text and the microphone was also a central element of the performance aesthetic here. The sound properties of the consonants and vowels were equally explored while a vocal line was sustained with minimal dynamic variation. This setting of the text reinforces Glass' approach of keeping the listener in the present, experiencing non-narrative time and atmosphere created by the repetitive rhythmic patterns and the seamless lines maintaining minimal variation in dynamic.

5.4 The Impact of the Microphone
Impact 2*:* The performance enabled new vocal techniques to be heard and/ or the construction of different ensemble relationships that enhanced the performance aesthetic.

The Schoepps condenser microphone was very effective for this repertoire and the acoustic space. It is designed to capture classical singing and to give a subtle boost to the high harmonics- helping the sustained high singing. It is not designed for close miking although a closer proximity was used for singing around middle C where projection and balance was an issue. Close miking was not necessary in other sections of the musical score as there was little variation in presence and dynamic.

The microphone and playback system also facilitated a uniformity of sound over distance and the balance between elements of the voice that had differing acoustic power and between the elements of the musical ensemble. It also provides foldback for the performers who were physically distant in the space.

Both works were performed with and without sound technology. An acoustic performance was possible in this particular physical environment, but not one that reflected Philip Glass' accepted performance practice. It would not have been possible to explore the theatrical and musical interaction between the performance, the audience and the physical environment without amplification. The skills of both performers in working in classical chamber music could produce an effective rendition of the piece, but not one that reflected the aesthetic intentions of the composer or the performers or that explored the theatrical relationship with the space.

5.5 Summary
The performance of *Songs From Liquid Days* demonstrated the capacity of amplification to facilitate and at times construct: how the piece was sung, the construction of the musical

ensemble, how the audience heard the piece, how the performers heard each other and the way the sound interacted with the performance space.

The performative elements of this performance were reliant on sound technology. Singer and pianist were physically separate and used the performing space to create strong visual images and to subvert the classical music associations of a singer standing in the bow of a piano. The sounds of the ensemble were visually coming from very separate physical spaces and yet were heard in ensemble. This use of space as theatre as well as for its acoustic properties is not possible without amplification. Amplification enhanced the ability of the audience to hear the detailed interaction between the vocal line and the piano regardless of where they were in the space. The balance between the voice and piano, the ability of the performers to be separated in the physical space and the construction of the ensemble were all significantly facilitated by the amplification. The capacity to explore text without the need to consider the acoustic properties of the vowel and the need for projection were also significant aesthetic markers of the amplification.

Although the sound design in a classical vocal performance may be effective, it may be that alternate choices would achieve a stronger correlation between the sound design and the performance aesthetic. A dedicated sound engineer who understood the performance aesthetic and/or was prepared to listen to the performers and interpret their aesthetic is essential in these types of performances. In this case Elizabeth Drake has a considerable knowledge and skills in the mixing of the sound, being a composer for film and theatre and used to working with sound technology. Unfortunately, the hiring of the sound equipment necessitated the hiring of a sound engineer. Both performers were capable of mixing their own sound-the setting did not change between the two movements. The sound technology in this case included the aesthetic judgements of those operating the live system. A choice to have a dedicated sound engineer who understood the performance aesthetic or have the performers operate the mixing would have been preferable.

The performance of *Songs From Liquid Days* demonstrated the integral role of sound technology in the performance of late twentieth and twenty first century art music. The role of the microphone and sound playback technology was essential to the wider expressive use of the voice required by the vocal writing and the performance aesthetic.

Chapter 6 : Creative Work Two: Performances of *A Body of Water*

This chapter discusses the background to the approach to amplification of *A Body of Water* and the resultant musical aesthetic. Initially the songs are examined to determine which aesthetic markers applied to the performance. Evaluation is then made as to whether amplification introduced a positive and significant change to the performance and which of the five aesthetic markers were applied to this change. Alternate choices in sound technology and their possible impacts are then discussed.

A Body of Water comprises the following songs:
 "Deo, Deo" (words and music by Stephen Adams)
<https://soundcloud.com/karen-cummings-441735240/deo-deo-from-a-body-of-water>

"As Tears Go By" (words and music by Jagger/Richards)
<https://soundcloud.com/karen-cummings-441735240/as-tears-go-byfrom-a-body-of-water>

"Lowlands" (Traditional Scottish folk song)
<https://soundcloud.com/karen-cummings-441735240/lowlands-from-a-body-of-water>

"Mysteries" (words and music by Beth Gibbons)
<https://soundcloud.com/karen-cummings-441735240/mysteries-from-a-body-of-water>

The performances of the songs are analysed according to the five aesthetic markers to determine the ways in which amplification influenced the aesthetics of the performances. The performance aesthetic is evaluated according to the three microphone impacts discussed in Chapter 4.

6.2 Background to *A Body of Water* and the Sound Amplification of My Voice

A Body of Water is an original amplified song-cycle using live and pre-recorded sounds and comprising original and arranged songs. It was performed three times in different venues: Paragon Café (Katoomba), Phoenix Theatre (Coniston) and Balmain Town Hall. The performers were Stephen Adams (composer/collaborator and multi-instrumentalist/singer) and myself (singer/ collaborator).

The work incorporates folk, contemporary and original compositions. It was performed three times and workshopped once a week over a period of two years. A key component of the workshopping was grounded in improvisation and reflection. This performance process was the beginning of me exploring the nature of a vocal practice that incorporated a microphone. It used live and recorded voices and electronic backing and live instrumentation. The same technology was used in both *A Body of Water* and *Songs From Liquid Days.*

I had previously worked with amplification in a range of music theatre works and operas and in live and studio recordings and broadcasts with the Australian Broadcast Corporation. I had also worked on two ambient music albums that had commercial releases. The performances of *A Body of Water* (and *Songs from Liquid Days*) differed fundamentally from my previous experiences in working with amplification. The primary aim of my experiments with these works was the exploration of the microphone as a musical instrument rather than purely an amplifier or carrier of the sound. In all of the previous performances that incorporated my mediated voice, I was a passive participant in this amplification, having neither the knowledge or skill to have any role in the construction of the musical or vocal aesthetic.

The two-year work-shopping process for this work involved the development of knowledge and skills in a number of areas. The workshopping process helped Stephen Adams and I to experiment and find a performance aesthetics for *A Body of Water* that fitted our approach. We experimented with different configurations of microphone(s), speakers, acoustic instruments and vocal aesthetic to find the sound technology that would allow us to give the kind of performance we wanted. The aims of this song cycle were developed and documented as the workshops proceeded:[371]

- to create and perform a song cycle using voice(s), pre-recorded sound and acoustic instruments where the use of technology and particularly the microphone were deliberate choices. We wanted the audience to be aware of the technology and its impact on the sound in the space. (We incorporated one unamplified song to create contrast in the way the audience experienced the performance.)

- To deliberately engage the audience in "feeling" something in response to the songs. We discussed the idea that we wanted to work with a more direct and human communication that rejected the idea of "distancing' the performance from the audience.

- to use the technology to create a more resonant sound in the performing space(s), and to use this more resonant sound to explore sonically weak sounds in the singing and instrumental playing. To explore the expression of text in ways impossible without amplification.

- to explore the listening/ performance space and the way the use of microphone(s) and playback systems helped construct the relationship between performance and audience.

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[371] Cummings, Karen. "Performance Notebook". 30/04/2015.

- to create different mixes for different songs to create distinct atmospheres for each song.
- to put instruments together that are not acoustically compatible.

These aims did not change substantially as the performance project developed, although the exploration of the way the technology interacted with the performing space(s) and the relationship that was constructed with the audience was never explored in any conscious way. The aim of deliberately engaging/connecting with the audience became less of a focus as the song cycle and our performance developed. It was assumed that the intimacy created by the performance and its interaction with the sound technology would lead to this impact. However, as the project proceeded we realized the problematic nature of the concept of intimacy in performance and of predicting audience perception of a work.

It was important to acquire technical skills in the choice and use of microphones, mixing and speaker systems. This involved using the following microphones and experimenting with their response to my voice (and my response to what I heard through this amplification):
- Sennheiser 965[372]
- Neuman KMS 105[373]
- Schoeps V4U [374] (used in both *A Body of Water* and *Songs from Liquid Days*) and
- the Australian made Rode Classic11 Limited Edition.[375]

All are condenser microphones. We used this range of microphones to experiment with different vocal aesthetics in the work. The Sennheiser e965 and the Neumann KM 105 are both large diaphragm condenser microphones designed for stage performance. These microphones give a detailed nuanced sound with a subtle lift to the high end of the voice, important characteristics for the vocal aesthetic of *A Body of Water*. Both mics give a more immediate, emotional sound than traditional dynamic stage microphones (according to the manufacturer).[376]

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[372] Sennheiser. e965 Vocal Condenser Microphone. Website. https://en-au.sennheiser.com/e-965 (Accessed 4/06/2019)

[373] Neumann Berlin. KMS105 Stage Microphone. Website. https://en-de.neumann.com/kms-105 (Accessed 4/06/2019)

[374] Schoeps Mikrophone.V4U Studio Mikrophone.Wesite. https://schoeps.de/en/products/v4/v4.html(Accessed 4/06/2019)

[375] Rode Microphones. Classic 11 Limited Edition.Website. http://www.rode.com/microphones/classic2ltd (Accessed 4/06/2019)

[376] Neumann Berlin. KMS105 Stage Microphone. Website. https://en-de.neumann.com/kms-105 (Accessed 4/06/2019)

My experience experimenting with these microphones and the standard stage performance mic, the Shure SM 58 confirmed these fundamental differences between the qualities of condenser microphones in contrast to standard dynamic microphones, although there are major differences within these categories of microphone.

The Rode 11 Classic replicates the warmth and clarity of classic old microphones. It is intended predominantly for recording but functioned well in live situations as well. The nature of the on-stage sound in both *A Body of Water* was mostly acoustically low with generally one instrument and electronic backing, so the use of this microphone was a viable option. It is a large microphone that limited the visibility of the singer from all angles and gives a particular performance and sound aesthetic reminiscent of the mid 20th century.

The Schoeps microphone is smaller. From the perspective of performativity, the Schoeps was preferable. For the quality of the sound the Schoeps did not have as much richness and weight in the sound as the Rode. For *A Body of Water* the lighter more transparent sound functioned better for the generally intimate sound. These judgements are partly technical and partly subjective: one microphone against another just felt better (in the same way as an instrumentalist may prefer certain violins or pianos over others for the way they interact with the performer and the repertoire)

Large diaphragm condenser microphones are gaining popularity among rappers due to their warmth and clarity. Similarly, for vocal works where the nuance of text is a priority, a large diaphragm condenser microphone is an optimum choice. Super-cardioid and cardioid polar patterns pick up sound most directly from the front and exclude sound arriving from the back or the sides. These types of pick up patterns were judged most functional for *A Body of Water*. The Sennheiser could be switched between cardioid and super cardioid pick-up patterns (although it was never used in the super-cardioid mode as the risk of spillage from sounds other than the voice was low.) The Neumann has a super-cardioid pick up pattern, the Schoeps is a cardioid that does accept some ambient sound and the experience of working with this microphone demonstrated this was not a problem with these works.

6.3: Performances of *A Body of Water*

The microphone and sound playback enhance an exploration of timbre and the concept of intimacy in performance. The technology used in all performances gave the listener the

proximity and detail of an intimate performance regardless of where they were in the physical space in relation to the performers. This sense of proximity and detail was inclusive of the separation and clarity of the musical parts.

Expressive vocal features explored through the microphone in this song cycle were shortness/constriction/freedom of breath, loudness /softness, depth and height in resonance, stridency and gentleness. The colour and texture of the text were explored in ways not possible without microphone. Combined, these enabled the evocation of particular emotional states.

6.4 Application of Five Aesthetic Markers to *A Body of Water*

Aesthetic Marker 1. The Microphone and Proximity and Detail

The unamplified singing voice has large variations in loudness and speech intelligibility. All voice types are louder as pitch rises. Higher pitches negatively affect speech intelligibility (how often do audiences complain they can't understand classical singers when they sing in English?). There is also considerable variation in the sonic power of vowel shapes.[377] This is a primary reason for vowel modification in classical singing. This necessity is negated by the use of the microphone. Vowel choices, length of vowels and other techniques to optimize the acoustic power of the singer become aesthetic choices when amplified and were treated as such in *A Body of Water*.

The amplification ensured that the audience, regardless of where they were in relation to the performance, heard the detail of the singing, the instrumentation and their interaction. The performance began with unamplified singing ("As Tears Go By") as the singer walked from the back of the space through the audience to the front. This allowed the audience to hear the difference between the voice interacting with the acoustics of the space and when it was being mediated by the microphone and playback system in the second verse. The performers wanted the microphone and playback system to function as musical instruments and for the audience to be aware of this effect. This juxtaposition of amplified and unamplified singing was also achieved by the contrast with the unamplified singing in "Lowlands".

The amplified singing in *A Body of Water* differed from an unamplified performance in a number of ways:

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[377] Meyer, Jurgen. *Acoustics and the Performance of Music. Manual for Acousticians, Audio engineers, Musicians and Musical Instrument Makers.*(Germany and USA: Springer, 2010.) 123-125.

- The acoustic power of the singing was much lower and consequently, less air pressure was necessary.

- Less sustained vowels were used as the microphone assisted legato and projection of the voice.

- vowels were closer to vernacular vowel shapes rather than received English.

- Consonants could be explored for their expressive qualities to a greater extent. Consonants (excepting voiced consonants) stop breath and consequently sound unless the voice is amplified.

- Extra vocal sounds (vocal micro-textures) were explored for their expressive qualities.

- Very soft (sonically weak) sounds that would carry in inconsistent ways unamplified were experimented with.

Some of these sonically weak sounds would be heard without amplification, but the effect would be sporadic and inconsistent. It is for this reason that rock singers scream with a microphone and make strong use of the singer's proximity to the microphone to boost the power of these sounds. An unamplified performance would rely solely on the interaction of the singing and the acoustics of the particular performing space.

The enhancement of proximity and detail in the performance resulted in featuring of the expressive techniques in the singing:

"Deo Deo" was able to incorporate sonically weak sounds such as in-breaths, glottal onsets and vocal creak (these were particularly audible in the opening improvised section featuring the repetition of the word *Hey)*. The middle, section (-hum did le um deo) allowed exploration of the consonant as well as the vowel. The 'h' was able to be used expressively with amplification whereas unamplified, a consonant is not used for expression. The h is unvoiced and requires the vocal folds to come apart to let air out. Consonants were used for rhythmic energy in this section. This emphasis on the expressive use of consonants is similar to Ted Hearne's singing of "Brownie You're Doing a Heck of a Job" in "Katrina Ballads."[378] In the improvised final section vocal onset and offset effects and vocal fry were used (these sounds are inaudible or weak unamplified)

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[378] Hearne, Ted. "Brownie You're Doing a Heck of a Job." YouTube Video, 13/02/2011. https://youtu.be/L_8IeYmFbvA (Accessed 4/06/2019)

"As Tears Go By" used little breath pressure as an intimate vocal delivery was intended. This was achieved using the singer's close proximity to the microphone. A speech- dominated vocal style similar to a folk or early music vocal style was used with little emphasis on vibrato and legato. The microphone assisted the legato. Shara Worden in David Lang's "Death Speaks" demonstrates an example of this kind of vocal delivery in a contemporary amplified classical chamber work.[379] Amplification facilitated the lesser breath pressure and the reduced emphasis on sustained vowel shape and vocal line (as loudness was not necessary for audibility). This allowed for an intimacy to be explored using a vocal delivery that matched the hesitancy and delicacy of the accompaniment. The role of the microphone in facilitating this type of singing is similar to the singing of Caroline Shaw in "By and By."[380]

"Lowlands" used two acoustic instruments (voice and flute) with no electronic accompaniment. The tempo was slow, and the vocal line was sustained. The vocal style was intended to express various levels of grief. It featured a more sustained vocal line incorporating more sustained vowels, a higher tessitura and a moderate to loud dynamic. This vocal approach facilitated the choice not to amplify.

In **"Mysteries"** the performance ensemble consisted of a singer and an electronic vocal track. "Mysteries" is a contemporary popular song by singer Beth Gibbons of "Portishead" that incorporates folk and hip-hop musical influences. The performance began with a very intimate delivery in the verse that moved into a higher intensity in the chorus. The singing was close to the speech register and vernacular vowel choices were used. The combination of the soft dynamic of the singing, the low registration of the vocal setting and the choice to use vernacular vowels combined to create a performance of low sonic power but one that incorporated a level of detail in inflection in the use of text and colouration of the sound purely for expressive effect. The microphone negated consideration of the need to be heard. The amplification facilitated a balance of presence between the expressive vocal elements, allowing some control by the singer in foregrounding some low amplitude vocal elements such as breath and use of consonants.

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[379] Lang, David. "Death Speaks." YouTube Video, 10/10/2014. https://youtu.be/L1y3qo0YnO8 (Accessed 3/06/2019).
[380] Shaw, Caroline and Calder Quartet. "By and By." YouTube Video, 16/08/2014. https://youtu.be/EyDvnUYB0sk (Accessed 5/06/2019)

Aesthetic Marker 2: Amplification and the Ensemble

As amplification is able to foreground sonically weak vocal elements it also can balance elements of a musical ensemble of differing levels of loudness. The incorporation of electronic tracks in the musical ensemble was feasible once the ensemble was amplified and mixing was used to create balance (the foregrounding of acoustically weaker sounds). This was done in "As Tears Go By", "Mysteries" and "Deo Deo". Without the microphone, the electronic tracks could overpower the voices. Combining electronic and acoustic sounds in a performance space creates unintended effects. There are multiple sources for the sound. The electronic accompaniment reaches the audience through speakers whereas the voice interacts with the peculiarities of the performing space and reaches the audience via a different route. Particular harmonics are more directional and reach the audience first (the upper harmonics). Ensemble can consequently be compromised. In "Deo Deo," the ensemble between the voices (Stephen and myself) was negotiated with microphone and mixing. The differences in the vocal registers of each singer could have made a musical ensemble difficult, but throughout the piece both voices are balanced and have equal presence.

Compression was used in the mixing of all the tracks to counter the tendency of higher pitches to be louder. Some songs were generally louder or softer, but such dynamics were not related to the vocal register the song was performed in. For instance, the low soft singing in **"Mysteries"** still had balance with the electronic track which had some high amplitude, sonically powerful sounds.

In **"As Tears Go By"** the electronic track, voice and live flute were balanced via amplification and mixing. This ensemble would have been very difficult to balance without the microphone and mixing. Without amplification, there would have been three sound sources: electronic sound through speakers; and acoustic instruments and singer interacting with the acoustics of the performing space. The flute and voice would have been difficult to balance with each other due to the low acoustic energy of the voice (low in pitch and an intimate volume) as opposed to the sonic qualities of the high-pitched flute. The use of amplification to facilitate musical ensemble between instruments of different sonic power is evident in "Katrina Ballads." In "Kanye West electronic instruments such as electric guitars are combined with acoustic instruments such as woodwind and voices, making an ensemble without amplification impossible." [381]

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[381] Robinson. "Kanye West."

No amplification was used for **"Lowlands".** The contrast between this unamplified performance and the other amplified songs served to allow the audience to hear both the performing space and the microphone, treating both as compositional elements. The audience 'heard' the technology: what was being revealed through the sound technology as opposed to what was revealed without it. It also allowed a different listening to the physical space(s). The acoustic space is more present in the acoustic performance. The lack of amplification also meant the performers could move in the space, as this performance used a fixed microphone on a stand. A different choice of microphone such as a head set could facilitate a different use of the theatrical and performance space.

"Mysteries" used an electronic track that was dense in sound and texture and had a number of high amplitude sounds. The singing in contrast was soft and intimate with little sustain of vowel and legato. Acoustically this would have been a very strange mix, but the ability of the mixing to bring the voice to the foreground created an ensemble that could not otherwise exist.

The featuring of an electronic tape accompaniment alongside speaker, singers and instrumental ensemble is demonstrated in Luciano Berio's *Laborintus II* which would have required similar mixing techniques for live performance.[382] The use of electronic recorded (and live) sound is a frequent device in contemporary vocal music.

Aesthetic Marker 3: The Microphone's Relationship to Vocal Micro-Textures
The ability of the microphone to foreground sonically weak sounds (and consequently facilitate new areas of vocal expression for the classical singer) is an important area of discussion in this thesis. A range of micro textures that are not audible or are compromised in sound quality without amplification can be incorporated in the amplified vocal performance. These include screams, howls and wails. Although these vocal expressions could be heard unamplified, it would be unlikely they would be heard consistently or uniformly in a performance space. This would most likely lead to the singer using more air pressure and effort level in order to be heard. Such effort is unnecessary with amplification as mixing can give these sounds more presence and power rather than placing the responsibility to be heard on the singer's larynx.

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[382] Berio, Luciano. "Laborintus 11, First Part."YouTube Video, 28/01/2011. https://youtu.be/oKP0UvdPyZU (Accessed 2/06/2019)

The incorporation of vocal micro textures in an unamplified environment would result in large variations in the quality of the sound and the singer relying on the power of breath and vocal mechanism to project these sonically weak sounds. Some listeners (depending on where they were positioned in the space), may hear particular sounds clearly and others would disappear or be "muddied". The amplification was able to foreground sonically weaker sounds and to ensure that the detail of the performance was heard with consistent fidelity in every part of the performing space.

In **"Deo Deo"** the in-breath and out-breath were used for expression. Constriction and vocal creak were also used. The majority of this piece was improvised and arose from a series of improvisation workshops where this expressive vocabulary was explored. These expressions included:

- the use of glottal onsets.
- variations in vibrato (at times very wide, slow and rapid).
- movement to the extremities of vocal range (particularly the lowest growl register to facilitate the keening, lamenting quality being explored).
- the use of different choices in registration, particularly a more chest dominated vocal timbre.

As these workshops progressed there was a greater sense of expressive freedom in using these sounds that sit outside the classical singing paradigm, confirming that the voice is to a great degree constructed by the singer's own practice.

The vocal production did not rely on the concentration of upper harmonics necessary for unamplified singing. A wider range of approaches to the balance of harmonics in the voice could be used without compromising audibility. This included a speech dominated timbre that used straight vocal tone and very little breath pressure. This is a quality unlikely to be used in unamplified classical singing. Although vocal micro-textures have had a long tradition in popular music, in particular in rock, blues and rhythm and blues, their use as part of the classical vocal lexicon is a relatively recent phenomenon and entirely dependent on the use of amplification. The capacity of amplification to facilitate the incorporation of vocal micro-textures is featured in *Speechless*.[383]

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[383] Hope, Cat. *Speechless*.

"As Tears Go By" used a close proximity of the singer to the microphone to allow the expressive in- breath to be heard. The mostly straight tone singing uses a predominantly speech dominated sound. The minimal reverb in the mix gives an almost "dry" timbre that matches the spacious minimal accompaniment. Facilitated by the singer's close proximity to the microphone, the listener has a sense of the audible texture of the vocal folds moving together. The onset of the sound at the level of the vocal folds is audible in certain words that begin with a vowel: "It" and "I" for example. The presence of the textures of consonants is foregrounded by the microphone (for example 'ch' in children and riches and the sibilance of 'sss' in sit). The weary and detached atmosphere of the song is in a large part dependent on these vocal expressions.

"Mysteries" could have used a stronger exploration of vocal micro-textures. This may have given the performance(s) a greater sense of the intimacy and longing suggested by the music and lyrics. This would have been achieved with less breath pressure and a lesser use of resonance and a greater emphasis on the sounds of the mouth and the breath. A closer proximity of the singer to the microphone could also have assisted this vocal aesthetic. Beth Gibbons's affecting and mesmerizing live performance of the song features the use of a wide range of vocal micro textures.[384]

Aesthetic Marker 4: Interaction with the Performing Space.
Amplification allowed *A Body of Water* to be performed in quite different spaces from very small intimate venues (Paragon Café in Katoomba) to larger resonant spaces (Glebe Town Hall) to theatre Space (Phoenix Theatre Coniston) with little impact on the performance style. The audience sizes in all of the venues never exceeded the recommended size for the amplification system. The same microphone and mixing settings were used for all the performances. The fixed and visible microphone and sound playback system limited the flexibility the performance had in its interaction with the performance space and the audience.

Aesthetic Marker 5: The Impact of the Microphone on the Interaction of Text and Singing.
The acoustic power of the voices was never a determinant of the expression of the text in the performance of any of the songs except "**Lowlands**."

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[384] Gibbons, Beth. "Mysteries." YouTube Video, 26/12/2011. https://youtu.be/HWNkmpG7WtE (Accessed 2/07/2019)

The text of **'Deo Deo'** was made up of syllables and sounds that had no narrative meaning thus the text was explored entirely for its sonic and rhythmic qualities. This particularly applied to the middle section, "hum did le um." The impact of amplification allowed an exploration of the consonant and its percussive and rhythmic qualities. The use of vocal expressions dominated by consonants are used for their sonic qualities by a number of contemporary classical performers, always dependent on amplification to foreground these sonically weak sounds. Meredith Monk often works without words, for example in her piece "Gotham Lullaby"[385] as does Nico Muhly in "Mother tongue."[386] Pamela Z's "Badagada" also makes use of the consonant as a rhythmic and structural device as well as for its expressive sonic properties.[387]

"As Tears Go By" uses intimate singing with a predominant use of straight tone (no vibrato), less air pressure and the more dominant use of speech quality. The song takes on the character of a spectator watching children playing and experiencing feelings of detachment and longing. The text was explored for its material sound and less emphasis was placed on its emotional and associative meanings of the words. Minimal attempt was made to explore speech rhythms. The emphasis was instead on the sustained atmosphere of longing and desolation. This relationship to the text was facilitated by the microphone's ability to foreground the sound of the in-breath and the textures of the words. Colloquial speech was used which emphasized the flattened qualities of the vowels. The microphone allowed less resonant vowel choices.

"Lowlands" used frequent repetition of text. As in "As Tears Go By" the relationship of the singing to the text emphasized the material qualities of the sounds of the words more than the representative meaning of the text. Keening, sobbing qualities of the voice and flute were explored and the song was treated like a ritual lament. More resonance and sustained vowels were used to create a strong vocal line that would carry to the audience acoustically than was used in the other songs. Less colloquial vowel choices were used. The musical qualities of the song were prioritized over the communication of the text.

In the performance of **"Mysteries"** the expression of the text and the exploration of what it communicated were prioritized. The close proximity of the singer to the microphone in this

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[385] Bjork and Brodsky Quartet. "Gotham Lullaby." YouTube Video,10/02/2009. https://youtu.be/fy7jG-C3B-Y (Accessed 3/04/2019).

[386] Muhly, Nico. "Mothertongue." YouTube Video, 15/01/2009. https://youtu.be/cB46mn8Exd8 (Accessed 3/04/2019)

[387] Z, Pamela. "Badagada." YouTube Video, 4/08/2017. https://youtu.be/1PZryVr5ijY (Accessed 23/05/2019)

song allowed a speech-based delivery where both the sonic and narrative meaning of the words could be explored without modifying vowels or adding singer's formant. "Mysteries" speaks of moments in life that take on a heightened intensity where personal turmoil dissipates, and the moment is all that remains:

"When the time bell blows my heart,
and I have scored a better day.
Well nobody made this war of mine.
And the moments that I enjoy, a place of love and mystery,
I'll be there anytime.
O mysteries of love, where war is no more.
I'll be there anytime."[388]

Speech rhythms were used in this performance and the colouring of the text used similar techniques to those I have used in the performance of art song. The area of divergence from these unamplified performances was in the ability to stress a word by creating space around it, that is, by suspending the vocal line. An example of this was in the phrase "when the time bell blows my heart". The words "blows" and "heart" were stressed by shortening the length of the vowel in the surrounding words. This is a technique rarely used in unamplified classical singing as the sound is conveyed through the vowel, and a shortened vowel means the vocal line is compromised. This is not a consideration in amplified singing.

6.5 Evaluation of Amplification
Impact 2:The performance enabled new vocal techniques to be heard and/or the construction of different ensemble relationships that enhanced the performance aesthetic.

The piece could not be performed with the same aesthetic without amplification. The microphone allowed the balance between two very different voices with different training and acoustic properties to be heard alongside the details of the musical performance and interrelationships of the parts. The amplification system facilitated the incorporation of pre-recorded tracks with the vocals and the live instrumentation. This integration of electronic backing and live sound were most effective in 'Deo, Deo', 'As Tears Go By' and 'Mysteries'.

Amplification also facilitated a musical ensemble and sound that allowed the listener to hear the same fidelity of sound regardless of distance from the speaker and the performance. The amplification also enabled subtleties and nuance to be heard while balancing and bringing

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[388] Gibbons, Beth and Rustin Man. "Mysteries" (Exerpt of lyrics). Apple Streaming,2002. Streaming Service.

clarity to the musical ensemble. It also allowed the exploration of a range of vocal techniques that diverge significantly from classical vocal techniques.

Many of the works in Chapter 3, Contextual Review and Case Studies demonstrate the ability of amplification to facilitate proximity and detail in the performance including: *Travelers Josephine Baker: A Portrait* and *Katrina Ballads. Invisible Cities* and *The Howling Girls* provide examples of the facilitation of ensemble balance and projection. *Spawn* (Holly Herndon) and *Partita for Eight Voices* (Caroline Shaw) demonstrate the incorporation of vocal micro-textures as a major area of vocal expression. *Katrina Ballads* and *Homeland* use sound technology to give nuance and expression to text that is not possible without amplification.

6.5.1 Alternate Choices in Sound Technology

Although the sound design in a classical vocal performance may be effective, it may be that alternate choices would achieve a stronger correlation between the technology used and the performance aesthetic. The choice of microphone, speaker(s) and mixing were ideal for the performances in this research. Louder and softer elements of the musical ensemble were explored without compromising intelligibility and audibility. Microphone techniques including closer proximity could have facilitated more exploration of a variety of ways of starting the sound (onset) and finishing the sound (offset), as well as the use of breath and texture in the sound. More exploration of the colours of consonants could also have been explored. The use of breath pressure and straight tone was effective, as was experimentation with the use of the microphone to create vocal line (legato).

Future performances of *A Body of Water* could explore the use of vocal micro textures to a larger degree. This use of vocal micro-textures involves experimenting with various levels of air pressure, resonance and use of the sounds of the vocal processes and breath. Further experimentation with the microphone would be in the following areas:

- using a wider range of air pressure and thus a greater range of vocal dynamic and resonance choices.
- varying the levels of mix between head and chest registers which would result in the development of a wider range of expressive colour.
- experimenting with a range of configurations of resonance (including the position of soft palate, mouth opening, tongue position, larynx position and head position) would also find a broader range of expression. These are all skill areas for the classical singer

wanting to develop a practice that explores the expressive possibilities of the microphone.

6.5: Summary and Reflection

A Body of Water explores the detail and proximity that the microphone can facilitate in a song recital. The use of technology allowed the performers to develop skills in constructing a musical piece with diverse elements that still had musical and thematic coherence. The workshopping process helped the performers develop new vocal and musical aesthetics and skills. Aesthetic choices that are inconceivable in acoustic performances were discussed, experimented and developed. The construction of the musical ensemble was a real and intriguing skill that was developed in this process. One aim of the process was to transfer the decisions made in the recording of a work into the live performance: the nature of the component sounds in the ensemble and their relationship to each other and to the listener were considered in detail.

The two-year experimentation and development process of *A Body of Water* demonstrated that the use of the expressive language of the microphone and its incorporation into a classical vocal practice require a disciplined practice over a period of time. This is similar to the acquisition of any new musical or technical skill. It also involves the development of an expanded view of the aesthetics of the classical voice: through personal practice and broad and analytical listening. Developing a broad and curious listening practice helps develop the musical imagination: listening across vocal genres and historical periods assists in the development of a broader understanding of what singers actually do in rap and hip- hop, soul, R&B, folk, opera, art music, electronic music and experimental music. It is beyond the scope of this research to identify the influences of amplification on all these genres, but what is clear is that amplification has influenced the development of popular vocal genres for nearly a century. That development has begun much later in relation to the classical voice and it has now irrevocably changed.

As with the development of any new artistic practice, the microphone challenges the singer's own (often unquestioned) assumptions about the nature of good singing. This questioning led me to the acceptance of a broader expressive range in my singing practice and an interrogation as to the nature of these expressive choices and what is communicated by them. The exploration of the relationship between the body, the voice, the ensemble, the performing space and the audience and the technology that constructs the relationship between all these elements is now

a key element in my work. This has led me to an understanding that the voice is not a static, biologically determined entity but a living, breathing, flexible, interactive, transient and changeable practice. This process helped me recognise the extent to which the voice I performed with was a construct of the practice I had developed that had a range of aesthetic underpinnings. The knowledge and skill developed through this process included: the technical skills involved in performing for an audience with a microphone and playback system, the greater range of expressive vocal techniques and aesthetics available through the use of the microphone, and the choices amplification can facilitate in constructing a relationship with the audience and the performing space.

A Body of Water contributed to a re-construction of a vocal practice that better reflected my own values and aesthetics. This developing practice aims to value the organic and interactive elements of performance rather than enshrining a fixed view of what the voice is. It recognises experience that sound technology takes nothing from the voice and that this interaction is multi-levelled, often surprising and seldom restrictive. It recognises that virtuosity comes in many forms, and that the amplification of the voice is central to many of them. It confirms that this practice draws on my classical vocal training but is not confined by it.

6.6 Recording Experiment

Spring Can Really Hang You Up the Most (with amplification and foldback)
https://soundcloud.com/karen-cummings-441735240/spring-can-really-hang-you-up-the-most-recording-experiment-with-amplification-and-foldback

Spring Can Really Hang You Up the Most (without amplification and foldback)

https://soundcloud.com/karen-cummings-441735240/spring-can-really-hang-you-up-the-most-without-amplification-and-foldback

In the initial stages of the PHD (2015) I did a number of recording experiments in the Harold Lobb Concert Hall, University of Newcastle. At this stage the thesis objectives were not formed, and the experiments were used to help give direction.

The first experiment in 2014 was an attempt to identify the differences in the harmonic properties between an amplified and an unamplified classical performance. It became clear that I found it impossible to give the same performance when I was amplified and when I wasn't. The song chosen was "Youkali" (Kurt Weill). It became clear that what I heard from the amplified sound both in the hall and through foldback facilitated me changing breath pressure, vowel resonance

and general volume. This led to the development of another experiment where I and Kelvin Heisman prepared a number of songs to record in the hall with no mediation, with mediation but no foldback and with mediation and foldback. The objective was to determine the differences in vocal expression in these various modes.

The songs were:

- "Spring Can Really Hang You Up the Most". (Tommy Wolf/ Fran Landesman). The song is a Jazz Standard.
- "Loch Te Boat Song" (Traditional Scottish song)
- "The Waters of March" (Bossa Nova) Antonio Carlos Jobim.
- "Claudinette Tango" (Enrique Delfino)

These recordings were unsuccessful as the process for identifying the aesthetic differences between the various modes of sound transmission were never clearly stated. This resulted in recordings that did not reveal significant differences. We anticipated that these recording experiments would identify differences in aesthetic markers 1. Proximity and Detail and 3. Vocal Micro-Textures. At that time, the process we used to record the experiments did not capture what was heard in the space. Since that time a greater level of skill and knowledge in the understanding of the relationship between acoustic space, technology and sound recording (placement of microphones etc.)has been gained. A revised version of this experiment would be more successful in the future.

We learnt from these experiments that performances and experimentation were more likely to reveal more about the amplified classical voice. The process of constructing experiments and attempting to isolate particular elements of performance and examine them in isolation from each other proved to be more difficult than anticipated. The essence of this practice with microphone and sound playback technology is that it is a fluid, interactive one. The other element of developing the methodology in this thesis was the development of listening skills in relation to amplified works, i.e. hearing the elements of expression that would not be there unamplified.

Chapter 7: Conclusion

7.1 Summary

This thesis has shown that the mediation of the classical voice by sound technology is a pervasive, multi-faceted and varied practice that has forever changed the nature of a classical singing practice. It has and continues to transform the way classical singers sing, what and where they sing, the nature of the musical ensemble, the theatrical use of the performing space, how they use their bodies and interact with words. This expanded expressive vocabulary is creating opportunities for a wider range of voices. This includes those of sound artist Holly Herndon (quote above) whose practice is exploring new boundaries between machine and human, new expressive vocabularies, new philosophical approaches to the voice and music and their place in market-driven, neoliberal dominated contemporary society.

The musical works incorporating classical voice and a microphone and sound playback system in chapters 2 and 3 reveal an incredible variety of approaches and styles. It is clear that twenty first century classical voice has embraced amplification which has resulted in irrevocable changes to the classical vocal paradigm. The nature of the practices incorporating a classical voice and microphone are more varied than ever, creating crossings and permeations between vocal genres and other art forms. It is now not possible to speak of the classical voice, but of *classical voices*. This thesis has identified the ways in which a classical vocal practice incorporating a microphone varies and developed markers to determine the success or otherwise of this incorporation.

The methodology developed from the overview of works in Chapter 4 was applied to the performance component of this thesis. It was found that the incorporation of the microphone and sound playback systems in both *A Body of Water* and *Songs From Liquid Days* was analogous to learning a new instrument, except that this instrument draws its expressive language from the human voice. Rather than accepting that a classical vocal technique is any one fixed thing, the microphone invites an exploration of the many possibilities of what a voice can be when the acoustic imperative of being heard is no longer driving the vocal aesthetic.

The microphone facilitates the construction of the performing space and its relationship to the performers, the sound technology and the audience. The mediation of the classical voice creates a new paradigm where the singer is not reliant on the interaction between the power and breath of the singer and the acoustic properties of the performance space in order to be heard. The

microphone opens the gates to ensembles impossible without sound technology mediation: the incorporation of electronic instruments with acoustic ones, ensembles of voices that could not balance acoustically and the incorporation of instruments not associated with classical music (for example drums and electric guitars). Quiet instruments or timbres such as the sound of radio static can become part of this sonic world. The microphone invites experimentation with non-verbal language and the language of the microphone. For example, the sounds of the breath and various kinds of vocal constriction become part of the singer's expressive vocabulary. The microphone frees the singer's body to express the music in ways not possible when the body is responsible for the power of the voice. It invites different relationships with the audience including the use of intimate speech alongside powerful and resonant sounds.

The microphone and sound playback system have a central role in the construction of the listening experience. For example, amplified performances can construct a virtual acoustic space that could not exist acoustically and that does not relate to the listener's anticipation of the sonic qualities of a particular performing space. This manipulation of the relationship between the acoustic properties of the performing space and the performance's sonic qualities has been experimented with in classical music over centuries. It has included spatial antiphony in choir performances and off-stage choruses in opera. Singers/composers use this application of sound technology as another expressive technique in their work. Amplification can create intimate experiences in a stadium and replicate epic operas in a set of head-phones.

The microphone invites the performer to construct their own practice and the voice(s) that will serve it. These practices can branch out and take on new roles as composer, producer and engineer. These artists embrace the sound technology of the twenty first century. They see this interaction as part of the evolving language and artistic practice of the twenty first century classical singer. Practices emerging from this interaction examined in this thesis confirm that the mediation of the classical singer is not leading to the destruction or decline of classical singing. Instead, it is being transformed. The microphone and its interaction with the classical voice is leading to an acceptance that the cultural primacy of the classical voice has long passed. Much of the most exciting music of the twenty first century is coming from popular singing genres and classical artists working with sound technology and genres that are almost impossible to define.

Rather than bending the knee at the altar of the power of the classical voice, Steven Connor and Brandon LaBelle make eloquent arguments for valuing the "side effects" of the voice: the

sigh, the scratch of the vocal folds, the breath that communicate gently to the very core of our humanity, and are part of the expressive language of the voice. These sounds have been embraced by popular music since the microphone emerged nearly a century ago. *The Howling Girls* and *Speechless* are examples of the incorporation of this evolutionary vocabulary of the microphone in opera and music theatre.

The boat has sailed as far as amplification of the classical voice is concerned. The most important battle now is in relation to the voices that are represented in the development of these evolving practices. The broad range of artists working in this area continue to make in-roads into creating new artistic forms, expressions, voices and points of view that better reflect the diversity of our communities. This is in contrast to the globalized, standardized, homogenized version of classical voice we often see.

The works reviewed in this thesis demonstrate that collaborations, explorations, cross-fertilization between other art forms and with technology are the way forward for classical singing. These classical practitioners working with sound technology value learning from unexpected sources, openness and curiosity rather than the current paradigm of relentless turning inward in ever-diminishing circles. Eco argues for an artistic practice that embraces:

> The notion of possibility… and the discarding of a static, syllogistic view of order and a corresponding devolution of intellectual authority to personal decision, choice and social context.[389]

This seems the way forward. The remaining part of this chapter discusses implications, makes speculations and challenges pre-conceived assumptions about the use of the microphone and sound playback systems.

7.2 Implications
We are not a collection of individuals but a macro organism living as an ecosystem. We are completely outside ourselves and the world is completely inside us.
(Holly Herndon)[390]

This thesis challenges the idea that composition and performance are about achieving individual technical virtuosity and shows the way forward to an inclusive, fluid, interactive practice that gives anyone who wants to be heard a platform. It recognises that we need to create space for a multiplicity of voices, some of whom will make us uncomfortable, such as

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[389] Eco."The Poetics of the Open Work.*"*
[390] Herndon, Holly. "Proto." 4AD,10 May 2019. https://4ad.com/news/957 (Accessed 23/05/2019)

the voices in *The Howling Girls*. It places contemporary classical music back into the dialogue about the kind of societies we live in and help us dream about new ones. To paraphrase Holly Herndon again: we need new fantasies. Ones that don't endlessly repeat the same old tropes. And to do that, we need new ways of telling our stories, creating our universes and working with each other and the beings and things we share that universe with.

This is not to say there is no place for what has broadly been understood as the classical vocal technique. It is to say that it sits on a continuum amongst a range of approaches that intersect with contemporary vocal techniques (and new expressive techniques that are emerging as a result of the intersection with sound technology.) The singing performance of opera, music theatre and the art song has significantly changed as a result of amplification.

Classical singing has never been a static or fixed practice. It has historically responded to changes in repertoire, performing space, instrumentation and cultural and political context. Medieval and renaissance singers emphasized text over tone colour and arguably sounded more like contemporary folk or rock singers than the classical singers of today. Classical voice has always been subject to technological intervention through the design of the architecture and the acoustic properties of the churches and theatres performances they took place in. Vocal aesthetic, ideology and the relationship to the audience were constructed through this interaction.

John Potter recognises that the privileged status historically accorded to the classical voice has forever passed. Without an acceptance of the varied singing practices evolving through conversations with sound technology, classical singing will most likely become moribund and static. The interaction of classical voice with sound technology has transformed the classical voice. It can no longer be considered a homogenous practice, if it ever was. Ever-evolving range of voices are finding their way into and around it. In so doing, they are creating crossings between vocal genres, other art forms such as dance and digital media and opening it up for a diversity of voices. Many of these voices belong to women, composers and performers from cultural backgrounds generally excluded from classical music. With these new practices come new points of view.

The exploration of the classical voice as more than a carrier of beautiful sounds has a long tradition, hitting a high point more than half a century ago with Cathy Berberian. She explored what was communicated by the word and beyond the word, the singer as composer and

collaborator, the nature of vocal genre and its cultural meaning and the performative nature of the voice and the body. Sound artist Holly Herndon explores the interiority of the body and develops new expressive languages tied to the microphone and technology. She has created *Spawn*, a programmed entity who learns to sing with a choral ensemble and many volunteer vocal coaches. The work that has emerged from this technologically human collaboration is a joyful, indescribably beautiful oratorio of optimism.[391]

It is telling that many of these artists wanting to speak of social injustice, racism, misogyny, the crisis in the environment and the state of the world we live in, do so with a microphone. They are able to do more with amplified words, use their own voice and employ a wider expressive language. They refuse to be relegated to the fringes, dismissed as cross-genre offerings, fringe or plain eccentric. They say what they mean performing wherever they like without considering the acoustic properties of the performing space as a precondition for its use. The cultural meanings of performing spaces become more important than their acoustic properties as operas take place in Railway Stations, song cycles are performed in night clubs and the chains enslaving the classical voice to the church or the opera theatre or recital hall are forever broken. *Katrina Ballads* responds to the political and social crisis that evolved post Hurricane Katrina. Josephine Baker: A Portrait uses the story of singer/dancer/activist Josephine Baker to explore race and gender relations in America *Speechless* responds wordlessly to Australia's crisis in immigration detention to create a wordless, visceral argument for change.

This evolving practice and its development of new expressive languages challenges conceptions of the classical voice as integrally tied to the foundations of power and projection. It asks questions about the primacy of beauty, notions of virtuosity and the place of the 'imperfect' voice. Sound technology creates space for the 'weak' voice, the aged voice and always for the voice that has something meaningful and powerful to say. The unique qualities of these voices become part of the powerful insights these voices have to give and no longer defined as either dysfunctional or bad singing. Each voice is given its space to explore and develop what it has to say and how it will say it.

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[391] Brooklyn Vegan Staff. *Holly Herdon debuted "Proto" Live Show at Pioneer Works* 17/05/2019. Brooklyn Vegan Website.. http://www.brooklynvegan.com/holly-herndon-debuted-proto-live-show-at-pioneer-works-pics-setlist/ (Accessed 24/06/2019)

Gaelynn Lea's performance of "Someday We'll Linger In The Sun" won her the 2016 NPR Tiny Desk Contest.[392] Gaelynn is a classically trained violist and song-writer who uses looping pedals to accompany her voice. She is also a disability advocate who was born with brittle bone disease. The microphone opens up the nuance and beauty of the universe inside her, that can never be sonically powerful but demands to be heard and listened to. Quinn Christopherson, the winner of the 2019 Tiny Desk sings about his experience as a young transgender, Athabaskan and Inupiaq artist living in Alaska:

> I used to think I was a woman, so I got used to pulling the short stick... I've got a voice now, I've got power, but I can't stand it. Nobody interrupts me; nobody tells me that I can't do it. I got so used to pulling the short stick …I got tired of people trying to erase me.[393]

Quinn uses the microphone to tells his story. It is a voice etched with rage, pain, humour and grief communicated through the vocal markers that only the microphone or the intimate listener can hear: the grain of the voice.

While the nexus between power, breath and the classical voice has been broken, a new frontier in the exploration of timbre has opened up. Nina Eidsheim frames an understanding of vocal timbre that embraces the body that *is*, and the body that *is made*. Voice is not a physiologically predetermined entity, but an adaptive and changeable construct responding to experience, culture and vocal practices. The physical environments that voice encounters internally and externally transform the voice. Sound is energy pulsating and transmitting through and around bodies and objects and technology: meeting, adapting, being changed and transferring energy through these collaborative entities. Singing thus becomes a non-fixed practice that adapts and is changed by all the elements that make up a particular performance at a particular time: a practice that leaves room for the possibility of the moment, for improvisation and deliberate interactions through technology and physical space. Nora Fischer works with vocal looper to create a multi-layered virtuosic vocal performance in Jacob TV's opera *Headlines*. She uses a microphone to interpret Oswaldo Golijov's "Ayre" with an authentic chest-register dominated folk style singing, challenging concepts of virtuosity and authenticity in classical singing.

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[392] Lea, Gaelynn. *Someday We'll Linger in the Sun.* Music City Roots. 8/11/2016. https://youtu.be/dHLL7fGoLMQ (Accessed 6/06/2019)
[393] Christopherson, Chris. *Erase Me.* NPR Tiny Desk. 2019. https://tinydeskcontest.npr.org/2019/celebration (Accessed 6/06/2019)

The homogenized, market-driven conception of classical singing is associated with an ever-diminishing repetition of limited repertoire reflecting mostly European male viewpoints. The New Opera Workshop held in Brisbane; Australia called unanimously for fundamental, systemic change in the opera sector:

> We want to decolonize the distribution of power so that the stories and creative work of women and all people with diverse voices resonate equally with that of men.[394]

Women's and culturally diverse voices have mostly not found a place in the opera sector or in any classical vocal form. Many of these composers/performers who have not been part of mainstream cultural institutions are using sound technology to make room for themselves. Australian composer Andree Greenwell develops music theatre works that defy genre categorization. They have a strong and varied voice: lyrical, full of beauty and demand curiosity and listening. Greenwell produces and musically directs and often conducts her works. Cat Hope has also created works that deal with the current Australian politics and culture, curating works responding to the misogyny surrounding Australia's first female Prime Minister, *After Julia*.

The unamplified classical song recital has almost disappeared, while the exploration of thematic and musically coherent performances by contemporary and classical singers working with sound technology are gaining large audiences. Gabriel Kahane responded to the crisis in American politics by writing a song cycle *Book of Travelers*. It is based on conversations he had on trains post the election of Donald Trump. It is sung in a folk-rock style with instrumental writing reminiscent of Terry Riley's Trains. *Book of Travelers* has blood-lines connecting it to the songs of Charles Ives with Kahane's ability to capture seismic social and political shifts through intimate portraits of everyday events and the people that experience them. Kahane played the album in a tour of Europe and the United Kingdom in April/May 2019 in classical concert halls, contemporary music venues and festivals. American Singer and composer Missy Mazzoli and the vocal ensemble *Roomful of Teeth* are further examples of classical artists working exclusively on microphone and exploring singing from a range of vocal traditions including non-Western ones to create works of power, intensity, curiosity, humour and beauty.

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[394] Blackwood, Lim, Polias and Van Reyk. *Opera and the Doing of Woman.* Artshub, 2019. https://performing.artshub.com.au/news-article/opinions-and-analysis/performing-arts/blackwood-lim-polias-and-van-reyk/opera-and-the-doing-of-women-257968 (Accessed 16/06/2019)

Sound design has become an integral part of contemporary classical performances. Venues are either retrofitted with sound technology or designed with various sound technologies to ensure detail and proximity in the sound. Opera houses and operas are amplified in ways that are not obvious to the audience, except when an audience member happens to spot a microphone. Audience members have been conditioned to the intimacy and grandeur of amplified performance through recordings and broadcast. They are disappointed when this quality is not present in live performances. Opera directors make use of the freedom of body expression that mediation gives the operatic performer. Jane Sheldon's 2019 performance of *La Passione de Simone* had her back to the audience for the entire duration, a piece of direction only possible with mediation. Christopher Cerrone makes use of sound technology to set his headphone opera *Invisible Cities* in a working railway station where the singers and dancers are physically and sonically physically distant (except for the use of sound technology) and yet able to perform in ensemble with immense beauty and integrity.

The emergence of the outdoor opera spectacle has achieved an almost unanimous acceptance denied to amplified opera in an opera theatre. Both are a result of the classical voice's intersection with technology. Mediation constructs the vocal aesthetic, its relationship to the ensemble, the audience and the space the performance takes place in. As soon as a voice is transformed into an electrical signal it is changed, just as a voice travelling through air in a vast resonant cathedral is changed by that intervention. It appears that the use of amplification in relation to classical voice is acceptable if it is clear that its function is to facilitate a performance in a physical context where an acoustic performance is impossible, for example, on the Sydney Harbour. It is still much less acceptable for a classical singer to use the microphone as an instrument and develop a practice exploring and utilizing the expressive possibilities of this interaction.

This development of a broad range of classical vocal practices incorporating sound technology creates a need for the training of singers entering the twenty first century. Singers performing twenty first century classical vocal compositions will work with amplification. In order for them to discover the range of expression available to them through the voice and the body, exploration and interaction with sound technology are essential. New paradigms will be embraced as a result of this practice. These see the voice as full of possibility: adaptive and interactive rather than fixed. The voice does not impassively act upon other objects and entities

in the space. It is open and reactive to the possibilities of that interaction including those with sound technology.

The medium through which the singer hears the performance impacts their singing. This is an undeveloped research area, and yet a key one for understanding the interaction of technology, instrumentation, other humans and the performing environment on the performance. Sound, how it is transmitted and how we hear it, impacts on what the singer does. Listening and participating in a performance where one hears the sound acoustically, through fold-back or in- earpieces or headphones are different experiences. Exposure to a range of listening experiences is an important part of developing a practice incorporating a microphone.

This thesis has analysed the new technical skills and expressive range available to classical singers working with sound technology. The fear that the classical singer has been dis-empowered by the microphone or that classical vocal artistry has become a paler, weaker version of its former glory has proven unfounded. The diversity of this practice has created a continuum of amplified classical vocal practices. On one end of the continuum are practices where the aesthetic of the vocal performance is clearly recognizably similar to an unamplified performance, (for example, *Invisible Cities*). In these practices amplification transforms the nature of the sound the audience hears: there is more detail heard in the musical performance and the sound quality is more consistent within the performing space as a result of amplification. This is not to say that there aren't aspects of the vocal performance that are changed once a microphone is present. On the other end of the continuum are practices where the vocal aesthetic diverges from unamplified classical vocal performances in very significant ways, such as the use of the amplified voice by *Roomful of Teeth* and Holly Herndon. The work of these pioneering performers inevitably feeds into the work of the mainstream classical companies and enrich their creative development. Despite scepticism as to their status as classical vocal performances, these works are thriving and finding audiences.

Finally, classical vocal works incorporating a visible microphone and a classical voice receive less acceptance from mainstream critics or become relegated to the cross-genre, the inconsequential or the plain weird. Classical singers armed with knowledge, experience and vision are and will continue to use sound technology to push the boundaries of the classical voice into the twenty first century.

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