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**Creativity with Apparatuses:**  
**from Chamber Music to Telematic Dialog**

## **Introduction**

In the concluding remarks of *Into the Universe of Technical Images*, Flusser drafts the futuristic vision of chamber music as a prototype of telematic dialog. He suggests chamber music as a paradigm of creativity in telematic society. The pregnant image that emerges from his account is one of a society structured as a network where man and machine engage in a playful game with images and sound for the purpose of generating information. (Flusser 1983: 185; Flusser 2011: 172). The telematic dialog promotes creativity with apparatuses and Flusser draws the attention to the use of apparatuses, the way we play with machines for creating synthetic sounds and images. However, he states that the relation between man and machine is ambivalent; playing with apparatuses is a risky game. Apparatuses can make us creative but they can also take control of us. In the essay *Towards a Philosophy of Photography*, (Flusser 1983: 2000) he looks into this ambivalent relation. Today human beings operate *black boxes*, with which we are less and less competent: “Anyone who is involved with apparatuses is involved with black boxes where one is unable to see what they are up to” (Flusser 2000: 73). How does one construct a creative space for human intention in a world dominated by the apparatuses of post-industrial society? How can we best guard against the automatic programming of the apparatuses that leads to banality?

We play with apparatuses but also against them. Creativity is primarily achieved by subverting the automatizing tendency of the apparatuses. Apparatuses draw the attention to the outside and keep hidden their inside. In today’s society, we are fascinated by the bright surfaces of digital images produced by different kinds of devices such as tablets and smartphones. Inquiring about the magical fascination of technical images in our current society, Flusser developed a critical phenomenology of photography and the photographic apparatus that can be extended to the electronic music apparatus. The prehistoric magic, according to Flusser, activates a ritualization of models in the form of myths, which are communicated orally; in contrast, the current magic activates a ritualization of models in the form of programs. The programs are basically features and functions of technical apparatuses, such as the ones that allow a camera to take pictures or DJ electronic equipment to perform music.

The programmatic magic of technical apparatuses tends to eliminate critical thinking, replacing historical consciousness with a second-order magical consciousness that reduces culture to the lowest denominator. With the apparatus, the relations of power move from the level of objects and material to the symbolic level of programs and their operators. This what characterizes the “information society” and “post-industrial imperialism” (Flusser 2000: 30).

## Listening to Music

Flusser suggests that the gesture of listening to music conveys both the logical and the physiological dimensions of music. By listening to music, we embody the vibratory nature of sound and music that take over our body and mind. We try to capture both a logical and a mystical message: music “makes the whole body vibrate” (Flusser 1997b, 155); it gives us a kind of existential “massage” healing body and mind. Flusser compares the body in the acoustic environment to a black box. Music creates a cybernetic circularity as it nourishes the body with vibrations while awaking the mind. Music illuminates the inner darkness of our black boxes. When listening to music, we feel that the separation between man and world disappears; we transcend our skin and our skin transcends us (Flusser 1997b: 158).<sup>1</sup>

Reflecting on the musical creativity in today’s society, one must consider the role of sound reproduction and electroacoustic music, which impacts all kinds of music. Electroacoustic sound and music technology expands the music material by incorporating environmental noise and synthetic sounds to musical composition. It creates forms of pure electroacoustic but also hybrid forms in combination with vocal and instrumental music. Composers began to explore apparatuses for sound reproduction such as tape recorders for developing a new kind of musical creativity. When used in an unconventional way, the tape recorder subverts its reproductive tendency. With digital signal processing, the electroacoustic technology migrated to the computer. We are living the age of digital audio and music.

Looking back at the history of electroacoustic music gives us an understanding of how analog and digital technology transforms our consciousness of sound and music. After World War II, two important studios emerged in Europe producing electroacoustic music: the studio of Paris associated with *musique concrète* and the studio of Cologne, associated with *Elektronische Musik*. They represent the

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<sup>1</sup> Flusser reflects on the embodiment of musical communication in his essay *Die Geste des Musikhörens* [*The Gesture of Music Listening*] (Flusser 1997b: 151-59). He claims that, when listening to music, the body is literally penetrated by the musical message: “the body becomes music and the music becomes body” (Flusser 1997b: 155).

diversity of aesthetic tendencies that marked the beginning of electroacoustic music in the 1950s, which also impacted the overall musical creativity of the second half of the 20<sup>th</sup> century. The electroacoustic music studio is a model of telematic dialog as it promotes the systematic exchange of information between different kinds of partners such as composers, performers, engineers, technicians, and listeners using apparatuses for creating and listening to musical works (Chagas 2002: 2006). The electroacoustic music studios of Paris and Cologne accomplished such a cybernetic role; the musical works produced by the studio build points of condensation on the networked flow of information. The media environment connects the studio to the outside world. The electroacoustic music works composed, produced, performed for audiences and broadcasted over radio generate a feedback in the society, which re-enters the studio. The feedback loop forges the telematic dialogue that takes place in the studio, which can be seen as an interdisciplinary and intermedial environment, in which man and apparatuses are connected in many different ways with the purpose of generating music and sound art.

The concept of telematics embraces the communicative complexity that emerges from the convergence of telecommunications and information processing in today's society. Flusser believes that telematics has the potential to radically transform the way we communicate. He is concerned with the natural tendency of entropy, a state of randomness in which information is unpredictable and therefore impossible. However, the universe of technical images and sounds can reverse this tendency by converting historical and discursive thinking into dialog. In Flusser's telematic dialog, man and machine act as partners, devoting themselves to the systematic generation of information through a playful game. The telematic dialog embodies Flusser's utopia of freedom as a struggle against entropy, which emancipates man from the controlling functionality of the machine.

## **Technical Reproduction: Benjamin**

Flusser's ideas on the role of technology in creativity can be traced back to Walter Benjamin. *The Work of Art in the Age of Mechanical Reproduction*, Benjamin's essay originally published in Paris in 1936,<sup>2</sup> is a major reference in humanistic studies on the relationship between art, media and technology. He reflects on the impact of technical reproduction on artistic creation, perception and the function of

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<sup>2</sup> The original text in French—"L'œuvre d'art à l'époque de sa reproduction mécanisée"—appeared in the journal *Zeitschrift für Sozialforschung* Jahrgang V, edited by Mark Horkheimer (Paris: Félix Alcan, 1936, pp. 40-68). Available at: <http://ia700805.us.archive.org/2/items/ZeitschriftFrSozialforschung5.Jg/ZeitschriftFrSozialforschung51936.pdf> [accessed April 21, 2014].

art in emerging mass society. One of the most quoted passages of the essay states: “[F]or the first time in world history, technical reproduction emancipates the work of art from its parasitical existence on ritual” (Benjamin 1977: 144).<sup>3</sup> The first artworks, according to Benjamin, originated in the service of a ritual, first the magical then the religious ritual. The aura of the work of art is ingrained in its ritualistic function, which declined during the Renaissance and was replaced by the secular cult of beauty. This prevailed for three centuries until the advent of photography, which was the first revolutionary medium of technical reproduction that challenged the notion of the “authentic” work of art. For Benjamin, the doctrine of *l’art pour l’art* appeared as a reaction to the loss of authenticity, installing a sort of theology of art, a cult of pure artwork detached from any social function. We can interpret the ritualistic function of art from the perspective of the body. The religious ritual is celebrated in a physical location in the presence of bodies. When art gets detached from religion, the artwork is transformed into an autonomous object that can eventually be celebrated as an *ersatz* for religion. The aura of the work of art is thus due to this simulacrum of religious content that became invisible as the art itself became a “profane” ritual. The technology of reproducibility replaces the physical presence through a virtual presence, which creates its own rituals. Along with photography, recorded sound should also be included in the revolution that introduced the era of technical reproduction. The cinema is the first art form that accomplishes the convergence of these first virtual bodies, images and sounds.<sup>4</sup>

Benjamin’s essay, written during the rise of Adolf Hitler and the German Nazi party, is a political critique of fascism in Europe; it anticipates the events that culminated in the outbreak of World War II and the tragedy of the Holocaust. The reflection on the role of technological reproduction in shaping human experience goes together with his concern about the increasing proletarianization and development of a mass culture in modern society, a process that Marx and Nietzsche had already observed at the end of the 19th century. The conclusions are ambivalent. On the one hand, Benjamin suggests that technology introduces a revolutionary change, which appears already in photography and especially in film, as it disengages the artwork from its “aura” of authenticity, allowing the spectator to participate in the creative experience. The technical apparatus has deeply penetrated into reality; in film, for instance, the actor performs not directly for the audience but for

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<sup>3</sup> The passage is translated from the German text. The German word “Reproduzierbarkeit” means literally “reproducibility”; it has been translated as “mechanical reproduction”; I prefer instead the term “technical reproduction”, which is more general, yet it doesn’t convey the exact meaning of the original German word.

<sup>4</sup> In *How We Became Posthuman*, Hayles proposes a semiotic model to analyze the materiality of signifying processes in the post-industrial society that give rise to new kinds of embodiment, through the interplay of *presence* and *absence* (cf. Hayles 1999: 247-82).

the camera. The camera doesn't present the actor's performance but its own performance resulting from the combination of shooting and editing techniques. The audience can only empathize with the actor's performance if it empathizes with the camera's performance. As Benjamin points out, the technical apparatus brings a new kind of creativity that liberates art from the bonds of authenticity and the ritualistic function associated with location and the original utility. However, creative potential can only be achieved if the aesthetics of the artwork explores the new possibilities of the apparatus from a critical perspective, if the apparatus doesn't become itself an object of veneration. On the other hand, Benjamin recognizes the alienating potential of art in the age of technical reproduction. Film illustrates this resistance to eliminating the cult function of the artwork; it creates a new kind of illusion that puts the audience into a state of scattered, fragmented attention. In the epilog of the essay, Benjamin replaces his optimistic tone with a warning and an apocalyptic vision of the future dominated by the fear of emerging fascism. The violation of the masses and of the technical apparatus are two related consequences of the fascistic orientation of society. The technical apparatus is pressed into the production of ritual values, serving the fascistic purpose of reintroducing aesthetics into political life: "All effort to render politics aesthetic culminate in one thing: war" (Benjamin 1977: 168). Benjamin quotes Marinetti's manifesto about the Ethiopian war, in which he celebrates the beauty of the war machinery and the aesthetics of war and violence. War is supposed to provide the artistic gratification of a sense perception that has been changed by the machine and technology. Benjamin sees in fascism the culmination of the ideal of "*l'art pour l'art*". Self-alienation within fascism becomes so extreme that the destruction of humanity becomes itself an aesthetic experience.<sup>5</sup>

### **The Telematic Dialog: Flusser**

A half century after Benjamin, Flusser's media philosophy expresses a similar kind of ambivalence toward the potential of technical apparatuses. Flusser is recognized as one of the first philosophers to anticipate the emerging digital society of the internet and web-based culture dominated by technical and electronic images, a form of life that is now shaping our scientific, political, and artistic

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<sup>5</sup> The terrorist attack on the World Trade Center on September 11, 2001 is a major symbolic event for the fascination exerted by violence and destruction; the images of the attack repeatedly delivered by the mass media are examples of the potential of terrorism to shape aesthetic pleasure. In Baudrillard's words: "By the grace of [sic] terrorism, the World Trade Center has become the world's most beautiful building—the eighth wonder of the world" (Baudrillard 2002: 48).

environment.<sup>6</sup> His book *Into the Universe of Technical Images* (Flusser 2011), written in the mid-1980s, one decade before the internet revolution and two decades before the mobile communication revolution, introduces “the prospect of a future society that synthesizes electronic images [...] a fabulous society, where life is radically different from our own” (Flusser 2011: 3). The book opens with a warning statement about the repressive potential of global networks, while at the same time, is a manifesto for unraveling their creative potential through this new kind of connected communication that he calls telematic dialogue: “Taking contemporary technical images as a starting point we find two divergent trends. One moves toward a centrally programmed, totalitarian society of image receivers and image administrator, the other toward a dialogic, telematic society of image producers and image collectors. From our standpoint, both these social structures are fantastic, even though the first presents a somewhat negative, the second a positive, utopia. In any case, we are still free at this point to challenge these values.” (Flusser 2011: 4)

The first option provides the scenario of a techno-fascism that eliminates human agency and decision, and transforms man into a programmable being; the second option encourages us to explore the liberating potential of digital technology, which empowers us with the ability to achieve a new kind of freedom by programming our own reality. Flusser’s account of the telematic society focuses on the transformation from a writing-based culture to a digital images-based one. He analyzes the evolution of communication codes through the text/image relationship. The image has a magical and mythological meaning; prehistoric man communicated through traditional images that preceded the invention of text. The development of writing, which began with the Sumerians around 3500 BC, represents the lack of belief in the magical iconic power of images and the belief in narratives, theories, and ideologies. Flusser associates writing with the linear mode of thinking that created historical consciousness. The shift occurred, according to him, when the scientists of Modernity began to envision knowledge more in terms of numbers and less in terms of texts; theoretical thinking has migrated from written to numerical codes—from alphabetical codes and historical consciousness to binary codes of computer and cybernetic systems. This transformation culminated in the invention of technical images—photo, film, television, video, and computer. The calculative and analytical thinking of science and technology has decomposed the phenomena into abstract and punctual elements. This process has resulted in the crisis of modernity that affects all spheres of life, including the existential, social, cultural, and has caused the lack of faith in the power

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<sup>6</sup> For a concise account of Flusser’s media philosophy, cf. Hartmann (2000: 279-98), and Kloock and Spahr (1997: 77-98).

of theories and ideologies. Technical images are the expression of the crisis and at the same time, the possibility of overcoming it. They have re-codified the world by re-introducing magic and belief in the power of the image. Yet the current magic of technical images is of another kind, different from the magic of traditional images. The pre-historic images encode the concrete world in terms of myths—they are like mirrors that can be decoded as signs; technical images encode abstract concepts that can only be decoded in terms of programs.

Flusser reflects on the cybernetic paradigm of dematerialized information. He argues that the apparatuses that produce technical images have the potential of reversing the process of alienation or abstraction, rescuing and reshaping the concrete universe. As previously mentioned, he calls this ability of the technical images to create concrete forms from abstract elements the *power to imagine* [*Einbildungskraft*] (Flusser 2011: 33-39). Our culture is no longer concerned with creating a picture of reality, but with developing an alternative imagination, by exploring the products of scientific and technological revolution. The alternative worlds that have been emerging in computers and other digital devices represent this process of transformation from abstract into concrete elements: they are condensations of digital particles or bits, taking the form of images, sounds, and eventually bodies, robots, and other forms of life endowed with artificial intelligence. Computers symbolize calculating thought that can synthesize and project alternative worlds from algorithms. As Flusser claims, “We are no longer subjects of a given objective world, but projects of alternative worlds. From the submissive subjective position we have raised ourselves to projecting. We are growing up. We know that we are dreaming” (Flusser 1997a: 213). These projections can be as concrete as the environment that surrounds us. The more sophisticated the condensation processes of computers are, the more real the synthetic worlds become, so that we no longer distinguish between reality and digital appearance.

In the unfinished essay *Vom Subjekt zum Projekt* [From Subject to Project] (Flusser 1998), which can be considered the latest stage of his digital utopia, Flusser recasts the idea of telematic dialog in terms of the *practice of projection*. Numerical, calculating thinking has penetrated deeper and deeper into things, “but instead of reaching a bottom has dissolved things into clouds of vapor floating in nothingness” (Flusser 1998: 11). This relationship has gradually abolished the belief in the subject/object relationship. As an object, man is dissolved into a network of simultaneous relations—psychological, psychic, social, and cultural; as a subject, man is fragmented into calculus itself. Flusser applies the analogy of the computer bit in order to characterize the transformation from linear thinking or written codes to the pixel, and then to the null dimensionality of digital codes

and the state of nothingness, which evokes the “death of humanism”. Yet Flusser rejects nihilistic pessimism; he proposes instead a negative anthropology—a postmodern and post-humanistic one—in order to deny nothingness. From this reversal results an affirmative philosophy of the *practice of projection*, which is performed by means of digital apparatuses and transforms numerical thinking into synthetic codes: lines, shapes, colors, and sounds. Thanks to the *power to imagine* we have overcome the lack of belief, the subjectivity that led us to the state of catastrophe. We are standing up in order to project ourselves, not as a group of individuals, but as a dialog in a telematic network. The possibility to construct alternative worlds reconstructs the concept of “freedom”, in that we have to continuously develop a consensus to keep this inter-subjective dialog alive and participate in the practice of projection (Flusser 1998, 17).

Flusser’s description of the telematic society indicates tendencies of the present. For example, the playful game of generating information points to the Platonic utopia of a society whose economy becomes increasingly dedicated to providing people with entertainment and leisure; the networking architecture of the dialog points to the merging of political and private spheres in the social media; the interactions between humans and robots point to the mutation towards a hybrid (post-human) society: “The scenario, the fable, I propose here is this: people will sit in separate cells, playing with their fingertips on keyboards, staring at tiny screens, receiving, changing, and sending images. Behind their backs, robots will bring them things to maintain and reproduce their derelict bodies. People will be in contact with one another through their fingertips and so form a dialogical net, a global superbrain, whose function will be to calculate and compute improbable situations into pictures, to bring information, catastrophes about. Artificial intelligences will also be in dialogue with human beings, connected through cables and similar nerve strands. In terms of function, then, it will be meaningless to try to distinguish between natural and artificial intelligence (between primate brains and secondary brains). The whole thing will function as a cybernetically controlled system that cannot be divided into constituent elements: a black box.” (Flusser 2011: 161)

## **Telematic Chamber Music**

In the concluding chapter of *Into the Universe of Technical Images*, Flusser suggests chamber music “as a model for dialogic communication in general, and for telematic communication in particular”



(Flusser 2011: 162).<sup>7</sup> He draws a parallel between communication through music and technical images. The universe of music is just as calculated and computed as that of technical images. Both have emancipated themselves from the semantic dimension, channelizing the possibilities of composition and computations toward self-referential “pure” art. Traditional chamber music, according to Flusser, is a pre-industrial form of communication that anticipates imaging techniques. It requires sophisticated communication between the players, each one performing for him- or herself and for all the others. From the point of view of sound production, chamber music requires interaction between bodies, voices, and musical instruments. It shapes a direct relationship between the bodies and instruments or voices, since the resonance of the instruments is transmitted to the bodies (in the case of voice the transmission is internal) and the bodily activity of the musicians controls the sound events of the musical flow. There is thus a direct and analog feedback between body and sound. From the point of view of communication, chamber music is a collective process unlike music for soloists. At the same time, it stimulates the individuality of musicians, unlike orchestral music directed by a conductor. Feedback processes affecting the body and sound also regulate the relationship between the musicians.

The dialog between bodies and instruments, including the voice, is therefore the foundation of chamber music both as sound production and communication. Gesture is one of the most important aspects of this dialog. In performing a work of chamber music, the musicians refer to a system of instructions that can either be a pure score (classical music), a schematic score (jazz, popular music), a diagram with instructions (improvised music), or any kind of textual or graphical notation (free improvisation is generally communicated orally). The interpretation of these instructions requires a multifaceted system of communication consisting of aural, visual, and gestural elements. It is through gesture that musicians communicate intentions such as maintaining a rhythm, beginning or completing a musical phrase, increasing or decreasing loudness, accelerating or decelerating tempo, and other crucial features of musical performance. Typical gestures of chamber music include breathing to indicate the intention of synchronizing actions, tapping feet on the floor; making movements with the head, arms, or other body parts. Other gestures involve making abrupt movements with the instrument such as with a woodwind, the bow for stringed instruments, or drumsticks with percussion instruments. In general, musical performance produces indexical gestures

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<sup>7</sup> For an account of telematic chamber music see my article “A Música de Câmara Telemática: a Metáfora de Flusser e o Universo da Música Eletroacústica” [Telematic Chamber Music: Flusser’s Metaphor and the Universe of Electroacoustic Music] (Chagas 2008).

resulting from the combined action of bodily movements with specific movements of the instruments.

The function of gesture in music is not restricted, however, to the corporeal and immediate aspect of performance. As pointed out by Wittgenstein, gesture plays an important role as an external sign of musical understanding.<sup>8</sup> Recent studies on musical semiotics indicate that gesture not only articulates nuances of perception, cognition, and affection, but also negotiates the understanding of more abstract musical structures through the internal synthesis and integration of elements. Barthes, in his essay on Schumann's piano music, identified several "figures whose body textures constitute the musical meaning" (Barthes 1985, 307). Lidov (1987) outlined a semiotic theory of gesture in music, showing through the interpretation of Chopin's music for piano how gesture can contribute to creating different musical meanings. Hatten (2004) developed a comprehensive theory of emergence and generalization of musical gesture. Defining gesture as "significant energetic shaping of *sound* through time" (Hatten 2004, 95; emphasis in the original), he demonstrates the evolution of stylistic gestures in the works of classical and romantic composers such as Beethoven and Schubert. Hatten's analysis focuses on the interpretation process through which physical gesture is transformed into musical gesture. This process creates stylistic and stereotyped gestures, which synthesize and integrate various musical elements that are relevant to understanding different levels of structure and musical form.

A semiotic investigation of musical gestures provides insight into musical evolution from the point of view of the relationship between stylistic elements and concrete contexts. This can be observed for example, in the evolution of the string quartet, a form of chamber music that has achieved an outstanding level of sophistication. In watching a performance of a string quartet, we can observe how physical and musical gestures vary according to specific styles and aesthetics. Since the mid-18<sup>th</sup> century, composers such as Haydn, Mozart, Beethoven, Schubert, Debussy, Schoenberg, and Webern have written works that have expanded the instrumental and aesthetic possibilities of music for string quartet. This process has also extended the repertoire of musical gestures, as we see for example, in the music for string quartet composed in the second half of the 20th century: micro-polyphonic textures (Ligeti), complex scores that transcend the logical limits of

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<sup>8</sup> Wittgenstein refers frequently to gesticulations [Gebärde] and gestures [Geste] to illustrate the problem of understanding. The metaphor of gestures is a recurrent one in *Culture and Value* and *Philosophical Investigations*: "This musical phrase is a gesture for me. It creeps into my life. I make it my own" (Wittgenstein 1988: 83). "These notes are a powerful gesture, but I cannot put anything side by side with it that will serve as an explanation" (Wittgenstein 2001: §610).

notation (Ferneyhough), stochastic and algorithmic models of composition (Xenakis), and experimental aesthetics that re-elaborates concepts of time and space in music (Stockhausen).

In Stockhausen's *Helikopter-Streichquartett* [Helicopter String Quartet] (1992-93) each musician of the string quartet plays inside a flying helicopter and the audience sits in a concert hall. The sound of the instruments is captured by microphones, mixed with noise produced by the aircraft and projected to the audience in the concert hall together with images of the musicians captured by cameras. This work can be considered a prototype of telematic chamber music for many different reasons: (1) The piece disconnects the performance from the physical presence in the concert hall and connects it to a telematic choreography that creates a displacement of both space and time. (2) The piece subverts the function of the helicopters as they fly for the sole purpose of performing a work of art. (3) The musicians perform for the audience via the electroacoustic audiovisual medium (microphone, amplifiers, and video projection) so that the presence of the electroacoustic medium replaces the physical body.

Flusser's model of telematic dialog is an attempt to make a synthesis of two different types of communication: (1) The communication of chamber music, which occurs in the physical medium with bodies producing gestures that are translated into sounds. (2) The communication of electronic music, which occurs in the virtual medium with apparatuses producing programs that are translated into sounds or images. He describes the telematic performance as a dialog between "musicians" and "intelligent memories", which are, at the same time, transmitters and receivers of information. The goal of the dialog is to synthesize new information. Unlike traditional chamber music, which is structured as a succession of linear events such as themes and variations, the telematic dialog "occurs in simultaneous time and space, and all players in all places make decisions relating to themes and their variations all at once" (Flusser 2011: 163). In this view, the basis of telematic communication is not an original score but a program, a set of rules that will soon be replaced by reprogrammed memories with which the musicians will improvise. He doesn't distinguish between composition and performance; his model of telematic communication suggests that he is seeking to reconstruct an "experience of presence" that emerges from the performative character of improvisation and at the same time, while pushing to the background the role of music composition. What are the implications of such a conception of creativity?

## Creativity of Electroacoustic and Digital Music

Studying the creativity of electroacoustic and digital music requires a multifaceted and pluralistic view combining historical, theoretical, cultural and practical approaches. A comprehensive approach seeks to investigate both particular cases and the context of its cultural references. Electroacoustic and digital technology has radically transformed sound consciousness and propelled the process of artistic differentiation. The creativity that emerges through the use of apparatuses becomes more and more integrated in all spheres of musical activity. How then, shall we look into the future?

Sounds are vibrations transmitted through the air and perceived by the ear and other parts of the body and thus have the ability to put the body into vibration. Musical sounds are forms built as differences in the acoustic medium, which are used for the purpose of artistic communication. Acoustic music results from the action of the body; either the body generates its own sounds (voice, handclapping) or it manipulates an instrument to produce sounds. Electronic sounds generated by apparatuses play an increasingly important role in music. Apparatuses are products of scientific and technical knowledge that prevail in all spheres of life. The category of music apparatus embraces both those that generate electronic sounds such as computers and synthesizers, as well as meta-apparatuses that organize music in society, such as mass media or networking media.

A fundamental characteristic of modern art is self-programming. Electroacoustics expands music's capabilities of self-programming by creating new channels of collaboration between art, science, media and economy. It stimulates the creative and critical use of apparatuses, increasing the connective possibilities between sound and other media such as image, body, and space.

Being that electroacoustic music emerged from the experience of World War II, the medium of radio awakened the consciousness of the aesthetic manipulation of electroacoustic sound and of the listening experience through the loudspeaker. In the 1950s, the studios of the European state-owned broadcasting corporations started to produce electroacoustic music on a regular basis and integrate it into the communication system of art.

The studios of Paris and Cologne are emblematic for the aesthetics of *musique concrète* and *elektronische Musik* and their different self-descriptions of the source material of electroacoustic music composition: the former favors processing of sounds captured from the acoustic environment and the latter, the synthesis of sounds generated by electronic apparatuses. These two approaches show how electroacoustic music can develop different kinds of aesthetics through self-programming.

Cybernetics, another byproduct of war, has provided the philosophical and scientific basis for the development of computer science. Computer music that emerged from the research on sound synthesis merges analog electroacoustic music with the digital medium. The development of digital technology propelled the popularization of electroacoustic music. The concept of digital music points to the self-description of music in the digital society, including use of digital technology for composition, performance, distribution, and listening.

The emergence of the apparatus as a reflexive medium reconstructed the concept of self-programming as a function of the apparatus, which creates an automated reality that becomes emancipated from man—and thus self-referential. The ambivalent feelings concerning the relation between art and technology have been the object of critical studies at least since Benjamin. However, such critical approaches still have a limited impact on fields of music studies such as musicology, music theory, and analysis.

The notion of composition is traditionally coupled with the medium of a written score, which functions as a programmatic memory for the performance. Electroacoustic music extends the notion of composition to the medium of technical reproduction. The analog apparatus (tape) emerged as a device for sound reproduction but turned into a tool of composition and performance. The computer intensifies the multifunctional characteristics of the technical apparatus as it transforms sound into numerical data that can be manipulated in manifold ways, re-coded, recombined, and reconstructed.

Digital technology challenges the idea of the work of art as a closed and complete unit, for example, through the practice of “remixing” material from existing artworks. Increased openness in digital music suggests a tendency to emphasize the *contingency* of the artistic process rather than the *necessity* of a form as a unity. In other words, improvisation instead of composition. We observe this tendency in many spheres, not only in the world of DJs, but also in academic institutions, for example with improvisation ensembles and laptop orchestras.

Jazz improvisation is clearly a prototype of such an improvisation model. Jazz musicians improvise on the basis of a “program” and make decisions at the moment of the performance, communicating with each other and with the audience. Continuous feedback is incorporated in the formal process, which is a central aspect of jazz creativity.

Although Flusser’s model of telematic communication is centered on chamber music, it is also rather oriented around jazz improvisation. This becomes clear from a number of observations such as the musicians use of “recordings of recordings of recordings”, and “the improvisation with

continually reprogrammed memories will replace the score” (Flusser 2011: 182). Flusser’s model doesn’t solve the problem of the *temporal processing of meaning* concerning both composition and improvisation. Composition is a calculating and computer time that requires time, but improvisation requires the reference to a *style* that is also a temporal form.

A possible approach to the distinction between improvisation and composition is through the distinction between *incorporation* and *inscription* proposed by Hayles (1999: 192-221). Incorporation practices are context specific, always “performative and instantiated”, so that they necessarily contain improvisational elements. In contrast, inscribing practice can be transferred from context to context once it has been performed. Incorporation emerges from the collaboration between the body and embodiment and cannot be separated from the embodied medium. In contrast, inscription is normalized and abstract, in the sense that it constitutes a system of signs operating at a symbolic level and independently of any particular manifestation.

I suspect that the emphasis on improvisation that we observe in Flusser and in the current practice of electroacoustic and digital music is an attempt to restore the so-called “authenticity of human experience” in the creative process. This effort of reconstructing subjectivity can be also observed in the current scholarship, for instance with the persistence of notions such as presence, materiality, and embodiment, together with the emphasis on the “experience of presence”.<sup>9</sup> Electroacoustic and digital creativity can be analyzed from different perspectives; for instance through the relationship between man and machine and their interpretations disclosing both positive and negative tendencies. Flusser’s utopian vision of the telematic dialogue points to the need to creatively shape the partnership between man and machine. The joyful game is the strategy for generating information, exercising reflexive criticism, and promoting freedom.

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<sup>9</sup> For an account of improvisation from the point of view of system theory, see “Improvisation: Form and Event: *A Spencer-Brownian Calculation*” (Landgraf 2011).

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