Between listening and sounding: exploring the limits of augmented instruments

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Abstract

This paper explores some of the changed relationships between body and environment that occur when instruments are augmented by electronic or digital circuits. Taking Gregory Bateson's theorisation of the schizophrenic body (1973) as its starting point, the paper explores situations in which the relationship between the performer, body, and instrument takes on increasingly separate communicational modes, in which the body and its meanings come to resemble the 'unlabelled metaphor' of the schizophrenic. A series of instrument/personas are brought before us, representing both the 'norm' of acoustic instrumental performances and the extreme limits of instrumental identity, offering critical insight into the space that augmented instruments occupy and transform. In considering some of these changes, and in reaching towards their extremities, attention is paid to the friction or awkwardness that accompanies the metamorphosis. In the same way that the ability of a language to 'point' is fraught with inconsistencies and potentials for misunderstanding, so the transformation in instrumental identities does not happen in a smooth and transparent way. However, the changes do create the potential for new sensibilities and forms of critical and ethical awareness.

Keywords: sound, environment, instrument, embodiment, communication

Resumen

Este artículo explora algunos de los cambios en las relaciones entre cuerpo y ambiente que ocurren cuando los instrumentos son aumentados por circuitos electrónicos o digitales. Tomando como punto de partida las teorías de Gregory Bateson sobre el cuerpo esquizofrénico (1973), este texto pone en escena una serie de situaciones donde la relación entre ejecutor, cuerpo e instrumento toma formas de comunicación cada vez más separadas en las cuales el cuerpo y sus significados pueden parecer una 'metáfora no etiquetada' de esquizofrenia. Para recorrer este proceso, una serie de instrumentos/personas se nos presentan como representantes de la 'norma' en la ejecución de los instrumentos acústicos y los límites

extremos de identidad instrumental, y ofrecen una perspectiva crítica en el espacio que los instrumentos aumentados ocupan y transforman. Explorando algunos de estos cambios y alcanzando sus extremos, se hace hincapié en la fricción o incomodidad que acompaña esta metamorfosis. Así como el lenguaje tiene la habilidad de 'indicar' y el posicionamiento de una 'auto-icona' en su interior se revela un proceso complejo cargado de inconsistencias y potenciales malentendidos, la transformación de las identidades instrumentales no ocurre de una manera transparente y fluida, sino que deja vestigios importantes de estados previos latentes en los nuevos.

Palabras claves: sonido, ambiente, instrumento, encarnación, comunicación

Introduction

The interaction between musicians and the acoustic environment has been one of the traditional strengths of music. It stretches to include an audience and ritual participants but originates in group activity, the interpersonal responses of one musician to another. This paper examines the way in which electronic media have transformed instruments and their interactions. A central theme is the way in which mediatisation creates new splits within previously integrated musical situations and also merges differences usually defined by physical boundaries.

These changed musical relationships are theorised through the work of Gregory Bateson, in particular his work on schizophrenia (Bateson, 1956) which examines the nature of schizophrenic breakdown in the family context and emphasises the importance of the relationship between embodied communication and linguistic communication. This analysis is then used to consider the role of augmented instruments (musical or not), in which embodiment, or tokens of embodiment, are changed, augmented, or adjusted by adding mediatised elements.

The qualities that Bateson identifies in schizophrenic breakdown, acting at the intersection between embodied communication, language and identity, provide a model for the consideration of the wider communicational environment in which new instruments exist and open a space for the consideration of the ethical relationship between sound, environment and listener. There, the 'instrument' is at a critical juncture, a boundary object involved in

trans-contextual tangles (King, 2016), placed in the physical world but conceived as a vehicle to enter into aesthetic and artistic discourse.

Bateson and the analysis of communicational frames

Gregory Bateson's theories were developed in the 1960s and 70s and represent a high point in the critical integration of research into perception and communication. His work explores the richly interrelated levels of communication which exist in any living environment, for example in an ecology, a society or a family. His distinctive way of thinking about the relationship between them led to the formation of a well articulated epistemology. His analytical methods have had impacts in fields as diverse as continental philosophy (Deleuze and Guattari 2004, Foucault 1988), family therapy (MRI Interactional school of Weakland, Jackson, and Watzlawick, the Milan school of Palazzoli) and artificial intelligence (Maturana, 1987). In musical research, his work is reflected most directly in the new fields of bio-musicology (Cross, 2003) and evolutionary musicology. Chris Small's influential book *Musicking* (1998) uses some of his ideas as a base.

Bateson's notion of framing and the identification of the types of frame within which communication takes place are particularly relevant for this paper. At its most simple, the problems and interests of 'framing' exist between the iconic and the symbolic, where the iconic is where the body of the giver of the message is always part of the message, and the symbolic is where the message is part of a virtual system of representation. In terms of instruments and sound, this allows considering the new relationships that emerge between body and environment when instruments are transformed by electronic media. Bateson's analysis of some of the fundamental features of this relationship will form the bases for the analysis of augmented instrumentation that follows.

Bateson's linguistic 'frame' clearly connects with Wittgenstein's proposition that language creates the limit and frame for knowledge. But Bateson's theory has a more biological basis, suggesting that communication is not formed out of language games alone but develops from biological and social relationships[1]. A deepening of Bateson's theory

[1] The famous article co-authored by Maturana "What the frog's eye tells the frogs brain" (Lettvin 1959), was a ground-breaking piece of research which decoded the information passing from a frog's eye into the brain. It was discovered that the brain receives pre-filtered data from the eyes which privilege fast-moving small objects, i.e. the frog's inner world is already geared towards the noticing of bugs. It set in

occurred in the analysis of the schizophrenic communication in the 'Double Bind', which will be discussed shortly.

The primary scientific context Bateson refers to in order to articulate the biological frame is the theory of evolution, which he reinterpreted as the survival of the individual plus the environment. Bateson cites Lamarck (Bateson, 1973:403), a pre-Darwinian theorist of evolution, as the first to devote an entire work of evolutionary theory to ideas about the evolution of the mind. In Lamark's work, the mind can be seen as a product of the evolutionary plus environmental system and not a separate transcendental entity.

Similarly, Bateson's theory of communication begins by examining the types of messages that animals can exchange based on their mutual context in the environment, and works through further levels which evolve by virtue of learned but changeable social and linguistic frames. The essay Redundancy and Coding (Bateson, 1973) discusses the evolutionary and other relations between the communication systems of humans and other animals. It begins by observing a distinction between the kinesic and paralinguistic forms of communication used by animals (and humans) and the verbal language used by humans alone. The difference consists particularly in the nature of the 'frame', which makes the communications intelligible.

The way animals communicate with each other is through an 'embodied metaphor'. A dog threatens you with its bare fangs, which would be the objects used in a real attack. A cat wishing to be fed acts out its dependency on you, meowing and twisting around your feet. A bird indicating a general threat acts as if it was personal, making angry and attacking gestures. These kinds of communication can be called iconic, in that the message material stands as an icon for the thing it refers to. They work in a 'part for whole' way, in which a part of the phenomenon or sequence is used and taken as an icon for the whole. Thus, exposed fangs stand for attack, dependency stands for 'feed me', 'I am angry' stands for 'look out there is a threat around'.

Several things can be said about this state of communication:

The individual giving the message is always part of it, is always a subject in the message.

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motion a train of artificial intelligence research based on the notion of autopoiesis, the means by which a system generates its own perceptual schema.

- The message always refers to the relationship between the giver and the receiver. There is no possibility of referring to relationships of which the subject is not a part.
- Intensities and magnitudes in the action relate to intensities and magnitudes in the thing referred to.
- The communication is a proposition, not an assertion, and it always refers to the here and now, not something far away in place or time.

Iconic or part-for-whole communication persists in humans in many forms and can be experienced in dreams and the type of 'primary process' thinking revealed in slips of the tongue or unconscious, inadvertent actions. The communications that come from paralinguistic or kinesic actions are hard to falsify. If you love, hate, or respect someone, it will be most quickly revealed in this kind of communication, and conscious goals will not easily distort it. The fact that verbal language has not made paralinguistic and kinesic communication obsolete in human communication can be seen as an indication of the fact that they serve complementary purposes. The kind of here-and-now communication of relationship enabled by use of the body (founded on the shared evolution in a common environment) saves linguistic communication from having to take on that burden.

Linguistic communication, on the other hand, suggests that a message can be placed in something other than the 'I – you' interactional pattern, and in order to do this, there needs to be a way of framing the context of the communication so that it can be understood. Since the communication no longer derives meaning from the embodiment of the individual emitter, there needs to be a way of creating a 'virtual context', something that says 'this is a map' and 'this is the way that the elements on it are to be related to a territory'. One could say that language allows communication to occupy a mobile, displaceable context. Linguistic communication can detach itself from its grounding in iconic, self-referencing contexts, and move into a world of symbolic reference. A shift has occurred in which 'self-reference' no longer refers to an individual biologically-embodied speaker referring to herself in her environment, but to the language system referring back into itself. The system of signs that make up language becomes the 'self' to which reference has to be made. This leads to the distinct features of linguistic expression which differentiate it from iconic communication. Some of these features are:

- The ability to refer to events and places which are remote in time or in place.
- The ability to refer to situations which are not centred on the self.

- The ability to make indicative assertions (statements which assert their own truth).
- The 'digital' nature of the word symbol, which needs no proportional or qualitative relation to the object it refers to, i.e. the word 'loud' does not need to be spoken loudly, the word 'hot' does not need to radiate more heat than the word 'cold'.

Whilst it is easy to give a list of features of linguistic communication and to distinguish them from the features of iconic communication, there are very deep questions about the actual way language achieves this seeming separation, and the way language succeeds in pointing to or referring to things. Particularly paradoxical is the status of the 'icon' in language. In the embodied communication we have been calling 'iconic', the actual bodily self of the organism is presented as part of the communication. In evolving the ability to use language, there is the suggestion of some kind of transformation of this 'self' icon, a suggestion that linguistic competence evolves out of a re-framing of the self.

Lacan (1993) proposed a theory of how children move to embrace the 'symbolic order' of language. He suggests that a child facing the Oedipal conflict (the impossibility of possessing the parent of the opposite sex) engages with the symbolic order of language as a way of resolving the conflict, of incorporating the 'other' in a symbolic sense. The symbolic order allows the desired parent to feature in a symbolic form alongside the symbolic representation of the self. Thus, the relationship can be internalised and the loss mitigated.

In another theory Pines (1998) describes the process by which the child and mother construct a proto-conversation. From the start, mother and child participate in social interaction and use turn-taking dyadic exchanges to pattern their communication. The rhythm of these pre-verbal exchanges is shaped by sensitivity and reciprocal awareness. They form a basis from which the child can build a concept of self, inside a proto-linguistic exchange. The acknowledgement of the self by the other in conversation allows the basic building blocks of self-representation, object representation and a linking effect to be established.

The theories of Lacan and Pines suggest some of the multiple different ways in which the difference between the self-body used as an icon in communication and the symbolic icon used in language can be negotiated. The dimensions of this separation can be seen in many other ways too [2]. It is, for example, an area of critical interest in the analysis of the separation

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[2] The methods by which a sentence points to a subject are always affected by a process of remote reference, relying on a meta-linguistic structure.

between a musician and the sound produced, discussed in the later part of this essay. In this entangled world of communication, the larger environment will always be available to transform the meaning of the smaller one —the part is always defined in relation to the whole.

Some of the particular consequences of this on the individual's experience were studied by Bateson in his work on the Double Bind (Bateson, 1973). Later, this study was elaborated in a far-reaching thesis on the nature of communication.

The Double Bind

The Double Bind (Bateson, 1973) is the study of schizophrenia in a family. In particular, it marks the way that stark conflicts between levels of communication employed by the parents can create mental illness in the children. Bateson proposed that, in the case of a schizophrenic, the communication patterns of the family can be seen to have created the schizophrenia: the mental illness of the individual was placed in them by the communicational environment that they are in, and by their inability to question, change or frame the context.

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He looks at the situation from two viewpoints, the schizophrenic patient and the relationship between the patient and their family. From the patient's point of view, the problem can be described as the lack of a strong sense of self or ego:

> (a) He has difficulty in assigning the correct communicational mode to the messages he receives from other persons. (b) He has difficulty in assigning the correct communicational mode to those messages which he himself utters or emits non-verbally. (c) He has difficulty in assigning the correct communication mode to his own thoughts, sensations and percepts. (Bateson 1973: 173)

"Denotative communication as it occurs at the human level is only possible after the evolution of a complex set of metalinguistic (but not verbalised) rules which govern how words and sentences shall be related to objects and events." (Bateson 1973: 153)
Certain kinds of meta-linguistic code may be picked apart in semiotic (Nattiez 1990) or structural (Chomsky 1988) analysis, but these analyses depend on unspoken codes of how they relate to the territory, in a spiral which can go on forever. The separation of the 'deep rules' from the surface structure which Chomsky aimed for in structural linguistics attempts to avoid this paradox and to reserve a place for the 'deep rules' in a universal space.

The particular kind of communication featured in schizophrenia is the use of unlabelled metaphors. A speaker will avoid referring to any relationship, implicit or explicit, between himself and the person he is addressing, and he will avoid indicating whether the message is intended ironically, literally, as a joke or as a metaphor.

Bateson proposed that this manner of structuring dialogue came about as the result of a particular learning process which occurred within the family and which he labelled the 'double bind': a situation in which the patient or 'victim' is forced to misunderstand or ignore those aspects of communication which serve as markers of context. Symptoms are caused by 'the experience of being punished precisely for being right in one's own view of a context' (Bateson, 1973: 206).

He gives the example of a mother who is, for whatever reasons, unable to tolerate intimacy with her child and is, in addition, unwilling or unable to acknowledge this feeling. The child is lonely and desires affection and approaches the mother. The mother, wishing to avoid intimacy, suggests in a caring way that the child is tired and should go for a nap, even though the child is not tired. If the child follows her instructions and takes a nap, this will have a double benefit for the mother. First, the child goes away, and second, she satisfies her need to feel she is caring.

> To be close to the parent, he must sacrifice his right to indicate that he sees any meta-communicative incongruencies, even where his perception of these incongruencies is correct… The patient may know but must not tell, and thereby enables the parent to not know what he or she is doing. The patient is an accomplice in the parent's unconscious hypocrisy. (Bateson 1973: 208)

The analysis of the Double Bind, and the many situations in which it occurs, gave Bateson a very clear picture of the mechanisms at work in the communicative relations between people. Particularly important was his recognition of how the larger family system works to create the state of the individual within it. This observation lead Bateson and his co-workers Jackson, Haley, and Weakland to develop the school of family therapy in which therapists engage with the communication systems in the family. The therapist acts to facilitate the discovery of new patterns of communication, which restore the potential for individual growth and learning.

This overview of Bateson's communication theories shows the importance of the frame in judging what communication has taken place. In complex human interactions, the frame

includes elements of both iconic and linguistic communication. Becoming adept in interpreting communicational frames is a social skill of considerable complexity that begins in the earliest stages of childhood. The first learning about communicational frames begins in the family and is powerfully influenced by the systemic qualities of the communications within the family.

Whilst schizophrenia is an extreme example of the consequences of misalignment, recognising the depth of the interdependence between body and environment in communication is a fundamental insight.

The following section of this paper will explore some of the changed relationships between body and environment that occur when instruments are augmented by electronic or digital circuits. Taking Bateson's theorisation of the schizophrenic body, the paper explores a series of situations in which the relationship between the performer, body, and instrument adopt increasingly separate communicational modes, where the body and its meanings might resemble the 'unlabelled metaphor' of the schizophrenic. In order to take us through this process, a series of instrument/personas are brought before us: the acoustic instrument performer, the sound-director with mixing desk, the sound-director as microphone (a reincarnation of Murray Schafer), the sound-director as Loudspeaker (a reincarnation of Pierre Schaeffer). These represent both the 'norm' of acoustic instrumental performances and the extreme limits of instrumental identity, and represent a space that augmented instruments occupy and transform. [3]

In exploring some of these changes, and reaching towards some of their extremities, attention will be paid to the friction or awkwardness accompanying the metamorphosis. In the same way that the ability of a language to 'point' and the place of a 'self icon' inside language is a complex process, fraught with inconsistencies and potentials for schizophrenia, so the transformation in instrumental identities does not happen smoothly and transparently but leaves vestiges of earlier states latent in newer ones. These transformations will be explored in a series of vignettes each of which focuses on a particular set of relationships in acoustic identity which are transformed by subsequent ones.

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[3] Whilst the relational structures of music provide a language-like resource for traditional instruments, the new relationships between sound, body, and environment introduced by augmented instruments introduce challenges in conceptualising a shared acoustic vocabulary. The focus in this paper is on the new listening and performance situations brought about by augmented instruments, and the discussion of new shared acoustic languages is implied but beyond the scope of the paper.

Vignette 1: The acoustic performer

A musician performing with an acoustic instrument or singing is placed within sound, both as producer and listener. The reflexive relationship created between the production of sound and its return from the environment provides the starting point for the following examination of some of the changes that occur when electronic mediation is brought into the process.

The potential for seeing the performing musician in a central position, recovering a balance distorted by electronic production, has been articulated by Murray Schafer in evangelical terms. In *The Soundscape* (1994), Schafer suggests that the highly immersive experience of listening with headphones may direct the listener towards a new integrity with himself, but "only when he releases the experience by pronouncing the sacred Om or singing the Hallelujah Chorus or even the 'Star Spangled Banner' does he take his place again with humanity" (Schafer, 1994:119).

The fullness of the journey of a sound between its source and its reverberant reflection can be seen as a unique feature of sonic experience. Compared to sight, for example, sound offers a more immediate experience of multiple perspectives. Barry Blesser describes the activity of sound-making as a kind of aural illumination of the space and compares this relationship to the space with one based on vision, where

> … because human beings do not possess an intrinsic means for generating light, a space does not react to our visual presence, which manifests itself there only through interrupted or reflected light – as shadows or mirror images. (Blesser, 2007: 16)

Blesser makes the point that humans do not create the light with which they see, but they can create the sound by which they hear. The person making sound is "immersed in the space's aural response. By responding to human presence, aural architecture is dynamic, reactive, and enveloping ". Blesser, 2007: page 16(ibid)

Acoustic musicians develop ways of dealing with the most extreme version of this simultaneous experience: the immediate source of the sound is within the body (generated by muscular action and, in the case of singing, interior vibration), but this is heard at the same time as the return from the outside environment, conditioned by the physical space and stylistic norms. The way that these two types of experience are combined into the semblance of a coherent whole is a complex process, dependent on multiple social and psychological factors as well as physical criteria.

Similarly to Bateson's identification of the differences between iconic communication, in which the subject is always a part, and linguistic expression, which suggests a non 'I' 'you' pattern, Blesser identifies one of the sources of complexity in sonic identity as the mix between an allocentric and an egocentric way of perceiving space:

> Because an allocentric framework situates you within a fixed external environment, philosophically, it implies that reality exists apart from your self. In contrast, an egocentric framework situates your self at the center of an experiential universe where everything is interpreted relative to you. A cognitive map of space can be egocentric, allocentric, or some combination of both. The choice of framework modifies the experience of space. (Blesser, 2007: 46).

The extent to which the egocentric and allocentric are interlinked can be seen very clearly in music therapy, where the unconscious inner state of the client is presented to the outside world via sound-making, and the state is acknowledged and responded to by the therapist in a way that is analogous to an external reflection. This reflection from the therapist back to the client, modified by the therapist's internal process, encourages a therapeutic deepening of the relationship

> More sophisticated procedures include those developed by Nordoff and Robbins (summarized in Rider and Eagle 1986:231-2) and involve the therapist mimicking the spontaneous musical behaviors of autistic children in synchrony with them. In their experience, once a child realized his behavior was being mirrored by the therapist, "there was almost universally a laugh, a smile, or some observed affective change which seemed to indicate the children were willing to enter into a more therapeutic relationship. (Clayton et al. 2004: 230)

The psychoanalyst and music therapist Edith Lecourt has discussed the psychodynamic aspect of this balance in her article *Le sonore et les limites de soi* (Lecourt, 1983), and employs a particularly direct term for it: the 'self-sound interval'. This symbolises the way in which the distance between the inner sounding self and the outer sounding self is in constant fluctuation, partly related to the environmental context, but more deeply related to a sense of sonic self acquired over time, and particularly within the social circle of early childhood.

In the context of music therapy, the focus is less on music as an object and more on a reflexive understanding of the situation in which the music-making occurs. (Ruud, 2008).

Vignette 2: The acoustic performer using vibrato: an example of the culturally constructed difference between close and distant listening

In the same way that music therapy allows some of the individual and private conditioning of our listening habits to be foregrounded, so the following brief analysis of vibrato allows a perception of some of the shifting cultural frames in European art music.

The nuances of vibrato form part of the code musicians use to distinguish between different stylistically framed gestures, for example, between Baroque and Romantic performance practice. The use of vibrato in this context is partly based on differences between the sound as it is at the point of performance (close or inside the performer's body) and the way that it behaves in the room, thus becoming a significant tool for marking the social distance that exists between a performer and audience in the wider acoustic field. (Leech-Wilkinson, 2009, Katz, 2010:85-98)

Vibrato is produced by an oscillating pitch, the physical consequences of which are felt particularly in two areas ——the resonating body of the instrument (and the performer's body) and the reverberation of the enclosing space (hall, room etc). In the resonating body of the instrument, the oscillation can excite and vary some of the upper partials of the tone while keeping other parts of the timbre stable. The result depends on the size and rate of the vibrato, the base pitch to which it descends and on the intensity of the energy put into the instrument. Vibrato can be used to focus or spread the intensity of a forced and bright sound and to add shimmering and colourful layers to the upper partials of the timbre (Flesch, 1924:40)

The effect in the surrounding space is equally important. In resonant acoustics the diffused sound becomes impossible to track as a single moment-by-moment event, and a range of positions are heard simultaneously. Between these two places, the close and the far, will be a number of intermediate points, where the room's reverberation will emphasise different aspects of the spectrum. The key is that both these attributes of the sound, the close and the distant, are audible simultaneously by the performer and most of the audience. The sound that the musicians produce is not just created with close proximity in mind but also with its distant effect. Particularly, it is about the kind of meaning that is carried by the difference between these two positions. The significance of this can be deduced from changes in the use of vibrato in Baroque and Romantic performance practice (Hauck, 1975:23-24).

In Baroque styles there is a greater use of lifted notes (notes where there is a silence after them), in which the resonance of the room can be heard, and much less use of vibrato. When the performer plays a sustained tone without vibrato there is a higher degree of fusion

between the direct sound of the player and the reverberation. The lifting of the tone or the addition of a moment of vibrato then becomes a way of highlighting the separation of the performer from the enclosing acoustic. In Romantic performance practice there is much greater use of vibrato. The performer can maintain a continuous production of vibrated sound and is able to saturate the space more completely whilst still having a way of coding the difference between himself and the enclosing environment.

Murray Schafer has suggested that the "desire to dislocate sounds in time and space" has been part of a historical trend in Western music:

> the introduction of dynamics, echo effects, the splitting of resources, the separation of soloist from the ensemble and the incorporation of instruments with specific referential qualities (horn, anvil, bells, etc.) were all attempts to create virtual spaces which were larger or different from natural room acoustics (Schafer 1994: 91)

The use of vibrato in Romantic performance practice can be seen to participate in a similar trend, creating a human acoustic presence which increases the saturation of the wider acoustic space while maintaining a functional distinction with the immediate sound of the performer.

My own experiences of baroque and romantic performance practice make it clear that musicians are able to conceptualise differences between close and distant sound and hold these as elements in a culturally constructed relationship between an interior self and an exterior reflection. This relationship is not simply a matter of physics, or a subsidiary hurdle in learning to play an instrument, it is fundamental: one is learning to play the room and the space as well as the 'instrument', learning a culturally significant way of hearing oneself from a distance whilst monitoring what occurs within.

The point is that the listening of the musician to the return of the sound from the outside is directed by culturally defined priorities —it is not the reverberation per se that the musician is listening to, but those aspects of the sound in which a deliberately created relationship between the sound made and sound returned can be discerned. Sounds that are heard may include many 'objective' or phenomenological aspects which are unclassified or ignored, but will also include certain key elements which form the basis for a way of structuring the relation between inner sound-making and the space that encloses the maker.

Vignette 3: Amplification: The Sound Director's [4]mixing desk and the unconscious communications of the performer

If one of the cultural complexities for a performing musician is the simultaneous interpretation of the inner and outer forms of acoustic experience, in which the room or enclosing space becomes an extension of the instrumental identity, then this increases dramatically with the use of electronic media. By bracketing out segments of the mechanical propagation of sound and replacing them with circuits linking microphone and speaker, aspects of the musicians' and instruments' self/sound identity are distributed, and the musician is moved to new ways of staging the self. The placement, control and hearing derived from these additional 'circuits' creates not only new concepts of the instrument, but also new psychological and ethical positions for the performers and listeners.

In establishing the personal ground on which the performance of self is based, there is an important place for signs which are presented as unconscious but which are in fact under control. Theatre actors develop skills to bring the more unconscious nuances of body and vocal inflexion under conscious control, and musicians do it no less. [5]

The performing actions of the acoustic musician contain carefully cultivated displays of what appear to be personal and private material. Thus, when executing the movements required to make the 'official' notated sounds of a piece there will be many other sounds produced. These sounds include breathing, shifting strings, tapping fingers, the sounds of the tongue and lips, and the roughness which emanates from certain parts of the instrument. On the cello, for example, these sounds occur during string crossing or when releasing a finger from the string and sliding then re-attaching. They are caused by a hidden hierarchy of movements, which can give the appearance of sleights of hand when they are well controlled, or of mistakes if they are inadvertently revealed. The choices of what to demonstrate or keep hidden are largely cultural: for example, in the earlier 20th century there was much greater

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[4] The title "Sound Director" has some every-day connotations which will provide an initial point of departure. The label "sound director" is here used to stand for the new performer/instrument role created by the mixing desk, in order to explore their effects on the construction of the stage, audience and instrumental identities.
Later, these will be opened out to include more diverse definitions.

[5] In Goffman's book The Presentation of Self in Everyday Life (1959) he somewhat playfully analyses a number of group social situations in terms of their front and backstage behaviours, identifying the role played by the backstage in supporting the performance presented in the front (discussed in thesis chapter 1.2.1). Although front and back stage are physically separated from each other with walls or other barriers to perception, they are interdependent, working together to create the environment in which 'front' behaviour can take place.

use of audible glissando to move from note to note. Discovering this underhand language and becoming more familiar with its cultural connotations is one of the pleasures of learning an instrument. Though it can also be one of the pains, as the movements are so fought over and upheld by conservative tradition, taste masquerading as rules.

Mediatisation can change the basis on which such personal separations between public and private are made. By using microphones and loudspeakers, the carefully staged relationship of a performer to the nearness or distance of sounds can be eroded. Amplification can mean that sound produced by the performer is equalised through the space. For example, the dual function of vibrato (close and distant effect) can be negated (Katz, 2010), the backstage 'unconscious' sounds of the performer can be broadcast effortlessly through the space, and equally, the performer may feel detached from what the audience is hearing, the sound of the loudspeaker system in the auditorium being inaudible to the performer. It can also mean that there is a genuine loss of the ability to construct the appearance of unconscious or private material, with the resulting potential exposure of something inappropriate or unwished for. Or the reverse, that previously unconscious parts of a performance become a deliberate and conscious part of it, as described by Barthes (1997). [6]

Vignette 4: Amplification - Relationship between performer and Sound Director in Saariaho[7].

Even in the simple case of an acoustic musician with microphone and a sound director who controls the diffusion of the amplified sound, using the instrument-like functions of the mixing desk, there are interesting problems in interpreting the nature of the identities created. In her analysis of flautist/sound director interactions in the works of Saariaho, Riikonen (2005) discusses differences in the way that performers construct identities. One flautist interviewed described her responsibilities as directed towards the flute, continuing the 'self-flute' paradigm that comes with many years of training, whilst the sound director spoke about his responsibility to the audience in managing the final diffusion of the sounds from the

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[6] In 'The Grain of the Voice' Roland Barthes makes a distinction in a similar vein concerning the difference between the singers Panzera and Fischer-Dieskau (Barthes 1997). For him Fischer-Dieskau has turned the breathing and lungs of the singer into a controlled object for cultural consumption, removing it from the backstage privacy of the body, whilst Panzera, focussing on the language-based articulation of vowels and consonants, leaves breathing officially inaudible and hence more tantalising.

[7] The work discussed here is Kaija Saariaho's 'NoaNoa' for flute and electronics (Saariaho, 1992)

loudspeakers. They spoke about their relationship to each other in terms of a negotiation of power, with mutually supporting and regulating roles.

However, the description of this power was inconsistent and often contradictory. One flautist spoke of her discomfort at the amplification of certain in-breaths (those needed for the sake of air while performing otherwise sanctioned notated sounds) as if this invaded a certain privacy or passed the threshold between flautist identity and personal, bodily identity. Another flautist interviewed by Riikonen spoke of his ability to disregard the sound coming from the loudspeakers, saying that it was the responsibility of the sound director to deal with it. But as Riikonen says: "Alanko (the flautist) retains the authorship of the playing activity entirely with himself in a quite contradictory way; the activity of the field is acknowledged by arguing that it is not necessary to hear one's 'own' sound". (Riikonen, 2005: 239)
Thus, the modality of sharing constructed between the flautist and the sound director has, for the flautist, the potential to veer between a sense of intimate exposure or, alternatively, a sense of disconnection from a personal essence. In one case, the flautist wishes to retain an instrumental identity that reaches the whole space, whilst in the other the flautist defines identity in the comparatively narrow sense of performing flute-playing actions without really hearing the sound. These responses of the flautist represent one side of a fluctuating equation which also includes the sound director and the audience. Riikonen's analysis focuses on the flautist identities in interpreting Saariaho's pieces, but even in this relatively constrained environment we see some of the new relationships between front and backstage identities created through electronic media. In the next vignette we examine in a little more detail the way in which the new role of 'sound director" and mixing desk function in relation to the acoustic instrument identity.

Vignette 5: Amplification - Sound Director's mixing desk and the performance of intimacy

Moving slightly further from the identity of the acoustic performer, we shall now turn our attention to the role of the sound director. In the professional discipline of live sound mixing there is often a division between monitor engineer, who mixes signals for the performers on stage, and the front of house engineer who mixes a signal for the audience. This suggests a dual responsibility, firstly to comprehend the nature of the sound that the performers habitually make, and secondly to amplify it with as much vividness and plausibility as possible for the audience. We shall examine these two responsibilities in more detail.

In attending to the performer and thinking of how to relay a sense of an individual's performance to the audience, the sound director is faced with a particular paradoxical problem. Since the instrumental identity adopted by the performer already contains a coded sense of the image presented to the audience (as argued above), created through culturally inflected choices about the coupling between room acoustic and instrumental sound, how does the sound director recreate an image of the 'performer' and present it in the wider space? To ignore the coded coupling of the instrumental identity to the actual room acoustic is to fail at some level to transmit the nature of the performance identity to the audience. However, to succeed is equally difficult since the act of amplification changes the nature of the sound in the space and thus a good portion of the symbolic and physical acoustic relationship between it and the performer's actions. One solution is for the performer and sound director to base their respective actions on a stereotyped or shared fiction of the sound. The performer focuses on her preexisting sense of instrumental identity, imagining a generic space in which she is playing whilst in fact ignoring parts of the actual environment (as if the sound coming from loudspeakers was actually inaudible to her)[8] . The sound director deals with the qualities of the sound received from the microphone (whilst ignoring some of the live sound coming from the instrumentalist and hall), adjusting the sounds so that they represent an adequate version of the performer playing in a space which resembles the one the performer is imagining, possibly by adding a small amount of reverberation and adjusting the dynamics. The director will in a sense be compensating for perceived deficiencies and peculiarities of the actual space, no doubt concerned with its increased size, in so far as it fails to represent the ideal space in which a performer might be playing. This version of events can bring a wider public into the audible range of a live performance, but it depends on the existence of a stereotyped instrumental identity and an acceptable way of rendering this in the loudspeaker space.

The Sound Director is also **attending to the audience**: By being placed with the audience, usually in the middle or the last few rows (in a traditional performance layout), the sound director will have a different perception of the sound from that of the performer. From this perspective it will be possible for the sound director to gain an impression of the volume

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[8] She will be helped in this process by the nature of the music she is playing. Traditional musical structures encode relationships between performed space and performers. For example, echo effects are the crudest of a vast spectrum of musical techniques which refer to external spatial phenomena, and which can be used within musical structure to make symbolic connections between the space and the performer.

level and spatial distribution of the sound as heard by the audience and be able to modify sonic attributes to change this impression.

As suggested above, the sound director's intent will be to produce a sound which represents the instrumental performer, but his focus will also be on the qualities of the sound diffused to the audience listening space by the loudspeakers. These sounds will will have many differences from those produced directly by the instrument, having been transformed by the qualities and positions of the microphones, the amplification system, the types and positions of loudspeakers and any other intermediate electronic processes such as equalisation or reverb.

The sound director may wish to compensate for the audience's distance from the performer by emphasising the usually somewhat hidden articulations of the performer, those heard close up, by using a microphone placed near a flautist's lips, for example, or by amplifying lower frequencies or exaggerating dynamic contrasts. Depending on the intent of the sound director, the sound heard by the audience may become increasingly divergent from the activities of the acoustic performer.

These two perspectives, the close acoustic events on the stage and the distant acoustic events in the room, can be seen to mirror those being negotiated by the acoustic musician in unamplified performance. In the unamplified situation the musician structures her actions in order to create a symbolic and actual connection between these two areas. However, with amplification these two areas can become less connected, and the perception of the sound director and acoustic musician may well be that the stage and auditorium have become two separate areas.

Francisco Lopez has described the situation in the following way

> The electronic amplification of instruments in rock / pop (and also jazz) has naturally created two strangely separated areas of sonic experience and control in the space where the live music takes place. What the musicians on stage hear, through the monitors, and what the audience hears, through the main PA, are two different things; quite different things. Not only in terms of volume (the musicians can be unknowingly blasting the audience, or the contrary, which in most cases they would consider even worse), but also with regards to any other imaginable property of the sonic matter in the audience area. It is the sound technician in the back of the room who is really creating that (by mixing, EQ-ing, panning, routing, balancing of speakers, etc.). In a way, from the position of the audience, the

> musicians have control over the generative part of the process, but the sound technician has the control over the final phenomenological part of it, with all its consequences. Of course the bands take pains at hiring good, akin sound technicians but, because of the stage, they have to keep this sonic splitting anyway. (Lopez, 2004: page)

However, despite clarity in describing the splits in the amplified contexts I believe that Lopez is incorrect in ascribing a similar situation to the unamplified musician: "Because the sound radiates from his / her position, the player of an acoustic instrument cannot be the generative actor and the receptor-as-audience at the same time." (Lopez, 2004: para 10)
It seems misleading to suggest that because sound 'radiates out' from the performer, they are unable to attend to their own sound; sound also radiates back in. The listening position of the acoustic instrumental performer can be thought of as somewhat different from that of the audience, but not completely dissimilar. To suggest that because the performer is not in exactly the same place as the audience they will be disassociated from the sonic material through which instrumental identity is constructed is to miss the point. Instrumental identity is not made out of a straightforward 'whole' which is simply projected out into the audience space. At a fundamental level it already contains differences and splits (between personal and public identity, close sound and distant sound etc.). Differences between the perspective of the audience and that of the musician are part of the semiotic potential of the situation: they create difference but not a complete schism. The acoustic space occupied by audience and performer is common to both but is one in which articulations of difference can occur.

Lopez portrays one of the advantages of sounds controlled by the mixer/sound-director as the ability to reunify the split between sonic spaces and the personas that occupy them (Lopez, 2004: para 10 ibid). However, my argument is that the exploration of difference in the shared acoustic space of the performance is a principal constituent of the meanings which are constructed in the performance. Without this difference, represented in the admittedly unstable symbols of the sounds and actions, there would be no point of contact or mutual interest in the event between audience and performers. This is not to say that the sounding situation of the mixer/sound director does not have numerous marks of difference on which to draw but to question Lopez's inference that the reunification of splits is the quality that makes this desirable.

Vignette 6: Amplification – Hybrid: Sound Director and performer identities in live performance

One of the potential outcomes of amplified performance is the creation of spaces which are experienced as separate, the separation of 'frontstage' and 'backstage'. A second, more experimental option exists, in which the acoustic musician and sound director explore the construction of new identities by investigating the way that they can shape each other's acoustic representation. The performer relinquishes some of her pre-established ways of engaging with the instrument, and the sound director takes on a more prominent role in the generation of a sonic identity, not just, to use Lopez's term, the phenomenology of it.

This demands that both sound director and performer attend to a shared acoustic presence and develop a reflexive awareness of their effects on each other. In the reflexive situation described above, the sound created in the space becomes an indicator of the kinds of relationship being explored between the acoustic musician and the sound director [9]. Thus, as well as any traditional ways of coding the space which may exist for the instrumental performer, there will exist a new range of sonic material, having as its source a reference to the evolving relationship between the performers. An interesting example is the case of "feedback instruments", which are acoustic instruments with an embedded loudspeaker with the feedback process determined by any number of agents, who may be other human performers or artificial intelligences, all listening in and playing the circuits. A specific example is the 'Feral Cello' (Davis 2019), with a wider range of instruments discussed in Eldridge, A. et al., 2021.

The role of the mixer/sound-director is thus, in many ways, a collaborative or hybrid one, in negotiation with acoustic instrumental identities but also potentially parasitical, having the effect of stereotyping, supplanting or displacing the traditional instrument.

Recording - the tape recorder as instrument

The separation between the acoustic instrument on the stage and the listening audience discussed above can be taken to an even greater extreme when sound-recording, in any of its

[9] The interest in the mental state of another person, discussed as theory of mind (Cross 2007), is seen as a core element of responsive processes in music, such as entrainment. It is not explored in this paper, but is the subject of the chapter "Reciprocal Mimesis and Grounded Mimesis" in Gardner, Voegelin (2016).

technological forms, is used. When using recording or playback the role of the sound director can move away from the traditional one of amplifier of a performance and out into the field or the studio, freed both from an accountability to the musician or to an audience, as they are no longer placed between them. The tape recorder becomes a virtual placeholder for the sound director, fixed between the sound event as it happens in the world and the sound object as it occurs through loudspeakers, and the actual sound director is able to take up positions elsewhere along the axis of technological mediation.

In exploring these new situations, we shall initially assume that they occur at different times. While making a recording, the sound director is not simultaneously diffusing the recording into the environment, or while playing back recordings, they are not simultaneously re-recording and manipulating them. The separation of these activities is the starting point behind a more detailed exploration of potential differences between the acts of recording and playing back. By temporarily abandoning the idea of feedback between recording and playback, we are able to explore more divergent contexts in which the microphone and loudspeaker operate. The idea of a separation between the experience of the sonic event in situ and its experience at a later stage in a technologically mediated form is at the crux of a split in the experience of sound.

The unified term ‘sound director’ that we have been using to describe the person who was placed between the performer and audience will also be temporarily split and incarnated as the two personas of R. Murray Schafer and Pierre Schaeffer, representing the views as seen from the perspective of the microphone and loudspeaker. These terms are used advisedly and will be contextualised more fully. The incarnations are set in a particular historical period, in the decades following the Second World War. As such, their approach to the problems of modernity and issues of musical meaning is marked by the catastrophic undermining of trust in existing cultural values. The desire and hope for a firm basis on which to re-establish viable human communication is entirely comprehensible, and both Schafer’s soundscape orientation and Schaeffer’s musique concrète suggested paths through which trust could be restored, guided by the testimony of the sounds heard at these far ends of the spectrum, in which the body can be alternately replaced by the instrument of the microphone or loudspeaker.

In the analysis that follows, rather than treating these two instrument-personas as completely separate, we will examine their connection to each other through the prism of ‘schizophonia’.

Vignette 7: the sound director as microphone (a reincarnation of Murray Schafer)

Schafer's term 'schizophonia' was first used in his book *The New Soundscape* (1969:43) and is a label for a problematic split in signification arising from electroacoustic reproduction. It

> …refers to the split between an original sound and its electroacoustic transmission or reproduction... Originally all sounds were originals. They occurred at one time in one place only. Sounds were then indissolubly tied to the mechanisms that produced them. The human voice travelled only as far as one could shout. Every sound was uncounterfeitable, unique. … Since the invention of electroacoustical equipment for the transmission and storage of sound, any sound, no matter how tiny, can be blown up and shot around the world, or packaged on tape or record for the generations of the future. We have split the sound from the maker of the sound. Vocal sound, for instance, is no longer tied to a hole in the head but is free to issue from anywhere in the landscape. (Schafer, 1969: 90)

Schafer's intention in labelling a split in this way is clear: it is both a pointer towards a less alienated relationship of man to nature and a pejorative label for the presence of amplified sound in culture. Schafer points to the way in which the industrial revolution is responsible for a break in the continuum between nature and mankind, and that the original hi-fi soundscape of rural life is being replaced by the lo-fi soundscape of the urban dweller. The description of the richness and interdependent relationship between humans and nature in a pre-industrial society contrasts with the depletion and social and acoustic poverty of life in an urban setting.

One of the activities that Schafer proposes as both a form of resistance to this split, and as rehabilitation, is the use of exercises (called ear cleaning) that will help re-awaken our listening or clairaudience. The creation of a new listening mode mirrors the role played by Pierre Schaeffer's reduced listening, which will be discussed shortly, in proposing not only a definition of a new conception of the place in which sounds are made but a parallel new mode through which those sounds can be heard.

Part of the deprogramming of the schizophonic listening state makes use of the mediatising tools of microphones and tape recordings themselves. Pauline Oliveros describes the way in which the childhood gift of a tape recorder opened her ears to a new way of hearing the world, one which then could begin to operate almost independently of the machine itself.

> I have been training myself to listen with a very simple meditation since 1953 when my mother gave me a tape recorder for my twenty first birthday. The tape recorder had just become available on the home market and was not so ubiquitous as it is today. I immediately began to record from my apartment window whatever was happening. I noticed that the microphone was picking up sounds that I had not heard while the recording was in progress. I said to myself then and there: "Listen to everything all the time and remind yourself when you are not listening". I have been practicing this meditation ever since with more or less success. I still get the reminders after forty-six years. My listening continues to evolve as a life long practice. (Oliveros, 1999: page 3)

Extending this metaphor in a more clearly political direction, Hildergaard Westerkamp makes an activist use of recording to address social and environmental breakdowns. The potential for unity is revealed in an oppositional sense through the use of the schizophonic medium.

> Rather than lulling us into false comfort, it (soundscape composition) can make use of the schizophonic medium to awaken our curiosity and to create a desire for deeper knowledge and information about our own as well as other places and cultures… Rather than disorienting us, such work potentially creates a clearer sense of place and belonging for both composer and listener. (Westerkamp 2002: 54)

Thus, Westerkamp is able to say that soundscape composition can be used as part of a conscious effort to heal, or at least critique, a rift which has opened up with the natural world. The instrument of the microphone and recorder are used almost as in a guerrilla war, like weapons seized from the enemy and used against them.

The awareness of the damage being done to the environment is linked explicitly to the notion of a split in the signs at the centre of contemporary acoustic communication —a breakdown in the communications linking our bodies and our environment. In the case of soundscape and field recording, the potentially parasitical substitution of the microphone for the body of the listener is turned into a means of political critique and enquiry. The body of the field recorder, as a gendered, ethnic and socio-economic presence, is brought into consideration, for example in Mark Peter Wright's "The Noisy-Nonself or I, the Thing in the Margins" (2015) or Zoe Irvine's "Distance and proximity piece" (2011)

The difficulty, however, with schizophonic methods of critique is that there is a potential idealisation of one side of the split as if it were an original whole (rather than simply heightening awareness of an imbalance), which places the notion of difference in a problematic light. As discussed earlier, the 'instrumental identity' of the performer is constructed around a series of differences and not by reference to a unified whole which is then radiated out, or in which one is completely immersed. However, before returning to the distinction between a split and a difference, I would like to further explore the scene of schizophonia and look more closely at the other side of the split identified by the term.

Vignette 8: the sound director as loudspeaker (a reincarnation of Pierre Schaeffer)

Whilst Murray Schafer's vision of the path to restoration from the schizophonic split can be thought of as the recovery of relationships existing in an idealised past, an equivalent but opposite version of wholeness was explored by Pierre Schaeffer. In this version, the restoration of unity lies in the future, in the fuller realisation of the sonic phenomena which the tape recorder enabled. In this scene, the body is replaced by a loudspeaker, and the newness, authority and primacy of the potential sounds are taken as the starting point for new worlds and new structures.

Schaeffer was acutely conscious of the complexity of the semiotic processes into which recorded sound was placed. He discussed the meaning of music, the systems of referentiality which support it, the status of music as a language, and the idea of sound in itself. His work may be seen as an initial attempt to create a map in which the new kinds of sound and signs available from recorded material could be placed back in the cultural domain.

> Nous recherchons les eléments préexistants à tout système musical possible, et prétendons qu'ils serviront alors à réexpliquer aussi bien le nôtre que d'autres systèmes possibles ...
>
> We are looking for the elements which preexist all possible musical systems, and suppose that they will serve to re-explain our own system as well as any other possible one… (Schaeffer 1973: 38)

However, the process by which this might take place had difficulties. Seth Kim-Cohen has suggested that the basic underpinning of Schaeffer's ideal is the essentialist proposition that the sound signifier refers only to itself and not to any further symbol or external context.

> Schaeffer's dream for musique concrète is this: the sound signifier signifies only itself; it does not point to some other signified that is meant to be brought forth by the signifying relation. Strictly speaking, Schaeffer's method, his aesthetic, relies on a disarming or suspending of semiotic activity in the listening experience (Kim-Cohen 2009: 12)

The phenomenological sleight of hand by which all the contingencies of our material embodiment are bracketed out, only to be later restructured according to the discoveries made in this deliberately naïve state, is awkward to defend. By proposing a prior state of purity of the musical sign and suggesting that this can become the essence of a new semiotic system, Schaeffer makes contamination a serious issue.

> Par l'invention de nouveax objets, on accède à l'inoui. Mais cet inoui en tant que tel n'a pas d'intérêt musical autre que potentiel. Il doit être récupéré, conquis, assimilé par une oreille qui s'éduque tout en le découvrant. Parmi les objets sonores, ainsi écoutés musicalement, apparaîtront peu à pue les <<objects convenable>> (au musical).
>
> By the invention of new objects one creates a shock. But this shock has in itself nothing but potential musical interest. It needs to be recovered, conquered and assimilated by an ear which educates itself whilst discovering. Amongst the objets sonores, thus listened to in a musical way, there will be the gradual appearance of objects which 'lend themselves' to music. (Schaeffer 1973 :41)

In this case Schaeffer suggests that the musical ear becomes a gatekeeper, assimilating some sounds and rejecting others as unusable, performing a process of selection to move from the objet sonore to the objet musical.

As with Murray Schafer's ear cleaning exercises, Schaeffer proposed a new mode of listening, one which arose through the practice of repetition known as écoute réduite [10]. Thus,

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[10] The fulcrum around which the theory of musique concrète rotates is the moment of *écoute réduite*. This is the moment of transformation where pertinent features of sounds are separated from their embodiment. By studying their morphology and spectral content in and for themselves, without any preconceptions, new 'musical' values may be uncovered. Schaeffer pays tribute to the closed loop recordings (*sillons fermés*) which allowed the breakthrough of repeated listening to occur. He felt that this enabled *musique concrète* to advance from the shock state of inconceivable sounds and into the development of sonic typologies. Sonic typologies allow sound to move from the unusable of the specific to the musically useful of the generalisable.

not only are the sounds new, but the mode of listening is new too, “The tape recorder has the virtue of Pythagoras’ curtain: if it creates new phenomena to observe, it creates above all new conditions of observation.” (Schaeffer, 2004:81).

Schaeffer’s argument was that the perceptions afforded by the technology of the loudspeaker should not be regarded as linked to the media, but rather, should be considered as having an ontological status equivalent to that of all acoustic sounds. His belief was that the process of judgement by which the human subject arrives at the assignation can be transparent and clear, that somehow it is possible to resolve the problems of representation inherent in language or in the construction of a stable subject able to make such judgements. It would suggest that the contingencies of culture or habit can be temporarily bypassed and that the contingencies of technology, such as distortion and obsolescence, are not relevant. One may define the starting position of the Schaefferian listener as one in which the self is treated ‘as if’ it were an autonomous and fully integrated whole. Such a fully and independently constituted self would be able to explore sounds coming from unlabelled sources in an objective manner.

As with field recording and acoustic ecology, however, the work descended from Pierre Schaeffer is less about the modernist construction of new worlds and more a method of critique and exploration of the limits and nature of our human listening habits. The testimony taken from these sounds ‘in vitrio’ is a spur to consider our habits, methods and prejudices in framing them.

Augmented instruments: rehabilitating schizophonia - pressing Play and Record at the same time

Both of the above, treating the body ‘as’ microphone and treating the body ‘as’ loudspeaker, represent an extreme possibility, on the one hand sensitising us to and developing an ethical relationship between the recordist and the environment (hearing our effects), and on the other highlighting the phenomenology of listening and the way this changes our perception of the world (effects of our hearing)[11]. In these situations the microphone and loudspeaker also act

[11] This highlights some of the difficulty and unresolved nature of the practice which accompanies these instrumental end points, particularly as they represent seemingly oppositional strategies: on the one hand de-programming our technologised listening habits (acoustic ecology) and on the other accepting the sound from speakers as the source of new listening (acousmatic).

as the sources of unheard testimony to be incorporated and responded to with new kinds of representation and language, using novel processes of repetition and listening practice through which this enculturation could take place. [12] *Écoute réduite*, sound walks and clairaudience are a creative response to the need for new processes through which to enter into or be with the relationships created at these instrumental limits.

New processes of practice and enculturation will also be required for all augmented instruments, in which the question of how to play them is not only a physical question but also a philosophical one —with a profound question about the nature of the 'practice' and learning required. In this context it should be mentioned that the mediatised circuits of augmented instruments are easily supplemented by artificial intelligence, using machine learning, which functions to replicate, bracket out or accompany the human learning process.

The areas touched on by these new positions can be seen as oppositional and symptomatic of a schizophrenic split between the body making sound and the body that hears. Nevertheless, equally, it is symptomatic of the opening up of a perception of differences which allows agency for new voices which have been marginalised. The details of some of the negotiations of power and identity in the preceding vignettes illustrate the multiple ways in which the biological self-body used as a sounding icon in communication enters into wider language-like discourses, changing the nature of the communicational environment. Particular examples include the psychic balance of the "self-sound" interval discussed by Lecourt in Vignette 1, the particular effects of vibrato as a 19th Century encoding of the relationship between performer and space (vignette 2), the foregrounding of previously unconscious sounds in amplified performance (vignette 3) , the negotiations of power between performer and sound director which includes potential stereotyping of instrumental and audience identity (vignette 4 and 5), resisting or embracing the parasitical relationships created by mediatising elements (vignette 7 and 8), and the potentially unbridgeable schisms and factions that come through idealisation (vignette 7 and 8). In moving between these vignettes, attention has been drawn to the friction and overlap between them, for example in the way that amplified performance can foreground the unconscious sounds of the performer (or alternatively, aim for a stereotype of performer sound), and the

[12] As discussed earlier, a fuller consideration of the processes of entry into language might include recognition of an Oedipal process (Lacan, 1993) and a diverse spectrum of reciprocal parent/child exchanges (Pines, 1998, Stern, 1977).

overlap with field recording in which the sounds of the field can be framed as an unconscious communication or as a stereotyped or Instagramable representation.

These situations coalesce around certain pivotal problems or instabilities, and two were addressed in particular. The first is the potential split between the performer and audience that occurs when amplification is used in live performance resulting in the appearance of spaces which are sufficiently different for them to become disconnected (stage, auditorium). The second is the potential split introduced by recording, between the sounds occurring in the wider environment and sounds that occur in a virtual environment created by loudspeakers. These differences between stage, auditorium, environmental sound and reproduced sound are areas in which the cultural symbols through which we construct auditory experience are in particularly wide flux, and to which we will naturally be drawn.

Examples of augmented instruments which traverse and pointedly connect these areas are infinitely wide, but include the river Danube which becomes a form of embodied instrument in Annea Lockwood's *Soundmap of the Danube* (2005) , a meteorite in Signe Liden's *SKALA* (2015), war-damaged musical instruments which are helped to share their broken voices in Susan Phillipsz (2015) work, a climbing frame instrument on which a group of performers explore their interlinked acrobatic identities with sampled and synthesised sounds in *Soundnet* (Tanaka 2004b), a web page instrument 'Daisyphone' designed by Nick Bryan Kinns as a collaborative musical instrument/interface (2004), the author's own 'ouija board' which relates acoustic performers and electronic sound through the shadows of the Ouija players hands (Gardner 2015), Jennifer Walshe and Memo Aktens "Ultrachunk" which creates an AI doppelgänger of the singers' performance (2018). These each create a unique politics which explore areas of difference, and bring silos into contact with each other. These examples offer only the briefest glimpse of the specific politics and choices made in the design and use of a particular augmented instrument, the specific workings of each one will have its own references and form of cultural intervention.

Final vignette: mediatised silence

Cage suggests that tape has brought about "a profound alteration of musical action, the consequences of which are not limited alone to tape but will affect all music" (Kostelanetz, 1970, p129). In relation to silence, this brings two pieces particularly to mind: *Imaginary Landscape 4* (1951) and *4'33"* (1952). There is a strong link between these two works —the first involved a performance in which a chance combination of circumstances (the late hour

of the performance and the consequent lack of broadcast material) produced a radiophonic silence, and the second brought about a deliberate instrumental silence. It was through Cage's expanded conception of radio as instrument that the initial chance performance of silence came about. His radical next step was to apply the insights from this encounter to the cultural situation represented by a piano recital, introducing audiences to a profoundly altered experience of musical action in Tudor's performance of *4'33"*.

The gap between radiophonic silence and Tudor's silent performance represents the new terrain of instrumental action, as suggested in the earlier vignettes. However, there is a difference in emphasis. Cage valued silence and its accidental revelation of unintended noise as a way of accessing a space free of human judgement, pleasure or disgust. He described *Imaginary landscape 4* as being "free of individual taste and memory (psychology) and also of the literature and 'traditions' of the art… Value judgments are not in the nature of this work as regards either composition, performance, or listening." (Cage, 1968:59) In this sense, like Murray Schafer and Pierre Schaeffer, Cage was offering an alternative to the complex politics of individual identity and its social and technical construction.

The position which I have outlined in this paper differs in that it engages deliberately with creative splits in identity and their potentially schizophrenic consequences, an indeterminacy at the heart of signification. This leads to a difficult rhetorical position in which the goal is not to advance a particular hypothesis but to bring areas constituted as having uniqueness into contact with each other. The productive work is then to seek out situations in which defined positions are highlighted and placed within mutual reach, deconstructing autarchy and generating new forms of touch and conditions for exchange. The breadth of the terrain opened up by Cage suggests a range of actions that are un-circumscribed by factional or territorial interests, however, the work with augmented instruments consists precisely of an exploration of these factional and territorial interests and the ideals and authorities that they represent. Part of the motivation for making such instruments derives from an interest in what is excluded or placed outside the circle by an ideal and the nature of the binary thinking through which this takes place. The particularities of an augmented instrument illustrate a mode of working which remains open to the shadows of these binaries, but makes use of them to construct new points of departure.

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