Video Mapping in Audiovisual Performances: Projecting the Club Scene Onto the Urban Space

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Abstract

This article focuses on the use and evolution of video mapping in audio-visual performances over the last decade. This multimedia technology, used for projecting light or video onto volumes, was quickly adopted by the A/V scene, and was the subject of numerous outdoor shows. Our paper details the multiple functions of this projective technique as a singular type of multimedia production based on mixing live sound and visual materials for an audience, through a process of technological mediation. The search for new visual experiences, through gigantism, relief and depth effects, will take this practice beyond the boundaries of clubs, thus reaching a broader audience.

We will demonstrate through video mapping, how audio-visual performers extend the synesthetic experiments which are at the core of this practice, both spatially and technologically. We then illustrate, by way of example, how these visual artists reshape urban space, most notably by considering buildings' facades as the original sensory interface between the tactile activity operated by the performer in his work of visualization and sound, with the public who interacts with the audio-visual objects created.

Keywords: Audio-visual performance; Video mapping; Architecture; Projection; Intermediality.

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The development and democratization of digital technologies over the past twenty years has had a profound impact not only on the way images are produced, but also on the techniques which enable their projection, be it on a screen or any other surface. If traditional enclosed spaces such as cinemas have evolved towards digital and 3D projection, public space has also undergone a transformation in its visual landscape, as shown by the rising number of screens that broadcast advertisements or public messages. In addition, the urban space is increasingly being utilized for new kinds of content, combining animation, light design, performance, digital graphics, music and sound installations, as well as buildings being used as projection surfaces. The latter has primarily been achieved through video mapping, described by Yun, Kim and Ishii as "an imaging technique synchronizing objects (real) with images (virtual), which is not simply projecting images or computer graphics on the screen or a plane, but projecting them on a building, 3D structure or artifact with a projector" (2013: 78).

Urban shows based entirely or in part on this type of projective technique are increasing, whether for the enhancement of architectural heritage (animation of cathedral or castle facades), events and advertising, or to animate sound and light shows. As technology has advanced, video mapping has become more widespread, to the point of regularly being programmed in festivals dedicated to the digital arts (Elektra in Montreal, Nemo Festival in France) and the visual arts (such as the Festival des Lumières in Lyon). There are even events now dedicated solely to video mapping, such as the recent Video Mapping Festival in Lille. Although the development of devices for projecting light onto (primarily outdoor) large surfaces is not new in itself (evolving as it did throughout the 20th century), the development of digital technologies has given an increased impetus to this type of projection since the mid-2000s.

It is difficult to precisely date the birth of the term "video mapping". The abovementioned articles by Yun, Kim and Ishii, as well as work done by Rossella Catanese (2013) go into detail on the form itself, but do not specify its origin. Nor do these articles detail its differences with Augmented Reality, defined by Ronald Azuma in the late 1990s as a variation of Virtual Environments, "allow[ing] the user to see the real world, with virtual objects superimposed upon or composited with the real world. Therefore, AR supplements reality, rather than completely replacing it" (Azuma 1997: 2). In an article written four years later and dedicated to the latest advances in Augmented Reality, Azuma still does not use the term video mapping, noting that AR "combines real and virtual objects in a real environment; runs interactively, and in real time; and registers (aligns) real and virtual objects with each other" (Azuma et al. 2001: 34).

Insofar as this technique meets the criteria set out by Azuma, we can consider video mapping as one of the contemporary developments of AR. The form was made possible by the appearance in the early 2010s of new software which allowed this type of digital projection, with its focus being on superimposing controlled lights or digital graphics on a physical space. This had the primary aim of subverting the representation of space through visual imagery rather than to increase reality. In this sense, it might seem more appropriate to use the term "Augmented Space" rather than "Augmented Reality", as Lev Manovich already suggests in his book *The Language of New Media* (written several years before the rise of video mapping), since this technology creates a "relational space" in which the audience can establish a new type of dialogue with the space that is mediated by the performers (Manovich 2001).

Originally conceived for scenery in the performing arts, Millumin is one of the most well-known software applications used to generate and control video mapping. It was quickly adopted on its release at the end of the previous decade by visual artists and designers investing in the field of contemporary video creation, starting with audiovisual performers, long called VJs (for "Video Jockey", an acronym formed from its music equivalent: "Disc Jockey").[1]

Formed in the late 1970s and early 1980s in clubs in the major Western cities (New York, San Francisco, Amsterdam, London), this specific type of multimedia performance consists of generating or manipulating visual imagery in real time, through technological mediation and in synchronization with music. While a large part of research within this field is primarily directed towards new ways of merging visual and sound matters, or forging new experiences of sound visualization, the spatial paradigm on which this type of performance is based has always been an issue for its practitioners. The first VJs have consistently expressed the desire to reconfig-

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1.   By extension, their activity is called *VJing*.

ure the club into a multi-projective space in order to provide it with multiple sensory opportunities, and this pursuit has been taken on by their successors. The success of Millumin has paved the way for video mapping softwares specifically designed for audiovisual performance, starting with MadMapper, created by the Swiss developers GarageCube (creators of the popular VJing software Modul8), which allows users to calculate and project videos onto surfaces via different effects, or to remotely control LED lights.

The success of video mapping has grown rapidly in the A/V scene. VJs or groups that appeared during the 1990s such as D-Fuse, Vello Virkhaus (ex Optic Vid Tek) or Pfadfinderei quickly adopted it, whilst other videographers used it even without an existing background in clubs beforehand. There has also been a rise in Video mapping tournaments, such as the Live Performer Meeting in Rome or Vision'R in Paris. In perhaps the biggest indictment of video mapping's primacy in the industry, one of the biggest European festivals dedicated to the A/V scene — held at the Zoo in Geneva — is called the Mapping Festival, as if this technique now embodied the entirety of audiovisual performance (this intention is corroborated by its promoter).[2]

Similarly, most audiovisual performers present their video mapping works on their website, in an entirely separate section from their performances using more traditional projective devices (flat projection on one or more screens, in clubs or outdoors). This compounds the idea that adding an architectural dimension in the configuration of audiovisual performance radically alters its essence and makes it, after thirty years of experimentation, its own distinct medium.

The object of this article is to utilise existing research on the A/V scene and apply it specifically to video mapping, as such putting it into perspective as its own aesthetic art form.

Contrary to what part of the A/V scene and the few articles mentioned previously suggest, video mapping has not truly been considered its own autonomous discipline, but primarily only studied for its technological implications as opposed to its artistic potential. Both indoor and outdoor video mapping will be considered, with one of the primary aims of the article being to examine the consequences the shift from the club space to the urban space (made possible by video mapping) has on specific shows and, more broadly, the entirety of the A/V scene.

1   Opening the club doors: video mapping as a vehicle for the A/V scene's emancipation

The emergence of contemporary audiovisual performances has taken place against the backdrop of a constant race between the visual and the aural, with the visual always struggling to keep up. The visualization of sound in concerts of classical electronic music, electroacoustic music or contemporary experimental music, has always been considered as an optional element (or even useless, according to the specialist Michel Chion).[3] However this way of thinking is not sustainable, and it stands to reason that, in an audiovisual performance, one of the defining principles should be that visuals and sound operate on an equal footing, so that both can work to complement each other. However, the technological gap between video and audio was a problem in the early days of this practice, perhaps best summarized in a well-known industry maxim- "audio precedes video". Since image production requires more resources than sound production (especially in terms of digital memory), musical innovations tended to be several years ahead of their visual counterparts.

This becomes apparent in an examination of the technological evolution of audiovisual performance. When the practice was born in the early 1980s, the VJ could only perform through the use of VCRs connected to a makeshift editing table. They could only juggle between their different visual sources, unable to loop their samples and modify them live. In comparison, DJs could already utilise many audio techniques developed

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2.   Amira El May, artistic director of the festival, says in 2011: "VJing was before just clubbing, it was decoration, it was a practice. Today, thanks in particular to Video Mapping, it has really become an artistic movement that has spread to dance and living theatre. These are performances on their own right, it is no longer the VJ who follows the DJ." Quoted from Broquet (2011: 8) (our translation).

3.   "As long as it is grandiose and turns into a light show, [the visual adjuvant] gets to become a show in which music is only the support. A public show focusing on sound is more fragile than a visual show, more easily supposed to be disturbed. Surely, but wouldn't the solution simply be to offer sound as a show all by itself?" (Chion 2009: 79) (our translation).

throughout the 1970s (scratches, breaks, cueing) whilst also benefiting from an overall greater degree of control over the music they were using. VJing only truly became widespread with the emergence of laptops powerful enough to launch and modify visual loops through several effects (chroma key, blur, blend, video compositing, etc.). After a decade of experiments, two key developments in VJing occurred. The first was the release of the Fairlight CVI in 1984, which made it easier to generate video effects experienced through early video synthesizers, and mix visual sources through an analog/digital architecture. The second was the release of the first computers from the Atari ST and Apple Powerbook series which ultimately led to the the release of the first software designed for sampling and mixing visual loops- VuJak (1991) and VJamm (1997), respectively co-developed and used by Brian Kane (Emergency Broadcast Network) and Coldcut. A few years later, software such as Moonster and Arkaos GrandVJ, specifically designed for the audiovisual mix, landed on the market. Other software, such as Resolume Avenue or Modul8 added additional functionalities in the mid-2000s, notably by taking up the concept of layers from graphic editing software such as Photoshop. As such, a shift occurred wherein video became reconsidered by designers as a superposition of several graphic layers that can be added and modified at will, thus leading to visual animation work that became even more refined and complex.

However despite this period of intense innovation in visual and audio mediums, the field of projection remains relatively neglected. The latest software only allows projection in a 16:9 format (instead of 4:3) and in HD resolution (instead of VGA). Despite this, the ways in which images are projected has still been a key source of experimentation for audiovisual performers. In her VJ sets in the early 1980s in the New York clubs (the Hurrah, then the Danceteria), Merril Aldighieri mixed projections of films on the walls, projected lights, and had a diffusion of visual loops on monitors arranged in different places, in order to change the club into a multi-sensory visual space.[4] Following this example, audiovisual performers practiced multi-screen projection, projection on different types of surface, handcrafted projection on building facades (for example the French collective Easyweb at the end of the 1990s) 3D effects, or gauze screen technology which give a holographic look to the projection, as for the collective The Light Surgeons which has experimented this technique for several years, notably for the performance series *All Points Between* (2001), *True Fictions* (2007), and *SuperEverything* (2011).

Figure 1. *SuperEverything* (The Light Surgeons, 2011).

The Light Surgeons also produced a similar result in their installation in the Wind Tunnels of Farnborough Airport called *Soundfield* (2014), though they used different technological methods. Six projectors with very wide angle lenses covered the walls and ceiling of the tunnel in three separate bands along the length of the

4.   For an overview of these performances, see the artist's website: http://artclips.free.fr/ (last accessed 14-06-2018).

space. Each of these arches of light contained a pair of audio speakers and a pair of vocal microphones at their bases. As the software generated different virtual energy forces that slowly moved down the space, the audience is encouraged to interact with these visuals by making sounds into the microphones. Different simple visual patterns (dots, lines, colored shapes) come to life depending on the varied vocals. This large room thus becomes an intimate space, both receptacle and interpreter of the human energies going through this vast structure. Here, the performers use the particular architecture of the place, whose angles and perspectives already are in stark contrast to the classic flat projection, without having to program particular 3D effects.

For most outdoors performances though, video mapping realizes the creation of a software environment that reached maturity towards the end of the previous decade. Software such as MadMapper or Resolume Arena are designed as natural, simple, logical extensions of the virtual video mixers they complement (Modul8 and Resolume Avenue respectively). This technological kinship is embodied in the term *video mapping*, which echoes with *key mapping*. Key mapping allows the assignment of a software function to the key of a device, it can be a keyboard, a mouse or any mobile device. In VJing, key mapping is used to trigger a visual loop or a video effect from a MIDI keyboard, a video mixer (such as the Edirol V-4, widely used in the A/V scene) or a launch pad. Video mapping is thus presented as a projective extension of what was previously done in electronic music and later in VJing: assigning a visual source to a set piece or a facade element in the same simple and intuitive way as when connecting a sound or a visual effect to a keyboard key, with the objective of audiovisual performers being to have as much latitude and visual possibilities as the electronic musician does with the musical matter they are manipulating.

All of these technical progressions were implemented with the sole aim of establishing VJing as an autonomous practice. With these progressions and the continued experimentation of practitioners, a debate began around the accuracy and relevance of the title Video Jockey. The key object of this debate was how heavily the title recalled the figure of the DJ, this comparison ultimately impedes the VJ, as it ascribes a number of preconceived notions to the role, and essentially creates the impression of the VJ as a non-essential or optional component of a show that can easily be performed without them.[5] Today, the term "audiovisual performance/performer" seems to be the most agreed upon term, probably because it puts visual and sound elements on equal terms. This emancipation echoes the forms constant search for power: first of all, this practice had to free itself from its original function (provide some kind of "visual embellishment"), to go beyond — as Xarene Eskandar emphasises — the simple categories of "visual wallpaper" and "eye-candy" (Eskandar and Nuengsigkapian 2006: 4–5). They then had to turn away from the connotations ascribed by the term DJ's, claiming their performative orientation and independence (shown to be necessary when MTV appropriated and misused the term VJ)[6] and develop their own tools. The technological constraints of the form (such as finding ways to mobilize their visual database to match the music they're discovering live) were combatted by putting audiovisual performers and musicians on an equal footing through multidisciplinary collectives, where images and sounds are conceived before the performance, and modulated live through a series of small improvisations from a structure rehearsed in advance. This finally blurred the line between videographer and musicians, creating a separate singular entity, such as performances using algorithmic generativity (image and sound being generated from the same line of code, using applications such as MAX/SP's Jitter or Pure Data).

For the A/V scene, video mapping therefore has three dimensions. First of all, by amplifying their synesthetic paradigm through the simultaneous diffusion of several visual and sound sources in the same space, this technology allows audiovisual performances to convert the place (a club, a cinema theater, any type of space equipped with a video projector) into an immersive audiovisual space. Moving image becomes a medium in its own right, in the original Latin sense of the term: a setting, an environment in which someone lives and which determines their behavior.

Then, video mapping allows this practice to achieve its quest for emancipation. Now considered as a discipline in its own right, it can evolve outside the circuits usually devoted to electronic music (clubs, festivals, rave parties), to reach a broader audience and thus offer shows that no longer have the sole purpose of amplifying

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5. This debate was very lively throughout the 2000s, as evidenced by the first books dedicated to audiovisual performances, see Eskandar and Nuengsigkapian (2006), Faulkner (2006), Sprinrad (2005).

6. On MTV in English-speaking countries, the term Video Jockey refers to the hosts introducing and commenting on music videos broadcasted on the channel. See Goodwin (1993: 55).
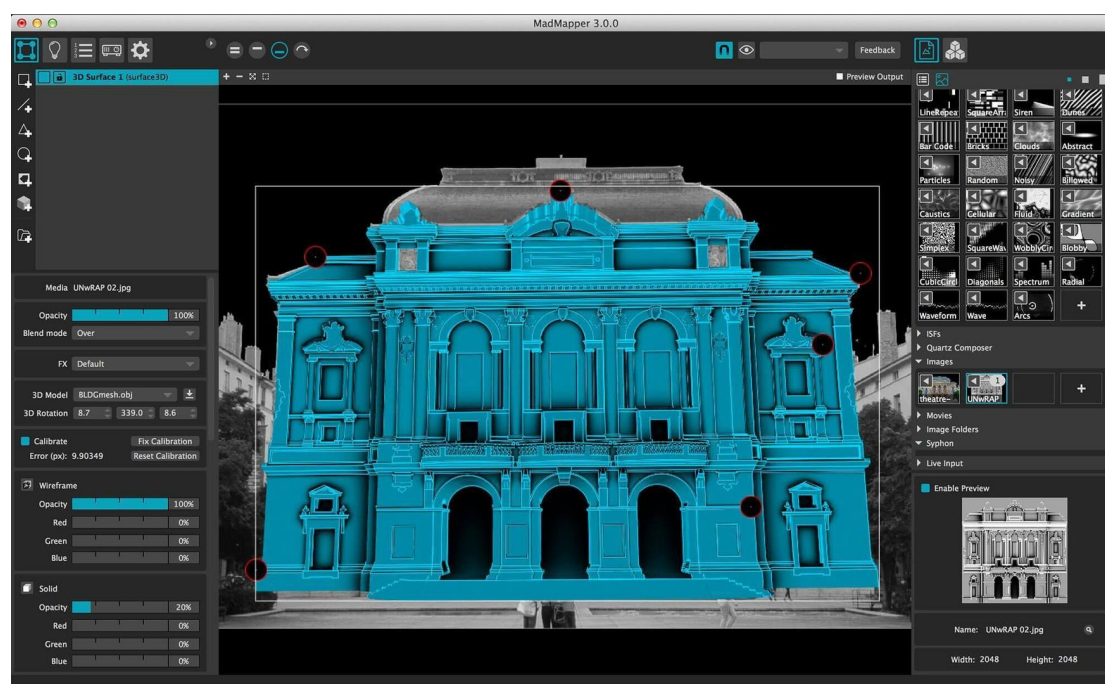
Figure 2. Interface of the MadMapper software.

the effect of music by making people dance through different techniques (editing, using the kinetic attraction of the visual loops). This strive towards independence is explicitly claimed by some performers of the A/V scene, such as the French antivj label, which brings together former VJs who have adopted video mapping as their main technique to radically break away from the club scene and its stereotyped configurations.

Finally, the introduction of video mapping indicates that video has finally caught up with audio: the image is now as enveloping as a soundwave. Previously, the visual mix performed by the VJ in a club could possibly be neglected or ignored by an audience (the screen constituting a single point of fixation, isolated in a precise point of the space), now it can fill all the visual space in the context of a video mapping setup outdoors, cover the urban landscape and remodel it at will. Image gets the same "omni-encompassing" faculty as music. In this sense, video mapping can be perceived as a pure catalyst of the audiovisual performance.

2   Video Mapping as a catalyst for audiovisual performance

The introduction of video mapping in the practice of audiovisual performances has the consequence of generating two simultaneous phenomena. It amplifies its performative paradigm by giving the art of merging visual and sound matters a monumental scale, while altering its poetics by giving it an additional dimension — an architectural dimension. Being essentially a transmedia practice, audiovisual performance, which until then had mainly combined sound and visual creation, is thus led to absorb an additional medium. This movement is part of a dynamic that has been at work from the very beginning of the A/V scene: the search for constant innovation, the pursuit of the latest technologies to provoke new ways to astonish an audience.

Video mapping thus appears as a way to bypass a relative "aesthetic stasis" sometimes caused by a software technology reaching maturity, and a general inertia in the technology used by performers in their live set. For example, audiovisual sampling has been practiced since the early 1990s by groups such as Emergency Broadcast Network, and graphic animations and visual loops have become relatively inert, tending to reuse motifs already seen in the abstract cinema of the 1920s-1930s.

Before, the performer's work was concerned with crating and sustaining the audiovisual flow that they were generating. Now they also have to take into account the structure of a building, the distribution of doors

and windows, and the relationship between the building and the urban space surrounding it. Previously, a performer could create their set in advance without knowing the topography of the venue (the number and the disposition of the screens, the connectivity, the location of the speakers). However the current medium has caused a shift from an undifferentiated (by conforming to its disposition without the possibility to configure it as we would like), to a specific apprehension of the projective space (taking into account the specificity of the place from a blueprint thought out and determined in advance).

This profoundly alters the essence of audiovisual performances which, until these changes, were mainly intended to be performed in several places, with little to no changes made to the actual performance itself (such as when used in music concerts). Now the adoption of video mapping makes it essential for the performer to know the venue, and their shows are not intended to be performed on any other buildings or urban elements.

Thus, what was traditionally designed to be a nomadic practice, using laptops and hardware that can be connected to any video projector, the audiovisual performance becomes sedentary by attaching itself to a specific, tangible, material space that has not been originally designed to allow a visual projection. The architectural challenge set by video mapping also allows new experiments on projection surfaces that differ from the traditional screen (concrete, glass, brick, sheet metal). In this sense the A/V scene harkens back to and elaborates on the experiments within the early 20th century avant-garde. In the 1920s, various experiments were conducted to alter the texture of the moving image by modifying the material on which it was projected. For example, the futurists Arnaldo Ginna and Bruno Corra tried various supports: white canvas coated with glycerin, silver paper surface, and a canvas covered with a coating which produced, through reflection, a kind of phosphorescence. Likewise, Marcel Duchamp imagined a rubber screen which could inflate or deflate little by little.[7] All these projects are part of a vast array whose common denominator is to demonstrate the various ways raw materials and objects can alter the way in which we see images.

Through the use of digital projection, audiovisual performers can extend the expressivity of the projected image even further than what avant-garde artists could do at the time. Not only can it go beyond any standard aspect ratio by adapting itself to the morphology of the various facades, but it can also cover the entire building like a second skin, following its contours, and taking in the slightest architectural detail. Video mapping is not the only way to explore this tangible, consistent and enveloping aspect of the projected image. It was a working theme for a number of videographers, photographers and visual artists who took up the digital medium in the 1990s, and were already experimenting with outdoor projection in large volumes (for example, Krysztof Wodiczko's *The Hiroshima Projection* [1999], or *If You See Something* [2005]) without any backup from this kind of software. In her essay *Surfaces*, Giuliana Bruno sees in these various experiments the advent of a new type of projective screen, whose properties differ from the traditional cinema screen:

> This contemporary screen [...], far from representing any perspectival ideal, is no longer containable within optical framings, and cannot be linked to a window or a mirror, but is to be reconfigured as a different surface. In my view, a screen-membrane is emerging, performing as a connective tissue, and turning architecture and art into pliant planes of moving images. Made of translucent fabric, this screen is conceptually closer to a canvas, a sheet, a shade, or a drape. Partition, shelter, and veil, it can be a permeable architectural envelope, and it is habitable space. (Bruno 2014: 5)

With the rise of the digital image, a transfer of materiality has taken place, leaving the medium (celluloid), once a primary factor in the projection of an image, to become subsumed in the very material properties of the projected image, whether through a singular process of visual imagery, an original projection medium or a particular experience of interaction with the projected image offered to the spectator. A material reconfiguration of the visual space then takes place, each surface being inscribed, to use Gilles Deleuze's terminology, in a possible "becoming screen". Just like earlier experimental films and video installations, video mapping constantly plays with the fictional dimension of the projected image, its ability to transform and transcend a place, whether through the sculpture of light, painting with colors or playing with spaces and volumes through the movement of images.

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7.   To know more about these experiments, see De Haas (1997: 95–9).

This technique also plays with the images ability to become a habitable space, to the point of blurring the line between the frame of the image and the architecture that screens it. If video mapping, as used in audiovisual performances, doesn't innovate much in its use of the projected image, it nevertheless distinguishes itself in its very playful use of the various effects allowed by this technology (effects on perspectives, depths, 3D and other *tromp l'oeils*). These new ways to give the projected image a particular elasticity (or to give proven effects an improved and higher definition) is thus what seems to interest the performers in the first place, its capacity to surprise and astound the audience by its optical illusions (we can emphasize here a distant heritage of magic lanterns and other phantasmagorias, as well as the fairground origins of cinema, as Karunaratne points out [2018]).

Furthermore, video mapping also allows for a further extension of the haptic propension of the projected image[8] — a dimension which had been explored since the very first VJ sets. In audiovisual performances, visual and sound matters are mobilized to build an experience that goes beyond the traditional functions of "audio-vision", which tends — virtually for the viewer and practically for the performer — towards the tactile. The links between the visual flexibility- or plasticity-of moving images and matter effects have already been underlined in relation to cinema in other works, which brought the creative role of the hand (not very obvious in the context of mechanical arts) closer to the ways of haptic reception.[9] The notion of "plasticity" implies the finite form (modeled in a material that represents a figure), but also the molding or shaping of something, i.e. the work consisting of modeling the material, which presupposes manual intervention by the artist. This conception of the specific plasticity of animated images goes back at least to Elie Faure's writings on "cinéplastique" as "the art of expressing form in movement", as "a mobile composition constantly renewed, constantly broken and redone, vanished, resurrected" (Faure 1976).

We cannot in this piece take account for the entire evolution of this theory throughout works on the plasticity of the cinematographic image, but it is important to note the idea that the plasticity of the moving image should be a subtle realization for the audio-spectator. If it is essentially represented in cinema through editing and various interventions engaged on the film material to alter its state/texture (such as the scratching of the film operated by Len Lye, the painting on celluloid experimented by Norman McLaren, or the collages carried out directly on the film by Stan Brackhage on some of his films),[10] it remains at the core of audiovisual performances' poetics.

The task of the performer not only consists of selecting the visual sources that they will project in osmosis with the music, but also of processing, combining and modifying them in real time. The performative paradigm of this practice draws its whole essence in this tactile control of the audiovisual flow. Placed behind its machines, the visual artist keeps pressing buttons to launch visual loops, turning its knobs to modulate a video effect, sliding its potentiometers to add or remove a graphic layer, pushing its crossfaders to switch from one visual source to another. The image presented to the audio-spectator is thus constantly crossed by "haptic metaphors", attesting to the bodily inscription of the performer in the audiovisual object they are projecting.

The oldest of this type of metaphor — and still one of the most used today — is *video scratching*, developed in the early 1990s by the group Emergency Broadcast Network, using its VuJak software. Their creations present jumping and pausing effects in the scrolling of images, and shares parallels towards its musical equivalent invented by Grand Wizard Theodore. The viewer can almost see the performer's hands scrolling back and forth, just as the listener to a hip-hop song can literally hear the DJ spinning the disc on the turntable and manipulating it between his fingers. We are thus in the presence not only of an eye that sees, but a "seeing ear" which also has the ability to touch, scroll, rotate, enlarge or erase moving images. Other haptic figures of this type permeate audiovisual performances, illustrating the constant shaping of the projected audiovisual flow that sets up its plastic dynamics.

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8.   We recall that the term haptic (derived from the Greek *âpto*: to touch), traditionally designates — since the works of Adolf Hildebrand and Alois Riegl — a possibility of the glance, according to which "the sight discovers in itself a function of touch which is proper to it and belongs only to it, distinct from its optical function" (Deleuze 2002: 99). The eye is said to "touch" in the sense that it immediately captures material species on flat surfaces. The depth disappears in favor of a tactile proximity of things.

9.   See the chapter "The eye, the hand and the spirit" in Aumont (1999).

10.   To know more about this type of cinema, see Sitney 1974, Noguez 1985, Mattis 2005.

We can thus consider video mapping as a vector, allowing audiovisual performers to expand to a larger scale, and examine two dimensions that they were already exploring in more traditional configurations and which constantly complement each other: the plasticity of the projected image and its immersive capacity. Video mapping extends both spatially and visually the plastic activity of the performer, and therefore extends the spectator's sensory experience.

3   Expanding the audiovisual experience: projections

Video mapping not only immerses the audio-spectator inside an environment entirely animated by moving images, but it is also constantly reminding them, through haptic metaphors, that it is the work of several busy hands that are modeling it live. The audience thus becomes part of what Gilbert Simondon calls "an associated medium,"[11] a space entirely determined by technique, with which they enter into a relationship through this "tactile audio-vision". Through video mapping, the performer plays with his ability to bend, twist and manipulate space at will. Thus, this type of show can be seen as a remediation of architectural space by the digital image, the latter asserting its superiority in its ability to encompass and simulate it. The plastic dynamics deployed by the performer mainly exist by constantly switching between these two dimensions of remediation as formulated by Bolter and Grusin (1999): *immediacy* and *hypermediacy*. In other words, between the capacity of the digital image to shape, represent and simulate the architectural space it covers in a convincing way, to the point of merging with it like a vibrant and luminous membrane, and, on the other hand, its ability to alter, change and redesign it through various visual effects.

Video mapping thus heightens a trend that audiovisual performers were already exploring previously in more traditional projective devices: attributing fictitious properties to images. This type of aesthetic research is not specific to the A/V scene and is also apparent in painting, photography, or cinema. In his study on the poetics of the cinematographic image, Emmanuel Siety identifies the four main fantasies that experimental and mainstream cinema have explored throughout their history: *the animistic fantasy* (the image seems to be animated by forces that go beyond the material reality of the device that captures them), *the matrix fantasy* (the production of the image escapes the artist's hands to be undertaken by the image itself in a process of spontaneous generation), *the fantasy of incorporation* (giving the viewer the impression of penetrating and living within the fictitious space constituted by the image) and *the fantasy of empathy* (the image is conceived as a sensitive surface, a body consubstantial with the other bodies that move within it) (Siety 2009: 41–70).

Parallel to cinema, audiovisual performers rely on these various fantasies to design and modulate the visual effects they combine throughout the performance, often switching from one fantasy to another to introduce breaks or transitions in their live graphic composition. For example, the video mapping performances delivered by the antivj label in 2009 (on a building in the city of Songdo, South Korea, and on the facade of the town hall of Enghien-les-Bains, France) constantly go back and forth between the matrix fantasy and the empathy fantasy. The smooth and refined surface of Songdo's building (mainly made of glass and aluminum) and its curved shape evoke a giant cinema screen from which shapes can emerge (bricks that seem to burst through the facade in rhythm with the music beat). This imaginary screen is also that of the computer, where the images that will be projected are generated. The old matrix fantasy is thus embodied in the prosaic reality of the digital image, which can create forms through algorithmic calculation.

The empathic function of image is explored through all the "matter effects" which constantly punctuate the video mapping carried out on the facade of the town hall of Enghien-les-Bains. These effects are enhanced by the use of sound: cracking sounds accompany the progression of virtual cracks running more and more through the structure, as if the facade was on the verge of collapse. The squeaks of leaves combine with the graphic visuals representing ivy branches running along the walls, and at one moment projections of mechanical visuals on the windows are followed by rattling noises, as if the building were moved by a giant clockwork

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11.   "This individuation [of technical beings] is possible by the recurrence of causality in an environment that the technical being creates around itself and which conditions it, as it is conditioned by it. This medium, both technical and natural, can be called associated medium. [...] The associated medium mediates the relationship between the technical elements produced and the natural elements within which the technical being functions" (Simondon 2012: 70).

Figure 3. Video mapping performance by antivj in Songdo (2009).

mechanism. The building thus seems to go through various transformations that constantly threaten its integrity and stability.

These two performances also use a figure that can be found in video mapping creations performed by other visual artists that we could call the "matrix view": the facade is plunged into darkness, only the contours of the windows, doors, pillars, porches and bays are highlighted by LED lights. This matrix view has several functions. Firstly, it ensures the transition between two sequences of graphic animation by "cleaning off" the surface, as one would clean a blackboard covered with chalk inscriptions. It is also used for its self-referential dimension: this cleaned view refers to the graphic interface of the video mapping software which first calculates the different volumes composing the building, allowing the performer to choose which graphic loop and which effect he wants to assign to which element of the facade. Finally, this matrix view refers — more or less ostentatiously — to the architect's plan, and recalls that before being a structure of concrete, glass and bricks, the building was first designed and drawn from a paper sheet. It originated as a calculation, just like the moving images that are covering it. Two temporalities are thus placed in parallel, each referring to a type of architecture: one belonging to the ancestral art of construction from solid materials and the other — more contemporary — using architecture through light and moving visuals.

This dialog is reflected in the video mapping realization performed by the British group D-Fuse on the facade of the natural history museum of the city of Jakarta in 2010. The visual artists take advantage of its structure, which is rigorously symmetrical with its main body flanked by a wing on each side, to compose a live set arranged as a triple screen display. The various graphic animations (halos of light, scrolling text, visual loops, 3D effects) respond and complement each other, or act as counterpoints. Centered around the themes of evolution, nature and ecology, these visuals aim to bring out all the historical memory contained in the building to revive what it holds inside in the form of remains, fossils and artifacts. By multiplying visual sources for one hour (including a counter showing the evolution of the world population through the centuries, from antiquity to future projections), this performance fully exploits the dynamics of hypermediacy. The projected image thus appears both as a triptych reminiscent of Renaissance altarpieces, but also as the interface of a graphic creation software, each visual element being triggered following a selection in a menu, illustrating again the

Figure 4. Example of the "matrix view" – Video mapping performance by D-Fuse in Jakarta (2010).

digital origin of the projection. The mapped visuals can be seen as a giant interface, a contact surface between the urban space and the performers who is reshaping it, a membrane on which the artist's gestures are printed.

This ability for the projected image to be handled in various ways can also be taken on directly by the spectator, as in video mappings based on an interactive device. For its performance on the facade of the Lyon City Theatre at the 2010 Festival des Lumières, the French collective 1024 architecture made a vocal interface available to the audience. By shouting, speaking or singing into a microphone connected to a sound visualization program, the spectators animate a giant mouth projected on the main door of the building. It opens, closes, folds, and shows its teeth, following the vocal modulations given by the audience. When it opens wide to simulate a scream, the mouth seems to twist the theatre's pillars, compress the windows, crush the buttresses. The projected image thus acquires a double dimension: both as a virtual membrane giving life to the animated, transforming the tangible space into a virtual space, and as a translator of a software synthesis.

This brief journey through a decade of practice shows that video mapping has not necessarily paved the way for a new discipline that would evolve independently, in parallel with audiovisual performance, but rather served as a catalyst for its users. Admittedly, A/V performers, thanks to video mapping, can perform in different places and spaces than traditional clubs, but the core essentials of their practice and aesthetics have not changed much in the process. In the end, it only offered them new spaces to work with and enriched their visual palette with new effects of depth and 3D. The few examples given all come from a rather opulent period for video mapping: this technology had just reached maturity and the effects of immersion and 3D had never reached such a degree of realism. Today video mapping performances seem to have exhausted — for the actors of the A/V scene — their capacity of astonishment and novelty. As Yannick Jacquet, member of the antivj label, acknowledges:

> I have the impression that we are going through a period of relative stagnation. It is only my own perception, but I think we still remain in this kind of "digital minimalism" aesthetics, based on elementary geometrical forms and algorithmic generation of very pure and cold particles or lines. It's a trend in which I have personally participated and which I now find rather daunting. (Watier 2016: 312)

Figure 5. Video mapping performance by 1024 architecture at the Festival des Lumières (Lyon, 2010).

Yannick Jacquet's own artistic trajectory illustrates this observation, since he now practices video mapping through installation, as on his *Discursive Mechanics* project (2011–2016), where this technology interacts with the oldest of image reproduction techniques: wood engraving. While outdoor video mapping continues to be practiced and retains its spectacular strength for many audiences, these recent years have been marked by a greater diversification in the use of this technology in the A/V scene. Visual artists are reinvesting in immersive but indoor spaces, video sculptures and interactive installations. Thus, this technique has ceased to be considered as the only vector of innovation, and they are currently experimenting on artificial intelligence and mirror neurons to develop new experiences of sound visualization, a proof that the relationship between art and technology still remains fruitful for the A/V scene.

Video mapping was therefore an important step in the evolution of audiovisual performances, since it allowed performers to look at projection in a new light, when previously it had been seen as a technical or handcrafted medium. It is a tool that is still widely used today in the VJ community, despite some of the most popular groups like the Londoner duo Addictive TV still refusing to use it. Thus, it does not seem to be that there is only one generic type of video mapping performance, but rather a plurality of events, performances, sound and light shows, installations that use — each one with their own tools, their own history, their own purpose — this technique. A serious, exhaustive and necessary study of video mapping would fail if it did not take into account this plurality to explore its various occurrences, amongst which audiovisual performances provided one of the most spectacular and intriguing declinations.

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