Anachronic sonorities of technoculture in digital games: A preliminary questioning

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ABSTRACT

This article offers a preliminary questioning of the extant research on the sound of digital games and situates these extensively disseminated contemporary artefacts in a wider technocultural frame of reference, in order to develop an approach capable of articulating communication, memory, and culture.. To achieve this goal, we propose a partial revision of prominent works dealing with the sonorities of digital games, contrasting them through the theoretical-methodological contributions of Walter Benjamin's philosophy of history and media archaeology. Through the conceptual approach developed in this article, we are able to reformulate questions being asked about the sounds of digital games, taking them instead as compelling objects for inquiry regarding our contemporary technoculture and a memory of media that surpasses them. Having reconceptualized our research object, we suggest a method for an empirical research still under development.

KEYWORDS

digital games, sonic traces, temporalities, memory of media, technoculture

Introduction

In this article, we initially try to present a few perspectives on the research of digital games, showing how we position our object of study in relation to epistemological assumptions about these media. The following subsection defines the theoretical and methodological references that we deem most pertinent to analyse the objects under investigation and justifies some implications of these choices. In the third section, we weigh in on what we understand as the sonic *traces* we have been looking for; and finally in the last section, we suggest the current research alignments and our understanding of the relationship between the sonorities of digital games and a memory of technically mediated sounds, in which we intend to situate our research within communication studies.

As we see it, the current work on the audible dimension of digital games does not properly situate games within a broader media landscape. The conceptual reframing that we suggest here is, from our perspective, an appealing opportunity to explore under-analysed aspects of digital games. For this reason, in the concluding section of this paper we also suggest some methodological procedures to be employed in further investigations.

State of the art

Until recently, it was fairly common to justify investments in digital games in two directions: initiatives that proposed the need to take games as "serious cultural objects", as more than casual amusement artefacts (Carvalho 2013; Newman 2004); and remarks that the proposals that took these artefacts as their *corpus*, as communicational objects, were still incipient or unsettled (Perani 2015).

However, there is nothing between these two instances that would justify a restriction on the way of looking from the first to the second (to take casual artefacts seriously), as we understand it. Quite the contrary, we see in the trivial dimension of digital games, also manifested in the somewhat playful logics that appear exponentially in a great diversity of fixed and ubiquitous screens, some of its most prominent characteristics. The more casual the use of media is in our daily life (the more it appears to be "natural" to the ecosystem of audiovisual media), the more its own logic also tends to engender itself in technoculture. To echo an argument of Wendy Chun (2017), this suggests that media become more important when their status is no longer perceived as 'new' and moves toward the 'usual'. If one cannot state that this is the case for videogames today, given the surprising effect that digital games still carry when they are inserted in the most varied fields of debate, this seems to be precisely the case of audiovisual media to which we are already so accustomed that we hardly perceive their persistence in our daily lives - let alone the persistence of their languages in the ways in which other contemporary media such as videogames themselves build their worlds. But let us begin our discussion of the state of the art from the second assertion, about the incipience and the unsettlement of the proposals on video games as communicational objects, to move gradually and subsequently toward the more complex first question.

It has been only a few decades that research projects on digital games have been developed under Communication Studies, but today they are already very frequent in the field. Our review of articles published since 2015 tends to corroborate the conjuncture that Mônica Acevedo (2013) describes: the proliferation of studies on digital games in the Humanities, Social Sciences and Arts occurred a little more slowly than in other fields of knowledge, such as IT Sciences and Engineering; approaches on the aesthetic dimensions of games took a while to develop; and the angles that proposed to problematise these objects from their imagery and sonic constructs did not achieve the same prominence as other perspectives until more recently.

Although we cannot disregard this so-called delay, it is not necessary here to hide even more the proposals that sought to regard digital games as relevant objects for audiovisual communication research. David Sudnow's *Pilgrim in the Microworld* (1983), for example, is one of the most detailed accounts of the relationship of the player's body to the machine we've encountered so far. A very peculiar work, with phenomenological contours, in which the author, a social scientist and jazz pianist, narrates (making associations between the experiences of "interfacing" through video game and a musical instrument) his experience with the game *Breakout* (1978, Atari 2600), the images and sounds that were produced, and the finger movements they demanded.

The current state of game studies points to a variety of studies interested specifically in the sonorities of these artefacts. *Game Sound: an introduction to the history, theory and practice of videogame music and game design* (2008), by Karen Collins, Winifred Phillips' *A*

composer's guide to game music (2014) and the collection *Game sound technology and player interaction: concepts and developments* (2010), organized by Mark Grimshaw, are works that in certain parts describe the sound expressions in digital games and that present us, above all, material elements and design models related to it. However, they are not works that openly intend to discuss the historical conditions of their experience, or their association with the aesthetics of other media, except for the work by Collins (2008), who attempts to establish a broader relationship between games and other media drawing from observations by Lev Manovich (2001).

The article *Sound in electronic gambling machines* (Collins et al. 2011) explores similarities between the uses of sound expression in digital games and electronic gambling machines, pointing out how sound in the latter builds mainly reward effects. The text makes detailed descriptions of casino machines, with the concern of thinking how these sounds can be used in sound design practices of current games. However, the former article (Collins et al. 2011) presents two themes we try to problematise in our work: firstly, because the authors focus on the description of the casino slot machines, some forms remain unnoticed, such as the ways home games already update tendencies that were in a somewhat 'standing-reserve state' in those machines; secondly, the text presents the game-sound-player relationship in terms of causal effects, and much of what would be rich communicational processes between these instances and environments is understood in regard to *one-step flow* models[1]. In a more recent work, though, Collins (2013) unfolds her arguments in a more composite direction: the experience of sound involves all senses, moving the body, stimulating emotional responses and generating associations with space and textures, even if one listens with closed eyes. To explore this argument, she derives from Merleau-Ponty's (1998) phenomenological approach and Michel Chion's (2008) sound studies with films.

Particularly under the understanding of the experience of game worlds, the perspective of Lucas Meneguette's work is pertinent. In *Situações sonoras e jogos digitais* (2013) *(Sonic situations and digital games*), he circumvents the dichotomy between "virtual environment" and "real environment" through consideration of the sensorial stimuli incited by games. Meneguette suggests that the experience of the game is dependent on a kind of communion between the perceptive subject and the potentialities of action in the game environment, under an affection regime (immersion). He also makes slight approximations between games and films, pointing out traces of contamination between these languages.

In his article *Worlds of sound*, Michael D'Errico (2015) follows a similar path, suggesting analogies between techniques, aesthetics and creative practices of contemporary game design and experiments of generative art and music with computers in the second half of the twentieth

[1] It would equate only the part of the phenomenon, more specifically to the part of the technique that Peter Krapp (2018) calls *Ping*, in an analogy to the testing of sonar and radar signals. *Ping* corresponds to the computer-computer information transmission model, which analyses the signal and confirms or not its receipt. The design of videogames depends, however, on the establishment of conditions of human-computer interaction, which plays a critical role in their technical-aesthetic development, as the author shows. This form of relationship, therefore, before operating under a ping-ping logic, would operate in a ping-pong relation, by which *Pong* refers to the programmed management of the reaction movements to the initial signal through the interface, and from which it is installed an interdependent meddling between the consecutive movements realized between the human and the machine.

century, such as the compositional techniques of Stockhausen and Koenig, the indeterminate music of Cage and the *phasing* of Steve Reich. For D'Errico, some initiatives in digital art and modern music share aesthetic and technical aspects with ways to operationalise computer resources in game design such as Fract OSC (2014), and Proteus (2013). D'Errico's argument seems to converge implicitly with the ideas of authors who understand that this procedural point of view brings to the forefront of the game its rules and mechanics, as well as directing (again) the visual and sound repertoire towards abstraction instead of verisimilitude. Generative audio application in games would be intrinsically linked to "real-time" sound synthesis, while most games would still work with pre-recorded audio samples, in which other cinematic cues such as audio samples from capture and post-production practices of sound effects are applied. According to Ian Bogost (2015), this is a recurrent problem in both game studies and game criticism. In his view, there are two converging dangers that unfold from this bias: the first is a linearly progressive view on games; the second is based on the perspective that technical development would carry by itself the aesthetic development of media. Bogost points out that videogames are technical devices, with applications and operations connected to their mode of operation, but they are also means to express other experiences of use.

Such a perspective, though, can be problematic if we think about the design of game interfaces. If we are to consider digital games as expressive media, we must observe that the forms of agency and operability of digital games, relying on the usability of "stable" interfaces (Fuchs, Mañas, & Russeger 2013, 32), tend to promote a rather linear and allegedly "universally applicable" method of usage. Instead of nurturing a more properly "ludic" agency between user and machine, this usual stability of digital games interfaces connects them to a quite traditional property of mass media, inscribing gameplaying as part of contemporary attention economics. This is particularly so if we consider the current permeation of society with methods, metaphors, and attributes of games (Fuchs 2018).

The possibilities of interfacing with sound are also to be considered. This could start by hearing the computer itself. As Stefan Höltgen points out, even computers of the pre-electronic era were already very noisy: their peripherals have always made sounds "with their motors (tape and floppy drives, printers, scanners), rotors (fans), movable heads (hard disk and floppy drives), or relays (in built-in cassette recorders and power supply choppers)" (Höltgen 2018, 216). This perspective draws our attention towards the infrastructure of communication technologies in which digital games are embedded. This is a very intriguing approach to be combined for example with Nikita Braguinski's (2018) observations on "retro game audio". According to Braguinski (2018), the somewhat fuzzy notion of "8-bit aesthetics", used largely in today's popular culture to label voluntarily produced "low resolution" sounds, beeping noises, simulated crashing sounds and alike, hardly correspond to the sonic experience of dedicated audio chip sounds of videogame consoles of previous generations. Furthermore, our reception of such sounds cannot possibly be alike because the very conditions of possibility of our perception have changed. Braguinski draws the conclusion that the imitations and evocations of 8-bit-era sound aesthetics (and we could extend it to other so called "retro" sounds, such as pre-electronic-era's) are technologies themselves, and as such they must at least partially originate from cultural desires. He raises the question in order to assess what those desires would be. We seem to be on a very similar path towards the mnemonic aspects of technoculture in digital games.

In contemporary technoculture, phenomena like these can be thought as more than a sophisticated effect of media technologies, reaching towards what Peter Krapp (2018) defines as aberrations of cultural memory. While arguing over cliché pop music programming in radio, Krapp states that the hits of a "more remote" past are more often remembered, while the trending music of very recent past is set to be forgotten. Such a phenomenon is very similar to the case of so called 8-bit-era videogame sounds. The fact that most of the players of contemporary games probably have not tried the first generations of videogames makes the phenomenon of retro aesthetics even more curious. Perhaps one of its key driving impulses is this fascination with the construction of a past that was necessarily not experienced.

We also reviewed other works that touch upon the technical-aesthetic dimension of games, speaking tangentially (Bogost 2007) or directly (Fischer 2013; Galloway 2006; Manovich 2001) of a technocultural context that endures in them. We approach them in terms of how they inscribe games in broader discussions on media and cultural habits. Regarding this aspect, the work of João Ricardo de Bittencourt (2018) interested us for what he addresses as the playful, mechanical and audiovisual layers of *gamic images*, proposing a way of understanding (and showing) the different visualities produced by videogames in a larger framework. In his research, Bittencourt describes the pixel, for example, not only as an isolated technical element, but as a central exponent of the marks of the technocultural processes of image production in contemporary times. The multiple presence of pixels in different contemporary images therefore testifies about the wide circulation and porousness of the technical images of gaming. Our perspective stems from very similar aspirations, yet, instead of looking at the pixels on the screen we ought to hear the noises of gameplaying.

Works as these might get us closer to how digital games are articulated with temporalities and, more specifically, with practices that may contest the recurrent "novelty-driven" rhetoric associated to game aesthetics and technologies – inscribing them, instead, as cultural techniques where the old and the new coalesce. This formulation is closely aligned to our research goals, as we will comment below.

Questions concerning the temporalities of media

We are aware that we have left important topics, such as the cultural anthropological theories of sound design and audio technologies (Schulze 2019; Bijsterveld and van Dijck 2009), out of this review. But from this discussion on the research of digital games as audiovisual media, we wish to move in another direction, because what we propose to contribute to the debate is, first of all, a way of highlighting what we listen to in games. In this way, we are assuming that there are still many opaque areas of the life of these objects, areas the research about which has been seldom visited, or touched only as a passing note. We believe that a quantifiable-driven research about the sonorities of *games* and an overly recurrent historical narrative of the constitution of these media (Guins 2017; Höltgen 2018; Huhtamo 2005) are related to this phenomenon, which imparts very regular demarcations[2] to the history of digital gaming, with only sporadic mention of the machines of images and sounds to which their languages relate. The lack of reflection on how these objects develop in *time*, combined with their recurrent

[2]From generation to generation of consoles, audio cards, linearly according to a quantifiable difference in terms of depth of bit rate or availability of sound channels.

arrangement in solidified chronologies, produces the occlusion of the intimate points of contact that videogames present with broader trajectories of the way we communicate through techniques, aesthetics, and audiovisual codes.

In experiencing the games by listening to them, the impression we have is that there are more traits associative to the aesthetics of other media than the theoretical review suggests. Attention to these traits can help us to understand a little more about the audiovisual memory that is updated through them, in the soundscape of the designed gameworlds, in the sound mixing of the characters' voices, in the relation of the sound effects with the images, and in the way the sonorities interface with the player/user.

Exploring some of the assumptions in current videogame sound design research and the rhetoric that accompanies technical-aesthetic developments in audiovisual media, we find that the problem of such narratives is tightly connected to a broader discussion that goes back to the study of aesthetic expressions regarding media and art history more broadly.

According to Philippe Dubois (2004, 33):

> 'For each historical moment in which they have emerged, these image technologies [photography, cinema, television, video, computer image] have always been new - which, we shall see, proves to be at least relative, restricted to the technical dimension and not necessarily reaching the aesthetic terrain. [...] In fact, it is clear that this idea of "newness" associated with the question of technologies works first and foremost as a language effect. [...] This occurred both in the emergence of photography in 1839 and in the arrival of the cinematograph at the end of the nineteenth century, in the expansion of television after World War II, or in the current globalization of the computer image'.

We recognize the similarity between the assumptions on the sonorities of contemporary games and those teleological discourses aimed at the image technologies that Dubois (2004) emphasizes when writing about video. According to Dubois (2004, 35), the confusions arising from such claims of innovative forces are extensively cultivated and dispersed discursive formations that tend to be consistently repeated throughout the history of technology. The innovation rhetoric frequently postulates prophetic visions of the future, subscribing to an advertising logic that voluntarily promises prompt, decisive ruptures with what has gone before:

> The amnesic discourse of novelty completely obscures everything that can be regressive in terms of representation (concealment of aesthetics to the benefit of what is purely technological), or stresses the eminently traditional character of some great issues, such as the real (and realism), that of analogy (mimicry) or material (materialism).

This rhetoric of novelty is often a thin-veiled expression of an ideology of blind progress that undermines more nuanced understandings of the potentialities and limitations of emerging technologies. Two main ideological frameworks are evident in the rhetoric about sonorities in videogames, and they are emblematic of the cases we seek to investigate: first, the notion of uniform progress, due to practices that refer to sound recording and reproduction techniques, which attributes the judgement of an advance toward the ideation of "sound fidelity" of the phonofixation techniques to the aesthetic scope of sonorities - a finalist fantasy that in sound

studies was known as the ideal-model of *perfect sound forever* (Devine 2013, 10) and that is at least as old as Edison's public demonstrations of the phonograph*;* and a second, which operates under the logic of the *tabula rasa*, and which we find repeatedly remarked in statements about the new technical possibilities of audio produced in the guise of computer mediated design. The ground-breaking features of dynamic audio and the possibilities coming from procedural regimes of "real time" computer synthesis would push the sonorities of games towards completely new, unprecedented directions.

However, we notice how certain previous aesthetic tendencies are updated in games when sound is performed synchronous to the action of the player, a main feature to the images and sounds association in videogames. Also, it does not seem reasonable to consider the quest for crystal-clear sound as the sole perspective for game audio design. The very texture of the sound and noises of older media becomes an aesthetic effect in many games, i.e. in the production of the voices of characters and the simulation of the use of audio artefacts in their sonic expression. Effects like these already testify in favour of a greater complexity in understanding the sonorities of games with regards to its temporalities, observing the contradictory relations between its technical conditions of development and its aesthetic expressions. Similarly, the possibilities of dynamic audio, and the ability to address responses between the actions performed by both the machine and the player, rely heavily on the recall of audiovisual synchrony effects.

Thus, videogames seem to revive, albeit perhaps unintentionally, aesthetic experiences based on the materialities of communication, mimesis, similarity-dissimilarity dialectics, among other remote topics on the history of representation. This observation has enabled us to position our research object transversally to the epistemological problems that comprise media studies and art history, finding some ways to make the study of game sounds less confined to the more autophagic tendencies on game studies, displacing (or repositioning) digital games to an observation environment in contact with temporalities research and memory studies.

In this way, therefore, we try to look for genealogical traces that inhabit in an irregular, divergent and unequal way the diverse formations and materialities of the means of representation. We recognize, therefore, the need for a theoretical-methodological movement towards the archaeo-genealogical aspects (Fischer, 2013, 11) of the sonorities of digital games. Also, Erick Felinto (2010) suggests that archaeological approaches combined with an attention to the materialities of media are capable of wavering the triumphalist rhetoric that often returns to the debates on media and technology, without however drifting into apocalyptic or nostalgic discourses. Such a look would open the horizon to the heterochrony, the leaps and discontinuities that accompany media culture and that allow us to probe other stories of these artefacts.

A similar perspective is proposed by Raiford Guins (2014, 2), who argues that it is up to the researcher to perform:

> 'actions that seek to untangle, and to then re-entangle, historical narratives that have all-too-easily calcified into a narrow perspective - game-centric, design-centric, invention-centric, innovation-centric, user-centric – […] that regards the task of the historian to be one of endless surveying to populate a pre-established record rather than the labour of careful research. [...] Part of the task is to intervene on how the history of games is currently being practised'.

Although archaeological approaches to videogames are not that rare, the sonic dimension of game machines and game world environments demands much more attention. That's not, however, a problem that is unique to the research in digital games, as Siegfried Zielinski (1999, 35) recalls while evoking the image of a 'wasteland' to refer to the state of the archaeological research of the technical-aesthetic impressions and expressions of sound in audiovisual media. Recently, several efforts have been made in this direction, but as we have previously emphasized, sonorities and game histories are rarely taken simultaneously.

These questions were taken into account when constructing our object of study based on the method of intuition, as developed by the philosopher Henri Bergson and later systematized by Gilles Deleuze (2004). According to this method, research problems should be dealt with more in function of time than space. In this way, and because we perceive contacts, contagion and tensions between the sound languages of other media that leave traces in the way games sound today, the research question that guided our first empirical observation was:

RQ1 What do the sounds of the games communicate about themselves as traces of other sonorities?

From the traces in digital games to the resonances of technoculture

Thus, we have shifted the emphasis of our work from games to the memory of media and technoculture. We now consider that the way a game seeks to model the human experience contains traces of other media formations, which also depend on the relation between images and sounds to shape the conditions of their experience, which allows users of these artefacts to relate to them (apparently) in a more familiar way.

This perspective led to the formulation of a second research question:

RQ2 Through which techniques and aesthetics does memory resonate, imprinting traces of other temporalities and layers of technoculture in the sonic constructs of digital games?

According to Terry Eagleton (2009, 32), the treatment of these traces in research practice acts upon the object:

> 'The traces inscribed on an object's body are the web that undoes its self-identity, the mesh of consumptional modes in which it has been variously caught. The erasure, preservation or revivals of traces, then, is a political practice that depends on the nature of the traces and contexts in question: the object may need to be treated as a palimpsest, its existent traces expunged by an overwriting, or it may secrete blurred traces that can be productively retrieved'.

As the objects are excavated, however, new sediments are shown. Therefore, there is an epistemic question that plagues those who wish to follow traces, according to some important considerations by Benjamin (2009, 841). In the *Arcades Project* (1927-1940), Benjamin suggests that the experiences of those who pursue traces (*Spuren*) have neither sequence nor system, and that such activity is configured as a rather primitive form of work. Faced with this, the knowledge produced is, in part, a product of chance, and carries within itself the mark of being essentially endless. In this regard, one must be reminded of Jeanne Marie Gagnebin's (2002, 128) argument that the action of trying to decipher the traces, by extension, is also

marked by traces of this unintentionality - which often leads the researcher to the repeated search both for the processes that left traces, and for the apparatus that promotes their erasure.

It should be said, under this line, that the sonic traces in videogames can be left over without the developers themselves being aware of the traces that associate them with those of other media. Such a sensation itself seems circumscribed to the constant, recurrent and vast dialectic that marks the process of habituation to the new media that we discussed earlier, on which Bolter and Grusin (2000, 5) remark:

> 'Our culture wants both to multiply its media and to erase all traces of mediation: ideally, it wants to erase its media in the very act of multiplying them. [...] The logic of immediacy dictates that the medium itself should disappear and leave us in the presence of the thing represented: sitting in the race car or standing on a mountaintop'.

As for remediation, Bolter and Grusin (2000) complexify what we have pointed out earlier in describing the dual logic that permeates media and its conformation in technoculture. We must search for and find proposed invisible, imperceptible and, in our more particular case, perhaps inaudible traces of mediations. Eventually, we can use a strategy similar to that adopted by the authors of *Remediation* (ibid.) to explore media traces that disappear while promoting the illusion of transparency, including in the probing of empirical objects games that work in the opposite direction: games that seek to expose the layers of mediation that arrange hypermediation. Sound design, when well-built in the sense of being transparent in the experience of digital games, hide the multiple mediations necessary for the realization of such an effect. This feature is at the heart of contemporary games' strategy to produce in the player the sensation of being inside the diegetic world, an effect that is reached largely due to sonic technical mediations.

Recovering in the discussion of games a place for the issue of memory also allows one to regain from Walter Benjamin's (2002, 854) critique on the linear conceptions of time:

> 'Events unfold before they [the dreaming collective] as always identical and always new. The sensation of the newer and more modern is in fact both a dream form of events and the "eternal return of events." The perception of space that corresponds to this perception of time is superposition'.

The question of the new and the old in dichotomous disposition; the ideation of a present and a past expressed in diachronic narratives; a history of beginnings etc., are some formulations related to a thought about history that would seek to reconstitute "things as they really happened." Benjamin referred to it as the "great narcotic of the nineteenth century" (2002, 863), criticizing conceptions that thus conceal the creative aspects of memory and becoming. Rouanet (1996, 56) points out that such utopias and dreams are overflowing with images that allow us to reflect on the extemporaneity that animates the objects and devices that we operate. Thus, by inserting our object into a deeper, memorial time, we are tracing anachronistic efforts and performances of the sonorities of digital games, seeking to arrange them as unstable apparitions in a montage of heterogeneous sounds. Under this movement, we seek to set the sonorities in oscillating associative relations in historical time, past and present.

Thus, the sonorities of contemporary digital games are resonant manifestations of virtualities that act in the present just as they acted in other ways, perhaps in the past, resonating with the

same virtualities that allow harmonizing or disharmonizing the contemporary *dispositif*[3] of any culture at other stages of technical development.

Mapping sonic constellations: A methodological proposition for analysing sound in games

All the issues dealt with thus far have led us to two decisive questions:

- Beyond the ideology of novelty that surpasses discourses about gaming, what do the sonorities of digital games say about media habits of today?
- What kinds of historical urgencies resonate within contemporary technoculture?

To address these questions properly, we elaborated a method, which we are using to conduct our current research (in progress at the point of this article's publication).We rely on a methodology based on cartography and constellations (Kilpp 2015; Canevacci 1997). Cartography, as a craft, refers to the drawing of maps. Led by the researchers' affections, this methodological action of research begins, in our case, with the conceptual mapping of sounds, drawing aspects of game audio from the phenomenological experience of gameplay. Associated to the cartographic work, we practice the writing of 'listening diaries,' in which some excerpts of the games' sonorities are highlighted to be reassessed later. This methodological gesture is required for assembling constellations from the affinities found among digital games' sonic expressions. The core setting of each constellation points toward its genealogical traces, where new and old tropes intermingle (Canevacci 1997), to challenge often too regular assumptions on gaming. Looking for alternative narratives (Trammell 2019), often concealed by the chronological historiography of this medium, the constellations aim to grasp differences in regard to the established knowledge about videogames, while the researcher modestly maps the variations in the uncanny valley of human culture (Thacker 2015), in the manner of an estranged cartographer.

The analysis of the sounds gathered in the constellations demand a set of technical procedures, to perform what we are calling an "estranged listening". This methodological gesture derives from a series of listening exercises[4], comprising sonological and audio-visual analysis - explored in more detail elsewhere by Luersen (2018). These procedures are to be taken as speculative actions, aiming to denaturalize the player/researcher's listening (Chion 2008), already accustomed to the perceptive habits of audio-visual media experience.

The main objective of this paper was to present key concepts and perspectives for the construction of a research object that takes digital games as a palimpsest of the historical conditions that shape contemporary technoculture. We argue that the enduring sonic traces in digital games produce qualities that are encoded in technoculture. Through their resonance, they render the current transformations in our media ecology audible. In the particular ways

[3] With the concept of dispositif, Foucault (2017, 364) seeks to define a heterogeneous set composed of discourses, laws, philosophical propositions, institutions, scientific statements [we would like to include here audiovisual techniques and aesthetics]; the constant play between the elements of this set, which makes them interchange their function and position with each other frequently; a formation that, at a certain historical moment, has as its main function to respond to an urgency of the disposif.

[4] To put it briefly here, these exercises mix procedures such as spectromorphological analysis of sound (Cook and Leech-Wilkinson 2009), audio-visual masking (Chion 2008) and acousmatic listening (Schaefer 1993).

that each medium builds its sounds, we can discern tendencies that last and that are spread to a wider universe of codes which we mobilize to communicate ourselves using audiovisual techniques. Through the methodological proposition we outline in this article, we suggest arranging the genealogical traces inscribed in contemporary game sound design into four constellations:

1) *anthropomorphosis,* in which the sonic forms that make it possible to produce voices within the game through avatars are highlighted. Vocal sounds perform the experience of an active presence in games, also differentiating personas, attributing certain affective aspects to the computational construction of the voice – building voices as user interfaces;

2) *rhetorical synchronizations*, which brings together sounds that punctuate actions, suggesting persuasive senses to the player's activities during the game. Mediating the agency between player and game, the sonic forms gathered in this constellation functionalize the user's relationship with the apparatus, turning audible an effect that is widely spread in contemporary technoculture;

3) *immersibilities* – this constellation gathers sounds to engage the player in navigable user-centred computer spaces, using sound envelopes to acclimatize him/her to the game environments, rhythms, and moods - showing the capacity that games have to build models of other worlds and other times based on certain sonic memories and the ways of entangling them;

4) *machinic ruins*, in which researchers gather sounds that resemble other media and even other games within digital games. Such sonic traces manifest the contemporary exponential profusion of ruins, and their relation to the current dispersion of audio-visual production tools. As these are all phenomena that show a set of cultural, ideological, and imaginary aspirations, digital games can make a set of technocultural tropes audible.

Through this conceptual article, primarily, we intended to contribute to the research of digital games by leaning towards the resonances of a technocultural dispositif that surpasses them. We shall deal with them somewhere else, as our purpose here was first and foremost to outline some of the crucial conceptual stances to guide such research.

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