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Examining meaningful engagement: Musicology and virtual music making environments.

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Abstract

In the twenty-first century music is being made in new ways in both real and virtual environments. This study builds on an ongoing examination of meaningful engagement in the production of music curriculum and experience design in music software and examines the adaptation of musicological strategies for research in these fields. The study reports upon the use of musicological analysis of both music making processes and communities that have been applied to the production of networked improvisational musical environments and community music projects. It advocates an exciting emergent role for musicology and ethnomusicology as a means of observing, evaluating and creating meaningful and engaging environments for music learning that enable interactive engagement with real and virtual musical worlds. The paper serves as the beginnings of a methodological meta study that examines a series of music projects involving youth community music and the effects of music making on social and cultural inclusion and the creation of Networked Improvisational Musical Environments. This project suggests a 'contemporary musicianship', which embraces the computer as instrument, the network as ensemble and cyberspace as venue. The paper focuses upon the implementation and adaptation of musicological strategies of musical analysis in software design and ethno-musicological methods for ethically observing and documenting multi-cultural and urban Indigenous music communities.

It is suggested that these methodologies and strategies that are inclusive of the artifacts and symbols systems common to music making practice should be used more in music education research than text and number based educational methods, which it is argued, filter the meaning inherent in music experience.

CURRICULUM VITAE

Steve Dillon is internationally recognised as a leading researcher in the field of positive effects of school and community music programs. He is a senior lecturer in Music and Sound at Queensland University of Technology Faculty of Creative Industry. Steve's research focuses upon meaningful engagement with music making in virtual environments and communities. He is director of the *save to DISC* (Documenting Innovation in Sound Communities) <http://www.savetodisc.net/> research project which examines and documents the qualities and relationships between music, meaning, health and well being. Project Leader for the Australasian CRC for Interactive Design (ACID): Network Jamming research. He is author of *Music, Meaning and Transformation* and a series editor for the new Cambridge Scholars Publishing series: *Meaningful music making for life*.

Examining meaningful engagement: Musicology and virtual music making environments.

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Introduction

In the twenty-first century, music is being made in new ways in both real and virtual environments. The idea that musicological research tools might be useful in the development of educational software presents an interesting role for musicologists but nevertheless, one that has become a reality for researchers in the field of interactive design and computer games software and hardware. Generative Arts involving music making for example requires the application of rule based musical analysis and conversion into generative algorithms. In the computer games industry computer programmers with music backgrounds that either compose musical ideas in digital form or create generative algorithms to generate music highlight an emerging trend for the employment of musicians. This paper focuses upon generative music making research-using a family of software called *jam2jam* and a hardware version of the same idea called V-Jam. Research about these generative arts systems has been documented over a five-year period (see for example: (Dillon, 2003; Dillon, 2004b; Dillon, 2004a; Dillon, 2005; Dillon, 2006b; Dillon, 2001a). Principally the research has been founded upon a philosophy of meaning (Dillon, 2007) and engagement (Baker, 2004; Brown, 2003; Brown 2006) and these philosophical principles have been applied to the software and experience design or specific curriculum and

teaching and learning environment. We have called this kind of music learning Networked Improvisational Musical Environment (Brown & Dillon, 2007; Dillon, 2006a).

“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, 2006a).

This concept seeks to provide an opportunity to create environments where users with relatively little musical skill can encounter musical knowledge as framed by the experience design and software. It allows an interactive listening and assisted collaborative experience as the software and hardware allow students to ‘improvise’ in real time with each other within defined musical parameters. Put in computer games terms it allows users to play a collaborative musical game where musical elements make up the dimensions of the 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 the ensemble.

Whilst this idea presents new challenges for music education philosophy and practice it also presents new 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 ethno-musicologists. Their

struggles with the ethical and methodological approaches in post positivistic contexts provide a 'music inclusive' approach to observing these relationships. The rule based analysis processes developed by musicologists to the measure and represent sound and music have a lot to offer researchers in interactive computer games design. 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 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?

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 ' (Galanter, 2003 In (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 & Brown, 2007). What this means is that we can use a simple interface that involves sliders, dials and icon movement to access complex java and impromptu computer programming 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

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.

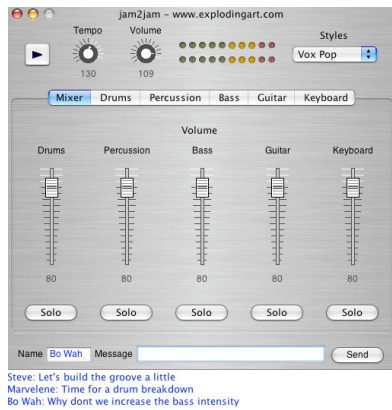


Figure 1 jam2jam grey

jam2jam grey (Download a copy: <http://www.explodingart.com/>)

Jam2jam grey is a multi instrument interface which features three popular music styles the design was based upon student preferences for popular music in a project we undertook as part of children's music festival 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 stylistic 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. As well as facilitating an instant band experience for users it also provides a virtual ensemble environment where users can play with others on the same piece of music in real-time.

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.

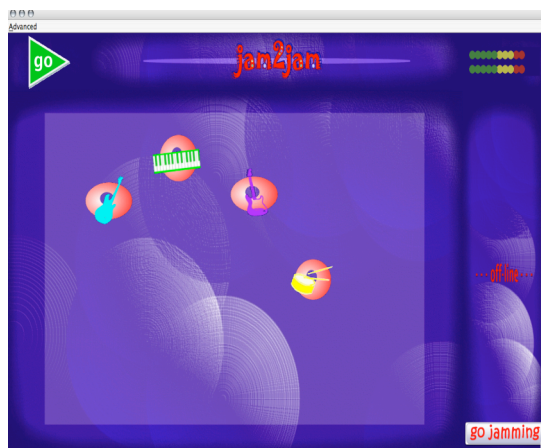


Figure 2 jam2jam blue

jam2jam blue (See examples: <http://www.jam2jam.com/>)

Jam2jam blue was designed to provide a more focused musical agenda and look more like a computer game interface. It is aimed more squarely at early childhood and early primary years users. Musically it uses a simple hip-hop like algorithm again drawn from children's musical preferences and interest. This 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.



Figure 3. V Jam
V-jam (See examples: <http://www.jam2jam.com/>)

V- Jam involves a major interface shift to a hardware version of the software performance instrument. The V- Jam unit (see figure 3) consists of an Apple iMac Computer loaded with Impromptu and a Kronox sound engine, 5 USB controllers and a pair of powered monitor speakers. Like jam2jam it is a collaborative music-making environment that generates music in real time however the sound is more professional and the interface more gestural and performative like a DJ. Users can jam/improvise with bass, drums, harmony and solo synthesizer sounds and they can also process video input taken live from the computers built in camera or external video image material. 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 the production values of DJ/ Dance music- 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 V-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 in this context that we became aware of the importance of including musical data as music in a way that privileged that data over language based and descriptive data. The kinds of ways performers interacted with the music making process and each other and the kinds of performances they made were extremely interesting. These data influenced our understanding of meaning and engagement for the users and generated important data which flowed back to both the interface and experience design.

Urban ethno musicology 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 recognizable to them as one they appreciated which 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 recognizable 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 V-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 old 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 V Jam controllers so that the music sounded like hip-hop with a didgeridoo drone. They placed urban dot paintings and graffiti tags 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 the five years and 2000 participants we have documented and observed 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 only be truly 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 analyzing 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, 2007; Dillon, 2001b). 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 the 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 utilized representation systems 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 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; Brown 2006) which has interesting potential for music learning (Dillon, 2006a). 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 looped 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 V- 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).



Figure 4: Young people using AV Jam USB controllers.

Conclusion

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 space for performance and critical analysis (Brown & Dillon, 2007). 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 tools for analysis bring a range of deep understandings to these research areas that existing educational and ethnographic methods often lose sight of through the technology of their language and textual filters. 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.

References

- (2007) 'Interact'. p. Video Analysis. Anstorf, Germany, Mangold International GmbH.
- Adkins, B., Dillon, S., Brown, A., Hirche, K. & Gibbons, C. (2007) 'The Role of Generative Arts in Supporting Cultural Participation: A conceptualisation of the jam2jam network Jamming Tool.' *VSSM*.
- Baker, F. (2004) 'Results from the Questionnaire and school Data for the Band Thing Project.' Brisbane, University of Queensland.
- Brown, A. (2000) 'Modes of compositional engagement'. In Brown, A. & Wilding, R. (Eds), *Australasian Computer Music Conference-Interfaces*, Brisbane, Australia.
- Brown, A. (2003) 'Music composition and the computer: an examination of the work practices of five experienced composers.' Brisbane, University of Queensland.
- Brown, A. (2006) *Computers and Music Education: Amplifying Musicality*, New York, Routledge.
- Brown, A. (2007) 'Software Development as music Education Research.' *International Journal of Education & the Arts*, Vol. 8, pp. 1-14.
- Brown, A. & Dillon, S. (2007) 'Networked Improvisational Musical Environments: learning through online collaborative music making'. In Finney, J. & Burnard, P. (Eds), *Music Education with Digital Technology*, pp. 96-106. Continuum International Publishing Group.
- Dewey, J. (1989) *Art as Experience*, U.S.A., Perigree Books.
- Dillon, S. (2003) 'jam2jam-Meaningful music making with computers.' In Barton, K. H. G. (Ed), *Artistic Practice as Research: 25th Annual Conference of the Australian Association for Research in Music Education*, pp. 65-77. Brisbane, Queensland, Australia, Australian Association for Research in Music Education (AARME).

- Dillon, S. (2004a) Meaningful music making with music technology. *Queensland Journal of Music Education*, **10**.
- Dillon, S. (2004b) 'Modelling, meaning through software design.' In Chaseling, M. (Ed), *26th Annual Conference of the Australian Association for Research in Music Education*, Southern Cross University Tweed Heads, Australian Association for Research in Music Education (AARME).
- Dillon, S. (2005) 'Meaningful engagement with music technology.' In Mackinlay, E., Collins, D. & Owens, S. (Eds), *Aesthetics and Experience in Music Performance*, pp. 327-41. Cambridge, Cambridge Scholars Press.
- Dillon, S. (2006a) 'jam2jam: Networked Improvisational Musical Environments'. In Moore, M. & Leung, B. W. (Eds), *School Music and Teacher Education: A Global Perspective in the New Century*, Vol. , pp. 19-30. Hong Kong, Department of CAPE, the Hong Kong Institute of Education & International Society for Music Education (ISME)
- Dillon, S. (2006b) 'Jam2jam: Networked jamming.' *M/ C Journal*, Vol. 9.
- Dillon, S. (2007) *Music, Meaning and Transformation*, Newcastle-upon-Tyne, Cambridge Scholars Publishing.
- Dillon, S. C. (2001a) Making computer music meaningful in schools. *Mikropolyphonie-online journal*, **6**.
- Dillon, S. C. (2001b) 'The student as maker: An examination of the meaning of music to students in a school and the ways in which we give access to meaningful music education.' *Institute for Education*, Melbourne, La Trobe.
- Jorgensen, D. L. (1989) *Participant Observation: A Methodology for Human studies*, Newbury Park CA USA, Sage Publications.
- Schon, D. (1984) *The Reflective Practitioner*, New York, USA, Basic Books, Harper Colophon.
- Sorensen, A. (2005) 'Impromptu: an interactive programming environment for composition and performance.' *Australasian Computer Music Conference, 2005*. .
- Sorensen, A. & Brown, A. R. (2007) 'aa-cell in Practice: An approach to musical live coding'.
- Xenakis, I. (1991) *Formalized Music*, New York, Pendragon Press.