

# LIVENESS IN NETWORK MUSIC PERFORMANCE

*Chad McKinney*

University of Sussex  
Department of Informatics  
C.Mckinney@sussex.ac.uk

*Nick Collins*

University of Sussex  
Department of Informatics  
N.Collins@sussex.ac.uk

## ABSTRACT

This paper considers notions of liveness in the context of network music performance, where through technological mediation performers may be distributed not only within a given space, but also in remote locations. Whilst there has been much written about liveness in electronic music, less attention has been given to network music, which has several unique features. We present here a preliminary study on liveness in network music employing a short questionnaire, completed by several actively performing network musicians. The questionnaire allowed qualitative open-ended responses, probing topics including communication, presentation, and performance anxiety. While the sample size is small, the results and analysis present additional perspective to the dialog on liveness as well as indications for refined research questions to be made in any larger-scale follow up.

## 1. INTRODUCTION

Many of the issues facing electronic musicians today are not new and can be viewed in the context of a larger trend of technology both mechanical and electronic, altering the means of production and consumption of the arts [20]. As Paul Valéry notes in a hauntingly foreshadowing quote from 1934, “Just as water, gas, and electricity are brought into our houses from far off to satisfy our needs in response to a minimal effort, so we shall be supplied with visual or auditory images, which will appear and disappear at a simple movement of the hand, hardly more than a sign.”[19]. Nowadays actors are more likely to perform for cameras, and musicians commonly perform for microphones. Furthermore, digital technologies have accelerated these changes exponentially. Reproduction has no bounds and the process has been accelerated to literally the speed of electricity and light.

It is within this context that live electronic music has developed. Nevertheless, there is still some lingering dissonance with electronic music performance given that traditional instrumentalists still represent the common image of a performer. As David Wessel notes “When asked what musical instrument they play, there are not many computer music practitioners who would respond spontaneously with ‘I play the computer.’”[23]<sup>1</sup> Electronic mu-

sic performers have often sought to enhance perceived performer liveness through the usage of controllers and interfaces, engaging the audience by recapturing the role of a traditional instrumentalist [14, 15, 25]. Yet, these controllers and interfaces must be mapped, and their decisions are to a point arbitrary. John Croft argues that these performances become more about showcasing the interface mappings, where any inference of a one to one connection is mediated by digital interpretation[5].

Perhaps the desire to reconcile live electronic music with traditional performance stems from the effort to appreciate new technology in the historic context of a live concert. Berio, in a 1983 interview with Roassan Damlonte, said of electronic music:

“With or without new tools and technologies, electronic music as a means for musical thinking reached a dead end. Moreover, the new tools detached it even further from the global and comprehensive *idée* of music making which is perceived not only by its technical, historical, and expressive terms, but in contemporary and social terms as well.” [2]

In contrast, writers such as Philip Auslander and Marc Leman have proposed that outdated notions of liveness and embodiment are inadequate in the age of mass media, the internet, and mobile technology[1, 10]. Social media and the web have transformed not just the format of an act, but also the fundamental audience. Sites like YouTube or Sound Cloud have become common as 21st century mediums created by increasingly fragmented groups of authors for increasingly fragmented audiences. Live performance away from Second Life streaming in the real world remains an active practice and where problems linger, may well be resolved over time. There is a point of view that suggests that newer audiences who have been raised watching DJs in clubs, playing video games, and never knew a time before the Internet, don’t feel the same need for a one to one connection between effort and output [8, 7]

With these developing trends in mind we now consider network music as a unique case in live electronic music. Whilst research regarding liveness in electronic music has tended to explore the relationship of bodies and instruments, audience perception, interfaces, and shifting definitions, less theoretical and empirical study has consid-

<sup>1</sup>Note that this quote from David Wessel is 10 years old at the time of this paper, and these sentiments may not be as prevalent today.

ered network situations, perhaps given their relative cultural novelty. Network music has seen many advances since the time of the Telharmonium, including the invention of the personal computer and the widespread proliferation of internet connections [16]. These advances have fostered a unique approach to live electronic music that facilitates collaboration in a field where solo performance is perhaps more common. Furthermore, the interdependencies, presentations, locations, and structures of these groups introduce new variables with regards to the perception of liveness for both performers and audiences[9, 18]. The dialog about liveness can benefit from additional perspectives in this regard.

In the following sections we present a preliminary qualitative study on liveness in network music; specifically how issues unique to a network ensemble can affect performance dynamics. The pilot study focusses on a small set of current performers in the network music field, probing their experiences and opinions on how networks might influence a feeling of liveness. We are interested in their perception of the presence of the performance to external parties, their experience as audience members for others' works, as well as their interactions with other members of their ensembles. Network bands and orchestras present a scenario where communication, co-ordination, and timing are important factors to performance. Especially for the case of distributed ensembles over multiple locations, focussed engagement in liveness remains a great challenge. Nonetheless, such ensembles may also have unique opportunities to convey musical efforts and their results to audiences, exploring a sense of meaningfulness of presence and action.

## 2. QUESTIONNAIRE

This study uses a questionnaire to explore notions of liveness in the context of network music performance. It is a qualitative study, with questionnaire responses solicited via email, drawing on the experiences and opinions of current practitioners. Actively performing network musicians were chosen because they have a unique perspective on the subject as both performers and as audience members, but also because their technical background allows them to respond in detail and with specifics to the questions posed. Because the study group is small (twenty four requests sent, seven received) and personally known to the research team, an option for non-anonymous response was made available. The default was anonymity, though, and non-anonymity only extends to attribution of direct quotes rather than comparative across group analysis. Ethics review approval was gained from the University of Sussex to run the survey in this manner. The full questionnaire is listed in appendix A on page 6.

Several topics are covered in the 23 questions, starting with some initial interrogation regarding several technical parameters of the performers' ensembles. Performance practice, communication, visualization, perception, presentation, and anxiety are subsequently probed in the re-

maining questions with the hope of sparking longer responses. While only seven responded, they represent several actively performing ensembles with a range of experience, make up, location, and approach. Still, given such a small sample size, any results from this study can by no means claimed to be conclusive or statistically significant. Instead, we hope to be able to add some additional perspective on the topic beyond lone introspection. The information gained can inform the planning of follow up studies, with consideration to lessons learned in the execution of this preliminary run.

Many of the answers were what might be expected given the questions, yet there are some notable surprises which will be discussed below. It was clear in the responses that there is room for improvement. Some insufficiently undifferentiated questions led to repetition in responses; whilst this helped to show respondents were consistent, their time is a precious resource. We also identified some missed opportunities for interesting angles of inquiry. That said, even when the responses were unsurprising, they served to reinforce and expand on assumptions which would otherwise be no more than just the authors' opinions.

We summarize briefly a general overview of the ensembles represented, their preferred technology, and their general approach to networking. The average size of the ensembles represented by the respondents is 4.57 (no laptop orchestras were represented). All the respondents claimed to use laptops with Macbooks being the most noted. Software and languages used covered a wide range including SuperCollider, Max/MSP, Pure Data, Processing, C++, Lisp, and Forth. Wireless and ethernet connections were used by all the respondents, but also MIDI and single board custom servers were noted as having been used historically by one. Only two respondents claimed their ensemble performed distributed, with the others stating that they had experience with distribution, yet don't currently perform as such.

## 3. EMERGING THEMES

Because of the small sample size we chose not to employ any formal qualitative content analysis and instead utilized informal cross comparisons of the responses as well as linking them to published literature on arising topics. There were several notable themes that emerged after collecting and comparing the questionnaires including the roles that live coding, communication, controllers, and visuals play in network music performance.

### 3.1. Communication

All the ensembles represented utilized some kind of text based chat, and for those ensembles who perform without distributed members the chat system is augmented by visual communication such as gestures or facial expressions, and occasionally vocalized speech. Communication in musical performances is often considered vital and network music is no different[13]. Unlike other

practices though, network music performances often incorporate some kind of projection, and for this very reason all the responses noted that their communication is projected to the audience. These projected communications aim to increase the audience's appreciation for the liveness of a given performance, though not all the responses indicated a preference for text based chat. One response indicated that gestures such as head nodding to the beat or hand movements are preferable. Juan Romero details the differences of the two modes by explaining "It's a trade, gestural communication is faster but simpler, it helps for the synchronicity and to show approval or disapproval and other basic responses. While chatting, the ensemble can write longer ideas and the others can respond to it, complement it and develop it, before it is executed. Chat is much more democratic, but in trade it takes more time."

Curtis McKinney from the network band Glitch Lich lauded text based chat for the ability to foster group awareness by stating "We find it to be successful, and it goes well beyond the traditional means of communication, being able to instantaneously and quietly communicate musical ideas, thoughts, or gestures." In contrast, Patrick Borgeat amusingly bemoans any effort for communication during a performance: "It's a general problem that both with chat and visual cues you don't have any guarantee that all members a) noticed it b) agreed with that. This is the same problem that traditional bands have. If the bass player and the drummer and guitarist all agree by looking at each other that they'll extend the solo part you're almost sure that the singer will start singing the chorus nonetheless"

Communication, in any form, can be a powerful tool in rehearsal and performance, though much of the utility is predicated upon group dynamics and politics[24]. These group dynamics are especially highlighted in improvisatory contexts, where the music can be heavily influenced in real time[6]. Unfortunately we missed the opportunity to directly inquire about the role of improvisation, especially with regards to communication and liveness. One response alludes to the role of improvisation, noting their ability to change their performance in reaction to the audience or the ensemble, but it would have been beneficial to have focussed responses on the subject.

### 3.2. Control and Performance

As mentioned earlier, novel controllers and interfaces have become a common technique among electronic musicians to increase perceived connectivity between effort and output, as well as alter the musician's relationship to their system. For this reason it is important to understand how they might be used in a network context as well as the opinions of the musicians about their usage. Questionnaire responses varied on their virtues, while none of the ensembles widely incorporated much more than laptops into their standard setup. One respondent explained the lack of controller proliferation because "Our pieces tend to emphasize a group network behavior, and this in turn de-emphasizes individual performance. However, group

members are free to use whatever input controls they desire; it's just that the demands of playing the actual piece and supporting the desired collaboration often preclude concentration on virtuosic, individual performance." In some ways this group dynamic can be compared to a Javanese gamelan, where the virtuosity of each performer is superseded by the importance of group cohesion, and where group virtuosity is more important than any given individual[3].

In contrast, another respondent regretted his group's dearth of options: "I feel that the one aspect that is lacking for the entire group is getting away from the keyboard and mouse. Granted, it would be difficult and expensive for us all to have the exact same setups but, in solo and group performances, I've found that not sitting in front of a laptop is a tremendous boost to the feeling of things being live, no matter what else you may be doing." This sentiment is echoed by some researchers, claiming that the more a performer incorporates the body into live electronic music, the more familiar the performance will be to an audience, and subsequently easier to appreciate[17].

Interestingly, when asked to discuss any differences between their solo and group performances, some respondents came back to the subject of control. Tim Perkis highlighted that his solo performances are often very gestural and instrumental, but his network music while still feeling live, was also more composer-like. In contrast Patrick Borgeat pondered his solo performance ambitions, stating "I wouldn't be that much interested in liveness here, but maybe just because I got all the liveness I want with my ensemble."

### 3.3. Live Coding

Live coding is practiced by many network ensembles and therefore it was important that we inquire about the role it plays in the respondents' own ensembles as well as how they consider it to impact their performance and sense of liveness. Three respondents claimed their ensemble live codes, with Tim Perkis of the Hub musing that "live coding only happens if things have gone very, very badly." On a more serious note, Patrick Borgeat of Benoît and the Mandelbrot celebrates the approach by stating "I believe that blank slate live coding is as live as computer music can get." His band mate Juan Romero tempers the sentiment somewhat by saying "It is hard for live coding to make a big show out of it, but for us, the combination of screen displaying, group interaction, communication and our music has had good acceptance as a live act."

Live coding practitioners have claimed that the practice shores up some of the short comings of laptop performance such as the obscurantism of the back of a laptop screen[22] By showing their screens they claim to allow the audience to have a better understanding of the intent and efforts of the performers[21]. On the other hand, there is a risk of further obscuring the act, as Alex McLean notes in his Ph. D. thesis on the topic "Most people do not know how to program computers, and many who do will not know the particular language in use by a live coder.

So, by projecting screens, do audience members feel included by a gesture of openness, or excluded by a gibberish of code in an obscure language?” [12] One respondent, Juan Romero, also suggests that live coding could have an effect on the interaction of the performers with the audience, stating that “After some concerts people remark how we write our code so fast, and we are fixed on our screens in a kind of Tunnel Vision, but then we start being more social and make the music collectively. So this kind of effort is more appreciable during the beginning of our concerts, but also visible throughout the whole performance.”

### 3.4. Visual Presentation

Laptops (which are used by all the respondents) have had many criticisms with regard to their use as a musical instrument. These criticism includes issues such as performer disembodiment, the appearance of an introverted demeanor, lack of social conventions or legacy, minimal physical effort, and a lack of authenticity[4, 11]. As one respondent eloquently put it, “It’s a bit ironic; the performance practice we have embraced in order to make electronic music that is very, very live, can look very, very dead from the audience’s perspective.” The previous section on live coding addressed some of these issues, and how live coding could possibly help, yet four out of seven respondents did not claim to live code. All of the represented ensembles utilize some form of visual projection during performance. For the live coding band Benoît and the Mandelbrots, this consists of showing their screens and the utilization of some visual effects on the signal. Other groups cited the use of chat displays, visualization of the network and flow of data, and two dimensional and three dimensional graphics as techniques that were employed.

It would have been useful to further inquire if the respondents were making choices with regards to approach and visuals representation in reaction to the previously cited criticisms of laptops. The fact that all the groups have some visual component to their performance beyond simply sitting behind their computers might imply that there are conscientious efforts to mitigate these issues, but the claim cannot be made with the current responses to the questionnaire. Juan Romero does offer some interesting insight with regards to audience opinion on visibility of liveness: “Other people have suggested we should use more light, and other kinds of gimmicks (e.g. using uniforms, walking on stage on Segways, marching while live coding, perform solos, virtuoso laptop air coding, boy band choreographies, etc.) which would help for a live situation, at least make it more interesting (and funny I guess), but our easy set up, and sitting in front on the computer is also acceptable for us, and for the interested audience.”

### 3.5. Perceptions of Liveness

All the responses indicated that they felt networked performance to be highly engaging. Tim Perkis explains “It’s

very personally engaging. Over time I’ve come to realize that the actual interactions and personalities and humor of the performers is the most compelling aspect of the music.” Nevertheless, none of the network musicians felt that networking itself had any effect on liveness (as opposed to engagement), as evidence by this quote from Patrick Borgeat: “I dont think that networking enhances or diminishes the ‘live factor’ of our performance.” Another response expounds “I don’t think the networked aspect causes an inherent difference in liveness; it much more depends on the priorities of the musicians involved.” Tim Perkis, earlier touting the engagement inherit in networking, only replied “Adversely, probably.” Another response simply stated “I don’t know :(” These answers are interesting because they imply that there might not be a direct correlation between performer engagement in a performance, and a sense of liveness for an audience.

Performance anxiety can have a large effect on some musicians, and it could even be said to be the result of a performance feeling *too* live. With this in mind, musicians were asked specifically about their opinions regarding the effect that networked performances have, if any, on their feelings of anxiety. Responses claimed a range of anxiety during performance, both in networked and non-networked settings. None of the responses claimed to have increased anxiety in networked performances, but several claimed a reduction for various reasons. Patrick Borgeat feels that performing network music moderates several problems that performance anxiety can create. Here he compares instrumental and laptop performances: “My traditional instrument is the saxophone, though I never played it professionally. I havent played it for several years but two months ago I played with it again in public. Here I realized that stage anxiety does much more influence my body than my mind: My air and lip pressure trembled and badly influenced my playing. Even if my fingers would tremble in this way I could still type code (maybe a little slower) so here the ‘digitalliness’ of our interface filters out the noise of my anxiety.” The added presence of other musicians was mentioned several times, such as this humorous response: “For me the slightly higher degree of anonymity in a laptop ensemble, mostly due to the relative difficulty to discern which member of the ensemble just exploded the filter, really seems to have an effect [on] the level of stress involved.”

Performing music with computers introduces the possibility for technical problems to impede the performance. One respondent noted the improvement of software over the years: “Back in the day, I remember a great deal of anxiety about technological failure, and for good reason! Now that the tech is much more stable, that is less of a concern. Having five noisy bandmates can cover a host of problems, as long as the whole network doesn’t fail. I don’t think I’ve ever played a concert that didn’t generate a great deal of excitement for me. It’s why I perform, after all.” Tim Perkis describes how the Hub copes with these issues: “Our music is complex and difficult enough to perform that there is often at least one person not work-

ing at any one moment, so there is little anxiety about that, we just expect it.” Glitch Lich, Curtis McKinney’s laptop band, performs distributed, and he described the effect on anxiety by saying that “Network music while playing dislocated and away from the actual audience severely diminishes this, but it also serves to somewhat dull the adrenaline rush and immediate sense of contentment with a well done performance.” Other responses supported the sentiment that distribution dampens the adverse effects of nervousness.

### 3.6. Ensemble Structure

Some suggested that fostering individuality in the network with regards to audio production and reaction to network activity has been vital towards creating more lively and interesting performances. A respondent explains, “Our design and performance practice, from the very early days, has concentrated on the emergent behavior of the network / ensemble, and I think this has led to consistently surprising and lively performance. One interesting thing that we’ve found is that it is very important that each member realize each piece specification in their own individual manner – sharing of piece code tends to homogenize and “deaden” the resulting performance.” On the other hand, Juan Romero suggested that there is an advantage to a symmetrical ensemble, stating, “We had a mix in our first performance (Max+SuperCollider) but then all the members of the band recognized that having all SuperCollider would be better to make a framework for staying in sync and sharing data. Also for learning from each other.” One respondent felt that having a shared visual interface helped foster performer interactivity as well as increase audience understanding, explaining “If we were all doing something completely different and just trying to make it work together sonically, I don’t feel like anyone, including us, would feel as connected to what we are doing as when we can all see and interact with the same environment.”

Ensemble distribution is one of the unique possibilities afforded to networked ensembles, but only one of musician claimed that there was any merit in this structure. Responding to an inquiry regarding multi-site distribution and liveness, Curtis McKinney explains “It certainly affects it, though it is not all negative. It’s a different performance medium, with different possibilities and restrictions.” Others had much more negative opinions. Responding to the same question, another musician plainly states “It affects it quite negatively; this has been our invariant experience. Nothing (in current technology) can approach the moment-to-moment live interaction to be enjoyed with musicians sitting in the same room together.” Tim Perkis agreed, saying “I don’t find multi-location playing very interesting. it seems like a gimmick that offers no particular advantage in any way.” Another had a more nuanced opinion, suggesting “I think that remote performers need some kind of visual presence (by video projection or with an avatar in the visuals), otherwise you don’t really recognize them as a performer who has influence over the current piece.”

## 4. CONCLUSIONS AND FUTURE WORK

We have presented a qualitative study on network musicians with regards to liveness, utilizing an informal methodology to cross compare responses and draw parallels to the literature. Because of the small sample size we do not claim any definitive results, though the respondents have helped give additional perspective beyond the opinions of the authors. Additionally, several opportunities for an improvement in the questionnaire have been identified, including the the consolidating of repetitious questions, and the inclusion of inquiry on improvisation and criticisms of laptop performance. Furthermore, with a larger collection of responses it will be useful to apply a more rigorous methodology towards qualitative data assessment.

## 5. REFERENCES

- [1] P. Auslander, *Liveness: Performance in a Mediatized Culture*. Routledge, 2008.
- [2] L. Berio and R. Dalmonte, *Intervista sulla musica*. Laterza, 2007.
- [3] B. Brinner, *Knowing Music, Making Music: Javanese Gamelan and the Theory of Musical Competence and Interaction*. University of Chicago Press, 1995.
- [4] K. Cascone, “Grain, Sequence, System (three levels of reception in the performance of laptop music),” in *Soundcultures*, M. S. Kleiner and A. Szepanski, Eds. Suhrkamp, 2003.
- [5] J. Croft, “Theses on liveness,” *Org. Sound*, vol. 12, no. 1, pp. 59–66, Apr. 2007.
- [6] J. De Jong, *Collective Talent: a Study of Improvisational Group Performance in Music*. Amsterdam University Press, 2006.
- [7] R. Dean, *Hyperimprovisation: Computer-interactive Sound Improvisation*. A-R Editions, 2003.
- [8] J. d’Escriván, “To sing the body electric: Instruments and effort in the performance of electronic music,” *Contemporary Music Review*, vol. 25, no. 1-2, pp. 183–191, 2006.
- [9] G. Föllmer, “Electronic, Aesthetic and Social Factors in Net music,” *Organized Sound*, vol. 10, no. 3, pp. 185–192, Dec. 2005.
- [10] M. Leman, *Embodied Music Cognition and Mediation Technology*. Mit Press, 2008.
- [11] T. Magnusson and E. H. Mendieta, “The acoustic, the digital and the body: a survey on musical instruments,” in *Proceedings of the international conference on New Interfaces for Musical Expression*, ser. NIME ’07. ACM, 2007, pp. 94–99.

- [12] A. McLean, "Artist-programmers and programming languages for the arts," Ph.D. dissertation, Goldsmiths, University of London, 2011.
- [13] D. Miell, R. MacDonald, and D. Hargreaves, *Musical Communication*. Oxford University Press, USA, 2005.
- [14] J. M. Morris, "Structure in the Dimension of Liveness and Mediation," *Leonardo Music Journal*, pp. 59–61, 2008.
- [15] P. Rebelo, "Haptic sensation and instrumental transgression," *Contemporary Music Review*, vol. 25, no. 1-2, pp. 27–35, 2006.
- [16] J. Rohrerhuber, "Network music," in *Cambridge Companion to Electronic Music*, N. Collins and J. d'Escriván, Eds. Cambridge: Cambridge University Press, 2007, pp. 140–155.
- [17] J. Rosa and S. D. M. University of California, *To Un-button: Strategies in Computer Music Performance to Incorporate the Body as Re-mediator of Electronic Sound*. University of California, San Diego, 2008.
- [18] A. Tanaka, *Interaction, Experience, and the Future of Music*, ser. Computer Supported Cooperative Work. Springer, 2006, vol. 35, ch. 13, pp. 267–288.
- [19] P. Valéry, *Pices sur l'art*. Paris, France: Gallimard, 1934.
- [20] B. Walter, *Illuminations: Essays and Reflections*. Schocken, 1969.
- [21] G. Wang and P. R. Cook, "On-the-fly programming: Using code as an expressive musical instrument," in *Proceedings of the international conference on New Interfaces for Musical Expression*, 2004, pp. 138–143.
- [22] A. Ward, J. Rohrerhuber, F. Olofsson, A. McLean, D. Griffiths, N. Collins, and A. Alexander, "Live Algorithm Programming and a Temporary Organisation for its Promotion," in *read.me — Software Art and Cultures*, O. Goriunova and A. Shulgin, Eds., 2004.
- [23] D. Wessel and M. Wright, "Problems and prospects for intimate musical control of computers," *Computer Music Journal*, vol. 26, no. 3, pp. 11–22, Sep. 2002.
- [24] A. Williamon, *Musical Excellence: Strategies and Techniques to Enhance Performance*. Oxford University Press, USA, 2004.
- [25] J. Wilson-Bokowiec and M. A. Bokowiec, "Kinæsonics: The intertwining relationship of body and sound," *Contemporary Music Review*, vol. 25, no. 1-2, pp. 46–57, 2006.

## A. QUESTIONNAIRE ON THE VIEWS OF NETWORK MUSICIANS ABOUT LIVENESS IN PERFORMANCE

1. Do you wish your responses to this questionnaire to be fully anonymous (the default) or to be attributed to you personally if used in direct quotation?
2. How many members does your ensemble have?
3. What hardware (laptops, phones, kinect, instruments, etc..) does your ensemble use?
4. What are the kinds of software, languages, and environments does your ensemble use? Does everyone use the same collection or is there a mix?
5. Does your ensemble perform with members physical distributed among several locations?
6. What types of connections does your ensemble typically perform with, ie. Ethernet, wireless, etc..
7. Do you use any kind of visual element during performances? If so please describe the presentation.
8. Does your ensemble live code during performance? If so, do you show your screens?
9. How would you classify the genre or style of music that your ensemble performs?
10. How does your ensemble communicate with each other during performances?
11. Broadly, how do you feel network performance, and in particular your ensemble's approach to network music effects a sense of liveness as a performer?
12. How does your ensemble's structure and approach influence your sense of involvement in performance?
13. If your ensemble performs physically distributed, do you feel this effects a sense of liveness or connectivity?
14. How well do you think your ensemble projects involvement and effort by its members to a given audience?
15. How do your ensemble's channels of communication impact on group awareness? Do you find this to be successful and how do you compare it to more traditional ensembles using acoustic instruments?
16. Given the network music context, in using any controller interface for your music, how does the hardware effect the connection between effort and sonic output?
17. How do you feel your ensemble's visual presentation is effected by your networking setup? Does this effect your feeling of connection to the other performers during a performance?
18. As a performer (of any kind of music) do you have any regular psychological responses to performing (anxiety, excitement, etc...) and how does performing network music effect this response?
19. If you perform electronic music as a solo performer as well, could you please describe how your solo performance and networked performance work differs with respect to liveness?
20. What do you think has worked well for your ensemble, and what do you think has not, in regards to fostering a general sense of liveness during performance?
21. As an audience member for other network performances, do you feel observing a networked performance differs from actively engaging in it? If so, why?
22. As an audience member, do you feel that multi-location ensembles are affected by their physical distribution with regards to active engagement by all performers?
23. If you have any additional comments you would like to add, please note them here.