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From Light to Sound: Mediumsprünge and Absence as Creative Matter

Keywords: Media Art; *Mediumsprünge*; Light-to-Sound Translation; Absence; Visual Impairment; Self-translation.

Abstract:

The paper analyses media devices and artworks based on light-to-sound translations through the articulation of Vilém Flusser's media theory – namely considering the zero-dimensionality of electronic and digital media and the concept of Mediumsprünge. By focusing on the role of absence as creative matter, the discussed examples were selected from references and methodological tools used in a cross-disciplinary practice-based PhD research on photosensitive materials and devices conducted between 2014 and 2018. The reflection turns explicit multiple dimensions of the notion of absence within creative processes in Media Art, analyzed as experiences of translation of materialities.

1. MEDIA ART AS TRANSLATION OF MATERIALITIES

Considering the materiality of contemporary media devices and artworks it is possible to observe their organic and man-made elements through a lowest common denominator: electric current. The manipulation of matter at the atomic level, where it is subject to quantum mechanics, is the scientific ground of Vilém Flusser's media theory that places media development in the history of culture as part of a history of abstraction (Flusser 2008: 16-19). According to Flusser, history can be divided into four gestures of abstraction. The first human gesture was to abstract time, transforming the world into circumstance: a three-dimensional experience. Later, circumstances were abstracted into scenes, images, two-dimensional representations. The third gesture consisted of abstracting images into texts, which gave birth to history and linearity, the one-dimensional experience. Last, the linearity of texts was abstracted into numbers and calculations: the zero-dimensionality of electronic and digital media and their software.

These thoughts form a crucial point of departure for my own understanding of electronic and digital media and its specificities, formed and constantly updated by the combination and recombination of complex technical ensembles, embedded with an immense variety of sensors and actuators. When organic matter is in play, as wetware, the input quality of sensors and output quality of actuators tend to merge, just like our skin: one touches and is touched, simultaneously.

The possibility of gathering all materialities under an abstract lowest common denominator of numbers and voltage changes, and, in a second step, transforming them into other possible materialities, makes the practice of media art an interplay between abstraction and concretization.

By viewing the creative processes of media artworks as processes of the translation of materialities, I call attention to the special possibility of programming and editing matter by transforming one type of physical or chemical stimulus into another. Through an expanded notion of language (Krippendorff 2011), this practice boosts the essential artistic impetus towards non-trivial articulations of objects and their relationships (Steyerl 2016), creating situations in which meaning emerges from the communicative experiences rendered by the specific combination of technical ensembles (Gumbrecht 2004; Simondon 1958).

2. *MEDIUMSPRÜNGE:* FROM LIGHT TO SOUND

To more concretely address how Flusser's ideas are manifested in media developments, I have cast some examples of media devices and artworks based on the translation from light to sound. These illustrate what Flusser called *Mediumsprünge:* acts of jumping from one medium to another, or from the logic of one system to another. Flusser elaborated and implemented this concept in different contexts: in his reflections on changes of media, comparisons between media, media as a form of translation, and media development (Guldin 2010: 166).

As the scholar Rainer Guldin suggests, it is also possible to bring Flusser's translation theory from the 1960's and his media theory from the 1980's into relation. Due to his immigrant background, Flusser's philosophical method was strongly based on translation and retranslation, and he even stated: "Perhaps, everything I am working towards is a theory of translation." (Flusser apud Guldin, undated).

Correspondences between different physicochemical phenomena and their specific logics are undoubtedly often implemented in current technological objects (implantable colour-to-sound chips, software, mobile apps, etc.) used for a variety of purposes. The history of media art contains countless accounts of light-to-sound conversions. A classic reference, for instance, is the *Very Nervous System* (1982-1991) by David Rokeby; another is Peter Keene's interpretation of Raoul Hausmann's

Optophone (1999, 2000, 2004) (Donguy, 2001), and more recent examples include Leslie Garcia's *Pulsu(m) Plantae* (2010-2013), Kathrin Stumreich's *Stofftonband* (2013), Yiannis Kranidiotis' *Pentatono* (2015) and his series of soundscapes based on classic paintings, and so forth.

Together with Flusser's idea of *Mediumsprünge*, these works raise a set of central questions concerning translations between materialities: Do they allow more freedom than those related to linguistic systems? What is at stake in the translation of materialities? Whether considering the media cases or the existential layer of the translation processes, what deserves special attention is the gap found between one system and another. The nothingness or absence that characterizes this transitional space can be investigated as a powerful substance for creative activities.

3. ABSENCE AS CREATIVE MATTER

3.1. Media development in relation to absence in sensorial experience

A popular example of absence as creative potential in audio-visual media history is connected to human endeavours towards verisimilitude culminating in the development of sound-film. Media historians who study sound in cinema betray a sort of ocular centricity in their narratives on the relation between image and sound in cinema history. Nevertheless, *"as long as cinema has existed, sound has been part of it – both in its presence and in its absence."* (Beck 2011:64). The first so-called silent films were accompanied from the beginning by music performed by musicians, who also used to create live sound effects, a possibility that was later enhanced by the inclusion of pre-recorded sound effects. However, the insertion of sound in the material film itself revolutionized the cinematographic industry and language, both in terms of economic profit and satisfying the human yearning for immanence. The absence of sound in cinema annoyed those who sought to use cinematographic language as a means to achieve complete audience immersion, providing the most 'real' experience, in short, an experience that more closely mimics how the human sensorial apparatus enables one to perceive and shape the surrounding physical world. If immersion is considered as the full involvement of the spectator's senses, the film experience remained an incomplete media, even if a live musician or orchestra accompanied the film exhibition. With the liveliness of theatre as a reference, the absence of human voice[1] and other diegetic elements is what impeded higher verisimilitude. Scientists and technicians across the globe have worked on finding solutions to this "problem". In this media technological race, one of the protagonists was photosensitive matter, namely the chemical element selenium, discovered in 1817 by the scientist Jöns Jakob Berzelius (1779-1848).

Furthermore, the use of mechanisms able to translate light into sound in order to deal with visual impairment also harks back to the first experiments on the applicability of the photosensitive qualities of selenium. As an enthusiast of selenium's wonders and fascinated by the possibilities for converting light into sound (and vice-versa), the engineer Edmund Edward Fournier D'Albe (1868-1933) developed a version of an *Optophone* in 1912 as a means to aid visually impaired people with orientation in their environment and reading. (D'Albe 1924: 32) The device thus belongs today to the heritage of blindness and the variety of technological attempts to facilitate the life of people whose bodies were not aligned with the standard media of the epoch, which constantly and emphatically stressed the supremacy of vision.[2]

Indeed, the development of media devices is vigorously based on adaptations to the limits of the human sensorial apparatus and the corresponding endeavours to extend, assist, enhance, and/or adjust or modify them. While mostly oriented by a normative perspective, discourses and devices do occasionally emerge that use

1. Therefore, sound-film is also called "speaking-films".

2. In Techniques of the observer (1990) the Art Historian and critic Jonathan Crary developed a deep and interesting analysis of how optical media have contributed to the abstraction of vision and the formation of visual-based consumers since the 19th century.

deviation as a means toward innovation. An instance of this is the *Optophone*, which remains an inspiring source for creative media technicians.

Media archaeologists have analysed the functional principles of former *Optophone* models, as depicted in Figure 1. D'Albe's reading machine resembles a primitive scanning technology, in which an object as a framed field is swept by light against a photosensitive surface (originally a selenium cell and nowadays an image sensor).

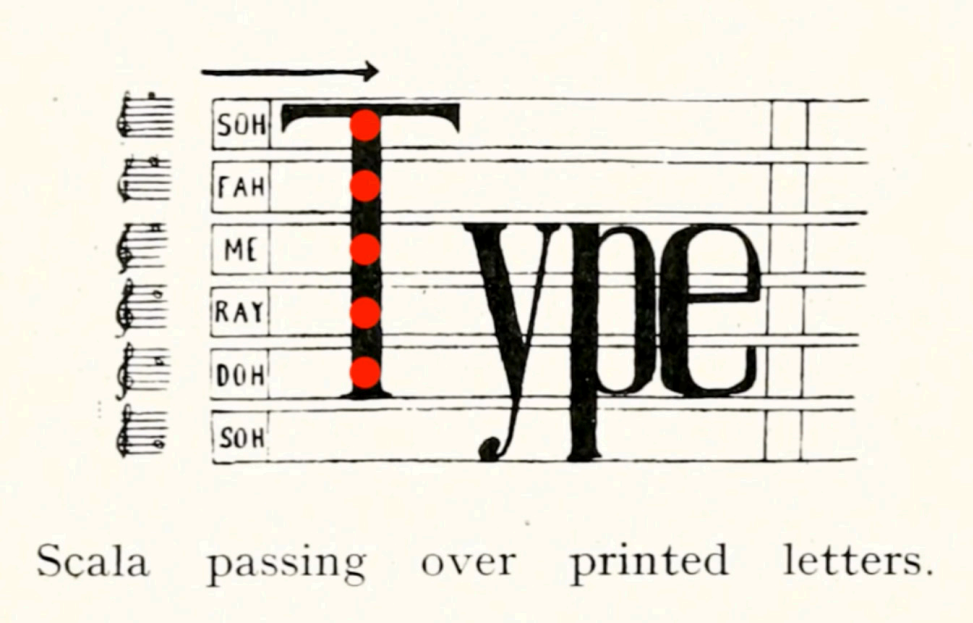

Fig. 1. Schema of the sound output of an *Optophone*. Source: Tiffany Chan/Maker Lab. July, 4th 2016.

Considering a Cartesian plane, axis x represents the path of the light source while axis y represents the acoustic notes. For each point detected in the scanned column, the corresponding notes that formed that letter were played. Although Fournier D'Albe claimed that through his invention the "reading problem of the blind was completely solved by means of selenium" (D'Albe, 1924: 94), the resulting combination of musical notes as feedback can still make it hard to properly distinguish each character, which probably contributed to the unsuccessful commercial lifespan of the device.

Contemporary attempts to use light-to-sound translations to develop assistive technological devices search for useful correspondences between visual and auditory stimulus that are more intuitive for users. Finding and establishing these correspondences is called by scholars image-visual to audio-auditory mapping, which necessarily presupposes an image encoder and software implementing methods to detect objects from the background of the visual scene. In a case of mapping reported by Matta et al. (2005), for instance, the images are transformed into a multiplexed auditory representation in which every frame is sampled, digitized and stored as a pixel matrix. Rows and columns of each matrix are individually averaged and the mapping translates the vertical position into frequency and horizontal position into time delay, while brightness is translated into amplitude. The mapping method suggested by Matta et al., however, since it also uses the image depth, becomes slightly more complex: Motion is translated into frequency shift (simulating the doppler effect); brightness into pitch; space into amplitude, reverberation, azimuth and elevation; and edge into duration. Although scientific efforts have aimed to find solutions that users could effortlessly adopt, scientists have been forthright in acknowledging the arbitrariness behind their inventions and have made it clear that the systems they develop require extensive training by the users, who have their own perceiving and learning idiosyncrasies.

Regarding light-to-sound translations in the Arts, Berlin Dadaist Raoul Hausmann also envisioned developing and patenting an *Optophone* (Donguy 2001: 217) at the

beginning of the 1920s. Though less known for his difficulties obtaining scientific legitimacy for his ideas than for his photomontages and poster poems (Donguy 2001: 217), the artist left a curious multifaceted scientific-artistic legacy, including what he called an *optophonetische Weltanschauung* (optophonetic worldview). Hausmann's theory aimed to harmonise cosmologic processes, modern media technologies and human life (Niebsch 2013: 19), and his propositions were clearly attempts to push the limits of the scientific and technological discourses to a symbolic and aesthetic level beyond the former utilitarian uses imagined for the *Optophone*, for instance. Convinced that the visual arts were saturated, Hausmann adopted destruction and recreation as his artistic method, artificially creating the absence of meaning and form that opened a terrain for him to let novelty emerge.

On the one hand, as an artist, he could play freely with the materials and techniques of his time. On the other hand, the scientific objectivism of the epoch remained sceptical of his endeavours – causing his patent applications to be rejected.

A casual look at the way artists and scientists create their light-to-sound translations induces one to perceive them as natural transpositions, as if the correspondences have always been there, and to ignore the human activity required to bridge the gap between one system and another. The arbitrariness of the established correspondences is necessarily bound to the subjectivities of those who have created them. As Wittgenstein noticed about Goethe's colour theory, such colour-to-sound associations are due more to the psychological than the physiological theories. D'Albe addressed a similar issue by calling light-to-sound conversions symbolic rather than actual, while revealing the problem of the great physical disproportion between the range of frequencies of light and sound waves:

> "Light-waves are from forty thousand to seventy thousand to the inch, according to their colour. In duration they are even further apart. If we could slow down an average light-wave until it took one second to pass us, and could slow down an average sound-wave in the same ratio, it would take no less than two hundred million years to pass by!" (D'Albe 1924: 90)

Within D'Albe's trial of an objective consideration of the problem one must also notice that his idea of an 'average wave' can only be stated in relation to a specific frequency range, namely, the spectrum that humans can perceive. Such pseudo-objective positions reflect the constant attempt to define a 'standard human being' and the notion of normality, which frequently is not compatible with the specificity of each being.

3.2. Self-translations

3.2.1. Self-portrait of an absence

Similarly to Vilém Flusser, whose writings ground my understanding of electronic and digital media, I have a blind eye.[3] Being monocular implies a reduced field of vision (circa 25%) and the inability to see media-based stereoscopic images. To the contrary of what people usually think,[4] monocular people do see depth, because there are many other elements in the one-eye image (texture, perspective, etc.) informing the body of the three-dimensionality of the world, together with retrieved information from the other senses – especially from tactile and auditory senses – that is all interrelated in the brain.

The coincidence that the "philosopher of the black-box" also had this partial absence of vision motivated me to create a concrete dialogue with his work, particularly through the notions of self-translation and *Mediumsprünge.* As an exercise in playing between the abstract and concrete worlds of codes and materialities, the performance *Self-portrait of an absence* (2016) started as a poetic experiment on the

3. According to Guldin, with the outbreak of World War 2, Flusser was dismissed by the Czech army because he had a blind eye. (Guldin 2010: 164)

4. I am oft asked if I can visually perceive depth and how it works. Other frequent questions relate to how blindness looks: Is it totally black? Totally white? And people generally become intrigued when I say there is nothing. It is absent.

search for the possible paths between sensing and making sense, by means of the confrontation between organic and machinic[5] light-sensitive elements, an eye and a camera.[6]

Technically, the artwork consists of an eye-tracking system programmed to generate and process sounds according to data generated from my asynchronous eye-movements. The eye tracking system was built in Python language using the library Open CV (Open Source Computer Vision) and a specific technique called Optical Flow, which is based on the recognition of the apparent motion of objects, surfaces, and edges in a given image, calculated by the relative changes within frames over time. Besides the eye tracking system, the software written in Python also sends the captured and processed data using OSC protocol to SuperCollider, another programming language for real-time audio synthesis and algorithmic composition.

Fig. 2. Performing *Self-portrait of an absence at Park am Gleisdreieck, Berlin*. June 27th 2017. Source: Video asset (https://vimeo.com/250959008).

How did this shape evolve? If the camera does not replace the blind eye in its functionality and sounds do not mirror what the camera 'sees', on what are the light-to-sound correspondences based? Here lie both the artistic freedom and the difficulty of achieving form in process-based media artworks. Simply copying and pasting pieces of code and schemas of the working system cannot explain how this initial absence is filled. One can access the documentation of the project at Github,[7] and I suppose the reader might be more interested in the imaginative path leading to the codes and the choices of materials and objects. The light-to-sound correspondences created on the software level were intimately related to other decisions made concerning interface and interaction design. As it was a complex non-linear creative process, I propose the following questions/answers format to cover the key elements:

What are the physical hints enabling the audience to notice the blindness?

Although indirect, the asynchronous movements of the eyes were the only effect of my partial blindness. The behaviour of the blind eye has always been an incognita for me, and thus this became the point of departure for the light-to-sound translation.

On the one hand, I was moved by the curiosity to know more about the behaviour of the blind eye and looked for a way to make it tangible to my own senses. On the other hand, I have taken advantage of my partial blindness to create a situation for triggering aesthetic experiences and dialogues with the audience.

Since I cannot hack the audience's sensorial and cognitive apparatus, how can I share this absence?

Besides the aesthetic influence by Janet Cardiff and George Bures Müller's audio- and video-walks, the performance was inspired by the delicacy of the animation *An eye for Annai* (2006), by Jonathan Klassen and Daniel Rodrigues, an animation in which Annai is monocular and is on a search for an element to complement the asymmetry of its single eye. I have interpreted the character's actions as a search

5. I adopt the term 'machinic' as synonymous to 'machine-based', as suggested by the media art historian and theoretician Andreas Broeckmann.

6. Eye and camera are black-boxes in the literal sense, but they also became epistemological objects for me in a second-order cybernetic perspective, both in performance and in my PhD thesis.

7. Codes and audio files used in the project are available at: https://github.com/grazilaut/self_portrait_of_an_absence Accessed April 24th, 2018.

for dialogue and for the possibility of making sense out of interaction, as is also suggested by the role of dialogue in Flusser's philosophy and conversation in Cybernetics (Pask 1976). Furthermore, the concern for sharing and going public reflected the cybernetic understanding expressed in the movement from Maturana's "*Anything said is said by an observer*" to von Foerster's "*Anything said is said to an observer.*" (von Foerster 2004: 12).

Since the performance depends very much on the auditory sense of the audience, moreover, going to a public space required an acoustically protected environment. Both issues were considered when choosing an umbrella to mediate the performance. Besides being an object that facilitates closeness and shared intimacy, it works as an acoustic shell and, since it is designed for two people, my limited visual field beside my body is suggested as empty space to be occupied by the participant.

How to suggest participation?

Wearing a special costume and accessories embedded with the necessary electronic devices, I went to a public space. This immediately frames my presence as an invitation to a performative encounter. By visually evoking strangeness through my unusual appearance, I observe the passers-by and through a corporeal gesture I open the system to enclose the visitor that demonstrates curiosity. If they accept, I start the sequence of sound modes that are the basis for a promenade with observing-listening exercises.

I also considered a way to discuss the notion of absence by means of relativizing what the notion of normality might be, by means of lending my eye tracking system to the participant. However, since the technical set up is not so simple and autonomous, this wish was set aside. This issue is nevertheless addressed, however, through the rhetorical question in the introductory narration: "Do you also have a blind spot in your body?".

Why light-to-sound translations?

Light as input was adopted because it is the physical element to which eye and cameras respond, organic and machinic case studies being analysed in my PhD research on photosensitive materials and devices within media history, media art, aesthetics and history. Any output could have been chosen, but opting for sound was based on my background in audio-visual media communication and technical feasibility in terms of available knowledge and resources.

How do the asynchronous movements of the eyes sound?

The sound aesthetics was created through the development of a soundscape enacting a hypothetical intervention in an urban space; the surrounding sounds were used as material for inspiration, as well as to predict potential technical problems that could arise while conducting the performance.[8] Out of this process emerged the five sound modes. Except for the introduction and farewell voices of the first and last sound modes, the other three modes were created using data generated from the synchrony and asynchrony between my left and right eye. The more desynchronized (D) their behaviors, the stronger the effects applied to the sounds being played. The five modes are: (1) pre-recorded voice greeting the participant and introducing the project's idea; (2) percussive sound whose rhythm loses its periodicity according to D; (3) bit-crushing[9] and downsampling[10] effects applied over pre-recorded audio samples,[11] more or less intense according to D; (4) tones synthesis, including vibrato[12] and panning[13] effects, according to D; and (5) pre-recorded voice thanking the participant and concluding the intervention.

3.2.2. He listens to colours

While developing *Self-portrait of an absence* and researching light-sound translations I discovered the case of the eyeborg Neil Harbisson, whose artistic statement is very close to that of Hausmann's *optophonetische Anschauung* and the old ambition of

8. For that, an audio recording of a walk through the Park am *Gleisdreieck* in Berlin was used as an initial reference. This strategy emerged from exchanges with the 3DMIN researchers.

9. Bitcrushing is a digital audio effect, which causes a distortion produced by the reduction of the resolution of digital audio. It is often combined with a reduction of the sample rate.

10. Downsampling refers to the reduction of the sampling points of a time series or other arrangements of discrete values. Except for special cases, the downsampling is thereby connected to loss of information.

11. The audio samples to be used can be captured from the surrounding environment where the performance is going to happen. In the case of the walk in Gleisdreieckpark, this effect was built over the birds' whistling.

12. Vibrato is a musical effect consisting of a regular, pulsating change of pitch. It is characterized by two factors: the amount of pitch variation and the speed with which the pitch is varied.

13. In audio technology, panning refers to the acoustic placement of a sound in a stereo image.

enhancing human perception through the development of new media. Inspired by his congenital disease achromatopsia, and in collaboration with the technicians Adam Montadon, Peter Kese and Matias Lazano, Harbisson has worked on the embodiment of a device that creates sounds according to the colours captured by a photosensitive sensor placed in front of his head. Harbisson reports that since the last update of the device, his perception of sound occurs through a direct connection with his skull, which has given him the new sense of 'hearing colours', a synthetic synesthetic experience that can be also understood as a process of translating materialities.

The existence of colours for human vision is the result of light-matter interaction, conditioned by the triadic material composition of the cones,[14] which are photoreceptors that form the retina together with the rods. (Guyton and Hall, 1996: 577-589) This basic physiological principle of human vision harks back to Isaac Newton's experiments in 1666, showing that white sunlight is not a single entity but a spectrum of infinite colours. Hausmann's concerns expressed in his texts about the *Optophonetische Weltansachuung* also address the different theories of colours[15] and reveal an attempt to merge the objective and the subjective aspects present in the dominant discourses of his period. "The eye connects space and brain through a subjective-optical creation to the temporal world-view, to an intuition of light, called optics. We do not see any light, we see colours."[16] (Hausmann, 2013: 76).

Today, considered as an electromagnetic radiation with wave-particle properties, the light-colour relationship is the basis of the measuring parameters commonly used both in scientific and aesthetic investigations. When isolated, the energy of a monochromatic beam of radiation is related to its wavelength and frequency. The subjective perception of colour, however, is not evidence of its supposed immaterial condition (Pedrosa: 1977), as some theoreticians defend. Looking more closely at light sensitiveness and the molecular structure of pigments, one finds a material condition enabling colours to be seen or not. (Guyton and Hall 1997: 577-589) The absence of specific material conditions within Harbisson's retina is the reason for his achromatopsia.

According to the artist, he was used to ignoring or avoiding colours in his everyday life until the moment he discovered studies relating colour frequencies to sound frequencies and felt motivated to investigate how he could perceive them. Ever since, his previous attitude of neglecting the absence has been transformed into a series of creative projects.

Although Harbisson does not provide information on how he developed his own relations between colours and musical tones, he has published what he named 'sonochromatic scale':

PURE SONOCHROMATIC SCALE		
(invisible)	Ultraviolet	Over 717.591 Hz
	Violet	607.542 Hz
	Blue	573.891 Hz
	Cyan	551.154 Hz
	Green	478.394 Hz
	Yellow	462.023 Hz
	Orange	440.195 Hz
	Red	363.797 Hz
(invisible)	Infrared	Below 363.797 Hz

SONOCHROMATIC MUSIC SCALE (basic 12/360)		
	Rose	E
	Magenta	D#
	Violet	D
	Blue	C#
	Azure	C
	Cyan	B
	Spring	A#
	Green	A
	Chartreuse	G#
	Yellow	G
	Orange	F#
	Red	F

Fig. 3. Neil Harbisson's sonochromatic scale: correspondences between colours and notes. Source: Wikimedia Commons, 2018.

14. Cones are classified into three kinds of cells, each type responding to visible light of different wavelengths on the electromagnetic spectrum. Long cones respond to light of long wavelengths, peaking at the colour red; medium cones peak at the colour green; and short cones are most sensitive to wavelengths of the colour blue.

15. The predominant influences were Newton's, Helmholz's and Goethe's theories of colours.

16. From the original in German: "*Raum und Gehirn verbindet das Auge durch eine subjektiv-optische Schöpfung zum Zeitlichen Weltbild, zu einer Anschauung vom Licht, Optik gennant. Wir sehen kein Licht, wir sehen Farben.*" (Translated by the author)

17. An audiovisual reference on Harbisson's sonochromatic scale is available at the Youtube channel of the artist at https://www.youtube.com/watch?v=UawXwCpwDjo Accessed Jan 6th 2018.

18. Images and brief description available at http://www.documenta14.de/en/artists/22761/ivan-wyschnegradsky Accessed Jan, 5th 2018.

19. *Musicolour* was in fact based on the translation from sound into light projection and movement (Rosen 2008: 131).

General methods for the sonochromatic music scale consist of microtonal and logarithmic scales with 360 notes in an octave, with each note corresponding to a specific degree of a colour wheel ranging from the pure colour to white, the maximum brightness. In contrast, Harbisson's sonochromatic scale is a non-logarithmic scale that includes infrared and ultraviolet, discards colour as being part of a colour wheel and ignores conventions on musical perception in order to overstep the limits of human perception.[17]

The search for correspondences between colour and sound seems to be an inspiring field of exploration for artists, as further historical examples demonstrate, such as the *Projet de clavier ultrachromatique* (1943) by the composer Ivan Wyschnegradsky[18] and the cybernetic *Musicolour* machine (1953-1957), by Gordon Pask (1928-1996) and Robin McKinnon-Wood (1931-1995).[19]

Since the translation from light to sound has been technically and aesthetically explored and discussed in a variety of forms, wherein lies the novelty and power of Harbisson's work? On one hand, it relies on the technical audacity to embody a hybrid version of what the classic references have proposed. The automatic response of the system embedded in Harbisson's body, translating luminous stimulus into vibrations, has led to a self-organizing arrangement. Self-organizing principles were already very present in almost all Pask's artworks, but in Harbisson's case biological and machinic systems were merged in the artist's own flesh. He states that he is technology, since a cultural object and its abstractions (encapsulated knowledge through codes) are attached to his body, forcing a new stage of organization upon itself.

On the other hand, what has substantially empowered his body experiment and its derivative artistic propositions is his wager on the creative use of absence. He approached his colour-blindness in an innovative manner, giving place for the aesthetics of disability to flourish.

Furthermore, by corporeally experimenting with processes of translating materialities one comes into explicit contact with the necessary betrayal and loss of information; however, it has still been a valuable exercise leading to a heightened awareness of gaps as creative sources, as open spaces for the emergence of novelty.

Facing the absence of the abyss between one system (light stimulus) and another (sound output), Harbisson's case and *Self-portrait of an absence* exhibit the freedom to create new correlations from inexistent ground. The interstitial zone of the absence is, in this sense, a fertile field of indeterminacy, in which artists can attribute and manage meaning from nothing. Experiments like these challenge the historical dichotomy between form and function attributed to the eye and camera, a revolution facilitated by the development of electronic and digital media and its zero-dimensionality.

Lastly, using one's own body and disability to query the notion of normality through art is a second-order cybernetic approach that allows the coincidence of both types of absences: one physiological and the other existential. In analogous way to how Flusser used translation and retranslation processes as philosophical tools (Guldin 2013) to react against the absence of meaning in life, media artists can wear similar lenses to exercise and create more meaningful artworks. Artworks and life are matters to which meaning can be attached.

4. SENSING AND MAKING SENSE IN ABSENCE

The translation of materialities relies on many in-between layers of abstraction (models and systems) between input and output. Manipulating matter through the zero-dimensionality of electronic and digital media potentially increases the number of abstract layers, which also leads to an increase in the level of complexity and noise.

In the case of *Self-portrait of an absence*, light variation entering the camera is captured and turned into data on the eyes' movements. The difference between the

movements of the eyes becomes relevant information that will later be converted into sound. I used the zero-dimensionality of digital media and the approach of translating materialities to challenge relationships between form and function in reference to the eye and camera. Alterations in the material's resistance resulting from the interaction of light and matter[20] in the camera's image sensor constitute the zero-dimensional matter (or data, as some might prefer to term it) that enables light input to be directed and transformed into another physicochemical stimulus. In the specific context of the performance, when the light beam entering the eye and the camera is translated into sound in the vibrating membranes of the loudspeakers, a new meaning is attributed to the technical ensemble being used.

In Harbisson's case, light variation is decomposed into luminance and chrominance to form a colour system, and only then does it emerge as relevant information (defined by the artist) to be further codified as sound. These processes are here described in a very summary way, but every step taken in programming matters, and meanings, from input to output and their circularity, can be decomposed into several layers of abstraction – variables, functions, protocols, etc. This marks one of the main problems of translatability when the notion of translation is implemented in relation to physicochemical phenomena.

In this sense, Flusser's *Mediumsprünge* concept suggests an understanding between material-oriented approaches, expressed for instance in Kittler's idea that 'there is no software' (1995), and concept-based approaches, such as those able to consider software and coding as "the technique of providing a dynamic background to control the automatic evolution of meaning." (Goldsteine and von Neumann 1947 apud Chun 2011: 25). Through the concept of *Mediumsprünge* Flusser combines discourses from linguistic theory, information theory and arithmetic thinking (Guldin 2010: 168) and affirms that distortions are unavoidable in the process of jumping from one system of logic to another. Nevertheless, he postulates that distortion, or deviation, can be compensated by the benefits of new information, novelty and innovation – this is precisely what one can learn from the translation processes themselves.

By self-translating in the artistic context of programming matter and meaning, the inherent immaterial and material contiguity of cultural and artistic artefacts evolve into a human existential issue. With the possibility of self-translating, media artists manage to overlap and unite object and subject, elucidating the continuity of communication between organisms and machines. In this process, despite the objective choices needed to make it happen, artists need to radically adopt and ambrace the creative and subjective aspects of translation processes.

While transcending the stigma of absence as limitation and using it creatively, Neil Harbisson and *Self-portrait of an absence* are transgressive acts of self-translation that place the initial repression of standardization as a secondary and diminished problem. They spontaneously join the aesthetics of disability, comprising the refusal of "harmony, integrity, and beauty – as the sole determination of the aesthetic" (Siebers 2006: 64).

In conclusion, far from recommending the management of the audience's sensorial and cognitive apparatus through aesthetic experiences, translating materialities is a conceptual strategy to nurture more awareness about the void between the two sides of the systems undergoing translation. This perspective calls for the invention of interesting new bridges; bridges substantially grounded on the specificities of the contexts being correlated – the systems in translation and the absences themselves.

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20. In a beautiful essay by Peter Sloterdijk on light and resistance one can find similitudes between his and Flusser's perspective on the interplay between material and immaterial layers of cultural objects, with each using the same metaphor of a blade: "*Der Mensch ist ein Tier, das schneiden kann*". (The human being is an animal that can cut") (Sloterdijk 2015: 40, Translated by the author).

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