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# The Role of Generative Arts in Supporting Cultural Participation: A conceptualisation of the jam2jam network Jamming Tool

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## Abstract

This paper contributes to a conceptual and empirical examination of the contribution of a generative arts tool to fostering music experimentation and improvisation in children. With reference to the work of Bourdieu and Dewey we propose that the significance of the tool is that it enables greater access to the experimentation required for aesthetic work. It provides some of the technical and performative aspects of music making that are commonly expected to be produced by the child through traditional music training, providing readymade musical resources enabling musical engagement and aesthetic participation.

**Keywords:** generative arts, music making, cultural capital, engagement

## 1 Introduction

The world commission on culture and development, in its report, *Our Creative Diversity*, pointed to the centrality of creativity to ‘communication on existential issues’ (Perez de Cuellar et. al., 1996). While the mechanisms that produce the links between creativity and the strengthening of social structures are not fully understood, research now suggests that the dispositions and competences needed for cultural participation - cultural capital (Bourdieu, 1984) - play a key role in the quality of social capital (understood as social connections) of communities and societies (Jeannotte, 2003: 39). However, while cultural participation may be critical for a sense of social connection, Bourdieu’s analysis of the field of culture suggests that cultural capital relevant to cultural participation is not equitably distributed. Rather this resource tends to be associated with other aspects of socio-demographic positioning and serves as a kind of ‘entry fee’ to the field of culture enabling the participation of some and producing the tendency of others to exclude themselves (Bourdieu, 1984).

In the context of the music field, researchers such as Csikszentmihalyi have pointed to the importance of broadening access to music making in terms of the “organized auditory information [that] helps organize the mind that attends to it, and therefore reduces psychic entropy, or the disorder we experience when random information interferes with goals” (Csikszentmihalyi, 2002). He describes how flow (autotelic experience, optimal engagement) can arise from listening to music and suggests that further benefits “are open to those who learn to make music” (Csikszentmihalyi, 2002). Reimer elaborates on these benefits in terms of “opportunities to operate at the highest levels of cognition that humans are capable of – to understand, to create and to share meaning as only music allows people to do” (Reimer, 1999). The benefits to be gained by enabling the availability of collaborative music making to a broader cross-section of people raise the question of the capacities of contemporary online and digital environments to support this participation.

This paper argues that generative arts tools can support creative participation in the field of community music and have the potential to enhance peoples’ capacity for cultural participation. Twenty First century music makers utilise digital technologies in the process of music making and these technologies provide the potential for different kinds of access to musical experience. Whilst most technologies are often isolating, the development of generative processes and networked environments provides an opportunity to explore collaborative music making with digital technologies that are accessible to a broad range of people (Dillon and Brown, 2007). In outlining the concept of the

jam2jam tool, we illustrate the way in which the tool has been designed to possess some of the capacities that were traditionally expected to be acquired by individuals, thereby potentially reconfiguring the traditional relationships of access to the field of culture. The development of the tool, then, needed to be based on a provisional conceptualisation of the properties that are likely to enhance musical participation.

The paper first turns to an introduction to generative arts and a description of the jam2jam tool as an instance of a specific kind of generative arts tool for the support of creative collaboration in the field of music. It then reviews what is at stake in enhancing participation in this field and the properties of the tool - the digital and online characteristics - that may promote this. This raises the question of the key processes and mechanisms that are required to produce access to creative collaboration in the use of the tool and the specific nature of its potential contribution to cultural participation. We argue that its specific relevance lies in its potential to foster the aesthetic disposition (Bourdieu, 1984; Adkins, 1998) by enabling the manipulation of readymade musical styles and forms to produce specific variations as musical works. The processes of Meaningful Engagement as theorised by Brown and Dillon are proposed to be central to this process (Brown 2006; Dillon, 2006, 2007). The paper finally reports on some preliminary observations of the use of the tool by children in the context of community arts workshops, pointing to important questions regarding the relationships that will optimally promote the achievement of collaborative music making.

## 2 Generative arts, creativity support and jam2jam

According to Galanter, 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 this respect the key defining feature of *generative* art is the involvement of a generative system which itself exerts at least partial control in the development of a work. Among other things, these systems can be developed to enable technically ‘inexpert’ participants to develop works.

Jam2jam is a generative music performance application which allows the user to control and direct musical outcomes individually or in collaboration with others. What differentiates the jam2jam application from traditional music software technologies is its generative qualities and its use of embedded cultural knowledge within the software. In relation to the activity of “jamming”, efforts at web-based or virtual jamming to-date have typically relied on the participants having certain pre-requisite musical skills, such as being able to recognise and use notes on a keyboard. For example, Eliëns, van Welie, et.al. have developed a framework that:

*...consists of a browser plug-in that supports the display and editing of scores as well as playing scores by connecting to a shared MIDI server. To participate in a jam session, clients of the MIDI server can also send data in real time, for instance by using a keyboard embedded in a Web page (Eliëns, van Welie, et.al., 1998).*

While this facility is online, it is still heavily reliant on members’ possession of a high level of culturally and/or pedagogically acquired musical skills. Thus, the entry point to undertaking a successful music jamming session is quite high and can be at the exclusion of individuals who may not have some of the traditional techniques, knowledge and skills necessary for collaborative music making.

In distinction from these cultural underpinnings, the combination of online and digital properties of jam2jam potentially allows more immediate entry into a “jamming” process whereby participation in a collaborative music event with and through the software can occur without some of the expertise that might otherwise be required. This virtual environment is based on the experience of a generative musical output through a shared common interface. For example, if a user was to make an adjustment to a parameter, which in turn changed the resultant generative musical output, this change would be immediately mirrored within the other user's interface and auditory output of the common virtual environment. By allowing the user to have control of parameters affecting the generative musical

output, without some of the traditional requirements of technique, knowledge and theory, jam2jam enables a more immediate facility on the part of the user to participate in collaborative music making. Brown and Dillon provide the following description of the tool:

*“jam2jam provides users with next to immediate audio feedback with updates in its musical algorithm occurring within an eighth note of shifting a slider or dial on its interface. Students use the software either in a local network or over the Internet where they are connected by the shared music and the replication of gestures moving sliders on each computer. ‘Chat boxes’ provide access to text communication but the more important communication occurs as students listen to the collaborative sounds that they share. Observations of a variety of age groups, contexts and cultural groups using jam2jam suggests that the virtual social meaning shares the same qualities as a ‘real’ ensemble experience.” (Brown and Dillon, 2007)*

By providing a basic scaffolding of rules, formulae and technology, jam2jam has a series of inbuilt musical styles, based on the formulae and logic of culturally emergent musical forms. These could include, for example, rules which support the generation of musical outputs such as rock and pop music. These styles, amongst others, are based on a series of generative musical rules which the jam2jam application follows. This, in turn allows the user to generate a musical output which is in line with the particular style chosen, without needing the traditionally required performance skills, and knowledge and techniques associated with the cultural rules of different musical styles. Further, jam2jam ensures that all musical notes and phrases follow harmonic principles ensuring that the output will possess the full instrumental and harmonic characteristics of the chosen style. The user acts as an arranger and conductor of the musical output through a series of interface control mechanisms.

Thus, by ensuring that many of the rules and cultural knowledge necessary for functional generated musical output are embedded within the tool itself, the system displaces some of the traditional location of cultural capital in the bodies of individuals to the online and digital functions of the tool itself. This raises the question of the nature of the insights, skills and processes required for users to explore their creativity and capacity for collaborative music making in this context. While a fully documented description of all of these requirements is beyond the scope of this paper, the next section will focus on conceptual and preliminary observational work analysing some required qualities of the interaction between users and the jam2jam tool.

### **3 The jam2jam Creativity Support Tool and the Aesthetic Disposition: the importance of meaningful engagement**

Bourdieu’s model of the social and cultural underpinnings of participation in the field of culture was an attempt to treat the question of cultural participation analytically and systematically where others may have tended to treat creativity as a “given” or inherited quality (Bourdieu, 1984). In applying this framework to the role of the creativity support tool, it is possible to identify specific relationships that may be at issue in the capacity to use the tool and enable participation even when the tool itself deliberately attempts to provide some of these qualities. The description of the jam2jam tool in the previous section of the paper pointed to the deliberate embedding of styles and music sequences that replaced the requirement for participants to provide these for themselves. In this respect, the tools to some extent replace the technical and skill requirements involved in reproducing these styles performatively. This frees the participant up to focus on becoming familiar with the styles in a musical sense and manipulating them individually and collaboratively to produce a specific work.

Bourdieu refers to this component of the broader set of skills competences and dispositions comprising cultural capital as the ‘aesthetic disposition’ (Bourdieu, 1984). This concept is related to the analytical question of when a worked upon object becomes an art object; when it is invested with a specifically aesthetic quality (Adkins and Emmison, 1992; Adkins, 1998). The point at which this occurs is identified with the artist’s attention to form over function. This distinction was illustrated by Bourdieu by citing an example provided by Panofsky:

*If I write to a friend to invite him to dinner, my letter is primarily a communication. But the more I shift the emphasis to the form of my script, the more nearly does it become a work of literature or poetry (Panofsky, 1955, cited in Bourdieu, 1984: 29).*

In this respect, the application of this digital and online tool in a specific spatio-temporal context provides an opportunity to investigate the interaction between tools, participants and context in relation to participants' experimentation with musical forms in the application or acquisition of a key component of cultural capital: the aesthetic disposition.

The refinement of a sense of what specifically cultural processes may be at issue in the use of the jam2jam tool raises the question of characterising the relationships of use that are likely to result in a specifically aesthetic experience. Dewey's framework provides insights into the nature of - and possible processes involved in - creative work. Dewey's philosophy places emphasis on the value of an experience. In this respect, a key dimension of the relationship lies in the capacity of the experience to provide the motivational resources to move from a functional use of the various musical styles available through the tool to a specific appropriation of a style in the production of a specific work. Dewey's identification of processes such as cumulation, conservation, tension and anticipation represent key elements in this process that point to a relationship between users and technologies to support creative practice that cannot be encapsulated in notions of functionality alone (McCarthy and Wright, 2004). Further, these dynamic motivational elements could be seen as a key to facilitate users' capacity to reduce their reliance on the ready-made character of the styles to produce specific versions and variations that embody their own specific musical works - something that is improvisational in character (Sawyer, 2000).

In light of this conceptualisation of the purposes and principal relationships involved in the use of the jam2jam tool, it was considered important as part of the tool's development to outline a pedagogical framework in which these principles could be operationalised in the application of the tool. Brown and Dillon have proposed this framework in the form of a meaningful engagement matrix (Brown 2006; Dillon, 2006, 2007). In keeping with Dewey's framework, Brown and Dillon have developed a 'middle range' theory of dimensions and levels of engagement in pedagogic settings associated with music education, focusing on the relationship and experience the student has with and through music. The theory underpinning the model is that engagements with music lead to the development of musical intuition and intelligence. Further they outline conditions under which this engagement optimally produces these outcomes: they need to be meaningful to the participant in ways that are enjoyable and enhance the participant's self-conception as a musician. The theory is illustrated in the following meaningful engagement matrix:

**Table 1:** Meaningful Engagement Matrix

	Appreciate	Direct	Explore	Participate	Select
Personal					
Social					
Cultural					

The matrix depicts dimensions of the nature of engagement itself described in terms of experience as follows:

- An appreciator – listening carefully to music and analyzing music representations.
- A director – managing music making activities
- An explorer – searching through musical possibilities and assessing their value
- A participant – involved in intuitive music making
- A selector – making decisions about the value and organisation of music or musical elements

Further it illustrates the way these types of engagement experience can occur at different social levels:

- Personal – the activity is intrinsically enjoyable.
- Social – the activity connects the student with others and these relationships are valued.

- Cultural – the activity is regarded as valuable by the community and, by participating (or succeeding) in it, the student achieves a sense that they too are important.

These modes of engagement with music relate to the different ways in which a student may approach musical tasks.

- As an appreciator the student analyses and listens carefully to musical productions, whether they are made by him or herself or by others.
- As a director the student has a clear vision about the musical result to be achieved and uses whatever resources they have to realize that vision. For example, the student may have a commission for a public multi-speaker sound installation and use sampling and algorithmic composition technologies to build it.
- As an explorer the student has some musical territory or space they wish to investigate and uses different techniques to reveal possibilities. For example, the student may wonder if a useful new style of music will result from combining African drumming patterns and polyphonic writing for string quartets and so they undertake musical analysis of features from works in each style, then compose a series of syncretic exercises utilizing those features.
- As a participant the student involves himself or herself in an intuitive musical exercise. For example, the student performs with others in an improvised sound track to an old silent film.
- As a selector the student exercises aesthetic and cultural judgment to make choices between musical options created by themselves, others or by machines. For example, the student selected the tracks and their order for the school's annual compilation CD.

These approaches may occur in the context of different levels of meaning:

- Personal meaning is derived from the satisfaction of making a good sound or completing a difficult task, or understanding a new musical concept. The student exploring the musical possibilities of combining African rhythms and polyphonic harmony is likely to achieve personal meaning from that self-directed task.
- Social meaning is derived from interacting musically with others. The student improvising with others to the silent film is likely to achieve social meaning from that activity.
- Cultural meaning is derived from receiving feedback from the community that your role as a musician is valued. The student who was commissioned to make a public sound sculpture is likely to receive cultural meaning from both the receiving of the commission and the responses of people at the exhibition of the work.

The relevance of Brown and Dillon's framework to an investigation of the use of the jam2jam tool is that of a middle range theory, embodying and applying some of the key principles espoused by Dewey which have been linked in this paper to a broader analysis of the requirements for cultural participation. Together these theories serve as an explicit concept of the purposes and mechanisms proposed to underpin the use of the jam2jam tool. This explication of a provisional theory of the use of the tool enables strategic investigation of its operation in specific spatio-temporal contexts in order to challenge, enhance and possibly change these principles. The next section turns to a description of some early observations of the use of the tool by children in school holiday community arts programs.

#### **4 jam2jam in the Community Arts Setting: Exposing the Conditions required for meaningful engagement and improvisation**

Preliminary observations of the use of the tool occurred throughout 2006 over two school holiday periods in the context of arts workshops in a Brisbane theatre complex. Researchers from different disciplinary backgrounds such as music, social science and interaction design observed various aspects of the workshops at first hand and also captured video data of the workshop processes. While researchers were aware of the concepts on which the jam2jam tool was based, they were also aware of the importance of ethnomethodological principles requiring that academic theories and concepts should not be invoked in the description of a setting unless they were 'procedurally consequential' for the participants in the setting under investigation (Schegloff, 1992). To this end, the children's interaction was examined in terms of the actual spatial and temporal context of the workshop.

Observations were conducted and digitally recorded in the context of four jam2jam workshops run for children, one occurring in August and the other three in September, 2006. As such the workshops were community arts activities located in an inner city theatre precinct. The overarching aim of the workshops appeared to be participants' achievement of music making through the guidance of the

group tutor and the generative music patterns provided through the jam2jam software. As outlined above, the theory on which the software is designed proposes that the key mechanism through which the tool produces this outcome is its support of creative engagement. In relation to the use of the tool itself, audio from the jam2jam software was delivered to each participant through the use of personal headphones. Each participant had individual control over a notebook computer running the jam2jam software, and used the notebook track pad to control the on screen mouse pointer, which was necessary to control the software interface.

All the workshops studied were conducted in a large rectangular room, accessed from the centre of the theatre complex. Spatially, the setting consisted of eight chairs placed around tables set in a rectangular fashion, with surrounding chairs for parents, whiteboards, television for program feature demonstration and a sound mixer at the head of the table as shown in the following images.



In some respects the layout resembled more formal pedagogic settings with the pre-allocated spatial arrangements of table and chairs, whiteboards and computers. However, the inclusion of parents and other stakeholders (eg. researchers) who determined their own level of participation as onlookers and sometimes in assisting roles, the time limited nature of the workshops (as opposed to an ongoing formal curriculum plan) and the relatively informal regulation of the workshops, distinguished them from formal pedagogic settings. At the far end of the room, there were musical instruments including drum kit and keyboard, which appeared to mark the room as oriented to musical activity. These were not used during the workshop time.

In terms of temporal organisation, the workshop interaction was clearly oriented to specific aspects of engagement as described in the meaningful engagement matrix. The workshop tutor guided the workshop focus over some discrete sequential phases. All three of these sessions provide evidence that the temporal timeline, as initiated by the session director, were steered towards a basic flow of private practice leading towards interactive network jamming with public performance opportunity at the conclusion of the session. Discussion and feature overview punctuated these activities, and the sessions were initiated and concluded with a brief informal discussion. The timeline was refined through the sessions, with the final session still having the basic flow of private practice leading on to network jamming, but with an increased emphasis towards public performance and discussion opportunities.

This pattern of temporal organisation appears to have oriented the participants towards an emphasis on exploration as identified in the meaningful engagement matrix. Specifically, the temporal organisation placed emphasis on exploration of the software and musical possibilities at a personal level and the exploration of musical possibilities at a social level, through the activity of network jamming. Overall the patterns of engagement reflected normative emphasis of the workshops on exploration. In terms of the engagement matrix, this meant that more instances of “exploring” (versus other types of engagement) could be identified, and these instances occurred at a personal, social and cultural level. Following ethnomethodological principles, it is important to open up the question of the meaning and logic of ‘exploration’ for participants in future observations. At this point in the research, however, it was clear that the early ‘explorations’ at a personal level provided for more shared and collaborative creative engagement later in the workshops

The observations revealed that the jam2jam tool fosters creation of social interaction and the development of social relationships within the setting. The musical elements were presented as if on a palette from which the participants could not make wrong choices, and could subjectively self-determine the appropriateness of their contributions to the musical outcome. Personal, private experience facilitated by use of headphones created a private learning space in which the participants could explore in their own time, uninhibited by others’ perceptions, criticisms, judgements, expectations, etc and build their confidence to a point where they are motivated to move to the social level, to interact with their peers by connecting their computers over the network. In this sense, the workshops moved from a private interaction with the readymade styles and the variations in tempo, volume etc possible within them, to an investigation of the way others in the workshop were experimenting with the tool as illustrated in the following image where a child is seeking to hear what is heard by the child next to her.

This move from personal to social exploration could be understood as moving to a form of interaction where problems are created rather than solved, which, according to Sawyer’s account of Dewey and Collingwood, is important in a move from reliance on a specific relationship to ready made approaches to improvisation (Sawyer, 2003). “Problems” are created by the children in exposing themselves to their peers’ experimentations, thus providing alternatives to the patterns they have devised and implemented for themselves. The process through which this occurs is illustrated in the example in the following image. Here, the child on the right moves about in his seat, in response to what he is hearing. This prompts him to tell the child next to him about what’s happening on his computer. He taps her on the shoulder and then tells her: “Look at what mine’s got...”



These explorations at a social level serve to create “problem raising” situations around the introduction of new possibilities and variations in, for example, musical style. In the following example, the child on the right said to the other child: “OK, do you want to change style?” and then demonstrated to her how to make this change using the interface.



Observations have also provided some early data on the nature of the conditions that are likely to influence the nature and level of creative engagement experienced in the workshop. It was clear that the design of the informal pedagogic organisation of the workshop, the complex relationships between online and offline relationships and the nature of the interface, software and hardware associated with the tool required further investigation. While the separateness of the children at their own desks exploring their own relationships with the given musical styles was a very important part of the workshop, it was also seen as important to facilitate their movement to a more collective and common understanding of their music making in order to facilitate a greater level of improvisation and “jamming”, a capacity to realise musical meaning at a collective level. This of course must also be considered in terms of the timeframes typically associated with community arts involving usually only one workshop contact.

## **5 Conclusion**

Our conceptual analysis of the possibilities of a generative arts tool such as jam2jam in enhancing cultural capital and cultural participation suggested that the central property of the tool for this purpose was its provision of ready made musical styles. This enabled users to concentrate on manipulating the readymade styles by tempo, volume, density and other dimensions to create their own versions and variations. We argued that this is consistent with developing requirements associated with the aesthetic disposition (Bourdieu, 1984). This was made possible by embedding some of the technical, knowledge and performative requirements of musical participation and collaboration in the tool itself. This, in turn has intensified attention on the capacity of the tool and the offline aspects of a workshop setting to realise the development of improvisation and aesthetic attention to form rather than function.

The examination of the workshop organisation has illustrated the complexity of the relationships involved in fostering aesthetic experience in a community arts setting. At one level, it was clear that children were moving from personal to social levels of participation which increasingly exposed them to the experimentation of others and thus further possibilities for themselves. However, the group observation strategies provided limited opportunity to understand the details of the children’s aesthetic experience and their sense of its development through the workshop. A more in-depth understanding of this is crucial if we are to identify the role of the tool in conjunction with the spatial, technical, temporal, social and cultural relationships in the workshop in the production of the experience. A research design that treats each child as individual cases embedded in the broader case of the workshop involving additional strategies to identify the children’s experience would assist in furthering our understanding of these relationships.

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