

# A CULTURAL APPROACH TOWARD THE NOTION OF THE INSTRUMENT

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## ABSTRACT

In the field of computer music research the development of new input devices for musical performance and sound interaction plays an important role. This paper explores the cultural implications embedded in the use and concept of the notion of the instrument in such fields. Cultural implications in this particular context are the meaning structures that evolve from knowledge expressed through language and developed through practices. The main focus of this inquiry is based on the potential to detect the impact of new computer music research on its socio-cultural environment. Concepts such as assemblage and ecology will propose alternative ways to address the hybrid relational (interdisciplinary) networks that create such input devices. This approach proposes alternative models to conceptualize interaction as performative relations between humans and non-humans, as outlined in the domain of Science and Technology Studies. Computer research interweaves the cultural dimensions with a social context and foregrounds the political implications signified by its practices and technologies.

**Keywords:** instrument, (epistemic) cultures, ecology, environment, network, assemblage, apparatus

## 1. INTRODUCTION

Computer music research touches upon ever-new ways to create, use, define or interact with sonic events and sonorous objects. The boundaries and definitions of “new musical instruments for expression” are usually defined by categorization-models of entities that are linked in a performance setup or complex system of devices (including controllers, interfaces, mapping strategies, synthesis parameters and performance software) [13]. We will divert from such categorization models to culturally scrutinize the use and value of the notion of instrument for contemporary states of computer music, its creations and performative ways of playing. We will focus specifically on developments of new input devices or “instruments” for real-time live performance situations. At the core of the underlying research lies a cultural and Science and Technology Studies (STS) approach. Different from a taxonomic [20] or organological model [8] an STS point of view highlights the multilayered structures

of emergent technologies and their cultural manifestation as co-produced by human and nonhuman agents. By pointing out the cultural dimensions of the creation of new interfaces to perform computer music we might arrive at a more critical and open-ended concept of what an instrument could be and if we need new ideas to think about the notion of the instrument in computer music. Part of such an inquiry is the complex interweaving of different domains of research in the field of computer music. The importance and value of instrument research in computer music derives from the underlying collaborations across academic and artistic boundaries. These dialogical practices enable a further understanding of musical expression away from traditional models, e.g. acoustic instruments, and toward models of interaction between humans and nonhumans as modular assemblages and ecologies [6].

## 2. CONCEPTS OF THE INSTRUMENT

Computer music developments of computer-augmented, gesture-based and interactive modes of musical expression refer to a historical lineage of research. It was Edgar Varèse who denominated the blurring processes of sound and music through electronic music as the creation of “zones of intensity” [21]. One can link these zones of intensity as focus of endless compositions throughout the genesis of electronic music to a simultaneous process in new music in its relation to space. Artists such as Alvin Lucier started treating acoustic space itself as a tunable instrument [16]. In a highly collaborative fashion Iannis Xenakis together with Varèse and Le Corbusier constructed the sonic-visual-architectural construct of the Philips Pavilion at the EXPO 1958 in Brussels. In 1977 Joel Chadabe stated that the unpredictable behavior of real-time systems force performer and system to co-depend on each other [16]. The advent of gesture-based sensor-technology for new music interfaces ties the human body itself into the network of transductive device assemblage. We therefore witness a process in which not only sound generation becomes distributed in time and space through computer-augmented technologies but the human body or rather multiple bodies become part of a performative network.

## 2.1. Terminologies and Classifications

The specific research on input devices for musical expression in fields of computer music ranges in its terminology without any clear coherence. We regard this circumstance as an ambiguity evoked by the performative knowledge produced in research processes rather than something negative or worth criticizing. In the literature on gesture-based input devices diversification and specification define the main tropes in instrument classifications and their analysis.

### 2.1.1. *Categorizations and Differences*

A major differentiation concerning new instruments is the split between performer (human motor program) and gestural interface/controller/generative algorithm/sound output assemblage as the actual musical instrument [22]. Another more specific way to distinguish different devices with the advent of new music instruments is based on the difference between controller and interface. The controller defines the new instrument whereas the interface facilitates new possibilities to map control input to sound synthesis parameters [12]. Interface and instrument become blurred in the terminology and mark an absence of a clear distinction. Atau Tanaka, while reinforcing a divide between performer and instrument, foregrounds the potential to play new instruments in a direct or metaphorical way, or as an extension of itself [19]. Such a definition emphasizes the wide range of musical interaction expanding into the realm of virtual musical instruments. Tanaka introduces a clear differentiation between tool and musical instrument. A tool is a device providing means to an end whereas a musical instrument is driven by the quality of sound it produces and its unique character [19]. The computer in Tanaka's concept becomes the powerful interface connecting controller and sound generation. Perry Cook distinguishes very clearly between controller, interface and instrument [2]. The main novelty in his approach for new instrument design lies in his insightful attention for the dependencies between music we like and we want to make, instruments we know how to play, performers we want to work with as well as available sensors, computers, and networks [2]. His insights clarify the entanglement of different factors in the process of new interfaces that move across boundaries between humans and nonhumans. Joel Ryan in a different manner supports the interlacing assemblage character outlined by Cook through his term of instrumentation [14]. Instrumentation circumscribes the complex relations between mechanical design of sensors and controllers, the electronics and software of the interface, and the modeling of the higher level relations between performer and composition [14]. The definitions outlined in such classification models expand the relations between different entities in a performative context for new music input devices. The notion of the instrument seems to be on the one hand continuously reformulated, e.g. through

its disappearance as concrete object [1, 15, 16], and on the other hand it is reinforced to signify a means for musical expression [12]. This wrenching duality between new models and inventions opposed to old terminology and concepts of instrument as musical tool lies at the core of our inquiry.

## 2.2. Distributed Example

As sensor-based model for a distributed state of the interface (i.e. a partial disappearance of the object) Chris Salter, Marije Baalman and Harry Smoaks "Sense/Stage" project feeds out of preceding interactive computer-augmented performances such as "Schwelle" [1] and "TGarden" [15, 16] to build conceptual and technological links between usually separated domains of environment, audience, performer, gestural controllers and sound synthesis. As a sensor-based system additional ambient data creates an ecological approach that not only distributes the interface across different input-parameters (e.g. monitoring, capture and analysis of light, temperature, humidity, acoustics and chemical changes) but also ties in Chadabes claim for the co-dependence of performer and system [1, 17]. In other words, the distribution of the interface annihilates the idea of an instrument as object and defined signifier and at the same time produces an ecology for a continuous co-production of sonic and experiential events between humans and nonhumans as active actants.

## 3. CULTURE IN THE FIELD OF COMPUTER MUSIC AND INPUT DEVICE DESIGN

The design of controllers and input devices in computer music include models of sound control and creation without the usual signifier of the musical instrument as object or locus for sound generation. In light of the heterogeneous character of computer music research cultures we have to ask, why the notion of the instrument persists and what might be the potential of a new terminology and alternative concepts. Computer music research comprises a very particular set of interrelations between different practices (mostly scientific and artistic) that encompass reconsiderations of the disciplinary frameworks and their terminology (with discipline we mean academic and artistic disciplines). A cultural approach scrutinizes the meaning structure developed through particular practices (e.g. research environments) and the ways they inscribe and transfer knowledge. The presented classification models exactly define such knowledge-producing processes. Each definition, each interface and assemblage introduces a particular performative knowledge that derives mostly from research practices and the relations between humans and technologies or nonhumans. A cultural analysis proposes to focus on the meaning that emerges from such practices. The question regarding the notion of the instrument becomes a question toward the potential that

new input devices introduce to think about the creative processes of sound generation and embodied interaction with technology. Such a cultural approach foregrounds the internal mechanics of interdisciplinary research and at the same time proves the relevance for the researchs integration into a larger socio-political context. Novelty in sound performance interaction between humans and machines becomes political through the specific knowledge that is produced in such research and the aesthetic implications for its larger social context. Computer music as cultural formation therefore delivers insights that are shaping society and are shaped by society [11].

### 3.1. Knowledge, Networks, Assemblages

The production of knowledge creates power relations that define what is regarded as meaningful in the discourse of computer music and what is less relevant or even excluded [4]. Culture as a concept refers to these power relations between different practices and their ways to impose and distribute proper knowledge [3]. Specifically the burgeoning approaches of STS offer appropriate models to understand the relations between different disciplinary practices and their co-production of knowledge.

### 3.2. Science and Technology Studies

Science and Technology Studies focuses on the emergence of scientific knowledge under particular cultural, technological and political circumstances from a social sciences point of view. Referring to the interrelations of power structures in different cultural formations STS is one of the first disciplines that analyzes laboratory environments in the domain of science as cultures that manifest knowledge in social discourses [9]. From a STS perspective the creation of an input device for musical expression depends on a complex entanglement between technologies, humans, knowledge and power. Computer music research becomes part of the ongoing relational network between different domains of knowledge (e.g. transdisciplinary research between arts and science), practices that are shaped by society (e.g. institutions, funding, etc.) and technologies.

### 3.3. Epistemic Cultures

The diverse structure of computer music culture composed of different knowledge backgrounds fosters a particular understanding of how culture is defined in regard to knowledge and power. Knorr Cetina conceptualizes epistemic cultures as “machineries of knowing composed of practices” [7]. For her it is essential to perceive knowledge not only as part and outcome of specialized practices, e.g. research and their results in laboratories, but where knowledge itself becomes an active practice [7]. Thus, the inquiry of what

instrument means in the cultural context of computer music signifies a particular knowledge that is constantly “under construction.” The move from instrument to other concepts such as ecology or assemblage would imply a change of the knowledge structure as performative process. Knowledge as practice becomes intrinsically performative in epistemic cultures. It is therefore important to regard the research environments (or ecologies) as composites of not only different pools of knowledge and practices but also of materials and technologies and their active shaping of the context.

### 3.4. Hybrid Networks

Bruno Latour uses the concept of hybrid networks to foreground the continuous relations between different actants [his term for agents] to build cultural artifacts and knowledge structures [9, 10]. Similar to Knorr Cetina for Latour knowledge is symbolically encoded and becomes meaningful in particular cultural contexts. The production of knowledge is always accompanied by a process of purification that aims at a containment of knowledge into transmittable blocks, or what he calls black boxes [9]. Hence, since knowledge itself becomes performative, it cuts across defined boundaries, what he calls the process of translation. The demonstrated definitions and classifications of the notion of the instrument in regard to input devices (see 2.1.1) would on the one hand signify a process of purification and the fabrication of black boxes as neat entities and terms such as instrument. On the other hand the performative knowledge creates hybrid networks that alter the original meaning structure. If we regard technologies (and this ranges from “inanimate” matter to higher-level computing) as actants that together with knowledge are performative, then the different models of sound interaction might re-define concepts of the instrument and its cultural implications.

## 4. ASSEMBLAGE/APPARATUS (CONCLUSION)

The particular examples of a distributed environmental network for sound interaction such as TGarden or “Schwelle” mark a clear difference from traditional concepts of the instrument [1, 16]. Through a close scrutiny of such systems we develop an understanding of performance beyond the human and include knowledge and actants as performative. The instrument itself becomes a shaping part in the production of knowledge in these processes. Michael Gurevich and Jeffrey Treviño outline clearly the symmetric relations between materials, technologies and humans in musical experience [6]. Their ecological approach offers a re-conceptualization of the notion of the instrument that radically reformulates what we understand as input devices of interfaces for musical expression: “An ecological approach to musical creation focuses on the relationship between composers, performers and listeners as a part of a

system that includes external factors such as genre, historical reception, sonic context and performance scenario” [6]. If we replace their notion of system by Latours concept of networks we already enter a state of performative entanglements between knowledge, humans and nonhumans. To regard interface-networks as assemblages or apparatuses that are in relation with their embedding ecologies would provide the necessary ground for a technical object to take the place it deserves and for us to work further towards new aesthetic paradigms of musical experience [5, 18]. An apparatus similar to assemblages defines an open-ended network of transductive relations. Such relations constitute a milieu that is performative in its essence and therefore meta-stable. Assemblage defines a paradigm shift with new potential for new relations to surface and new creative paradigms to emerge. In a field that creates environments for aesthetic experiences an awareness for the language and cultural implications of such research would foster the recognition of its cultural influence. Hence, the notions of assemblage, network, ecology and milieu all foreground the relational bonds between the domains of knowledge, objects and humans in a cultural and social fashion. The inquiry of the notion of the instrument and its potential alternation functions as an example for the complex and utterly relevant meaning structures embedded in computer music research. It is therefore not only a quest for power in terms of the more appropriate terminology but rather the fact, that each choice of a concept to think about input devices is a political choice that has socio-cultural reverberations.

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## 6. REFERENCES

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