

# Improvisation, Computers, and Primary Process: Why improvise with computers?

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Improvisation is a difficult matter. As a concept it is attributed to a wide range of activities and it has positive as well as negative connotations. One general understanding is that improvisation is a substitute for organization and pre-meditated actions: *I haven't had the time to prepare for this talk, I'll have to improvise*. The ethnomusicologist Bruno Nettl concludes that "[i]n the conception of the art music world, improvisation embodies the absence of precise planning and discipline" and points to the racist implications of the musical equivalent to the above statement and asks whether "[i]mprovisation as the music of people who don't plan ahead" is the "white musical world's way of expressing a racist ideology?"<sup>1</sup> Whether racist or not the understanding of musical improvisation as a method used as a 'substitute for preparation' has influenced areas in which the consequences are wide ranging and go cross ethnic boundaries,<sup>2</sup> and there has been a long academic and social tradition to discredit improvisatory musical expressions in favor for text based, pre-organized and reflected artistic output: "So within the realm of art music, improvisation is on a low rung, just as musics outside the realm of art music are often associated with the inferior practice of improvisation."<sup>3</sup>

However, the issue here is somewhat more complex than the 'preparation' and 'no preparation' dichotomy. In this essay I will attempt to show that lack of detailed control and preconception may in fact be an important aspect of some jazz and freely improvised music,<sup>4</sup> and I suggest that the various ways in which computer technology is used in these genres in some cases may be looked at as part of a methodology whose primary goal is to 'un-learn' idiomatically and stylistically bound musical knowledge. To understand and unwrap these issues I will make use of the conscious/unconscious continuum based on the theories of anthropologist Gregory Bateson and, just as Bateson, I will look at the notion of *primary process*.<sup>5</sup> In

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<sup>1</sup>Nettl (1998, p.7)

<sup>2</sup>In Sweden jazz- and improvising musicians are generally payed only 1/3 of what their classical chamber music colleagues are payed. One of the motivations behind this asymmetry sometimes quoted is that classically trained musicians need to practice (obviously implying that improvising musicians need not).

<sup>3</sup>Nettl (1998, 9). See also Lewis (1996), Bailey (1992)

<sup>4</sup>This is the term used by Derek Bailey (Bailey, 1992, 83) but, as he points out, the identity of the style suffers from some confusion. Bailey refers also to terms such as 'total improvisation', 'open improvisation', 'free music', 'improvised music': "It is a logical situation: freely improvised music is an activity which encompasses too many different kinds of players, too many different attitudes to music, too many different concepts of what improvisation is, even, for it all to be subsumed under one name" (Ibid)

<sup>5</sup>Somewhat simplified, in Freudian language the primary process is the operation of

addition I will be discussing the practice of a few artists, both from the point of view of how they describe their work, but also in relation to the idea that freely improvised music is an activity that mainly takes place in the unconscious.

## Computers and improvisation

By some (all?) standards computers are poor improvisers. We can program computers to calculate planet trajectories and to help us find patterns in extremely large data spaces, but one of the more difficult things to model or imitate in a machine is the human ability to spontaneously act upon stimuli. Although current computer science can build machines that are able to decode complicated real world patterns and—within a limited frame—construct viable reactions to these inputs, in many cases it is more efficient for the machine, and certainly for the programmer, to evaluate *all* possible responses in a simulation and make a choice according to a set rule. The quantity “all possible” is in this case a function of the accuracy of the sensory interface of the computer. Rarely would a human musician use such a method. Infinitely more economic for a human improviser is to pick one possible alternative based on *intuition*. I.e. what is in many cases the easiest alternative for a human—to act based on experience and empirically receive the impact of the action—is the most difficult for the machine/programmer. The human capacity for making “good” choices based on intuition is enormous and as a method it allows us to approach the “conditions of experience”.<sup>6</sup>

If the notion of intuition or spontaneous response to stimuli is difficult to model in a computer, even more difficult is it to attempt to simulate truly spontaneous action, such as improvisation. Improvisation, and the building blocks that constitutes it, may not occur as a response to some (external) stimuli. Think of a solo improvisation such as *Line 1* of Evan Parker’s *Lines Burnt in Light* CD.<sup>7</sup> This, the first track of the CD, is recorded before the audience arrived so there are no co-musicians and no immediate listeners. Yet, the music is flowing. How would a computer program have to be constructed in order to produce beauty in the way Parker does, let alone *any* music, in that same situation?

So much for the computer as a *player*; as a machine that attempts to mimic the human capacity to improvise. The more common use of the computer in improvised music however is as an *instrument*, as an extended synthesizer. In this capacity the issues discussed above are partly resolved as the function of the computer is merely to generate sound at the discretion of a performer, much like any other musical instrument. The human ‘computer-player’ becomes the interface between the machine and the world. But the instrument paradigm comes with its own set of challenges that needs to be addressed. Firstly we need to consider the intricacies of computer sound synthesis. A computer does not have *a* sound but rather comprises the possibility of (nearly) *any* sound. At first this may seem like a marvelous thing—*any sound at the tip of my fingers*—but, in fact, it is equally likely that this becomes a creative hindrance. In the musical example above, Evan Parker can *play* with the contextual pre-understanding of what a soprano saxophone ‘should’ sound like, and, at will, deviate from this. If *any* sound is possible there is no tension between expectation and production. Secondly, to say that *any* sound is possible is not quite true: A *representation* of any sound is possible, but—and this is true for many synthesis techniques—the kind of minute variation and dynamic change that constitute the very notion of a musical sound is still difficult to achieve on the computer. This is a

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the unconscious: Dreams are “metaphors coded according to *primary process*” (Bateson, 1972b, 135)

<sup>6</sup>Deleuze (1988, 27)

<sup>7</sup>Parker (2001)

programming challenge, a need to further develop synthesis techniques, but it is also a question of the interface between musician and computer, which brings us to the third point: The interface, or controller. The experimental music keyboard player and audio artist Bob Ostertag gives a striking account of the issues involved in his article *Human Bodies, Computer Music*: “The problem [...] still is how to get one’s body into the [...] performance.”<sup>8</sup> When playing the computer (and this is true for most electronic and electro-acoustic instruments) the player has no physical contact with the sound. In the case of the laptop, there is not even a meaningful mapping between the keyboard and any kind of sound production. The computer musician needs “controllers” with which the performer can interact, not with the computer, but with the sound. But, as Ostertag points out “[d]espite years of research and experimentation [...] there is still no new instrument sufficiently sophisticated to allow anyone to develop even a rudimentary virtuosity with it. I believe that this failure is rooted in the premise that the problem lies in inadequate controllers. The bigger problem is this: What exactly are we going to control with these controllers we would like to invent?”<sup>9</sup> By posing the last question Ostertag moves to the next level of this discussion: Once we have a sound synthesis that has a reasonable range of parameters and a controller with which we can interact with and control our computer instrument, we still have not solved the problem of mapping a physical movement to a parameter in the software. Furthermore, for a traditional instrument some of these mappings are not static but subject to change over time which implies that, for our computer instrument, we need a separate piece of software that knows about the controller and knows about the synthesis and, preferably, has access to some information about the performer. Ostertag summarizes the problem: “If I had some really wild controller that doesn’t exist now but that I could dream up—such as a big ball of a mudlike substance that I could stick my hands into, squeeze and stretch, jump up and down on, throw against the wall and wrap around my head, resulting in a variety of parameter streams that would be seamlessly digitized and fed to the computer—even if I had such a thing I don’t know how I would use it.”<sup>10</sup>

The dreary picture painted here makes the computer look like a pretty useless instrument for improvised music. And yet, the computer is most definitely an agent in the development of experimental improvised music. Despite its obvious shortcomings as a musical instrument—non-intuitive (musical) user interface, no physical contact with the sounds produced, no unified notion of what the computer-as-instrument consist of, etc—there is a number of musicians willing to challenge its limitations. Why is that? Why would someone want to use a machine in which physical contact with the sound is virtually impossible, to perform a music that thrives on expressive sensibility? Before examining these questions concerning the validity of the computer as a instrument for improvisation, I will give a personal reflection on the significance of sensibility in freely improvised music. As contradictory as it may seem, I believe that it is important to more fully ‘understand’ the incomprehensible nature of the unconscious processes that are central to improvisation, in order to understand why the computer may appear as an interesting instrument in this context. We will see how strategies employed by some artists may have influenced some groups of musicians to embrace the computer, as well as other electronic instruments.

### **Improvisation and sensitivity: The conscious/unconscious divide**

To listen to master improvisers such as Charlie Parker or John Coltrane is to experience an aural representation of the full blown complexity of human sensitivity.

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<sup>8</sup>Ostertag (2002)

<sup>9</sup>Ostertag (2002, 13)

<sup>10</sup>Ostertag (2002, 14)

In these and other cases of great improvisers, uncompromising individuality and perfectly synchronized group collaborations are not contradictions but co-exists in a dynamic relationship. The mere presence, force and density of some of their best performances, engraved into the vinyl of the LPs, makes them truly “gorgeous artifacts not even deaf people should miss...” as the poet and writer LeRoi Jones wrote on the cover of Coltrane’s *Ascension*.<sup>11</sup> The refinement in interaction, instrumental technique, sound and musicality is so intimately coupled in the expression that other possible representations, such as notated transcriptions, would only result in reductions so crippled as rendered meaningless. It is significant that LeRoi Jones<sup>12</sup> uses the *deaf* and the notion of an *artifact* in his poetic description of Coltrane’s music. The music, so tangible and irrefutable it renders artifacts, so real that even those who cannot hear can sense them. The spontaneous sensibility at play here, conveyed by these and many other great musicians in concert and on recordings is what George Lewis has labelled *afrological* sensibility,<sup>13</sup> and George Russel has referred to as *intuitive intelligence*.<sup>14</sup> Lewis discusses how the “personal narrative” is a part of the individual signature of the Afrological improviser summarized by the conception of his *sound*.

Moreover, for an improviser working in Afrological forms, ‘sound,’ sensibility, personality, and intelligence cannot be separated from an improviser’s phenomenal (as distinct from formal) definition of music. Notions of personhood are transmitted via sound, and sound become signs for deeper levels of meaning beyond pitches and intervals.<sup>15</sup>

By listening to the diversity of expression to be found in tenor saxophone contemporaries such as Lester Young and Coleman Hawkins or John Coltrane and Stan Getz it is not difficult to apprehend that personal narrative is an important agent in jazz. Their individual sounds (both in the meaning of the timbre of the sound of their saxophones, and by virtue of their individual expressions) are so different from one another that, for a listener unfamiliar to jazz and to the tenor saxophone, it would not be easy to be sure that all four of them were playing the same instrument. And Lewis’s suggestion that the personhood of the improviser is disseminated through sound—even when recorded—in a manner that transcends musical codes gives the musical ‘voice’ of the improvising musician the status of an alternative communication system. But for this language there is no universal grammar. To say the least, such a system of communication is difficult to imagine being portrayed by a machine.

In the very first section of Derek Bailey’s influential book on improvisation he writes about the impossibility to describe improvisation “for there is something central to the spirit of voluntary improvisation which is opposed to the aims and contradicts the idea of documentation.”<sup>16</sup> Though the elusive character of improvised

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<sup>11</sup>Jones (1965)

<sup>12</sup>a.k.a. Amiri Baraka

<sup>13</sup>Lewis (1996)

<sup>14</sup>George Russel, in a conversation with Ornette Coleman (see Clarke, 1985), concludes that the reason Coleman and the members of his band are able to start playing, in time, without counting the tunes off is thanks to “intuitive intelligence”, according to Russel a property of African-American culture. In an interview with Ingrid Monson Russel returns to intuitive intelligence giving the following description: “It’s intelligence that comes from putting the question to your intuitive center and having faith, you know, that your intuitive center will answer. And it does.” Monson (1998)

<sup>15</sup>Lewis (1996, 117)

<sup>16</sup>Bailey (1992, ix) Also cited in Nettl (1998, 12-3)

music may turn it into a somewhat special case, it would be reasonable to assert the same thing about the experience of listening to any kind of music, no matter how or with which method it was produced. The anthropologist Gregory Bateson writes about art in general as “an exercise in communicating about the species of unconsciousness [...] a play behaviour whose function is [...] to practice and make more perfect communication of this kind.”<sup>17</sup> (The “play behaviour” in the citation may be ambiguous in this context. Bateson is referring to a model he is using to explain interaction in systems that rely on iconic communication, i.e. the way play is used here it is not related to music.<sup>18</sup>) The improviser’s personal narrative as a reflection of his or her unconscious, as an interface between the conscious and the unconscious. And this is why it has to remain in a contradictory relation to the traditional notion of documentation; because, only confusion can come out of the attempt to decode unconscious expressions in the language of consciousness:

[The] algorithms of the heart, or, as they say, of the unconscious, are, however, coded and organized in a manner totally different from the algorithms of language. And since a great deal of conscious thought is structured in terms of the logics of language, the algorithms of the unconscious are double inaccessible. It is not only that the conscious mind has poor access to this material, but also that the when such access is achieved. *e.g.*, in dreams, art, poetry, religion, intoxication, and the like, there is still a formidable problem of translation.<sup>19</sup>

Art, and free improvisation in particular, I would argue, is, in a manner of speaking, a means for translating the unconscious of one individual into an ‘object’ possible for a potential listener to recreate. This is however not a translation into the structure of the conscious and the “logic of language”. It is in the meeting between the improviser and the listener that the ‘translation’ occurs, in a creative operation in which the listeners re-creates that which resonates with something in their own personhood (consciously or unconsciously). However, the meeting may, as in the case with my listening to Parker and Coltrane, be displaced in time and space. It may just as well take place through a recording “immanently open to re-creation”.<sup>20</sup> This faceless meeting between improviser and listener resonates well with Bateson’s statement that in primary process “the focus of the discourse is upon the *relationships*.”<sup>21</sup> Specified as a “relationship in the more narrow sense of relationship between self and other persons or between self and the environment” the unconscious becomes the location of the communication between musician and listener, a communication different in type from verbal messages. Bateson further specifies these relations as “the subject matter of what are called feelings”<sup>22</sup> which brings us back to Coltrane and Leroi Jones: “[...] Trane is now a scope of feeling.”<sup>23</sup> The formulation is striking: With a focus on the subliminal, as if Coltrane provided us with a territory of ‘inner’ sensations to explore, he is simultaneously projector and receiver of feelings.

So far the discussion has been centered around listening to, and appreciating a performance of improvised music, i.e. looking at improvisation from the outside.

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<sup>17</sup>Bateson (1972b, 137)

<sup>18</sup>(See Bateson, 1972c)

<sup>19</sup>Bateson (1972b, 139)

<sup>20</sup>Born (2005, 26). Georgina Born is discussing this issue from a slightly different perspective and she makes use of Alfred Gell’s concepts of the distributed art work, which she applies to improvisation and digital technology. She terms this distributed capacity of music “relayed creativity” (p. 26)

<sup>21</sup>Bateson (1972b, 139)

<sup>22</sup>Bateson (1972b, 140)

<sup>23</sup>Jones (1965)

Now we will instead turn to the act itself. If we assume that Bateson is right and that the greater part of the communication that takes place in art (music) is structured according to the principles of primary process, how do the improviser get access to the unconscious? Does it happen 'by itself' or are there conscious operations that can be performed that allows the artist access to his or her 'inner' life? Bateson speaks about "[t]he *code*" whereby the artist accomplishes the transformation from conscious, verbally coded, actions (*I want to improvise*) to the unconsciously signed output of the action.<sup>24</sup> The better I know something the less conscious I become of my wisdom: "There is a process whereby knowledge sinks to deeper and deeper levels of the mind."<sup>25</sup> This is obviously related to 'habit' (walking, breathing, playing) and 'skill' but, as pointed out by Bateson, there is a peculiarity with relation to the arts and the practicing artist: "to practice has always a double effect. It makes [the artist], on the one hand, more able to do whatever it is he is attempting; and, on the other hand, by the phenomenon of habit formation, it makes him less aware of how he does it."<sup>26</sup> As we will see, and perhaps contrary to what one may think, the fact that the 'how' becomes unconscious through habit does not necessarily mean that the 'what' exploits a greater sensibility or moves to a deeper level. Furthermore, the skill of the artist, the point of which is, among other things, to convey information about his or her legitimacy ("Since I know how to play 'the changes', I may play 'wrong' notes"), may have no, or even the opposite meaning in some contexts. Bateson brings up American visual artist Jackson Pollock—for whom chance was an important agent—as an example: "In these cases, a larger patterning seems to propose the illusion that the details must have been controlled."<sup>27</sup> In other words, where a 'skilled' performer needs to communicate the 'I'm-in-control' message to the listener (conscious) in order to move beyond it, the performer for whom skill is not important (unconscious) may leave it to the listener, or to the larger structure of the performance, to construct the detailed order.

## Without memory

The American saxophonist and jazz musician Ornette Coleman, whose 1960 record release *Free Jazz: A Collective Improvisation*<sup>28</sup> (The cover for the original release of the LP record was a reproduction of a painting by Jackson Pollock.) lend its name to the entire *Free Jazz* movement, had already in the late 1950's established himself as a leading figure on the avant-garde jazz scene. As for all alto saxophone players he had to deal with the intimidating heritage of Charlie Parker: "No other instrument is so loaded with jazz convention as the alto saxophone."<sup>29</sup> And, at least to the outside world, he was successful at it since the *lack* of Parker influences was one of the criticisms against Coleman<sup>30</sup>. But in order to be able to "create as spontaneously as possible—'without memory,' as he has often been quoted as saying"<sup>31</sup>, without any 'real' training he started playing the violin and the trumpet. These instruments gave him the freedom to play and improvise in a manner that his "memory" made it difficult for him to do on saxophone. When playing the saxophone he would be partly ruled by his meta-knowledge—his knowledge *about* playing the saxophone. Expectations encoded mentally as well as bodily would also influence him and, to

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<sup>24</sup>Bateson (1972b, 130)

<sup>25</sup>Bateson (1972b, 135)

<sup>26</sup>Bateson (1972b, 138)

<sup>27</sup>Bateson (1972b, 148)

<sup>28</sup>Coleman (1961)

<sup>29</sup>Glanzelius (In my translation from Swedish 1967, 12)

<sup>30</sup>Litzweiler (See 1992, 61-2)

<sup>31</sup>Litzweiler (1992, 117)

Ornette Coleman, this was a hindrance to his spontaneity. The trumpet, and even more so, the violin—the violin was not really an instrument used in contemporary jazz so there were no model to follow—he had learned himself. On the violin he adopted a highly original technique that allowed him to bypass “not only the jazz tradition, but Western musical traditions altogether. He had no teachers or guides to show him how to play trumpet and violin and purposely avoided learning standard techniques”.<sup>32</sup> A perhaps even more radical step was taken by Ornette Coleman on the record *The Empty Foxhole*<sup>33</sup> where he engaged his own 10-year old son to play the drums. Again was the criticism that the music didn’t sound the way it “should”. One, perhaps axiomatic, comment said it sounded “like a little kid fooling around”<sup>34</sup> but for Coleman this was a deliberating experience that, for a moment, relieved him of some of the pressures from the ‘outside world’: “I felt the joy playing with someone who hasn’t had to care if the music business or musicians or critics would help or destroy to express himself honestly.”<sup>35</sup> Freedom of memory and freedom of influence from extra-musical parameters. The to Ornette ‘unknown’ instruments gave him a sense of internal freedom, liberated from the physical memory associated with his saxophone playing. Playing with his son gave him a sense of external freedom where the undestructed naïvety of the child gave him access to the sound of the honest and pure self-expression with less noise between the (unknown) intention and the result. Or, rather, associated him with the possibility for a self-expression where the transformation from intention to result is not ruled by a pre-conceived notion of what the result should sound like and where the transference is not influenced by external forces such as the economic powers that surround the creative activity.

A comment by Marcel Duchamp—one of the great innovators of visual arts of the 20th century—shows us that the wish to outsmart learned and inherited habits is not limited to the field of free improvisation. In a study for his great work from the early years *The Bride Stripped Bare by Her Bachelors, Even (The Large Glass)* (1915-1923) he used “a mingling of paint and ‘non-art’ materials that had not as yet received the name of collage”<sup>36</sup> in an attempt to “avoid the old-fashioned form of drawing.”<sup>37</sup> The “old-fashioned” drawing was for Duchamp what the sound of Charlie Parker was to Ornette Coleman. A source that had to be reversed and unlearned, however not forgotten. In effect similar to Deleuze’s description of Bergson’s conception of memory as “a function of the future” and “only a being capable of memory could turn away from its past.”<sup>38</sup> Duchamp continues by asking:

Could one do it without falling into that groove? Mechanical drawing was the answer—a straight line drawn with a ruler instead of the hand, a line directed by the impersonality of the ruler. The young man was revolting against the old-fashioned tools, trying to add something that was never thought of by the fathers. Probably very naïve on my part. I didn’t get completely free of that prison of tradition, but I tried to, consciously. I unlearned to draw. The point was to forget *with my hand*.<sup>39</sup>

The concept to *consciously unlearn* seems inconceivable: Is it really possible to forget in a conscious manner? However, just as Coleman, Duchamp was using a (new) tool (the ruler) to revolt against the tradition. And the expression “forget with my

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<sup>32</sup>Litzweiler (1992, 117)

<sup>33</sup>Coleman (1966)

<sup>34</sup>Litzweiler (Freddie Hubbard cited in 1992, 121)

<sup>35</sup>Litzweiler (Ornette Coleman quoted in 1992, 121)

<sup>36</sup>Tomkins (1965, xx)

<sup>37</sup>Tomkins (Duchamp quoted in 1965)

<sup>38</sup>Deleuze (2002, 45)

<sup>39</sup>Marcel Duchamp cited in Tomkins (1965).

hand” is significant here as it puts the focus on the physicality of the action. Habitual muscular responses, learned “patterns”, which may even get triggered unconsciously are common and known to all who have played and practiced a musical instrument. What we see here and in Coleman’s use of alternate instruments, is an attempt to subdue the influence these “patterns” may have on the artistic output with the primary goal to get closer to the pure subjectivity, or the pure personal expression.

A slightly different method has been employed by the already mentioned British free improvised music saxophonist Evan Parker<sup>40</sup> whose saxophone playing is characterized by extensive use of circular breathing, alternate playing techniques such as split tones, over blowing and multiphonics. The sheer complexity of the sonic result is enough to relieve him and his instrument from the burdens of tradition. But in this context it is interesting to note that “Parker has worked to liberate different bodily aspects of his playing—the fingers, the tongue, the larynx, and the breath—so that each physical system may achieve a substantial degree of independence.”<sup>41</sup> Parker has consciously put himself in control and, through practicing, he has made it possible to ‘re-wire’ the links between the various parts of his playing apparatus (the instrument *and* the body). This would imply that *consciously unlearning* may be achieved through practicing; unlearning by doing (which is no less inconceivable). The result of Parker’s method, in particular in his solo improvisations, is to a certain extent a clear sonic representation of the re-wired physicality of his technique. Alone on soprano saxophone he can create a two to three part polyphony which “allows him to circumvent obvious ascending and descending phrases in a way that challenges the dominant conceptual mapping [...] of pitch relationships in vertical space.”<sup>42</sup> That the method has been successful is obvious from merely listening to his music, but he also explicitly states that he “believes the best part of his playing to be beyond his conscious control and his rational ability to understand”.<sup>43</sup>

## Why computers?

Ornette Coleman, Marcel Duchamp and Evan Parker have all three, in their own ways, consciously attempted to oppose habit in the way they carry out their respective practices. They have done so, I believe, in order to more fluently be able to speak the language of the unconscious and, hence to be more adept in conveying their message. In these processes there are no logical, linear operations, no rationality: “A jazz musician may choose his own resistance. [...] Resistance is not a goal for which the musician will strive, it is a constantly stretchable challenge.”<sup>44</sup> Rather than trying to minimize friction and make ‘playing’ easier, they have made it more difficult and increased the resistance on purpose. This is consistent with Aden Evens suggestion that “[t]he instrument’s resistance holds within it its creative potential, which explains why improvisers focus so explicitly on aggravating the instrument’s resistance.”<sup>45</sup>

Here is where we can go back to the questions regarding the role of the computer as an instrument in free improvised music: Why would someone want to use a

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<sup>40</sup>With regard to the significance of the unconscious in free improvised music it may be noted that Evan Parker’s record label is called *Psi*, referring to various variants of parapsychological phenomena. The mission statement for the record label Psi “is to present unique statements from individuals making music their own way regardless of genre” (See <http://www.emanemdisc.com/psi.html>).

<sup>41</sup>Borgo (2005, 49)

<sup>42</sup>Borgo (2005, 50)

<sup>43</sup>Borgo (2005, 52)

<sup>44</sup>Glanzelius (My translation 1967, 8)

<sup>45</sup>Evens (2005, 162) For more on the notion of *resistance* see Marcel Cobussen’s essay in this issue.



machine in which physical contact with the sound is virtually impossible, to perform a music that thrives on expressive sensibility? Precisely because of its 'shortcomings'. Because it *increases* resistance. Because it resists habit formation. "Habit is a major economy of conscious thought"<sup>46</sup> which is why the lack of standards and consistency with regard to the implementation and control of computer based instruments may appear frustrating on the analytical level but work perfectly well on the artistic level. Just as the "impersonality of the ruler" allowed Duchamp to revolt the "old-fashioned tools" the computer may allow the musician to forget with his hand. In this case in a double sense due to the lack of body-sound interaction particular to the computer based instrument. But again, the detachment of the body from the instrument, though it may prove a hindrance on some occasions, it may also be a guarantee to disallow habit to take control: "The musician who just allows his body to do what it will cannot be immersed in the music, for he is not even engaged by the music; the one who lets his body play is not putting himself on the line, not tying his own fate to the imminent death in the music, and so fails to draw out the ownmost possibility of the music in the moment."<sup>47</sup>

The frustration Bob Ostertag is experiencing<sup>48</sup> with computer based, and electronic, instruments is actually consistent with my theory here. Even though it is easy to agree with him in his critique of the nature of many of these instruments and their inherent lack of bodily possibilities, we must also acknowledge that Ostertag has successfully played them for over 30 years. The defeat is experienced on the consciously analytical level and doesn't necessarily manifest itself on lower levels of the mind where the *improviser* Ostertag continues to perform, in principle unaffected. If Ornette Coleman was in his 30's today, I'm sure he would have chosen to play laptop—instead of, or in addition to, the trumpet and the violin—as a complement to his saxophone.<sup>49</sup>

If I have managed to give an incentive for the use of the computer-as-instrument in the context of free improvised music, the situation for the computer-as-improviser is by the same reasons even more disconsolate. The main issue is the computer's abilities to interface with its surroundings, or rather, its lack thereof. If it cannot absorb relevant information at least with regard to its fellow musicians and the sounds they are producing, it will scarcely be able to move beyond the point of an advanced (very advanced) CD player. Or, somewhat less derogatory, in the words of composer Pauline Oliveros: "Unless the styles of the musicians improvising were already absorbed by the machine then what information would there be to calculate a response? If the outcome is known in advance it is not free improvisation, it is historical improvisation."<sup>50</sup> Personally, I still think a computer-as-improviser may be deployed with success. But the details of that process will be the subject of another essay.

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<sup>46</sup>Bateson (1972b, 141)

<sup>47</sup>Evens (2005, 143)

<sup>48</sup>Ostertag (2002)

<sup>49</sup>It should be noted that the Coleman/Pat Metheny CD *Song X* (Metheny & Coleman, 1986) was one of the earliest in which electronic instruments and samplers were used, even though Coleman himself does not indulge in the use of electronics.

<sup>50</sup>Oliveros (2008, 122)

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