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As a white, male heterosexual I might seem unqualified to comment on exclusion, disempowerment, invisibility—on the various flavours of peripheralness—although having ginger hair possibly nudges me into one socially-sanctioned marginal subgroup. Leaving aside the un-nuanced inadequacy and normalising power of these labels (and more pertinent for this discussion), I once identified myself, and was happy to allow myself to be regarded, in the predominantly pre-digital world of the late 1970s and early 1980s, as another kind of marginal creature: an electroacoustic composer.

I'll return to this statement shortly, by way of an autobiographical introduction for which I make no apology, as attending to the precisions of individual histories may provide one route through which we learn to avoid unhelpful generalisations and self-perpetuating narratives of disempowerment, and move towards 'better stories'. The observations I will offer were nurtured, among other things, by a childhood spent predominantly in and around the art schools of the 1960s in which both my parents worked, and in which the default reaction to anything previously unexperienced was acceptance and excitement, while any initial incomprehension was interpreted primarily as a lack in the development of the 'self', to be immediately addressed.

Equally formative was living for a substantial part of two years in Sweden, in a lesbian feminist collective where there was daily debate on gendered/post-gendered/non-gendered situations and relationships with things, ideas and people. I was privileged to be among a highly intelligent and articulate community which at that point self-identified as marginal, although certainly neither disempowered nor invisible. In the 1980s, the Social Democrat experiment was still intact: the Swedish government still awkwardly embraced dissidence by funding both formal education in non-violent protest against the state, and *kollektivhusen* (collective houses) in which 'marginal' groups (Uruguayan '*Tupamaros*', lesbian feminists, evangelical Christians) could live and work. In the early 1980s, back in the UK, the practice of electroacoustic composition was distinctly marginal, being associated primarily with a handful of universities (notably the University of East Anglia (UEA), Birmingham and City University), although Sweden had a 'national' centre for such activity in Stockholm's EMS (Electronic Music Studio). A ten minute piece might take six months or more to make, requiring a semi-nomadic life travelling among the small network of facilities across Europe in which it was possible to work; and such a piece reached its public at an even smaller number of sympathetic performance venues. This led to a sense of almost complete exclusion from the world of contemporary music—a world itself already peripheral to that of mainstream music. And so, to the delight of the Swedish national press, the inhabitants of our *kollectivhuset* joined the parade and marched together one 1st of May under a banner which read 'Lesbian feminists and electroacoustic composers for a better world'.

As indicated above, I write from a privileged position, but not only so. As a university lecturer with considerable experience supervising practice-based research degrees in electroacoustic composition and sonic arts, I have considerable anxiety that only 16 percent of my 50-plus research supervisees have been women, spread fairly evenly over the period 1994 to 2012, but with a relative reduction in proportion toward the end. Set against a context in which there are now both many more potential courses (three viable UK competitors at the

beginning of the period in question and over twenty at the end) and many more high-profile female role models, this is difficult to interpret.

Gendered education?

The current educational context in the UK involves a polarisation between the now ubiquitous 'music technology' (MT) degree, and the 'traditional' music degree, the latter usually consisting of a mix of broadly musicological, performance and compositional activity (cf. Born and Devine 2015). The problematic identity of 'music technology' as a subject has been addressed elsewhere (e.g. Boehm 2007) but the polarisation is unhelpfully reified by an avoidance in both camps of the notion that *all* music is technologized, not only in the sense of the manner in which it is currently mediatised, but more profoundly in that the clarinet is as palpably a piece of technology (bearing histories, affordances and resistances) as is the computer. In both cases, musicianliness emerges through imagination meeting resistance and developing a repertoire of conduct.

With regard to the Music *and* Technology (M&T) undergraduate programme that I introduced at UEA, it was certainly the case that fewer women enrolled on M&T than on music, but during the course there was slippage and movement equally of women from music to M&T and of men from M&T to music, strongly suggesting that the gendering expectations preceded arrival in HE and were to some extent successfully challenged by the reality of the course. A key issue seems to be what is afforded (even allowed) by education and educators. This is not necessarily about female role models, since powerful models for female technical and technological empoweredness may be men. The amount of slippage between the two programmes led to our merging the first year curriculum entirely: a successful experiment soon undermined by an unsympathetic management closing the school just as it reached number five in the national league tables.

Gendered technologies?

Gendering is situated. It is locally and historically specific, and is therefore also mutable. Much of the discourse around gendering technologies proceeds in an essentialist vein, but an adequately historical perspective acts as a useful counter to this (McGaw, 2003; Oldenziel, 2003). Just as 35 years of professional involvement with music's (explicitly electronic) technologies both in academia and in real-world performance, a time-span that exactly bridges the move from analogue to digital, has informed my perspective on the nature of this technological shift, so a historical perspective on our earlier technologies can be instructive.

As an instance of male-gendered music technology particular to the context of the UK, and notably London, in the period 1780 to 1830, the flute was an emblem of masculinity and civility, eclipsing all other instruments in popularity and gendered specificity, in a manner much like the electric guitar between 1960 and 1990 (Waksman 2001). Little about the flute in 2015 really suggests male gendering; indeed, successful female flute players arguably currently outnumber their male colleagues in the sub-45 age group in UK professional playing, and the disparity is still greater in conservatories and university departments.[1] That

[1] Krantz (2015) lists 76 of 134 current positions as professional flautists in UK orchestras (56.72%) as currently occupied by women. Robert Bigio (ex-editor of the Journal of the British Flute Society) estimates that over 90% of flute students in UK HE, including Conservatories, are women (in conversation 17/06/15). Despite the inertia and chauvinism of some orchestras this proliferation of female players provides affirmation of a real shift in professional UK practice.

an instrument can so profoundly shift in its 'accessibility' to women, from preclusion bordering on prohibition, to profusion and proliferation, offers a clear corrective to any sense of essential fixity in gender-instrument relations.

Gendered work?

Just as discussion of the gendering of technology tends towards essentialism, one of the pre- and mis-conceptions which hovers around the engagements of different genders with technology is the stereotype that men start with the technology and then find something to do with it, while women start with the concept and then find the technology to deliver it. The examples below illustrate the continuous nature of the engagement with both the technology and the concepts, and the necessary interweaving of the two, which characterize critical work in this area irrespective of gender. (I have masked the individuals' genders in what follows, in order to test the reader's assumptions regarding the origin of the projects):

> W's work investigated representations of mental illness and its treatment by articulating sampled archive film of 1940s and 1950s US patient treatment drawing on an existing competence as a skilled percussionist. Integrating an electronic drum kit with real percussion, s/he designed an interface to control three projected images, affording looping, step-frame replay, reverse, and various other interventions in the video. The resulting performance transformed the original documentation of appalling maltreatment into a poignant visual dance, without sweetening it in any way, and by manifesting similar physical force to that used in the 'treatments' illustrated – a sort of appropriation of the situation.
>
> Some of X's work coincidentally also touched on representations of a therapeutic engagement with sound, exploring through recording and analysis the experiences and soundworld of a deaf patient, recently afforded her first small window of hearing thanks to a medical procedure, as she learned to make spoken sounds. In collaboration with a visual artist, an installation developed over a considerable timeframe became a moving testament to one person's determination and excitement.
>
> Y was already established as a performer when s/he embarked on a research degree. The final portfolio explored abstracted soundscapes of local landscape, in collaboration with a similar approach from a film-maker, using violin and voice as layers of intervention. S/he also marshaled metaphors from the early weaving industry (including nineteenth-century weaving notation) which formed part of a Welsh cultural heritage as data for re-use in musical performance.
>
> Z was an undergraduate student who, during an electroacoustic music module, discovered a pile of reel-to-reel tapes and cassettes in the family garage. Among these was a tape of Z's grandfather finding, lacing and playing a further recording of Z's father sight-reading a book as a small child. During the recording the grandfather also replayed a further tape of **his** great aunt speaking. Z took these recordings of three generations of the family and reassembled them in Pro-Tools, embedding an additional generation of both family and technology into the mix. S/he then had the work pressed onto vinyl, the final submission to the module consisting of a portable record deck on a plinth replaying the work. Entitled *Four Generations: Thank Goodness Cassettes Came Out* (the latter part of this a recorded quote from Z's grandfather as he struggles to lace the reel-to-reel tape), the work is a sophisticated

> interweaving of personal and technological histories, entwining as it does four generations of each in non-chronological sequence.

What distinguishes the works described is not gender, but that they're good projects which integrate an explicit utilization of technology with something which aspires to more than merely demonstrating that technology's capacities. All the projects do broader cultural work, while secondarily commenting upon or flagging up technology's role. And they represent points in a continuously developing practice rather than being conceived foremost as independent works (although *Four Generations* is perhaps more accurately regarded as a piece of 'beautiful opportunism').

Routes into 'music technology'

If neither technology nor musical approaches are essentially gendered, one area potentially impacting the uptake of music and technology courses by different genders is the difference in routes and qualifications through which students come into music technology. 'Sound Art' may be just as contentious as MT (and just as historically problematic as a label), but it is undeniable that a generation of practitioners without the concerns of a conventional 'musical' education has emerged and is producing important work. Perhaps freeing 'music technology' of the requirement for prior music qualification might open a route through which dynamic students might enter the area. Art Schools have never had a problem recruiting female students, and a recent MA graduate from SARC illustrates the success which visual arts-trained practitioners can have on MT courses.

Helena Hamilton (Hamilton 2014) already had a distinctive and developing practice and a concern with sound and 'effort' when she arrived at SARC with a work, 'The Weight of My Soul Keeps Ringing in My Ears', in which she used a multi-track recording of her own voice to lift three kilograms of salt. Within a year she developed three significant new pieces which combined newly developed skills in Max/MSP programming with her existing concerns around effort and drawing, incorporating an increasingly explicitly performance component into her work. 'The Butterflies in My Brain', 'Untitled (When)' and 'But...' form a substantial body of work which bears witness to an imaginative practitioner's capacity to fully integrate technologies (whether these be overhead projectors, fluorescent tubes, motion sensors, USB cameras or Max/MSP patches) as essential elements of a critical practice in an 'unfamiliar' HE environment.

Gendered spaces

The Sonic Arts Research Centre (SARC), where I now work, has been described (by composer and *Leonardo Music Journal*'s Editor in Chief, Nicolas Collins) as the UK's equivalent of IRCAM or ZKM. It has a spectacular 'Laboratory' performance space with an acoustically-transparent mesh floor, and affords many creative and performative opportunities unavailable elsewhere. Other spaces in the building—those in which many spend much more of their creative time—are less successful, however, as with many other such flagship projects, and have been characterized as 'hospital-like'. An office environment of open-plan workstation spaces and smaller 'padded cell' studios without natural light is typical of many such MT resources across the world. As a frequent traveller often reduced to working in hotel rooms, I am driven to reflect that even these dull corporate spaces can often be more conducive to productivity than my official 'working environment'. Institutionally sanctioned decor and furnishings don't habitually lead to 'creative spaces', nor can

institutions easily admit that social space (and peer education) are often as important and productive as teaching space (and formal teaching contact). Conventional music departments have, by dint of their huge variety of different historically established methods of teaching (individual, small group, lectures, seminars, performance and rehearsal spaces), largely avoided being shoehorned into generic university room provision, but MT, as a 'new' discipline, has generally fared less well. It can be difficult to make 'aesthetic' decisions in a space with blue acrylic carpet tiles, orange and fawn acrylic absorbent wall tiles and fluorescent tube lighting. Art Schools, often occupying old industrial buildings with inherently good sound insulation between spaces, provide a good model for working environments which are varied and don't close down imaginative possibilities. Is it possible that the nature of the spaces provided by MT is a disproportionate disincentive for women? In truth, I'm as wary of the utility of the gendering of spaces as of the previous categories presented here, and suggest that multiply differentiated spaces would afford maximally differentiated practice, and attract (better) students regardless of gender.

Guarded optimisms

So how then might the imbalance in student numbers in MT be addressed? We are story-telling creatures, but I believe that we don't yet tell ourselves sufficiently positive stories about women and technology. To this end, the eighteenth- and nineteenth-century narratives of technology as productive (of materials and objects), as a substitute for and extension of manual labour, and conventionally historically gendered as masculine (as described in e.g. Pacey 2001), must be replaced in the networking age by an alternative, less gendered, more holistic story depicting technology as relational and connective (e.g. Ascott 2003).

Our technologies are increasingly body oriented. Despite notions of the virtual, the post-material and the post-human, the reality is that our capacity to make *any* kind of judgement, to empathise and to intuit, is rooted in our pre-linguistic inter-sensorial experience of the physical world (Maturana & Varela 1992). The 'return' to the body (Damasio 1999; Johnson 2007; Fischer-Lichte 2008); the current prevalence of philosophies of embodied mind (Varela et al 1991; Lakoff & Johnson 1999) and situated (Gallagher 2008) or enactive cognition (Thompson 2010); the notion of a relational aesthetics (Bourriaud 2002); the insights about the sense of 'selfhood' which emerge from the current collision of biology, philosophy, neuroscience and anthropology (Clark 1997; De Jaegher & Di Paolo 2007)—all point to an increasing sensibility and nuancing of understandings about relations between self and other.

The new ways of thinking through self–other relations and of conceptualizing the self that come about as we begin to realize more fully the implications of the embodied mind and the contingencies of situated and enactive cognition are congruent with the idea that an 'emergence' paradigm is more appropriate in many human circumstances than a 'design' paradigm (Borgo 2005). Fundamentally we have to find better ways of using our inquisitiveness to nourish our empathy skills—to see otherness as a way of learning more. Paradoxically, there is evidence that the variety of skills and competences involved in musicking (Small 1998) are an ideal way in which to do this. Music provides a wonderful, non-threatening context for investigating new ways of organizing human conduct, whether through the use of improvisation models to nuance other areas of activity, or through our increasing understanding of existing musical instruments as bearers of extraordinary rich histories of the nature of human interaction with devices. Music is uniquely productive of such devices—instruments for exploratory conduct and expression, and for enhancing and exploring the qualities of interactions between people. And improvisation provides unique

opportunities for positioning oneself as non-authoritative with respect to other(s). As Ingrid Monson puts it, improvising 'is a form of social action... [within which] interaction embodies very powerfully an ethos that binds its participants into something larger than the individual but less totalizing and ahistorical than "Culture" with a capital *C*' (Monson 1994, p.313).[2] It is a model for all decisions made 'in real time' on the basis of the specifics of a situation, rather than on the basis of a generic, 'go-to' categorization.

The notion of gendering tends towards a self-perpetuating narrative of disempowerment rather than stimulating a recognition of and a positive concern with difference and diversity. As a twenty-first-century human, I wish to explore the extents and limits of my selfhoods. 'I' am a multiple subject. And in musicking I can, to an extent, put my 'self' into abeyance. Musicking can afford an inquisitiveness with respect to otherness, an enhancing of empathy, and perhaps, through this 'opening up' to the other, engender plural socialities.

[2] In a later publication Monson explicitly positions improvised conduct as anti-essentialist: 'By stressing the activity of music making as something that creates a community, I am purposefully moving away from an idea of community that is defined by a particular geographic location or a particular social category, such as race, class or gender. Rather, I am interested in the ways in which the latter social categories (and their representations) interact *within* the activity of… … performance'. (Monson 1996, p.13)

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Abstract

This paper examines instances of recent work and asks to what extent it makes sense to regard certain practices and technologies as gendered. It looks at a number of working strategies, suggesting that male gender stereotypes are as prevalent and unhelpful (to practitioners) as female ones. It looks at aspects of the working environments of practitioners to determine whether changes in such conditions might alleviate the gender mismatch in enrolment in HE courses featuring ubiquitous technologies. The paper identifies historical precedents for technology gendering in which readings of such gendering have shifted radically, suggesting they offer scope for optimism in our longer-term reading of the

genderedness of current practices. The paper also touches on the extent to which a ‘research’ ethos—the foregrounding of the essential human attributes of inquisitiveness and empathy—may contribute to our capacity to tell better, less binary, stories of otherness in all its forms.

Keywords

Gender; music technology; education; improvisation;