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Abstract

Contemporary culture is embracing the creative and pedagogical potential of interdisciplinary collaboration as a means of promoting the relevance of the arts in society. Dame Evelyn Glennie, the world's first solo percussionist, is finding new ways to connect with the listener. Her motto, "to teach the world to listen" is intended to resonate both within and beyond her professional domain. *Sounds of Science* (2016), a collaborative project exploring mankind's timeline of scientific innovation through music, visuals, narrative and live performance, offers an indicative example of how interdisciplinarity can serve to create art works which function as vibrant forums for learning and engagement.

Keywords

music, science, percussion, collaboration, sound

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Music, Science and Expert Listening: Interdisciplinarity and Solo Percussion

Performance

Georgina Hughes

Growing interest in the connections between musicology and an ever-expanding range of disciplines has dictated progressively more intersectional perspectives in academic research. This both reflects and inspires more interdisciplinary approaches to composition, performance practice and creativity in contemporary music.

The potential advantages of interdisciplinary collaboration in both theoretical and practical contexts are clear: the sharing and exchange of ideas, raising awareness of disciplines beyond their conventional domain and promoting progress through creativity. This article will consider the convergence of science, history, image, narrative and music in *Sounds of Science* (2016), a collaboration between historian Christopher Lloyd, composer Jill Jarman and solo percussionist Dame Evelyn Glennie. This work provides an indicative example of how musical events can function simultaneously as art works and pedagogical constructs.

The interdisciplinary features of *Sounds of Science* are multi-faceted. Firstly, the alignment of science and music resonates with current pedagogical initiatives which recognize the benefits of holistic learning. Secondly, the convergence of a visual timeline, spoken narration (pre-performance), recorded audio (orchestral and ambient sounds) and live performance (solo percussion) coalesce to create a unity of artistic practices. Thirdly, the spectacle of solo percussion performance is in itself an interdisciplinary mode of communication, wherein ancillary and effective gestures create a choreography which heightens the meaning of the sonic events, stimulating the listener aurally, visually and kinaesthetically. Finally, Glennie's multi-sensory processes of expert listening (linked to the

fact that she is profoundly deaf) denote an interdisciplinary microcosm of the senses. The idea that music can only be experienced on an auditory level is refuted through exploration of how the physical and sensory self can create integrated interactions and responses to sound.

Sounds of Science premiered in 2016, the culmination of a two-year collaboration between Lloyd, Jarman and Glennie. Based on a timeline of human technological and scientific innovation designed and illustrated by Lloyd, visual representations of seminal innovations are brought to life through music. Lloyd is primarily known for creating visually engaging timelines of scientific discovery (the ‘What On Earth?’ series of wallbooks). Jarman had already demonstrated a personal interest in the confluence of science and sound in her compositions with works such as *Soundwaves of Light* (2006), based on the light frequencies of the stars, *H2O* (2010), which is inspired by a water molecule’s behaviour in different states, and *Resonance* (2015), a composition for cello based on the science of cymatics. *Sounds of Science* grew to become an ambitious and far-reaching collaboration. Its target audience was a younger demographic, and the intention was to stimulate interest in science, technology and music through the medium of solo percussion. At its core, the project seeks to achieve exactly what the title suggests: bringing the world of science to life through sound.

For the premiere performance at Edinburgh’s International Science Festival, the audience was provided with a programme which included pictures and titles for the ninety-two seminal scientific discoveries identified in Lloyd’s timeline. The stage was entirely occupied with various instruments and objects, a visually intriguing maze filled with sonic potential. Glennie began the performance kneeling at the front right of the stage. As the work progressed she journeyed through the myriad set-ups, with some instruments positioned on the floor, others on tables, and several to be played whilst standing. A number of instruments were instantly recognizable; the function of other objects remained more obscure until they were used. Live performance from the solo percussionist (both instrumental and vocal) intermingled with a

recorded track which combined orchestral and ambient sounds. The result was an immersive and multi-sensory experience centred on solo percussion, creating a soundscape where old and new collided – a particularly suitable aesthetic choice which mirrors the co-existence of tradition and innovation in both science and art.

Of course, the connections between science and music have existed since Ancient Greek times, so the idea of merging the two is less an innovation and more a definitive response to recent cultural and educational initiatives which seek to embed creativity in all endeavour.

If, broadly speaking, one denotes that science charts the intellectual development of mankind and that music traces the creative evolution of culture and society, the opportunity to explore the connections between the two as a cumulative reflection of human progress are multitudinous: “From Pythagoras onward there has been a supposition of unity between science and music.” (Tresch and Dolan, 2013, p.218)

Unquestionably, science has typically enjoyed a more elevated position in the field of academia. As a result, early musicological research (positivist musicology) centred on a scientific and fact-based approach, seeking to assert the academic study of music as an endeavour worthy of respect. Redfield, in 1928, notes the pre-existing links between both disciplines:

That there is an art of music will be readily conceded. That there is a science of music as well is not quite so obvious; yet such is undoubtedly the case. And that music as an art cannot attain the full growth of which it is capable unless fostered and nurtured by science, is equally true. (Redfield, 1928, p.1)

The introduction of mathematical systems to compositional processes and the integration of electronic and computer media into the realm of performance post-WW II have forged progressively more tangible relationships between music and science. In ‘The Liberation of Sound’ (1966) Varèse notes:

Now that composers and physicists are at last working together, and music is again linked with science, as it was in the Middle Ages ... new and more musically efficient devices will be invented. (Varèse and Wen-Chung, 1966, p.19)

In recent years, STEAM initiatives have sought to promote pedagogical practices centred on exploring the connections between science, technology, engineering, arts and mathematics. It is interesting to note that STEAM has replaced the initial STEM system, which excluded the arts. Revision to the initiative acknowledges that artistic creativity (absent in its first incarnation) is an essential component:

Students in STEM programs may have more experiential learning opportunities, but they are limited to only science, technology, engineering and math. Our economy requires so much more than an understanding of these areas – it requires application, creation and ingenuity. STEM alone does not foster these essential nutrients. (<https://educationcloset.com/steam/what-is-steam/>)

Fundamentally, STEAM is centred on the view that the learning experience can be greatly enhanced through collaborative projects. The main objective is to ensure that the next generation of students emerge as versatile and open-minded innovators. *Sounds of Science* celebrates the ethos of STEAM education.

An article discussing the transition from STEM to STEAM by Curt Bailey identifies three central reasons why the arts need to be integrated into interdisciplinary education: students will learn to embrace beauty, to embrace emotion and to embrace eccentricity. (Bailey, 2015, pp.21 -23) Many of the aims of STEAM education are inherently vital parts of the typical practice of musicians, and all three of Bailey's facets are already central to the art of making music.

The collaboration made science accessible and exciting, but it also provided Glennie with the opportunity to introduce percussion and contemporary music to a young audience. There is little doubt that this expansion was a success in both instances. The Institution of

Mechanical Engineers described the work as: “a musical masterpiece”. Glennie’s guest appearance on an episode of the ‘Love and Science’ podcast, a detailed and somewhat obsessive series exploring contemporary directions in scientific research, is further testament to the fact that *Sounds of Science* resonated within this community. *Sounds of Science* reinforces the important message that creativity, in any capacity, is what drives and inspires progress and evolution:

The musician stresses aesthetics, feelings, imagination and an unpressured atmosphere in which to encourage creative effort. The scientist is ordinarily less concerned with aesthetics in the same sense, but all the other ingredients of creativity apply. The scientist, too, needs unbounded imagination, curiosity, sensitivity to ideas, and freedom to break through commonplace stereotypes. (Novak and Barnett, 1960, p.44)

The intersensoriality of Glennie’s processes as a listener and the inherently theatrical nature of solo percussion performance combined with the visual timeline in the programme to create a truly multi-sensory experience. The audience was taken on a stimulating and constantly evolving sonic journey; this was an adventure through a plethora of percussion instruments, improvised sounds and timbral experiments. Several recurring features are immediately discernible in the composition. Firstly, the integration of recorded and live sounds, and the conflation of instrumental and ambient sonorities, is a defining aspect of the work. Secondly, the literal realisation of several events, delivered at times by the soloist and heard at various points in the backing track, create a playful blurring of the boundaries between what one defines as ‘real’ or ‘borrowed’ instruments. Aerosol sprays and the sound of an electric current are features of the backing audio; the soloist uses a bottle of pills as a beater for the advent of penicillin; wallpaper is played for the innovation of Chinese paper-making; a can is opened to depict the invention of carbonated drinks. The use of gesture in the performance is another notable aspect of the live experience. For ‘markets and writing’ the soloist moves methodically from left to right along a length of wood; a two-litre bottle of water serves as an

oar for the first ‘sailing of boats’; the ‘flushing toilet’ is depicted with a sharp downwards motion timed to coincide with the recorded sound in the backing track. As the work progresses, there is an increasing tendency for events to overlap, echoing the rapidity with which scientific advancements have propagated over the past half-century.

Speaking of the premiere, Jarman reflects the positive energy radiating from the live performance experience:

I became an audience member for a while, stepping back, watching the audience of all ages following the program’s timeline. There were young people swaying in their seats to the clockwork section, making gestures for the fireworks. There was rapt attention from the ‘adults’, a palpable excitement, and overall a sense of the shared discovery as the concert unfolded. (Jarman, 2016)

Lloyd was similarly enthused by the reception of the work at its premiere, noting:

That shared human experience in self-directed discovery will remain with me for the rest of my life. (Lloyd, 2016)

Since its first performance in March 2016, *Sounds of Science* has been featured at the Hay Festival, Borders Literary Festival, Cheltenham Science Festival and the Cambridge Corn Exchange (all with Glennie as soloist).

It should be remembered that the foundations of musicianship are rooted in co-operation – between pedagogues and students, between members of an ensemble, between composer and performer, and between musician/s and listener. Therefore it is natural that players should gravitate towards opportunities which allow them to work in collaborative environments. Miell and Littleton argue in favour of the view of: “the essentially collaborative nature of all creative endeavour”. (Miell and Littleton, 2004, p.2) Collaboration allows an artist to further explore their expressive and creative impulses. The rewards are irrefutable, as noted by Roe:

Collaboration between composers and performers can have significant beneficial effects on musicians' practice. These benefits include increased motivation, creative stimulation, multiple communication modes and notational clarification. (Roe, 2007, p.2)

The accessibility, versatility and appeal of solo percussion offers an ideal medium for exploring the potentialities of collaboration both within and beyond music. Captivating a younger audience through a kaleidoscope of sonorities and timbres offers many opportunities for music to converge with other disciplines. At the heart of all such collaboration is the effort to engage, to educate and to invigorate the mind of the listener. *Sounds of Science* is an important demonstration of innovation and diversification in contemporary pedagogy. It is an example of the fruitfulness of interdisciplinarity and collaboration, a reminder of the fact that new music and experimental modes of creativity remain central parts of our cultural consciousness. *Sounds of Science* is significant as an indication of the potential future of contemporary music – an arena of collaborative and interdisciplinary multimedia projects.

In relation to the larger values inherent in projects which unite disciplines, art forms, and modes of engagement, interdisciplinarity offers a blueprint for a more inclusive and integrated society, wherein the focus is on connection and intersection as opposed to boundaries and division. The confluence of music and science, live performance and recorded sound, traditional instruments and found objects, visual and sonic events, demonstrates the creative potential of collaboration. The result is a powerful educational experience, wherein the audience is immersed in the wonder of both science and sound.

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