Per Anders Nilsson

Control or Play?

Academy of Music and Drama, University of Gothenburg, Sweden
pan@hsm.gu.se

Abstract

This paper proposes a classification that distinguishes between different classes of electronic musical instruments and playing types. In many performances of today with so-called laptop music a lack of perceptible connection between what you see and what you hear is common. The theoretical framework takes as its point of departure concepts from the field of ecological psychology and perception, notably Refsum Jensenius (2007). A major tenet is his distinction between *Action-sound couplings* and *Action-sound relations.* A further distinction is made between *electronic devices* and *virtual devices*. Moreover, action-sound couplings comprise of an *action-sound palette* of conceivable audible outcomes from a certain object.

The proposed taxonomy[1] for electronic instruments distinguishes between 1) direct gestural control, *playing mode/instruments*, 2) indirect control, *controlling mode/instruments*, and 3) *effects*. P*laying mode* implies that a bodily gesture carried out by a player on such an instrument is directly and proportionally audible; its *action-sound link* is strong. Controlling mode is primarily a phenomenon in conjunction with electronic instruments and devices with no direct causality between a bodily gesture performed on the interface and audible output; it's *action-sound-link* is weak. An additional distinction occurs between *active control* and *active monitoring*. The former is close to playing, however carried out on a controlled instrument, where the instrument is left untouched, but adjusted if necessary.

I claim that the perceived connection between bodily action and sound produces affects the listening experience, regardless what it sounds like. My conclusion is that electronic musicians must take this into consideration when designing; choosing, and playing computer based musical instruments and interfaces for live performances.

Theoretical Background

In *Action Sound, Developing Methods and Tools to Study Music-Related Body Movement*, the Norwegian musicologist Refsum Jensenius (2007) examines the perceived relations between physical actions and sounds. On the one hand, when someone pick a guitar string the causality between the perceived sound and the player's action is clear, but on the other, when listening to a laptop musician we may not understand the relation between undertaken physical actions and sound produced. As a point of departure Refsum Jensenius refers to theories by Gibson (1986), Clarke (2005), and Schaeffer (1966). There are two concepts of particular relevance: *action-sound coupling*, and the *action sound relationship*.

The term *Action-sound relationship* refers to contexts wherein we cannot be sure of the relation between action and sound. A piano is expected to sound like a piano. However, on a

[1] Presented in Nilsson (2011).

digital piano we cannot be absolutely sure of the audible outcome: the instrument may be silent if someone has unplugged the power cord, or, the instrument may sound like a different musical instrument, such as a vibraphone, the action-sound link is much weaker (Refsum Jensenius, 2007, p. 23). A distinction is made between *electronic devices* and *virtual devices*. To produce a sound on an electronic device, usually we are performing in direct interaction with some physical part of the device in question, like pushing a button on a doorbell. In a virtual device the sound is not under direct control; rather the device responds according to a designed virtual action sound link, and one example is a smartphone. Furthermore, action-sound couplings are comprised of an *action-sound palette* of conceivable audible outcomes from a certain object, depending on such properties as the material, the force of the impact, or the shape of the objects involved. Extended techniques, a common practice among experimental composers and performers, aim to expand and challenge the action sound palette of conventional instruments in various ways, but are still bounded to the physics of the instrument. However, the possible outcome from electronic and computer-based technologies are huge, and action sound relationships are virtually infinite. It is quite possible to connect the doorbell button to a synthesizer or sample player; the bell may sound like an opera singer when the button is pressed. Probably most people will find this strange, and we can see that this indicates a weak action-sound relationship.

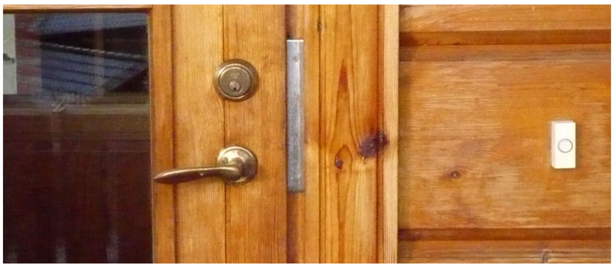

Figure 1: A doorbell, which may activates a male opera voice when pushed.

Early Systems

The pioneer of computer music Max Mathews once expressed: “the computer has the potential to be the universal musical instrument – something that cannot be said about any other instrument. You may love the violin as I do, but it cannot sound like a trombone” (Gayou 2007, p9). A decade earlier Pierre Schaeffer envisioned “The Most General Music Instrument Imaginable” (Gather, 2003, pp. 214–6). Their ideas pointed towards instruments with arbitrary and made up action-sound couplings. Furthermore, in the fifties a number of computer based compositional system was invented, notably the Olson Belar machine[2] and The *Electronium* by Raymond Scott[3] is worthy of mention. The Electronium asked the composer/operator to suggest a theme, and then to make modifications and variations with respect to melody, rhythm, and timbre by turning knobs and switches that controlled underlying random processes. Scott stated that the performer rather *controls* the system, then *plays* it: “The Electronium is not played; it is guided” (in Roads and Strawn, 1996, p. 828). In a personal conversation Joel Chadabe expresses similar ideas and compares it to flying:

[2] Discussed in Manning (2004, p 87).

[3] Raymond Scott is presented in the CD-box *Manhattan Research Inc.* (Blom 2000).

> And then you have more complex models, which I call ‘a fly by wire model’ because it’s like flying a complex airplane, an Airbus 240 for example; it’s just a ‘fly by wire airplane’ where the pilot doesn’t fly the airplane. The pilot tells a computer what he wants the airplane to do, and the computer flies the airplane. [4]

At one end we have the “push-the-button” instrument that automatically generates its output on the basis on pre-programmed instructions, like the Olson and Belar machine. A mid point position is systems that allows changes of parameters that affect its behavior accordingly. At the other end instruments responds to physical gestural input in a continuum. The *M*[5] software featured Chadabe’s “sailing model” whose output was based on real time interactivity that employed probability distribution of transitions of durations.

Instrument Classification

I propose a taxonomy[6] for electronic instruments that distinguishes between direct gestural control, *playing mode/instruments*, and indirect control, *controlling mode/instruments*, and *effects*.

P*laying mode* refers to acoustic instruments like piano and violin, which features action-sound coupling. This implies that a bodily gesture carried out by a player on such an instrument is directly and proportionally audible; its *action-sound link* is strong.

C*ontrolling mode* is primarily a phenomenon in conjunction with electronic instruments and devices. In this group there is no direct causality between a bodily gesture and audible output performed on the interface; the *action-sound-link* is weak. E.g., when the operator changes the amount of feedback by turning a knob clockwise, it causes an increase in the number of repetitions; while the same action performed on a similar knob that controls delay time causes a slow down in the repetitive rhythm, but the speed of the performed action does not significantly influence the audible result. An additional distinction occurs between *active control* and *active monitoring*. The former is close to playing, however carried out on a controlled instrument, whereas the latter deals with automatic generative processes where the instrument is left untouched, but monitored and adjusted if necessary.

E*ffect mode* implies processing and coloring of incoming audio on behalf of pre-determined parameter settings, and/or in controlling modes in effects employed.

With reference to Refsum Jensenius, the perceived connection between undertaken action and present sound affects the listening experience, regardless what it sounds like. My conclusion is that electronic musicians must take this into consideration when designing and choosing digital musical instruments and interfaces for live performances.

Post Conference Thoughts

In the discussion that followed the presentation some remarks were made on the proposed category *effects*. It was claimed that effects as concept is blurry, and implies that the added value of its sonic output should merely be “decorative” with insignificant impact on music

---

[4] Personal conversation in New York City, March 2006.

[5] Chadabe developed and commercialized the softwares Jam and M together with David Zicarelli, John Offenhartz and Antony Widoff in the late eighties.

[6] Used in my thesis (Nilsson, 2011).

performed. The provided video example[7] however, clearly showed that the delay processor employed, after processing, contributed substantial musical material to the performance. Mention worthy, such audio processors are most likely a controlling instrument and is performed in controlling or monitoring mode, it is rather its musical role in a particular performance, or part thereof, that is the distinguishes, then the type of device per see. Therefore I suggest naming this category secondary processors.

References

Clarke, E. F. *Ways of listening: an Ecological Approach to the Perception of Musical Meaning*. New York, N.Y., Oxford University Press, 2005.

Gather, J.P. *The Origins of Synthetic Timbre Serialism and the Parisian Confluence, 1949–52,* University of New York at Buffalo, Buffalo, 2003.

Gayou, É. "Interview with V. Max Mathews", in *Portraits polychrome,* Paris, Institut de l'audiovisuel, 2007.

Gibson, J. J. *The Ecological Approach to Visual Perception*. New York, Psychology Press, 1986 (1979).

Manning, P. *Electronic and Computer Music*. New York, Oxford University Press, 2004.

Nilsson, P.A. *A Field of Possibilities: Designing and Playing Digital Musical Instruments*. Academy of Music and Drama, University of Gothenburg, 2011.

Refsum Jensenius, A. *ACTION – SOUND, Developing Methods and Tools to Study Music-Related Body Movement*. Department of Musicology. Oslo, University of Oslo, 2007.

Roads, C. and J. Strawn. *The computer music tutorial*. Cambridge, Mass., MIT Press, 1996.

Schaeffer, P. *Traité des objets musicaux: essai interdisciplines*. Paris, Seuil, 1966.

[7] The author was playing My Funny Valentine on a digital musical instrument, and the secondary processor was a Time Factor by Eventide©. Link to the video: https://vimeo.com/99016839