Time and reciprocity in improvisation:
on the aspect of in-time systems in improvisation with and on machines.

Henrik Frisk
Malmö Academy of Music

11th ELIA Biennial Conference
Nantes, 2010

One term which I often come across is the concept of real-time composition. Even though I use it myself sometimes I believe it is a bit misguiding, because there is an inherent contradiction between the reflective act of composition and the concept of real-time, but the dynamic between these two modes of operation is central to much of my artistic practice. Another reason why the term real-time composition is problematic is simply because the term ‘real-time’ in the context of artistic practices may not be so informative. After all, few art forms are unambiguously non-real time or real-time.

A related distinction, one that I find more useful, and one that moves beyond the limitations of the real vs. non real-time, is that between artistic practices that are embedded in time (in-time processes) and those that are contained in time (over-time processes). For an action to be embedded in time means that the time it takes to perform it matters; that time is a factor whose value is decisive. Musical performance and improvisation (and also listening) are typical in-time operations and composition is an example of a typical over-time activity.

Resistance, physical or gravitational resistance, furthermore, is an integral part of in-time operations The weight and size of my leg when I walk is part of the walking activity and the resistance of my body and of my instrument are factors that shape my musical output in a performance. And, in the case of the virtual world of computers, the lack of a physical component in is a significant aspect of my interactions with it.

A patch, a small computer program such as the ones I commonly use when I improvise with and on computers, is in essence something which is contained in time rather that embedded in it. In general we may see it as a preconceived definition of a finite set of responses to a finite set of input patterns. And as such, it is different in nature from the act of improvisation that is used to interact with it. It has no real resistances and it performs almost always the same regardless of time. Hence, it has more in common with a composition and musical notation than with performance and improvisation. This difference between the logic of the computer program and the logic of the performance can be challenging and there is always a risk that the over-time aspects of the digital technology destabilises the in-time aspect of the performance.

What then is the significance of interaction in a music that makes use of interactive computers in musical performance? What is the significance of the fact that my activities as an improviser are embedded in time in this interaction? In what sense can the machine respond to me and in what sense can I respond to it? Are our interactions at all to be considered as communication?

The aspect of interaction in the field of interactive art and media is problematic as the term `interactive' to some extent has been hijacked by computer interface designers. Though one of its lexicographic meanings is “Reciprocally active” (The Oxford English Dictionary. 2nd ed. 1989. OED Online.) its meaning in the context of computer interface design is more geared towards a methodology of control, than sharing, or reciprocity. In the reduced meaning of computer interaction the actions of one part, ‘the user’, is used to control the reactions of the other, ‘the machine’, often in a one-to-one relation: one action, one reaction. In this kind of interaction, a reaction to any given action is commonly ignorant to any prior actions or reactions. A mouse click on a given icon on a computer desktop typically results in the same machine response, regardless of the user’s preceding activities. Musical interaction, on the other hand, is all about reciprocity, particularly in improvised music. (Well investigated by Ingrid Monson in her important contribution *Saying Something: Jazz Improvisation and Interaction* (Monson, 1996))

A successful interplay between musicians involved in an improvisation rests on a mutual sensitivity for taking, and responding to, musical initiatives. Musicians induce differences rather than alter states; they induce differences that “make a difference” and according to Gregory Bateson, such a difference that makes a difference is the definition of a bit of information (Bateson, 1979). In other words, new information and knowledge is constructed by changes over time. It is my experience and my understanding that there is a coupling between the dynamics of an in-time system and the dynamics of the cybernetic concept of differences that make a difference. Taking this one step further, perhaps it is possible to understand the logical and temporal difference between the human improviser and the interactive technology in terms of a difference that makes a difference. In other words, as a difference that produces information rather than one that displaces the temporal embeddedness of the performance.

Building on the cybernetics of Bateson, in my PhD dissertation (Frisk, 2008) I coined the two modes of interaction interaction-as-control and interaction-as-difference. The control paradigm influences much of the interaction design we encounter but may become problematic if it is transferred to the domain of musical practice. When I play, I do not want to only control the technology I engage with, be it a computer or a saxophone. I want to exploit both the constraints and allowances of the instruments I use and let these aspects influence the conditions for my interactions with them. In this reciprocal relation with the technologies I use, it is not the similarities that are interesting but the differences and the deviations. My vision of a dynamic human-technology reciprocity has its origin in an aesthetic choice, intimately linked to my improvisational attitude towards musical organization.

Just as in-time and over-time are not unambiguous categories, however, interaction-as-control and interaction-as-difference are not clear cut definitions in binary opposition. We are dealing with a continuum of interactive potential ranging from the most reduced form of interaction-as-control to the infinitely complex interaction-as-difference.

The challenge as I see it is to build interactive systems for musical improvisation that are able to adapt and move back and forth along the continuum of interactive potential. Rather than trying to make technology behave like a reduced human performer my interest is to find out what the inherent constraints and allowances are of the technology; the hardware as well as the software and to more fully understand the nature of the difference between the human and the technological.

Time in the arts in general and in music in particular is in itself a complex issue. A number of composers and theorists have stressed that music simultaneously encompass a number of temporal modes and different timescales. After all, that music is able to disrupt our notion of time and temporal flow is easily experienced by anyone engaging in music listening.

The American electronic music composers Curtis Roads makes the interesting remark that the discontinuities that appear in the boundaries between different (concurrent) time scales give rise to perceptual differences in sonic events. (Roads, 2001:4) A note terribly out of tune in one temporal order may have just the right intonation in another, and a beat out of sync in one time scale may swing in another. In other words, depending on our temporal zoom level we may appreciate different qualities in the music. This also suggests that the differences depend on the perspective; the note out of tune, in isolation, is an error but an emotional infliction when heard in context.

To the Greek composer and architect Iannis Xenakis the discontinuity of musical time was of pivotal import. Not only the interruptions that occur when moving across the boundaries between different temporal scales, but also the separability of events occurring within the flux of one particular time scale. Xenakis, with his background as an architect, had a great interest in the spatial properties of music in general and musical time in particular. The idea that musical time may be rendered in space, however, is common to several descriptions and in essence, this is what musical notation does.

Hence, music has had an out-of-time spatial representation ever since musical notation was introduced and with the advent of recording technology, not only the representation of sound in scores, but also sound itself has been transformed into space: “We might say that recording is a reflux, or distillation in which time is boiled off, for time must be added back in to get sound, in the form of a steady motion of the turntable or tape heads or the crystal clock in digital recording.” (Evens, 2005:54) In the engravings on an LP, or through the holes on the surface of a CD, the elusive nature of sound as embedded in time is captured and spatialised. The digital representation of sound in a computer is similarly spatialised: In other words, to even begin to think about using interactive computer technology in performance involves a transformation of the in-time embedded sound to an over-time representation.

Even though time-to-space transformations are clearly common and important in art and music I believe it to be important, however, to embrace the infinite interactive possibilities of in-time performance and to resist the out-of-time (spatially rendered) representations of music. This is without a doubt difficult and the addition of

technology can make it even more so in the way that technology lacks the multiple temporal possibilities inherent to musical listening and performance: the interaction may disrupt the musical flow.

In his book *Digital Performance: A History of New Media in Theater, Dance, Performance Art, and Installation* Steve Dixon discusses the problematic issue of 'liveness' in performance. There is a common sense that technology have "transformed or destabilised notions of liveness, presence, and the 'real'", (Dixon, 2007:127) suggesting that the real-time arts somehow becomes less 'live' when technology is made use of. Even though a performer (and an audience), simultaneously employs a number of different temporalities, the addition of the computer appears to sometimes disrupt the in-time process in various ways. As if the over-time operations of the computer, however lightning fast these may be, are sometimes too much for the performance to carry, making it impossible for the interactive interface to inform the digital system in a useful way.

Dixon's description of the lack of 'liveness' in performances involving digital technologies is very similar to my own experience of trying to combine improvisation and interactive computer programs that I described in the beginning of this paper. Whether the use of technology disrupts the liveness or not, due to the over-time aspect of computers and computer programs it may disrupt the in-time aspect of the improvisation. I believe interaction design may benefit from a deepened understanding of the temporalities of musical improvisation and how these differ from the potential temporalities of the machine.

The issue at stake here is not to merely accept these differences as assets or as bits of information, but neither is it to regard them as problems that should be balanced or evened out. The issue, I believe, is to use these differences, to play with them and to more fully understand them. If this is done successfully I am certain that new knowledge will be produced; knowledge about both humans and computers as well as their interactions and I believe that this knowledge will be of interest also outside the field of music and artistic research.

References

Gregory Bateson. *Mind and Nature*. Hampton Press, Cresskill, New Jersey, 1979.

Steve Dixon. *Digital Performance: A History of New Media in Theater, Dance, Performance Art, and Installation.* The MIT Press, Cambridge, Mass., 2007.

Aden Evens. *Sound Ideas : Music, Machines, and Experience,* volume 27 of Theory out of bounds. University of Minnesota Press, 2005.

Henrik Frisk. *Improvisation, Computers, and Interaction: Rethinking Human-Computer Interaction Through Music.* PhD thesis, Malmö Faculty of Fine and Performing Arts, Lund University, 2008.

Ingrid T. Monson. *Saying Something: Jazz Improvisation and Interaction.* Chicago Studies in Ethnomusicology. University of Chicago Press, 1996.

Curtis Roads. *Microsound.* The MIT Press, Cambridge, Mass., 2001.