

## **Anticipation, Improvisation and Multimodality: Musical Meaning on Interactive Performance**

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### **Abstract**

*An ongoing research on expressivity of interactive composition and performances is presented. This study is based on three frameworks: psychology of anticipation, improvisation understood as a musical development process and multimodality used to enhance expressiveness and immersion among composer(s), interpret(s) and audience.*

### **Introduction**

In contemporary music there is a growing interest in interactive and multimodal works. Composers and performers have started offering not only structured sounds but also structured visual and other stimuli which immerse audience into a multi-sensorial experience. The meaningful potentialities are spread over into several perceptive domains of human brain, and require listeners to perceive and integrate them into meaningful relations. Performers may furnish elements to facilitate the multi-sensorial integration, creating a potential meaningful whole. We are studying this framework as a way of understating musical meaning as a process rather than an object and, particularly, this paper focus is on interactive performances involving improvisation and multimedia material, in which the interplay between anticipation and improvisation can be understood as an expressive tool.

The following text presents our ideas in three sections. The first one discusses the theoretical framework in which we study anticipation and interactivity. We based our discussion on Meyer (1956) and recently the work of Huron (2006). In the second section, abduction and improvisation are connected using a perspective of Peirce (1931–1965) and Boden (1996). Finally, we describe a series of interactive performances in which these ideas are explored as compositional and interpretation paradigms relating composer, performers and audience in the context of multi-sensorial pieces.

### **Anticipation and Interactivity**

Acquiring knowledge from experience is an important evolutionary accomplishment, for it aids the organisms in predicting future outcomes in the always shifting environment. Also in the musical domain, anticipation seems to be a very prominent aspect of musical experience; listeners seek for relations in and of the antecedent sound events creating expectations as the possible consequents. Music expressivity and aesthetic pleasure or affect, important parts of artistic appreciation, are derived from the dynamics of expectations and their possible fulfillments in the unfolding of musical works (see Meyer, 1956; Huron, 2006).

Meyer's theoretical framework is composed of three kinds of meaning: hypothetical, evident, and determinate. *Hypothetical meaning* is the unconscious generation of expectations related to and specific of a stimulus situation, that could be described by probabilistic relationships between antecedents and consequents.

*Evident meaning* occurs when the consequent becomes “actualized as a concrete musical event”, reaching a “new stage of meaning” (Meyer, 1956, p. 37). The evident meaning appears when the relation between antecedent and consequent is actually perceived. There can be a conflicting tension between the two meanings, especially when the expected consequent is delayed or deceptive.

*Determinate meanings*, Meyer said (1956, p. 38), “arise out of the relationships existing between hypothetical meaning, evident meaning, and the latter stages of the musical development.” This kind of meaning has the distinctive characteristic of being manifest in the

‘timeless work’ of memory, when the relations among stimuli are comprehended in their totality. It happens when musical meaning becomes objectified, a process that operates over an object in the listener’s consciousness.

Huron (2006) offers a more updated account of musical expectation, with a more detailed neuroanatomic correspondence with the psychological domain, and a more biological inspired perspective on musically induced emotions. However, the basic assumptions of the role of expectation in music listening and signification remains similar to those depicted in Meyer’s theory.

## **Abduction and Improvisation**

We postulate that musical experience is not diverse from other kinds of cognitive experiences, thus employing similar reasoning than those applied on daily life. Solving a very complex mathematical puzzle or doing the supermarket, or listening to music employs the same mental-logical operations available to acquire knowledge from experience. These operations were characterized by C.S. Peirce as abduction, induction and deduction. The main assumption in Peirce’s Logic of Discovery is that creative processes are driven by logical inferences, and that they can be investigated objectively.

Our hypothesis is that composers, interpreters and listeners generate and exchange expectations using these three kinds of reasoning, understanding of the concept of musical meaning in a new (pragmatic) perspective. In our perspective there is an information system that interconnects these three agents in music generally.

The three species of logical inference form the basis on which one deals with the world. While induction and deduction are traditionally investigated thoroughly in philosophy, abduction seems to be less scrutinized, despite being one of the most important contributions of Peirce’s Pragmatism. Basically, abduction is the kind of inference that generates explanatory hypotheses when anomalous facts are perceived. It is related to the presence of surprising or unexpected events.

According to Charles S. Peirce, the main activity of any mindful or cognitive system is the production of habits. Stable habits, in turn, constitute beliefs from which the reality is apprehended. From this perspective, a mental system could be understood as a dynamic network of stable habits (or beliefs) from which novelties and anomalies are detected as surprising events. As stressed by Peirce, “... Belief, while it lasts, is a strong habit, and as such, forces the man to believe until some surprise breaks up the habit” (CP 5.524). Habits and beliefs give rise to expectations that allow the anticipation of future events. Given that expectations are not always successful, sometimes there is a conflict between the expectations of well-established habits and the dynamics of environmental events, producing a surprising effect.

From Peirce’s logical perspective, there are two kinds of surprise: active and passive. Active surprises occur “when one perceives positively conflicts with expectations” (CP 8.315). Passive surprises occur “when having no positive expectation but only the absence of any suspicion of anything out the common, something quite unexpected occurs.”

Surprise is direct connected to expectation and is also related to improvisation. In performance surprise and improvisation are correlated. In the case of active surprise, improvisation drives sound material to convergent or divergent states of the musical ideas. The relation between expectations and deviations is responsible for the affective experience of music (cf. Meyer, 1956), a case of active surprise. Active surprises are only possible in the sense there is stylistic norms on which listeners can create expectations. Considering specific multimodality (stylistically non-standard) improvisatory works, active surprise could only happen if listeners could grasp some schema of that work, otherwise only passive surprise would be manifest – should be noted that if aesthetic affection is due to relation between expectations and deviation, only active surprise can be aesthetically relevant.

The interaction of expectations and deviation could be thought in terms of conceptual spaces. A conceptual space is a multidimensional structure that contains the principles that

constitute and unify any area of knowledge (Boden, 1996). For instance, Boden understands the tonal system as a generative system that could be described as a conceptual space. Explorations made by composers and improvisation not only explore the possibilities of such a system, but occasionally also lead to transformations and expansion of its structures.

Our perspective is that the role of improvisation in interactive pieces is to act as a tool to expand conceptual spaces. Conceptually, these ideas are related to a point of view in which self-organized processes can be thought as a paradigm for compositional systems (Manzoli, 1996). Materials and agents develop relations in a musical system and in turning those agents modify, integrate and develop new organizations or structures within a performance situation. Here improvisation and multimodality are taken as a way of developing a meaningful musical process within interactive performance (as described in Traldi et al, 2007).

## Interactive Performances

To explore this new interactive approach, we have developed experimental workshops that resulted in the composition of “*Paticumpatá*” by Cleber Campos and Cesar Traldi, a work with visual and sonic characteristics, and “*Cuerpo Cardinal*” (<http://br.youtube.com/watch?v=COSTCfVEp54>) work composed by Jônatas Manzolli explores multi-sensorial perspective using sound and body touch.

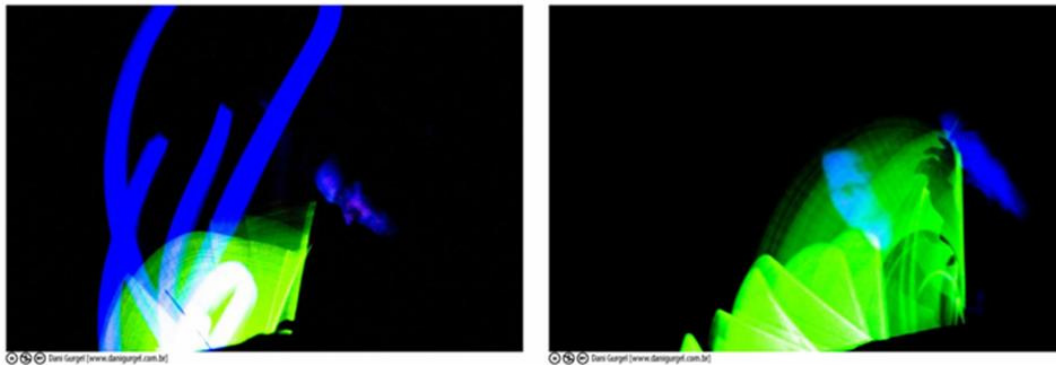


Figure 1 - Visual trajectories traced by the percussion fluorescent sticks during performance of *Paticumpatá*.

These pieces integrate audiovisual, improvisation, gestures and percussion stimulating listeners to create his or her proper anticipations. Works involving multimodal information might allow more prominent abductive implications, leading the audience to anticipate integration of the several elements in meaningful ways – listeners always have a very creative action. As an example of multi-sensory stimuli, in *Paticumpatá* the motion of fluorescent sticks in the air (without sounds), provide unusual information leading the public to formulate a set of expectations by means of abduction. In *Cuerpo Cardinal* the exploration of body touch is amplified using data gloves and performers produce a continuum flow of gestures moving from body percussion to scenic expressions.

Besides research perspective and also considering a poetic exploration, this research aims to re-build expression in performance situation using anticipation and improvisation. In another work continuaMENTE composed by Manzolli performers used improvisation, music gestures and technology to integrate texts, images, tape and live electronics. Video projections combined real time images with pre-recorded sequences. This piece is divided in eight scenes that were composed using different sound materials - from environmental to digital synthetic sounds. continuaMENTE invites listeners to perceive multiple sonorities fulfilling every-day reality, expanding sound conceptual spaces. The proposal is to construct passages related to sound neighborhood that many times we hear without knowing, or that by knowing it, we don't allow ourselves to actually hear them.



**Figure 2** – (top left) Composer during performance of “continuaMENTE”. (top right) performance of “Cuerpo Cardinal” during presentation of continuaMENTE. (bottom left) Interactive exploration of carpet interface (top right) percussionist play a MIDI controlled Disklavier using interactive sticks.

## Conclusion

The meaningful potentialities are distributed into several perceptive domains of human brain, and the abductive interaction of the listener has to deal with and to integrate them into meaningful relations as discussed in (Oliveira, 2008). In this sense, performers may furnish elements to facilitate the multi-sensorial integration, creating a potential meaningful system of norms and deviations. This idea of constant (re)furnishing of musical structures and expectations is the main concept that articulates interactive works.

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