

EXAMINING MEANINGFUL ENGAGEMENT: MUSICOLOGY AND VIRTUAL MUSIC MAKING ENVIRONMENTS

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Introduction

In the twenty-first century our experiences of music making are located in both present and virtual environments. These islands of musical context are metaphorically aligned to the established and geographically mapped islands and the islands that rise out of and disappear from the sea of human values. Musicological research tools provide a bridge between these islands and have potential for directing the development of educational software that enables learning within both contexts. Researchers in the field of interactive design and computer games software and hardware have a strong interest in hybrid methodologies that include arts production in context and that help make sense of the virtual and abstract islands and their relationship to the sea of societal values and knowledge. With generative arts for example music making requires the application of rule based musical analysis that is converted into a set of natural language rules or algorithm (Galanter 2003). Popular music software such as *Band in a Box* (<http://www.band-in-a-box.com/>) has applied these kinds of ideas to generate popular music styles using a computer. In the computer games industry programmers, often with music or sound design backgrounds compose music in digital form or create similar sets of ordered numbers that generate music.

This paper explores the virtual island of generative music making research as applied to a suite of generative software called jam2jam. Jam2jam research has been well documented and because of its rather unique nature and application in music education it is useful to make reference to the six years of collaborative research (see for example Dillon 2001a, 2001b, 2003, 2004a, 2004b, 2005, 2006a, 2006b).¹ The theoretical foundations of the research has been founded upon a philosophy of meaning (Dillon 2007) and engagement (Brown 2003; Brown 2006) and

these principles have been applied to the software and experience design or specific curriculum and teaching and learning environment. In our reporting on this kind of music learning environment we have called this experience “Networked Improvisational Musical Environment” (Dillon 2006; Brown and Dillon 2007). Describing this kind of virtual island experience with its technical and abstract qualities may indeed cause the readers “eyes to glaze over” as indeed it is a somewhat less established context for music making. Nonetheless we all travel between these present and virtual islands each day in our musical experiences. Whilst the technical definitions may be off-putting for some like most music making the experience is more compelling when seen and heard.

Networked improvisation and its associated environment from a technical perspective can be defined as online multi-user software environment for real-time asynchronous music making. Designing meaningful interaction promotes a range of modes of engagement (Brown 2000; Brown 2003) and musical knowledge is encountered through real-time experience constructed and focused by the generative musical algorithm because it directs the ‘score’. Furthermore networked environments provide opportunities for social and cultural meaning (Dillon 2006).

You can see examples of this kind of media art works made by children at: <http://www.jam2jam.com/> which may be more compelling than the above description.

With this research and software development we have sought to create environments where users with relatively little musical skill can encounter musical knowledge as framed by the software and the associated experience design or activity. (To see documentary about the project: <http://www.youtube.com/watch?v=Y08fTYdiJGA>). We have observed that jam2jam software facilitates an interactive listening and assisted collaborative experience that allows students to “improvise” in real time with each other within defined musical parameters. In computer games terms it allows users to play a collaborative musical game where musical elements make up the dimensions of a game. Users are able to participate and function within a complex virtual music ensemble environment where the means of communication between players is musical phrases and they participate actively in a collaboration based on listening and interacting with the sounds made by the players in a virtual ensemble.

This idea presents new challenges for music education philosophy and practice and raises a multitude of new issues surrounding pedagogy, authenticity and value of virtual learning. For some the virtual island might disappear beneath a sea of traditional values. It also presents

opportunities for musicological research in terms of defining ways of documenting and evaluating the quality of these programs as well as applying musicological tools to the development of software. Documenting the interaction between sound and society is a methodological focus of ethnomusicologists. Their struggles with the ethical and methodological approaches in post-positivistic contexts provide a “music inclusive” approach to observing these relationships. Rule-based analysis processes developed by musicologists to analyse, measure and represent sound and music have a lot to offer researchers in interactive computer games design when transferring a musical style or mood to computer language. It is this idea that I would like to focus on here rather than any detailed discussion of generative music making and networked environments. As I have been part of a team researching and developing music software programs for over five years now I would like to advance what I will call an urban ethnomusicology and software design study that discusses the use of musicological analytical tools and processes in the production of generative music making software.

What is generative music performance?

Let's begin by defining what generative art is:

Galanter suggests that generative art...refers to any art practice where the artist uses a system, such as a set of natural language rules, a computer program, a machine, or other procedural invention, which is set into motion with some degree of autonomy contributing to or resulting in a completed work of art (Adkins et al. 2007).

In the case of music the “system” or “natural language” can be defined by analysis and identification of succinct patterns of musical form, tonal, frequency and dynamic range and character that can be represented in computer code which employs probabilistic relationships to produce live performances where the musical style or framework can be realised (Sorensen and Brown 2007). What this means is that we can use a simple interface that involves sliders, dials and icon movement to access complex computer program code to systematise musical forms and musical knowledge. This enables us to make ensemble musical experience accessible to non-expert users in a game-like environment. When combined with appropriate experience design or reflective practice we can draw out musical knowledge and give access to learning through active experience. This suite of generative music making software tools that has been designed for music education and community music contexts has

distinct characteristics of design that will contribute to the readers understanding of the idea of networked jamming and collaboration.

A brief description of network jamming project

In this section I would like to focus upon three virtual islands we have located and observed and discuss how we have used musicological strategies to bridge and enhance their longevity and values above the surface. The network-jamming project explores how collaborative creativity such as networked music performances can enhance learning and community well being. The project uses generative systems to provide access to children, the disabled, and other novice users. The network jamming systems are connected to digital social networks that encourage the coordination, sharing and communication around the collaborative creative activities. Embedded within the musical styles and the interface design is well-defined musical knowledge. This knowledge is “encoded” within the improvisational algorithm and a teacher or music coach provides students participation leverage knowledge and guides access to it through reflective practice.

The projects themselves examine different aspect of both software hardware design or user access and educational opportunity, approach and curriculum/experience design. What I want to do here is briefly demonstrate and outline three projects then draw out the methodological tools used and highlight where musicological approaches have been useful and why.

Jam2jam grey is a multi-instrument interface, which features three popular music styles that were designed based upon student preferences for popular music in Delaware Ohio in 2002. Students at an Afro-American community centre supplied the researchers with a list of favourite music artists and these songs were analysed and turned into algorithms. MIDI instruments were selected based upon these musical styles. Bass, drums, guitar, keyboards and percussion provide the instrument set for the unit. Users are able to manipulate each instrument and increase and decrease the intensity of the sounds activity, change its timbre and volume. It provides a virtual ensemble environment.

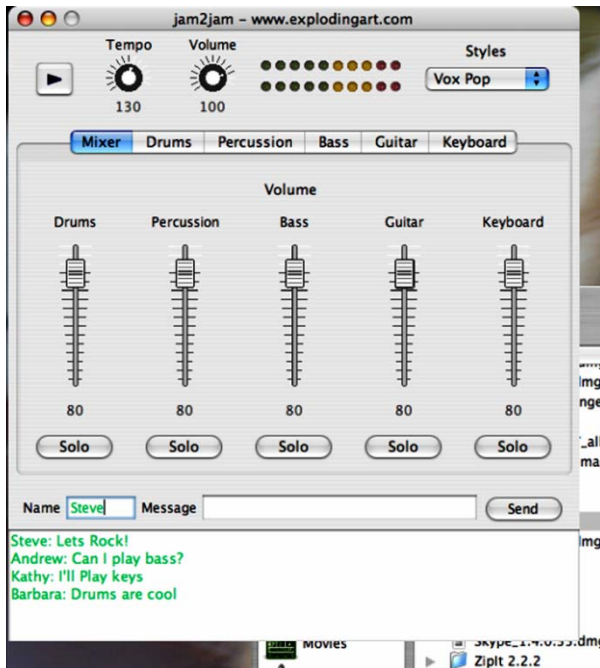


Fig. 18-1. Jam2jam grey (Download a copy: <http://www.explodingart.com/jam2jam.html>)

The interface was developed using iterative approaches to observation and the use of digital video recording. This constituted a new phase in our approach to research as we noticed that what we were doing seemed to be a hybrid methodology that fused extreme programming, case study, systems theory and action research (Brown 2007). Co-researcher Andrew Brown responded to this observation by developing the Software Development as Research (SoDaR) method which brought a focus to the problems of finding appropriate methodologies and strategies for developing software musical instruments and observing and developing experience design/curriculum and teaching and learning approaches. Whilst the method brings together the multi-disciplined approaches into a functional hybrid this approach still did not clearly acknowledge the role of musical analysis and the distinct relationship that children had with the musical instrument software or the cultural implications and value of the music in this context.



Fig. 18-2. Jam2jam blue (See documentary:
<http://www.youtube.com/watch?v=Y08fTYdiJGA>)

Jam2jam blue was designed to provide a more focused musical agenda and look more like a computer game interface. Rather than work with music technology style mixer interfaces, this interface takes its design metaphor from the computer games industry. It is aimed more squarely at early childhood and early primary year's users. Musically it uses a simple hip hop like algorithm again drawn from children's musical preferences and interest. The trial version has two axis of control: movement of the instrument icon up and down controls volume and movement from left to right controls density of note activity. In gathering data about participant's interaction with this interface we developed a digital video recording process we called "Kid Cam." This video observation strategy involved a multi camera setup where the users face, the screen activity and software sound are captured alongside a camera which captured multi users in the whole room. These data were analysed using a video analysis software called Interact (2007). This software enables the searching, coding and synchronisation of multiple video sources.

The software allows users to search and pinpoint precise frames of recorded behavioural events and code/meta-tag them. It enables the repetition of fragments of the video enabling detailed analysis and comparison. This technology allows the analysis of audiovisual data to remain in its media form rather than abstracted as text or number and allows other media data to be grouped with the more compelling audiovisual display.

What is important with the use of these strategies and technologies was that we were able to examine musical performance data and include sound/music as data. We were also able to examine the relationship between what users said about their music making and what they actually did.



Fig. 18-3. AV Jam (See examples:
<http://www.explodingart.com/networkjamming/>)

AV-Jam involves a major shift in interface design to use a physical hardware version of the software performance instrument. Users can improvise with the instrument by simply moving sliders on each USB controller up and down. Each slider provides a different musical or video transformation and each Controller controls a different instrument or video. The AV-Jam unit (see figure 3) consists of an Apple iMac Computer loaded with our own computer language called Impromptu and a Kronox sample engine, 5 USB controllers and a pair of powered monitor speakers. It is a collaborative music-making environment that generates music in real time. Users can jam/improvise with bass, drums, harmony and solo synthesizer sounds and they can process video input taken live from the computers built in camera or external video. The unit transfers the functions that are handled by virtual sliders and dials to real physical ones. The unit responds to a number of user issues. Firstly we were interested in what users would do with a physical interface where gestures could be made using real sliders and dials rather than mouse driven virtual ones. Secondly we used a professional sounding sound engine rather than the MIDI sounds available to us in the java version. These features were employed to address the youth preference for DJ-VJ looking and sounding technology. As you can see in Figure 3 the look of this unit is technologically complex. The sound also is professional sounding digital samples and matches what is possible by DJ producers. This unit was trailed in urban communities involving disengaged youth with a high representation of indigenous young people. This unit involves the use of

Impromptu language, *which, can be described as an interactive development environment for musicians and sound artists*. Previous versions of network jamming software have used a java-programming platform. The generative functions of AV-Jam are constructed using a live coding computer music programming language (Sorensen 2005). This language has been developed to be able to perform electronic music in real time with immediacy and with expressive range in a live and interactive performance. In a sense using Impromptu is perhaps analogous to Orff's use of more accessible orchestral tuned and un-tuned percussion and building child-sized and simple to access new instruments. The analogy is about adapting existing musical expressive tools/instrument so that children can use them both individually and collaboratively as an ensemble. The point raised here is that it was a musical expressive process and research through making music that drove the development of Impromptu. The strategies for observing how participants interacted with the unit and what they valued in these cases involved another aspect to research strategies that also did not seem to be covered by existing case study or actions research approaches. Whilst these kinds of interview and observational records that constitute a participant observation case study methodology (Jorgensen 1989) are able to include multiple data forms the actual art works performed and produced require more attention in regard to the sub cultural values inherent in urban youth communities. It was here that I was aware of the importance of including the musical data as music in a way that privileged that data over language based data.

Urban ethnomusicology moving to the digital

In each case described above the communities were asked what music they valued and then a style algorithm was designed around these data so that the first sound heard by participants was recognisable to them as one they appreciated and this encouraged them to engage with music making using the tool. Making these styles involved deep analysis and succinct representations and definition of probability so that the style was clearly recognisable but had broad enough range to ensure continuous engagement. In my discussion about meaning of music to young people I describe the importance of the first sound and the first experiences with music making as a micro aesthetic (Dillon 2007). I observed this idea frequently with AV-Jam users. The distortion of or unfamiliarity of a sound set at times was immediately off-putting for participants. However once a familiar sound set and style was accepted by a group the users invariably moved the familiar to extremes and were able to mutate styles

depending on the range of manipulations available in the interface. Both individuals and groups explored new variations of the preset algorithms regardless of age or the interface version. In Ohio we observed six year olds distorting every parameter of a hip hop style to turn it into a Punk/Gangsta hybrid. In an urban youth community we observed Indigenous Australian young people manipulate the AV-Jam controllers so that the music sounded like hip hop with a didgeridoo drone. They placed urban Indigenous dot paintings and graffiti tags they had made in front of the camera to project a distinct identity. There is a sense here that valued styles become an expressive medium that feeds into a more distinctive local identity for individuals and groups projecting personal, social and cultural meaning. What we observed repeatedly over six years and 2000 participants is the idea that users constantly develop music syncretically so that it evolves and becomes representative of the community. These kinds of observations and recordings can best be understood in terms of their musicological meaning because of the meaning invested in the cultural artifacts and practices and the embodied and performative aspects of the interactions and experiences. Capturing and analysing these data involved documenting what happened both musically and culturally examining not only behaviour but also performance relationships and how that affected music making.

Having music present in the conversation about music

In 2001 I completed a doctorate about the meaning of music to children (Dillon 2001, 2007). I collected hours of audiovisual materials in that project that were reduced to textual summaries. I became increasingly aware that the affordances of textual representations of sound or music experience limited and filter meaning. I wanted to have music present in the conversation about music. Having a background in qualitative education methodologies is in some aspects in tension with my compositional and analytical musicianship that is part of my practice as a musician. Interestingly it was work with computers and music education which drew my attention to musicological research which has included audio-visual materials as artifacts of musical experience and utilised representation systems to allow the sound that people make, and the experience they have that results in sound to be documented in more compelling ways. I was concerned that when we “textualise” music experience and product that we lose its essence. Granted we provide another lens on the phenomenon but it is nowhere near as compelling or immediately understood.

This aspect of my own approach to methodology was further reinforced by observations of networked environments, noting that they allow the participant to shift between modes of engagement and adopt both player and appreciator roles (Brown 2003, 2006) which has interesting potential for music learning (Dillon 2006). With network jamming a player can participate in a collaborative performance and when the players stop the generative music continues to cycle through playing repeatedly. The individual players can then listen to the repeated segment of music they have constructed and have a conversation about it. For education, this means that the musical knowledge embedded in the algorithm renders an affordance that a “frozen moment” can be identified and discussed. Performers can pause to discuss the aesthetic qualities of the sound. Music is a temporal art form and until now we have only been able to discuss recordings of a performance or composition after the fact. In this case however music can be present in the discussion about music in real time. This has implications and potential for music education and for developing ensemble experience. It also has educational possibilities because we are able to isolate aspects of musical knowledge and repeat segments of focused musical knowledge so that users can reflect on and analyse its character.

Furthermore, because the algorithm can be as simple or complex as we can program then the experience of the musical knowledge can also have that range of complexity. Indeed whilst much of the Jam2jam and AV-Jam algorithms have been based upon hip hop, grunge and RnB popular music styles we have also been able to perform a Xenakis chaos algorithm piece (Xenakis 1991) using two laptops and a vector interface that a five-year old could control. What this says for musicology is that the musicological analysis of style becomes the principle architecture for the musical knowledge encountered by the players. In ethno-musicological terms we can observe how particular musical value systems interact with the community of players in multiple modes of engagement. As Dewey suggests art is both in and with experience and with this technology and experience design we can experience both simultaneously (Dewey 1989).



Fig. 18-4. Young people using AV-Jam USB controllers

Conclusion

Whilst visiting them frequently and deepening our experiences of them enhance our understanding of established islands of musical knowledge and practise, our travel to virtual islands is nonetheless important. We spend large bodies of our time interacting with virtual music embedded in media environments and we need to be able to make sense of them and understand what value they have to us as expressive music makers. Identifying appropriate methodologies to document generative arts environments also reveals the possibility of examining a unique contemporary musicianship, where the computer becomes a collaborative instrument, the network provides an environment for ensemble experience and cyberspace becomes a venue for performance and critical analysis. Methodology provides a bridge to this understanding. What I have sought to highlight here is recognition of the value of musicological research methodologies within software development in the music education field. I want to draw attention to firstly the idea that musical analytical tools for analysis bring a range of deep understandings to these research areas that existing educational and ethnographic methods ignore. They introduce a range of diverse data forms presented by symbolic and audiovisual representations of music alongside musicians as participant observers who

understand the value of embodied and tacit knowledge in music making. This provides further opportunity for triangulation and adds the extra value of diverse media forms to the perspective. Secondly, the idea of having music present in the conversation and the discourse about music presents new possibilities for music education curriculum development as well as for the opportunity for reflection in music education to not just be on and in action (Schon 1984) but *through* it. Our understanding about how sound and society interact in schools and communities and the value, meaning and transformative effect of music on those communities needs to be measured and evaluated with music present in the discussion and with a focus upon musical strategies as the principle means by which these data can be examined effectively. When these virtual islands rise from the sea we can recognise their value and understand what it is they mean in our world.

Acknowledgements

The author acknowledges the Australasian Collaborative Research Centre for Interactive Design (ACID) for its ongoing research support of the Network Jamming project, the Apple University Consortium, Verizon Wireless, Exploding Art and CreActives for their philanthropic support for community music projects, personnel and equipment.

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Notes

¹ Please note that reference to the author's own research has been made to contextualise this paper within a context of a larger an ongoing research project. Jam2jam generative arts software is unique as applied to community music applications and this requires the research to be placed in relation to the six years of research undertaken so far. It is not an attempt to be self-referential but simply to acknowledge that many of the ideas represented here are part of a longer term collaborative research project.