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RESEARCH

Forming a Sonic Identity through the Integration of Transculturality and Technology

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This paper investigates the ways in which new sonic identities begin to emerge through a dialogue between cultures, artistic disciplines and technology. Musicians worldwide commonly shape their identity and forms of musical expression through the lens of the environment they grow up in. Ideas about desirable sonic aesthetics vary drastically across musical traditions and cultures globally. Whilst one musician may strive for a sound that is clear, pure and unaltered, another may strive for a distorted, inharmonic sound, for example. The article examines what happens when a musician from a given sonic tradition is exposed to and interacts with a diversely different approach to producing sound. It puts forward the case of an Australian double bass player with a long immersion into Tanzanian musical culture, carving out a personal approach to double bass playing via a synthesis of traditional western techniques, extended techniques influenced by Tanzanian sonic aesthetics, as well as mechanical preparations and electronic augmentation of the instrument. The combination of these diverse elements allows for the emergence of a distinctive sonic identity, illustrated by excerpts from three pieces composed and performed within this specific aesthetic framework. The article's discussion on sonic identity formation holds relevance as an example case of artistic creation within the current globalised context, where finding the distinct quality of one's expression needs to be negotiated through layers of transcultural and technological elements.

Keywords: sonic identity; artistic research; transculturality; augmented instruments; music technology

Introduction

Music is a central catalyst for the formation of identity at all levels of social organisation, from transnational feelings of shared meaning and belonging, to national cohesion, to the self-identification of specific cultural, sub-cultural and ethnic groups, and down to the distinct sonic identity of an individual musician. This text discusses the formation of a musician's personal sound in the current context of widespread transcultural influences and the profound impact of audio technologies on music making. It brings forward the case of an Australian-born double bass player with substantial experience of immersion in Tanzanian musical culture, weaving a synthesis of his heterogeneous musical influences into a personal approach involving extended playing techniques and mechanical as well as electronic augmentations of the instrument. Through this process, the instrumentalists 'own voice' is crystallized, giving rise to a distinct approach to double bass playing, accompanied by a strong sense of aesthetic ownership.

The key elements identified in this sonic identity formation are the interweaving of transculturality with technology, the negotiation of one's own identity in respect to the larger musical community, as well as the role of tacit knowledge influencing the entire process. This text articulates two moments in detail: the immersion into Wagogo music accounted as a first person narrative, and the implementation of electronics and audio processing into the double bass in order to further personalise the instrument's sonic palette. The process leads to the creation of an augmented double bass and its related musical repertoire, of which three musical excerpts are presented. The text thus accounts the gradual integration of seemingly disparate elements into a personal and coherent aesthetic framework, providing a conducive vehicle for artistic creation. The case study presented in this article holds larger relevancy in the heterogeneous and globalised contemporary context where artistic identity often needs to be negotiated through multiple layers of cultural and technological influences.

Sound and Identity

Sound is undoubtedly a fundamental means of communication and expression across cultures. It is widely acknowledged that music can act as a vehicle for shaping personal, collective and community identities worldwide. Identity formation processes involving music have been documented and analysed at various levels of social organisation, such as the nation (Knights, 2016), transnational popular culture (Frith, 1996), ethnic and political identities (Martin, 2013), or local group identities (North et al. 1999). Small (2011) has emphasised the social dimension of music and the shared agency of individuals engaged in making music – regardless of their actual role in the production of sound: 'the social and the individual meanings of the act of musicking are intertwined, being concerned with the participants' feelings of their own identity, of who they really are.'

Hargreaves et al. (2002) argue that identities may undergo changes and permutations over time, reflecting one's experience of the changing world around them. The concept of a musical identity is increasingly formed by drawing on a diverse range of influences and experiences, both locally and globally. Musicians, more and more commonly, reject the notion of identifying with a single, narrow and confined view of themselves, often weaving together multiple threads to construct their own distinctly personal musical identities. Elements are drawn together from the environment around them, travels to far away places, interaction with technology and with people from diverse backgrounds and cultures. Inherent within these processes is the knowledge that a musical identity is not static but is constantly evolving by nature.

The formation of an instrumentalists' individual sonic identity is embedded into larger frameworks of cultural identity and involves genre-specific value systems. The amount of space inherently available for individual expression varies across musical genres, traditions, cultures and musical approaches. For example, in score-based Western traditions, a composer is afforded ultimate freedom of expression and expected to form a unique individual voice, whereas the instrumentalist carves out a

space as an interpreter of a given text (score) between the uniformity of an orchestral section, to the showcase of individual skill as a soloist. The opposite is true in jazz and improvised music, for example, where the musical framework and value system serves the ultimate development of an individual sonic identity (Berliner, 2009). Possessing an immediately recognisable sound is regarded as a paramount goal for a musician seeking a personal identity, who faces the delicate task of shaping an individual sonic identity in regard to the given tradition, surrounding musical cultures, groups and other instrumentalists.

The current globalized situation allows for greater access than ever before to music and musical traditions from across the globe. "For any number of reasons we travel and relocate from one country to another, bringing with us our own ideas about music making and its connection to community. This in turn provides increased opportunities for intercultural dialogue, exchange and merging of ideas, as well as new musical challenges." (Thomson N.R. 2014, p. 22). Hendrickse (2005) argued that "the cultural and ethnic diversity of modern urban life makes it even more important to understand the nature of this exchange, and to ensure that musicians are able to respond to the challenges that it presents".

Referring to Katherine Marsh's research on children's musical games in playgrounds and schoolyards worldwide, Alexandra Kertz-Welzel points out that "this hybrid mixture of musical cultures in children's musical worlds demonstrates one notion that is significant in view of globalization: transculturality". Transculturality is an important theme in the authors' discussion in this article and in this context is acknowledged as a central aspect of the formation of new musical identities. The example of children's musical games (Marsh) illustrates a process of naturally mixing cultural influences, learning and sharing with others in order to construct an instinctive musical identity. In this environment, children are able to "design a transcultural musical identity that matches their feelings and beliefs." (Kertz-Welzel p. 90–91).

Transcultural arts practice becomes more and more relevant as musicians continue to travel, collaborate and base themselves outside of their own

countries. Regardless of the musical scenario, the essential thing is to learn how to effectively work together, learn from each other, exchange and merge musical ideas at the deepest level. In the authors' experience, the quality of music making is directly linked to the quality of the connections between the people involved. The importance of this can be often overlooked as we focus on the technical aspects of putting music together. It could be argued that music only becomes meaningful when the process of making it has been openly shared with others. As the Venda say: "people are people because of their associations with others" (Blacking 1995, p. 59).

Forming a Personal Sonic Identity

The aim of this article is to examine the formation of a sonic identity from an individual musician's perspective. We propose to follow the construction of an original and identifiable sound – the musician's individual voice and privileged means for self-expression, through two moments. The first moment involves immersion into the music of the Wagogo people during a three-year period spent in Tanzania and subsequent reflections on transculturality. The second moment relates the augmentation of an instrument's sonic palette through technological exploration and acoustic preparations, thus giving rise to an augmented double bass and the formation of an original repertoire for the instrument.

Within the musical context discussed in this article, the ultimate practice of a musician is the search for a distinctive musical voice or sonic identity; a sound that becomes immediately recognisable as that person, which is embodied and expressed in their own unique way. Peter Szendy (2015) evokes a 'digital rhetoric', or 'rhetoric of the fingers', where, music making becomes a way of 'saying oneself'; entering a musical conversation with one's own voice nourished by a sustained instrumental practice merging the body and the instrument. A personal sonic identity emerges gradually through interaction with one's instrument, history, environment, the people around them and the sounds one feels a personal connection to. This may happen within the context of one particular defined musical aesthetic, or it may

be influenced and formed by a diversity of musical approaches. In any case, this process requires one to search for something that is distinctively idiosyncratic to them, rather than conforming to or replicating the approach of others.

Throughout time, musicians have always been interested and influenced by new sounds and musical processes, which in turn contributes to the formation of new sonic aesthetics and identities. In this paper, intercultural dialogue and collaboration are viewed as factors that can broaden artistic practice, expand instrumental techniques and form new artistic identities. In this way, musical ideas, concepts and traditions are treated as starting points rather than destinations, with musicians striving for idiomatic vocabularies that are wide and border crossing.

The authors situate themselves in a context where cultures, musical approaches and technology merge and inform one another in order to produce new results and construct musical identities. The authors further put forward the idea that by embracing diversity and otherness, both culturally and musically, one has an enhanced possibility of finding a unique, rich sonic identity that is greater than the sum of its parts.

Developing a Sonic Identity through Intercultural Dialogue and Transculturality

This section is an *autobiographical account* of the first author's experience. It is written as a first-person narrative, in order to convey the journey's subjective nature and is based on and adapted from part of chapter 2 in Thomson, N.R. (2014).

A double bass player may be trained and approach the instrument in a variety of ways. In the western world, this most commonly involves building a technical foundation on the instrument through the aesthetics of classical, jazz or folk music. It is common to focus mainly on one of these musical areas, honing the corresponding bass techniques for the particular musical aesthetic in question. Primarily using arco (bowing) technique in classical music or particular pizzicato (plucked) techniques in jazz, for example. In recent years, new extended techniques have continued to develop from this foundation through drawing on ideas from contemporary composers and experimentation. This is of course nothing new, and we know from

experience that musicians have always been curious by nature in their exploration and development of sounds on their instruments.

But what happens if we are to expand our sonic palette and musical reference points, and allow ourselves to be influenced by and learn from musical perspectives that have not been part of our musical training or experiences so far? In which ways does this affect one's relationship to the instrument and expand the possibilities of the technical and expressive musical palette? With a focus on these questions, (I) author 1 will illustrate his own pathway as a case study in this chapter.

As an Australian-born musician and composer, I have been pondering questions of cultural identity and musical expression for most of my life. An Australian with European heritage, I was born into a culture that, from my perspective, didn't seem to match the land. Many of our traditions were adopted or influenced by the UK, but the land around us suggested other ways of living. Contrastingly, the Indigenous peoples of Australia carry traditions and beliefs that have existed for tens of thousands of years and have a completely different relationship to place. Growing up in Australia, I found myself admiring the first nations peoples'[1] connection to their land and the ongoing musical traditions they uphold, secretly wishing I could somehow be connected to that musical culture as an Australian.

Given the history of Australia and the fact that many Australians hail from mixed heritage, I have never felt that I belonged to one particular musical heritage. My ancestors were from Scotland, England and New Zealand, and I grew up on the Gold Coast, on the east coast of Australia. Many of the people around me also shared mixed and multicultural ancestry. In Australia, I was trained as a European musician would be trained and taught music belonging to European classical traditions. This music originated from some distant land that I could not even imagine as a child, and although I found enjoyment in the music, I didn't really feel a deep connection to it. Continuing on this trajectory I went on to complete a classical degree, later

[1] I acknowledge the Traditional Custodians of the land on which I was born, and recognise their continuing connection to land, water and community. I pay respect to Elders past, present and emerging.

realizing that the western orchestral path was perhaps not right for me. Jazz caught my interest during my studies as well, but I also wondered if that music was culturally connected to me in any way.

So what music should I play? What is 'my' music? What is the music of my culture? What is my musical identity? These are questions I have reflected on for many years, and are instrumental in setting me off on a path that has led to the exploration of my own musical identity. This does not mean that I wanted to completely abandon my musical upbringing, however, but I sensed that I needed to continue my development as a musician by investigating approaches to music-making from outside of the context I had grown up in.

I lived in Australia until the age of 21, and since then have travelled extensively. After 'backpacking' for some time, I settled in Tanzania where I lived for 3 years and Zambia for 2 years after that, followed by 10 years in London, later settling in Finland. In 1994 I sat under a large tree outside Hukwe Ubi Zawose's house learning to play the traditional overtone flute (Wagogo filimbi) from his tribe. Zawose would show me the blowing technique and then disappear for a while, to attend to goats or children, or his elderly father. After some time, he would reappear and play the beginning of a tune for me to learn, then disappear again. Some days he would sit under the tree with me making another instrument or having a chat with a visiting friend, all the time feeding me small bits of musical information, but not saying very much. He would then suddenly pick up another flute and play with me, and before I knew it, I was somehow playing the tune without realising how I had learnt it.

When I first heard the music of the Wagogo people of Tanzania, my initial reaction was that I wanted to become an 'insider', to completely integrate myself into their culture and learn to play their music. I began studying Swahili, as well as two of the traditional instruments from the Wagogo tribe, and ate the food the Zawose family kindly offered me each day. These things allowed me to get closer to my teacher and his traditions, and indeed built trust and friendship. I felt like I was accepted and had access to a tradition in the purest form. After some time, however, I realized that unless I dedicated the rest of my life to this path, I would never really be able to

play the music fully or to live like the Wagogo people. I also came to understand that although I had built trust and respect, Zawose was really only giving me a glimpse of his musical culture. In fact, perhaps the only way to achieve full integration into the culture was to be born into it.

Is it possible to learn another musical tradition outside of your own and assimilate it as if you were born into that musical culture? If so, what is the purpose? Over time, I realised that, in this particular situation, it was unrealistic to aspire to become fully integrated into the musical culture. That in itself was a dead end, an unreachable goal. The important thing for me was to allow myself to be an outsider and experience things from my own perspective, with respect and genuine interest in the music and the people.

When I engaged with the experiences in this way, I found I had gained new knowledge and musical inspiration, which I could carry with me and make sense of in my own musical contexts, and ultimately as part of my own musical identity. When I play the traditional Wagogo instruments today I rarely play traditional music, but rather make new music for the instruments and integrate musical techniques and processes from the tradition into my own artistic practice in various tangible, intangible and tacit ways. My personal experience is that opportunities like this period spent in Tanzania have inspired new ideas and musical processes, which have continued to unfold well after the experience.

As expressed by composer/performer Simon Allen during a private conversation about musical identity and transculturality, "I still find things I learnt in Côte d'Ivoire that surface every day. I've come to feel that every sound we ever make is, and must be, connected to all the others past and future." Simon Allen (personal communication, 19 October 2017) As a double bass player, the important aspect of this journey has been the realisation of the multiple ways in which this experience has affected my approaches to working with sound and the ways in which it has transformed my thinking, connection, embodiment, rhythmic sensibility, technique and practical approaches to playing the double bass.

Transference and Transformation

The Ilimba is a traditional instrument of the Wagogo people of Tanzania, which is a variety of lamellaphone with metal keys that are plucked by the thumbs (see **Figure 2**). A striking characteristic of the ilimba is the distorted buzzing sound created by a combination of pieces of metal wrapped around the keys and spiders' webs plastered across the sound holes of the instrument. The resulting sound is a constant, distorted growl rich in natural overtones.

Drawing on inspiration from the Wagogo ilimba, I began to develop methods for recreating the idea of acoustic distortion on the double bass. This process began during my time in Tanzania and has continued to develop long after my return. In collaboration with instrument maker Juhana Nyrhinen, attachments were made for the bridge of the bass using metal, brass and seed rattles, as well as metal and wooden keys that are inserted into the bridge and plucked. These attachments transform the sound of the double bass and contribute to the formation of a new sonic identity for the instrument. As a result, my previously formed technique and connection to the instrument began to take on new forms. Surprising new sounds and techniques emerged naturally through exploring the transformed instrument, which is simultaneously both familiar and unfamiliar.

In the study Transcultural Arts Practice (2005), Hendrickse examines work in the field of transcultural collaboration and describes it in the context of national and international debates about cultural diversity in music education, discovering how contemporary practice can be informed by a wide variety of influences without compromising the integrity of that practice. "It is clear that musicians have always transferred ideas, influences, techniques and even instruments from one 'tradition' to another simply because they are useful or available." (Hendrickse 2005).

Reflecting on my own case study as an example, it's clear that the process of forming an individual identity as a double bass player has taken place and continues to evolve through interaction with others. Furthermore, the encounters that led to new personal discoveries were characterised by engaging with various forms of musical exchange and experimentation, uncovering new personal ideas and

perspectives through bouncing off another. Chernoff (1979) makes reference to social and musical interactions in his book African rhythm and African sensibility reflecting on the concept of individuality, which is mediated through interaction with a community. "A musical occasion, like any other social occasion, is therefore beyond any one perspective a person can bring to it...(Chernoff 1979, p. 158). In this context, the individual voice gives way to the collective and is only of value if it contributes to the whole. But it is perhaps through the act of engaging with a community that the individual voice becomes stronger and begins to form its own unique identity.

Tacit Knowledge

An important aspect of transculturality is the unspoken knowledge and influences that are passed from one person to another, sometimes without even realising that this process is taking place. Michael Polanyi, in his book The Tacit Dimension (1966), opens his analysis of knowledge by claiming that "we can know more than we can tell" (p. 4).

I witnessed a clear example of this during a visit to Gambia in 2001. It was my first encounter with the Wolof drumming tradition, which I found to be incredibly rhythmically complex. As a musician I was trying to analyse the way the rhythmic patterns were structured and how they locked together. I was attempting to break them down into manageable parts in order to understand them. I then noticed the smallest children sitting alongside the drummers with plastic buckets, tin cans, whatever they could find. They were simply copying the drummers and trying to play along. They were watching their Father's hands and feeling the rhythms in real time, gradually absorbing the rhythms like a language. An example like this is perhaps the purest form of apprenticeship, and the transfer of tacit knowledge. This model is of course well established in many musical cultures and traditions worldwide.

The concept of tacit knowledge has been an important part of absorbing musical processes into my own artistic practice and identity. Renshaw (2009) argues that tacit knowledge lies at the heart of human relationships and experiential learning, pointing to a key ingredient in intercultural and transcultural arts practices.

The subtle art of discovering and coming to know something through interaction with another is key. If the environment is right, this may take place without much analysis or verbalization of how to work together; it is caught rather than taught.

Since leaving Australia, and having had the opportunity of experiencing different parts of the world, I realise I have gone through four phases musically:

Phase One: being seduced by 'exotic' musical cultures and wishing I had somehow been born into them.

Phase Two: trying to learn as much as I could about these cultures and somehow get close to playing their music.

Phase Three: accepting that I may be inspired by these different cultures, but I will never be able to fully integrate into the culture or play the music in the same way as someone who had been born into that culture.

Phase Four: The formation of an emerging artistic identity informed by my experiences, through intercultural dialogue and transculturality.

I have realised that my cultural heritage is made up of many diverse elements, and the environment I grew up in, including the ocean, birdsong, trees, smell of the land, the sonic landscape and turn of linguistic phrases all contribute to my musical identity. I have also come to realise that an important part of my cultural heritage lies in the fact that I was born in a land inhabited by First Nation Peoples and by the inherent influence of indigenous Australians on the formation of the Australian character and way of life (Greer 2004).

In Finland, the folk music traditions can be traced as an amalgamation of a variety of cross-cultural influences (Hill 2007). Regardless of ones' cultural heritage or upbringing, musicians have always borrowed from each other, and have been inspired by other musical traditions. This is a natural part of being an inquisitive musician and composer.

In the end, even though I may not be able to identify my own cultural heritage in the traditional sense of the term, perhaps my music has in some form been inherited from some combination of my ancestry, intertwined with my upbringing, homeland and subsequent travels. As Christopher Small (1987) observes: '...nothing human is ever quite lost; no culture ever quite disappears but is transformed over and over again, so that every one of us carries within him or herself elements of who knows what cultures and societies, in shards and fragments, passed down from grandmothers to sleepless grandchildren, nursemaids to their charges, older children to younger, in snatches of old songs, garbled tales, odd words, expressions and proverbs, little personal rituals and superstitions' (Small, C. 1987, p. 119).

When I look back at the musical material I learnt during my time in Africa, for example, the tangible musical elements such as melody and rhythm are of secondary importance when examining the experience through a wide angle lense. However, the experience of working with musicians from a different background to my own, playing with them, listening to them, experiencing their culture and approaches to music, these experiences are the ones that continue to inspire me in my musical life. I am convinced that the way I play my own instruments, the way I compose, teach and think about music has been directly affected by my time in Africa, but not always in the ways I expected this to unfold at the time. This experience has become inextricably intertwined into my musical identity through a complex web of both practical and subtle, indefinable ways.

Instrument augmentation: Sonic Individuality through Technological Appropriation

The rationale of electronic instrument augmentation is to introduce a technological 'graft' into an existing instrument, in order to develop new sonic perspectives while retaining the traditional playing interface and the related set of skills. Instrument augmentation is an established research field in the music technology area, with a string of landmark works such as the pioneering 'Cybersonic Horn' by Gordon Mumma (Smigel 2015), the 'Hyperinstruments Project' by Tod Machover and his research group (Machover 1992), Ircam's augmented string quartet (Bevilacqua et al.

2006), as well as Daniel Overholt's 'Overtone Violin' (Overholt 2005), just to name a few prominent examples.

In its essence, instrument augmentation is motivated by the ideal of bringing together the vast, rich and embodied instrumental tradition with the nearly endless sonic plasticity enabled by digital and analog audio technologies. In musical terms, the augmentation process is about the sound of an instrument, in exact concordance with the theme of sonic identity discussed within this article. The instrument augmentation practice can be seen as a direct continuation of extended techniques and preparations which have been increasingly popular since their adoption by composers and instrumentalists of the post-war avant-garde. As an example, John Cage's "Sonatas for piano" (1948) is scored for a piano with screws, bolts, plastic and rubber placed on specific locations on the strings, producing a palette of complex, altered tones – in striking resemblance with the Wagogo Ilimba instrument building tradition involving overtones and buzzing mechanisms referred to in section 3. In a similar manner, analog electronics enabled Gordon Mumma to introduce new sonorities to his French horn (namely, sustained tones), as well as to involve digital sound synthesis on a cello sound directly controlled by the bow techniques in the case of Machover's Hyperinstruments. Within the larger field of instrument augmentation, the commonplace figure is a technologically able individual musician in search of novel sounds for his/her instrument, such as Richard Graham who is developing technological extensions to the guitar in parallel with music composition and performance (Graham 2012).

The exploratory technological work enables new musical ideas to take shape. Instrument augmentation can be viewed as a music-specific emanation of the 'maker culture', where existing objects – be they physical or computational – are appropriated via hacking, patching and reassembling. In this view, instrument augmentation research equals to crafting new and personified sonic characters on traditional instruments, and thus going beyond the established timbral palettes. The resulting sonic possibilities offer fertile terrain for a musician seeking to establish a distinct sonic identity. In electronic music culture(s), sound is an absolute key element, both in the praxis of creation and in the enveloping verbal discourse.

Historically, electronic music placed a paramount emphasis on sound as the medium of expression, dissolving the musician's body (acousmatic music), or establishing a direct sound-body relationship via sub-bass resonance (techno); in both cases the 'medium being the message'. This emphasis is reflected in the discourse on electronic music, where it is commonplace to refer to an artist's 'sound' rather than to timbral, rhythmic or compositional aspects, or, in a larger framework, refer to the sound of a sub-genre such as 'the sound of Detroit techno'. These musicological and discursive aspects point to the importance accorded to sonic identity in electronic music genres, which is in turn reflected in the field of instrument augmentation.

The Augmented Double Bass: forming a sonic identity through the integration of transculturality and technology

During the past three years, the authors of this article have collaborated in order to create an augmented double bass, and develop it into an instrument with a distinctive sonic identity reflecting the first author's artistic research exposed in section 4. The augmented double bass brings together mechanical preparations, analog electronics, digital sound processing with max/MSP, music composition and performance, and it has been used in several concerts as well as on one published record; Electronic Chamber Music, (Siba records/Naxos, 2018), with a second recording planned to be released in 2019 (Nathan Riki Thomson, Resonance, SibaRecords/Naxos 2019).

The technological framework involves a Germania ¾ double bass, expressly bought for the augmentation process, fitted with an Ehrlund contact mic. The output signal is routed to max/MSP and Ableton live, running a selection of sound processing algorithms that include envelope-responsive filters, granular synthesis, ring modulation and distortion. An attack transient-based trigger for software synthesizer is also used, in order to launch pad-like sounds directly from a certain type of bass plucking technique. Max/MSP output signal is routed to a class D amplifier, and then to two Tectonic Elements TEAX32C30-4/B structure-borne audio transducers fitted on the bass (see **Figure 7**).

Figure 1: Early stages of building metal buzzer attachments for the double bass.

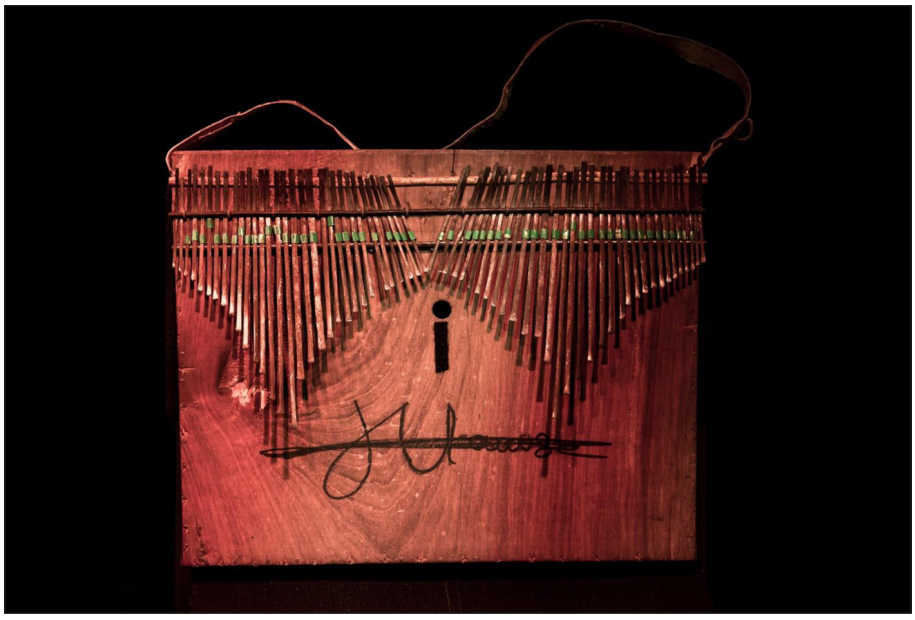

Figure 2: Traditional Wagogo ilimba (thumb piano) from Tanzania.

Figure 3: A custom-made Ilimba (thumb piano) attached to bass bridge.

Figure 4: Thumb piano and a brass cow bell with added thumb piano keys and a spring designed by Juhana Nyrhinen.

Figure 5: Buzzer and thumb piano attached to the bridge of the double bass.

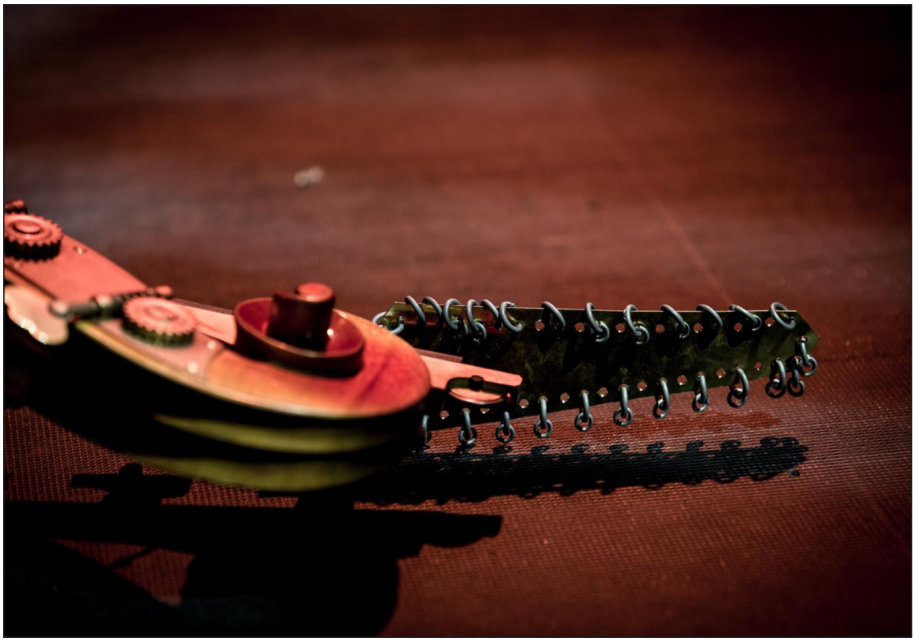

Figure 6: Buzzer attached to the scroll of the double bass.

Figure 7: Attaching a structure-borne sound driver to the body of the double bass.

Figure 8: The double bass with a set of preparations attached.

Figure 9: The double bass with a set of preparations attached.

The setup involves 'active acoustics' technology and technique stemming from the second author's research, as previously published in (Esqueda et al. 2018, Lähdeoja 2016), as well as custom-made buzzers, shakers and bass bridge-mounted Ilimbas (thumb pianos) developed by author one in collaboration with the luthier Juhana Nyrhinen, as depicted in the following photos (see **Figures 1, 3, 4, 5, 6, 8** and **9**). All photographs by Kalle Kallio.

The aesthetic outcome of the electronically processed sound diffused through the double bass body, on top of the instrument's acoustic sound creates an impression of a 'timbral shadow' or 'halo' strikingly analogous to the buzz effects produced by mechanical buzzers and preparations. The electronic processing can be considered as a continuation of a timbre-warping process starting in the mechanical and acoustic domains, and following on into digital technology. The summed possibilities of sonic output offer a large palette of sound coloration around the acoustic sound of the double bass.

The major drawbacks and limitations of the active acoustic technique employed in this case are the computational latency delaying the sound output, producing a non-synchronous output between the acoustic and electronic sounds, as well as a bias towards feedback due to the closed loop between pick-up and audio actuator both attached to the body of the double bass.

An iterative process between playing, composition, improvisation and augmentation design has been at the heart of the collaboration, developing a line of musical works that contribute to the first author's artistic research on forming an artistic identity in a transcultural context, centred around the transformation of the double bass and resulting musical outcomes and performance practices.

The interplay between technology and tradition creates fertile ground for the transformation of instrumental practice, allowing the player to explore the double bass in new ways, which in turn becomes a vehicle for the gradual formation of a new artistic identity. Inherent within this process is new music that emerges through improvisatory exploration of newly discovered sounds. This framework naturally breeds creativity and the development of compositional processes, leading to the creation of new works for the instrument.

In the following examples, we would like to highlight the interplay of transcultural and technological elements through three musical excerpts.

Excerpt 1: Cycles (audio).

Excerpt 1 (Cycles) is a composition for solo double bass and attachments. The piece utilises a bridge mounted buzzer and a custom made ilimba (thumb piano) inserted into the centre of the bridge (see figure 3 and 5 photos).

A specially developed technique is employed, which involves inverting the hands (right above the left) and uses the thumb of the right hand to pluck the strings, as well as a circular arm motion in order to create percussive sounds on the body of the bass. An ankle shaker is worn around the right leg, and the players voice is used percussively. These attachments and techniques were developed to emulate and re-imagine the sonic aesthetics of the Wagogo ilimba (thumb piano) and Kurya Litungu (plucked lyre) from Tanzania on the double bass. This process gives rise to new music and an expanded view of the role and sonic possibilities of the double bass, which in turn become integrated into the players personal sonic identity.

Excerpt 2: The Augmented Double Bass (audio).

Excerpt 2 is a piece for double bass augmented with a custom-made active acoustic system, consisting of two sound transducers placed on the instrument's body, enabling electronic sounds to be driven into the body of the bass. (see figure 7 photo).

This studio piece was recorded in order to illustrate the different sonic possibilities of our current augmented bass version. The electronics comprise live-processed sounds from the bass itself, involving ring modulation, distortion, filtering and reverberation effects (0'00"–2'40").

Envelope following is used to enhance the perceptual link between playing dynamics and audio processing, as well as sample playback of rattling sounds (2'40"–4'15").

Another strategy used in the piece is synthesizer triggering using the attack transients of the bass as triggers. The superposition of a synthesizer with the acoustic bass sound can be heard in the last section (4'45"–6'45").

A custom-made buzzer and ilimba (thumb piano) are mounted on the bridge of the double bass. A small seed shaker is worn on the index finger of the left hand and an ankle shaker is attached to the right foot of the player.

A dialogue is created as the double bass player responds in real time to the unpredictable responses of the electronics and the electronic musician in turn reacts to the impulses and responses of the double bass player. The music is composed in real time as a result of this dialogue.

Excerpt 3: Resonance II (audio).

Excerpt 3 is a piece for augmented double bass, voice and guzheng. Based on a textural atmosphere created by a limited number of pitches and freedom to choose the order of pitches, the players respond in real time to shifting, high pitched feedback loops created by filtering the bass sound, and driven back into the body of the double bass. Each performance becomes new as the electronic manipulations constantly change and morph according to the real time musical choices of the players. The electronically induced feedback forms a drone-like connecting element between the bass, voice and guzheng.

Conclusions

Through a case study in two parts, combining transcultural immersion and technological development, this article has outlined the process of musical identity formation of a double bass player. The merging, processing and appropriation of

heterogeneous elements into a coherent aesthetic framework arguably reflects the commonplace situation of artistic research in the current globalized context: how to find one's own voice – or sound – in an overflow of information and influences originating from way beyond one's initial cultural setting. In the case analysed here, new sonic timbres and music are created through the process of transforming the traditional sound of the double bass both acoustically and electronically. It becomes a process of allowing the music to emerge as a natural result of this exploration, where a third space is discovered through the combination of old and new elements.

The emergent properties stemming from the instrument, extended playing techniques, preparations and sound processing form a metaphorical parallel with the alchemy of cooking, as stated by Simon Allen (personal communication, 19 October 2017), where the bringing together of two diverse elements "creates a third entity, sometimes fully blended, other times a loose liaison of characteristics." A central discovery is that this phenomenon creates an opportunity to form and re-invent one's sonic identity, through the dialogue and merging of known and unknown elements. Through augmenting the double bass acoustically and electronically, the instrument begins to behave in new, unexpected ways, which in turn causes the player to react to the instrument in newly discovered ways and consequently produces new musical results. The individual enters into dialogue with the augmented instrument, akin to a dialogue between musicians from different cultures and backgrounds. The identity of the individual may be transformed as a result of this interaction, absorbing and merging newly found sounds, approaches and expressive possibilities.

Competing Interests

The authors have no competing interests to declare.

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Australian born Nathan Riki Thomson is a double bass player, composer, multi-instrumentalist and educator. Nathan has collaborated and performed with

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Nathan was a Lecturer at the Guildhall School of Music & Drama in London for 10 years. Finland is his new home, where he is currently Lecturer and Programme Leader for the Global Music Programme at Sibelius Academy, University of the Arts Helsinki. His most recent project involves artistic doctoral research under the theme of resonance and the formation of an artistic identity in a trans-cultural context.

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Otso Lähdeoja is a Finnish composer, guitarist and researcher in digital arts. He holds a doctorate in music from Paris VIII University and has led a myriad of crossover artistic projects over the past ten years. His works include musical ensembles, solo and group albums, multimedia projects, music-poetry, installation art and music for dance performances. He lives and works between Finland, Canada, Belgium and France, in addition to which he has toured around Europe as well as in U.S.A., Korea and India. Otso Lähdeoja is currently an Academy of Finland Research Fellow at University of the Arts, Sibelius Academy, Helsinki. His research interests are: 1) Structure-Borne Sound for Music and Intermedia Creation, 2) Augmented Instruments & Active Acoustics, 3) Embodied (Music) Cognition, 4) Digital Humanities (Post-Media Studies). Otso Lähdeoja currently leads the Academy of Finland "Active Acoustics – Smart Audio objects at the Interface of the Material and the Digital" research project, as well as the "Active Acoustic Augmented Instruments" project funded by the Nordisk Kulturfond's Handmade scheme.

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