

UNIVERSITÉ DU QUÉBEC À MONTRÉAL

**IMPROVISATORY LIVE VISUALS:
PLAYING IMAGES LIKE A MUSICAL INSTRUMENT**

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BY
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UNIVERSITÉ DU QUÉBEC À MONTRÉAL

**LES *VISUELS LIVE* IMPROVISÉS:
JOUER DES IMAGES COMME D'UN INSTRUMENT DE MUSIQUE**

THÈSE
PRÉSENTÉE
COMME EXIGENCE PARTIELLE
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SUMMARY

This study was inspired by my artistic practice in improvisatory Live Visuals in collaboration with live experimental music and/or sound art. Since I began this practice in the early 2000s, the emerging form of Live Visuals, referred to by a number of designations such as VJing, Live Video, Live Cinema and Visualist or Visual performance, has become ever more popular and spread to a wide variety of situations as diverse as experimental music events, contemporary music recitals, new music/free jazz improvisation sessions, DJ sets, raves, clubs and discotheques, pop music concerts, corporate parties, weddings, anniversaries and celebrations of all sorts. As it has grown in popularity the form has begun to figure in scholarly research and theoretical inquiry. This nascent discourse, however, tends to frame Live Visuals within its continuity to pictorial and cinematic traditions and often concentrates on the recent digital era alone. Though my background is in video art, it has always seemed to me that my own experience of Live Visuals, either as a practitioner or as a spectator, has much more to do with music and musical/sonic performance. In my view, the practice of Live Visuals has been shaped by its relationships to Western music aesthetics, traditions and technologies in perhaps more important ways than by its cinematic lineage. In fact, the idea to "play" projected stimuli for the eyes, live, in real time, in some organized way, as music can be played by a musical instrument, emerged from the practice of music itself. Thus the aim of this doctoral dissertation is to locate some of the diverse musical roots of improvisatory Live Visuals, from the seventeenth century when the first color organ was imagined to the present, to examine their role in the evolution of the practice as we know it today. It attempts to trace occurrences that can be regarded as essential for the coming into existence and expansion of the form. Considering Live Visuals as a field of potential trajectories and interactions between past, present and different artistic and cultural forces, the study undertakes a Media Archeological journey across the history/ies of Western classical and popular music(s) as context to excavate key music/sonic conceptions, apparatuses, aesthetic traditions, developments, technologies, events and practices, in order to draw connections with aspects of incarnations of real-time optical approaches. This panoramic survey weaves its way through a more or less chronological

collection of miniature case studies - from the early color-tone correspondence theories of Kircher and Newton, to the intermedia spirits of 20th century European and North American avant-garde movements, to the polysensory fusion aesthetics of popular music genres - that recontextualize the contemporary media art form of improvisatory Live Visuals by emphasizing junctures I deem pivotal between often neglected elements of its musical heritage and its pictorial/cinematic antecedents. This cross-disciplinary re-visiting of its evolution sheds an alternative light on the practice of Live Visuals and opens novel paths for further understandings and interpretations of the multi-faceted complexity of the form.

Keywords: Live Visuals, Live Cinema, VJ, Experimental Music, Intermedia, Interdisciplinarity, Media Art, Media Archeology.

RÉSUMÉ EN FRANÇAIS

L'inspiration pour cette étude découle de ma pratique artistique de *Visuels Live* improvisés en collaboration avec musique ou art sonore en temps réel. Depuis que j'ai commencé cette démarche au début des années 2000, la forme émergente des *Visuels Live*, connue aussi sous les appellations de *VJing*, *Vidéo Live*, *Cinéma Live* et performance visuelle ou visualiste, est devenue de plus en plus populaire et s'est étendue à un large éventail de situations aussi diverses que des événements de musique expérimentale, des récitals de musique contemporaine, des sessions d'improvisation en *free jazz* et musique nouvelle, des *sets* de DJ, des raves, des discothèques et des boîtes, des concerts de musique populaire, des fêtes corporatives, des mariages, des anniversaires, et des célébrations de toutes sortes. Grâce à sa popularité grandissante cette nouvelle forme commence à apparaître dans la recherche théorique et académique. Cependant, dans la recherche existante à ce jour, les *Visuels Live* ont tendance à être vus en relation au pictural et au cinématographique ou bien du point de vue du domaine numérique récent. Bien que ma pratique provienne de l'art vidéo, il m'a toujours semblé que ma propre expérience des *Visuels Live*, tant comme praticienne que spectatrice, a beaucoup plus en commun avec la musique et la performance musicale et sonore. Mon hypothèse est que la pratique des *Visuels Live* dépend peut-être plus de ses relations avec les courants esthétiques, les traditions et les technologies de la musique occidentale, que de ses origines picturales ou filmiques. L'idée de départ de "jouer" des stimuli projetés pour les yeux, en temps réel, d'une certaine façon organisée, comme la musique peut être jouée par un instrument, est issue de la musique même. Le but de cette thèse doctorale est donc de retrouver les diverses racines musicales des *Visuels Live* improvisés, depuis le dix-septième siècle lorsque le clavecin oculaire est d'abord imaginé, jusqu'à l'époque actuelle, pour en examiner le rôle dans l'évolution de la pratique telle que nous la connaissons aujourd'hui. Elle tente de retracer les moments clés, du point de vue musical, de la naissance et de l'expansion de la forme. Considérant les *Visuels Live* en tant que champ de trajectoires et d'interactions potentielles entre passé, présent et différentes forces artistiques et culturelles, cette étude entreprend un parcours média archéologique à travers le contexte des "histoires" des musiques classiques

et populaires occidentales pour en "excaver" des conceptions, dispositifs, directions esthétiques, développements, évènements et pratiques, afin de les mettre en rapport avec des aspects de différentes approches d'images en temps réel. Ce survol panoramique tisse son chemin plus ou moins chronologiquement parmi une collection de miniatures études de cas - partant des théories de correspondance couleur/ton de Kircher et Newton, en passant par l'esprit intermédiatique de divers mouvements d'avant-garde européens et nord-américains du vingtième siècle et par l'esthétique de fusion polysensorielle de différents genres musicaux populaires - qui recontextualisent la forme d'art médiatique contemporaine des *Visuels Live* improvisés en mettant l'accent sur des intersections que je considère centrales entre des éléments souvent négligés de son héritage musical et ses antécédents du domaine de l'image. Cette re-visitation interdisciplinaire de son évolution propose une perspective alternative sur la pratique des *Visuels Live* et ouvre des voies nouvelles de compréhension et d'interprétation pour les recherches futures sur cette forme complexe et multi-dimensionnelle.

Mots clés: *Visuels Live*, *Cinéma Live*, *VJ*, musique expérimentale, intermédia, interdisciplinarité, art médiatique, média archéologie.

"All art constantly aspires towards the condition of music"
Walter Pater

INTRODUCTION

Background and Subject

Since the late eighties, my artistic practice has been primarily situated within the realm of video art and experimental video, ranging in form from single-channel to installation pieces and touching upon different subject matter and processes. In the past decade, my work began to shift towards a quasi-exclusive concentration on collaborative projects with experimental music composers and sound artists.

Most important to me among these projects have been the ones where I make use of a more recent approach to my medium: the improvisation of "live video mixing" in performance with live experimental music/sound. Indeed, when I began to research and explore "live video mixing" in 2003, it opened up entirely new expressive horizons for me after many years of frustration with the production of screen and installation work in isolation. This new form quickly became a main focus as it provided unprecedented creative

satisfaction. I realized that this was due to the inspiration, and even thrill, that the real-time collaboration and spontaneity aspects of this form procured.

In fact live visuals represented, for me, somewhat of a dream come true. Ever since I can remember, I had always envied musicians for how they could just spontaneously "jam" with other musicians, sometimes even directly on stage with no prior rehearsal or experimentation. Since the nineties I had been very much interested in the possibility of mixing video live and followed an emerging scene of "VJs" (who didn't define themselves as such at the time), using large amounts of cumbersome and very expensive analog equipment to create real-time video at early rave-type events... but I couldn't fathom how I could ever manage to afford or even transport any such set-up of multiple tape decks, mixers, effects generators, video monitors, and more. However, the development, by the beginning of the XXIst century, of the laptop and of software alternatives for mixing video, as well as of affordable projection equipment, completely changed the situation. Finally, video and image artists could relatively easily acquire the necessary tools for mixing visuals live and could improvise on equal footing with music/sound artists (in a conversation in which no one partner has exclusive control) at a level of expressiveness on par with that of a musical instrument. Hereafter the idea of "jamming" live with projected visuals - spontaneously like an improvising musician - began to finally seem accessible to me. It is this practice of "jamming", or improvisatory mixing, of Live Visuals - specifically in collaborative performance with live experimental music/sound - that is the object (and subject) of both my already completed practice project and of the current thesis.

From the beginning my Live Visuals practice (based on a virtual mixing

interface I have been developing for my laptop via Max/MSP-Jitter since 2003) has taken place within the context of live experimental music performance and has sought to be seen as an activity equivalent to playing a musical instrument - producing a flow of projected images rather than a succession of sounds. This work led me to reflect upon how, in such a capacity, this form of improvisatory Live Visuals has much in common with the traditions, practices, and even the technologies of the world of Western contemporary music. Such considerations sparked my curiosity to explore the role of various aspects of musical aesthetics in the development of the form. However, as I began my investigation, I was surprised to find that while there exists plenty of material on various Live Visuals practices, this dimension of musical heritage was rarely, if at all, specifically addressed.

Indeed, over the past decade, primarily digital versions of "Live Visuals" have become ever more prevalent in a wide variety of concert settings. Contexts as diverse as rock concerts, contemporary music recitals, new music/free jazz improvisation sessions, dance club performances, DJ sets, and corporate parties with live bands, boast the presence of "live video", "live cinema", "live VJing" or other appellations of "Live Visuals". This practice of improvisatory moving imagery has begun to attract attention as a form in its own right and to figure in scholarly research and theoretical inquiry. Because it has so much in common with the language of cinema, though, existing research tends to view the form mainly from within the continuity of the history and aesthetics of the moving image. Yet the practice of Live Visuals that figures in concert settings has been shaped most significantly by its relationships to developments in Western music aesthetics and technology. In fact, the idea to "play" projected stimuli for the eyes, live, in real time, in some organized way, as music can be

played by a musical instrument, emerged in the eighteenth century from the practice of music itself.

It is thus on this particular angle of improvisatory Live Visuals, on the diverse music-related influences present in the form, so relevant to my own practice in the field, that I decided to focus the subject of my thesis. My interest lies in how music and musical aesthetics permeate the inspiration for the development of systematized approaches to the production of real time visuals to arrive at the variety of techniques and technological means that I, and my colleagues, have at our creative disposal today, means that actually do enable us to "play" live visuals like an "instrument".

My study proposes to revisit the development of the practice of improvisatory Live Visuals in relation to its connections with occurrences in the realm of music, past and present, in order to trace a tentative mapping of its musical heritage and the extent of its impact. To do this, it undertakes a media archeology inspired journey across Western history - from the 17th century to the present - to "excavate" a selection of key apparatuses, technologies, aesthetic developments and events where musical ideas or practices intersect in various capacities with practices or ideas of Live Visuals. Drawing on texts from art, film and music history, as well as music aesthetics and recent writings on VJing and Live Cinema, in addition to my own experience and creative involvement in the field, it attempts to construct a certain composite chronology based on elements of musical culture that I consider to have had a significant influence on the practice of Live Visuals. As the study weaves its way amid different times and places, and progresses from "site" to "site", it recontextualizes concert Live Visuals within an alternative set of

aesthetic traditions from the ones it is most often viewed in.

Purpose

The purpose of this study is to demonstrate the significance of the influence of Western musical aesthetics, developments and technologies, since the late seventeenth century, on today's improvisatory Live Visuals. The question it attempts to answer is: what aesthetic traditions, technologies, events, practices, developments - from the realm of Western classical and popular music history - can be considered to have shaped and made possible the contemporary media art form of improvisatory Live Visuals. It is my belief that revisiting the evolution of the form and its practice from such a perspective can counter the tendency of historians and theorists to confine it to the province of moving image or cinema studies while inviting new insights that open paths for further interpretations and understandings of its multi-faceted hybrid complexity and ever evolving possibilities.

Structure

After the introductory chapter presenting the background, subject, purpose and structure of the study, the first chapter contextualizes it as to the definition of its terms, its scope and its theoretical and methodological approach.

The main body of the text is dedicated to the chronologically oriented media-archeological revisiting of points of juncture - apparatuses, technologies, aesthetic developments and events - between practices of Live Visuals and music from the late seventeenth century to the present. In order to facilitate the reader's following of an expedition across much data and details, this central part is divided into three somewhat overlapping sections (forming Chapters II, III and IV) representing broad historical periods.

The first section (Chapter II) roughly spans an interval comprised between the late Renaissance and the rapid rise of industrial capitalism in the late 1800s and early 1900s. It begins with late seventeenth century (Athanasius Kircher) and early eighteenth century (Isaac Newton) ideas of correlation between tones and colors and the earliest known color organ concept (Louis Bertrand Castel). It continues with color organ concepts and apparatuses related to the evolution of lighting from oil, to gas, to electricity. It ends with the first inventions intended as independent "instruments" in their own right (the "Sarabet" and the "Clavilux"), rather than as devices for the demonstration of the correspondence between color and tone.

The second section (Chapter III) covers a period from the pre-WW1 years to the late 1970s. It starts with the ramifications of Wagner's concept of "Gesamtkunstwerk", as to different forms of mixing various media, for the diverse avant-garde movements of the early twentieth century. It proceeds with the artists' of these movements interest in film as the "total art work" *par excellence*, notably for Moholy-Nagy and Oskar Fischinger who later brought such approaches to North America. It further examines how 50's jazz improvisation inspired live film improvisation and live (liquid) light shows

which eventually lead to multi-projection and multi-media environments. It explores the spirit of Intermedia in art and music and concludes with the development of analog voltage control based audio synthesizers, followed by video synthesizers and processors, and their eventual use in live performance.

The third section (Chapter IV) extends from the countercultural youth movement music context of the 1960s to the 21st century VJ/DJ scene. It traces the development of light shows and liquid lights alongside different genres of pop music (psychedelic rock, punk, art-rock, post punk, industrial, etc.). It then follows the introduction of early video mixing into dance clubs and its transformation after the launch of MTV. From clubs the study moves on to the emergence of rave culture. Subsequently a number of collective projects, some stemming from the rave aesthetic, others coming from the art and experimental music scene, are examined. It finally looks at the development of hardware and software specifically devised for live video mixing, both commercial and developed by artists themselves, and ends with an overview of the most recent trends in technologies and practices.

The final chapter recapitulates the main points of the research and presents my conclusions along with my thoughts about future perspectives. This is followed by an appendix describing my own work with improvisatory Live Visuals as well as my practice project in the context of the requirements for the degree of PhD (Doctorat en études et pratiques des arts) and how they relate to my study.

CHAPTER I:

CONTEXTUALIZATION

1.1 Terms

This study is about improvisatory Live Visuals. While there is a diversity of trends and directions in the form, my specific focus is on improvisatory Live Visuals that are performed in collaboration with live experimental music and/or sound art.

What I refer to here by "Live Visuals" is the real-time production of two-dimensional projected, primarily moving, images (that can be video, film, slides, various kinds of colored lights, liquids, computer animation) in interaction with live experimental music or sound art in a concert setting. Thus I also sometimes use the formulation "concert Live Visuals" in lieu of "improvisatory Live Visuals".

The "live" of "Live Visuals" indicates that the moving images are produced in real-time, by way of live techniques or processes. These include live montage (where all the decisions are made during the performance, "on the fly", such as the choice of which pre-recorded material to use, in what order, its duration, how it is combined in terms of transitions and layers, the various

color, speed and other special effects applied), live camera work (where the visuals are the result of one or more cameras recording in real-time the movement of a person, object, phenomenon occurring at the same time), live manipulation of substances (such as different liquids, chemicals, dyes) recorded in real-time by one or more cameras, live manipulation or activation of lights and devices such as mirrors or prisms, live drawing or painting recorded in real-time by one or more cameras, or by a digital graphic tablet, combining the output of two or more film projectors together, to name the main approaches. Other approaches combine several such techniques into hybrid "mash-ups".

By "live experimental music" I allude to music which actively explores, and often pushes the boundaries and definitions of, musical forms and issues that can belong to a wide variety of Western genres (electronic, digital, contemporary, avant-garde, noise, free jazz, etc.) since the early twentieth century. I use the expression "sound art" as an all-encompassing term for more recent (performative) sonic practices that can be considered, or consider themselves, as distinct from music and can be based on processes such as field recordings, found or environmental sound, electronics, digital and analog audio technology, acoustics and psychoacoustics, among others.

I use "performance" and "concert" interchangeably to refer to a musical performance type of situation consisting in a presentation of (live) sounds and, in the case of this study, of (live) moving images to a public of listeners and viewers at a venue specialized for art music or any other kind of space used for such presentation.

Finally "improvisatory" relates to improvisation which I use in the sense of instant composition (and performance) or spontaneous invention, on the spur of the moment, (without any preparation) and leading to unforeseen results. Such a definition was mainly introduced by proponents of the genre of "free music" or "free improvisation" which grew out of free jazz and modern classical music tendencies in the mid to late 1960s in the U.S. and Europe that were interested in improvised music without any rules beyond the logic or inclination of the musician(s) involved. "Improvisatory" is close in meaning to "live" but with the added dimension of instant and spontaneous (for live could also be used to describe the interpretation of a scored music piece or for the execution of a previously planned visuals mixing strategy).

1.2 Scope and Limits

The time frame for this study is between the late 1600s and the first decade of the 21st century. My choice to begin in the 17th century is motivated by the fact that it was not before this period that the idea of "playing" projected stimuli for the eyes, live, in real time, in some systematized manner, by way of any kind of apparatus or mechanism, as music could be played by a musical instrument, appeared in theory or in practice. I have opted to end with the first ten years of the current century because I consider that the developments they brought in digital and electronic hardware and software, as well as in techniques and approaches, used for Live Visuals mixing have not undergone any major shifts transforming the form in any significant way as of yet.

Being concerned with examining the evolution of Live Visuals in relation to occurrences in music of the Western world of the past four centuries, geographically my research wanders between Europe and North America. The choice of particular locations is dictated by developments I consider pivotal for my subject. This results in different countries figuring more prominently in different parts of this study. Thus the fourth chapter primarily focuses on the U.S. and the U.K. as these have been the main breeding grounds of Rock culture and its derivatives as well as of the club scene both so important for the growth of Live Visuals as a form in its own right.

1.3 Theoretical Approach

The general theoretical approach of this study is mainly inspired by "Media Archeology". "Media Archeology" is a relatively emerging hybrid approach and discipline, taking shape over the last two decades, that seeks to uncover lost, or neglected, traces of past technological developments and practices in present day media. It grew out of Media Studies and constructivist social sciences perspectives particularly attentive to context while borrowing from ideas found in work by Walter Benjamin, Friedrich Kittler and especially Michel Foucault.

Walter Benjamin's concept of history - notably in his "Arcades Project" - as a dialectic between past and present in a relationship of tension, a tension-filled constellation within a nucleus of time, can be considered as an early precursor to the approach.

The most important influence is undoubtedly the idea of "archeology" as formulated by Michel Foucault in his 1969 methodological treatise *The Archeology of Knowledge*. Foucault referred to his work as "history of the present". He understood history in terms of discontinuity and rupture rather than totalizing linear progress, as multiple rather than singular. He explained his historical approach in his preceding works (*The History of Madness*, *The Birth of the Clinic*, and *The Order of Things*). He proposed his "archeology", in contrast to "the history of ideas", not as an interpretative method, but as a way to unearth the traces of discursive formations found in the historical "archive". Documents of the "archive" should be searched not for "meaning" but for the hidden rules, or assumptions, that govern the discursive formations and make them possible or impossible at given times and places. As media archeologist Jussi Parikka, in his 2012 book *What is Media Archeology*, explains:

Archeology here means digging into the background reasons why a certain object, statement, discourse or, for instance in our case, media apparatus or use habit is able to be born and be picked up and sustain itself in a cultural situation. (Parikka, 2012, p. 6)

Media Archeology thus drew from Foucault's terminology while changing the focus from discursive formations to media phenomena. Parikka states, however, that even more than Foucault's "archeology", his later concept of "genealogy" was much more relevant for Media Archeology.

From 1971 (with his article "Nietzsche, généalogie, histoire") "archeology" becomes for Foucault "genealogy". "Genealogy" operates on most of the same principles as "archeology" but adds the important aspect of power

relations. More than just seeking the rules governing discursive practices, it examines how these operate in relation to the network of power relations that create these rules and attempts to de-construct generally accepted "truth". It thus offers a wider scope than archeology. According to Parikka:

Here, the emphasis was more on questions of 'descent' and critique of origins as found in the historical analysis of his time, and it spurred a lot of research that was keen to look at neglected genealogies and minor traits of history: histories of women, perversions, madness and so forth - counter-histories. In this manner, a lot of media-archeologically tuned research has been in writing counter-histories to the mainstream media history, and looking for an alternative way to understand how we came to the media cultural situation of our current digital world. (Parikka, 2012, p. 6)

Foucault's genealogy, he says, was thus a theoretical articulation of how to think historically in new, more complex, ways.

The "archeology" in Media Archeology also has its roots in Film Studies point out Erkki Huhtamo and Jussi Parikka in their introduction to their edited volume *Understanding Media Archeology*. Since the 1960s the term "archeology" was used for certain studies in the pre-history of film and audio-visual forms. These include C.W. Ceram's *Archaeology of the Cinema* (1965), Jacques Perriault's *Mémoires de l'ombre et du son: Une archéologie de l'audio-visuel* (1981) and Laurent Mannoni's *Le grand art de la lumière et de l'ombre: Archéologie du cinéma* (1994).

German media theorist Friedrich Kittler, for his part, applied the concepts of Foucault's discourse analysis to historical media study concentrating on the

materiality and technicity of media. His de-emphasis on content was often likened to McLuhan's legendary declaration "the media is the message" and technological determinism, especially his claim that "media determine our situation" (Kittler, 1999, xxxix).

Carolyn Marvin, one of the earliest proponents of a media-archeological perspective, before it was yet coined "media archeology", greatly broadened the concept of media. In her seminal book *When Old Technologies Were New: Thinking About Electric Communication in the Late Nineteenth Century* she proposed that "the media are not fixed natural objects; they have no natural edges. They are constructed complexes of habits, beliefs, and procedures embedded in elaborate cultural codes of communication" (Marvin, 1988, p. 8). In contrast to the prevailing tendency in media historical analysis of what Marvin calls "artifactual history" -- where technology is considered as neutral and having an intrinsic logic of its own, independent of its context -- her constructivist perspective implies the importance of context and the relevance of the most varied sources and materials for research on the development of media and technologies, the relevance of the examination of multiple and various unconventional "histories" as different facets of media phenomena. This results in an anti-teleological stance where development is conceived, much like Benjamin, as "a pattern of tension created by the coexistence of old and new" (Marvin, 1988, p.8).

Marvin's research stance, with its numerous alternative dimensions and angles of consideration, was for me an early inspiration in terms of how to approach the question that interests me: what aesthetic traditions, technologies, events, practices, developments - from the realm of

contemporary Western music (history) - have shaped and made possible the media art form of improvisational Live Visuals? According to such a perspective I could consider the world of contemporary Western music as the context of my study and examine the multiple and various "histories" of apparatuses, technologies, aesthetic approaches, artistic happenings, that cross paths with each other, and with other factors, at various junctures, to eventually form the phenomena of improvisatory Live Visuals mixing. This position derived from Marvin was complemented by the early media archeological ideas of Erkki Huhtamo.

For Erkki Huhtamo, one of the first Media Studies scholars to define his work as media archeological, historical development is also understood as dialogue, or tension, between past and present as well as numerous other dimensions. His text "From Kaleidoscomaniac to Cybernerd: Notes Toward an Archeology of Media" - that appeared in the 1996 *Electronic Culture* edited by Timothy Druckrey, was my first introduction to the media archeological perspective. In this text, Huhtamo explains that the "media archeological" approach relies on the two key concepts of "cyclical recurrence" and "excavation":

First, the study of the cyclically recurring elements and motives underlying and guiding the development of media culture.
Second, the "excavation" of the ways in which these discursive traditions and formulations have been "imprinted" on specific media machines and systems in different historical contexts, contributing to their identity in terms of socially and ideologically specific webs of signification. This kind of approach emphasizes cyclical rather than chronological development, recurrence rather than unique innovation. In doing so it runs counter to the customary way of thinking about technology in

terms of constant progress, proceeding from one technological breakthrough to another, and making earlier machines and applications obsolete along the way. (Huhtamo, 1996, p. 303)

According to Huhtamo, this kind of approach expands the scope of the analysis:

The aim of the media archeological approach is not to negate the "reality" of technological development, but rather to offer some balance by placing it within a wider and more multifaceted social and cultural frame of reference. (Huhtamo, 1996, p. 303)

The media archeological approach can then serve as a way of uncovering at the same time as cross-associating the diverse significant constitutive layers/strata, the diverse "histories", which compose contemporary technological media forms, in interdependence and in dialogue with past and present. It proposes to view the new and the old in parallel lines, as suggested by Jussi Parikka (Parikka, 2012). In so doing, "[t]he past is brought to the present, and the present to the past; both inform and explain each other, raising questions and pointing to futures that may or may not be" (Huhtamo & Parikka, 2011, p. 15).

What interests me in Huhtamo's proposed strategy is its idea of focusing on the traces left by cultural traditions on media. To think of my own research as a quest for the traces, the residual elements, of musical traditions, aesthetic developments and technologies, within the form of improvisatory Live Visuals we know today, complexifies its scope from a mere history to a

recontextualization in relation to neglected occurrences, apparatuses, practices, etc.

This notion of "neglected" is in fact an important one in Media Archeology. For Erkki Huhtamo and Jussi Parikka suppressed, neglected and forgotten voices of media history, or media-cultural phenomena, are the central objects of the approach.

Media archeology is introduced as a way to investigate the new media cultures through insights from past new media, often with an emphasis on the forgotten, the quirky, the non-obvious apparatuses, practices and inventions. (Parikka, 2012, p. 2)

Basically, Media Archeology reflects on recent media phenomena by linking them to the network of less obvious occurrences out of which they emerged to construct new alternative histories. This way of considering the less obvious is most relevant for my project of re-visiting histories of music to construct an alternative account of the development of the form of improvisatory Live Visuals, an account based on voices neglected by its more usually presented moving-image centered histories.

Media Archeology's idea of alternative histories associates the media archeological approach with late twentieth century trends like New Historicism, subaltern discourse, postcolonial research or local knowledges, but goes beyond. German media theorist Siegfried Zielinski, a major advocate of Media Archeology, instructs to "not seek the old in the new, but find something new in the old" (Zielinski, 2006, p. 3).

Zielinski¹, who was the founding director of the Cologne Academy of Media Arts, calls for considering media forms as broadly as possible (even more broadly than Carolyn Marvin):

My archaeology makes a plea to keep the concept of media as wide open as possible. [...] All we can do is to make certain cuts across it to gain operational access. These cuts can be defined as built constructs; in the case of media, as interfaces, devices, programs, technical systems, networks, and media forms of expression and realization, such as film, video, machine installations, books, or websites. We find them located between the one and the other, between the technology and its users, different places and times. In this in-between realm, media process, model, standardize, symbolize, transform, structure, expand, combine, and link. This they perform with the aid of symbols that can be accessed by the human senses: numbers, images, texts, sounds, designs, and choreography. Media worlds are phenomena of the relational. The one or the other may be just as plausible from the way the objects are looked at as the bridges and boundaries that have been constructed between or around them. (Zielinski, 2006, p. 33)

Through such a view media become potentialities of relations with other phenomena as well as of paths throughout time and space, "spaces of action for constructed attempts to connect what is separated" (Zielinski, 2006, p. 7). For his expanded idea of media Zielinski even developed the concept of "variantology" by which he understands the imaginary sum of all possible genealogies of media phenomena including those coming from disciplines that up to now have remained outside the contemporary discourse on media

¹ Zielinski was the founding director of the Cologne Academy of Media Arts in 1994 and now holds the chair for Media Theory: Archaeology and Variantology of the Media at Berlin University of the Arts, is Michel Foucault Professor for Techno-Culture and Media Archaeology at the European Graduate School in Saas Fee and he is director of the International Vilém-Flusser-Archive at the Berlin University of the Arts.

(such as theology, classical studies, many areas of the history of science and technology) and to cultures of knowledge usually excluded from western discourse, as for example the oriental or the arabic-islamic.

This relational aspect suggested by Zielinski, this notion of connectivity, of media archeology - that can stress difference and ruptures, as much as continuity - suits the multi-faceted nature of my subject. Through its general theoretical framework improvisatory Live Visuals can be considered in terms of a field of potential trajectories and interactions, as a conversation between a broad range of dimensions, from technical and technological, to aesthetic and theoretical, as well as traditional and social.

Media Archeology thus provides a productive framework to reflect on the multiple and diverse music-related forces at play within the development of the practice of improvisatory Live Visuals in collaborative interaction with live experimental music or sound art performance. It stresses the importance of the contexts where media come into being and broadens the definition of media themselves to junctures of relation between technologies, events and concepts while emphasizing a consideration for the neglected voices. It thus complexifies the investigation of the tension between past and present in media forms and practices beyond a simple chronology or history.

1.4 Methodological Approach

Media Archeology, which is at the same time a theoretical approach and a research method, then also provides the main methodological frame of

reference for my study. My research is based on "excavation", according to my understanding of the media-archeological meaning of the term. In the introduction to their recent *Media Archaeology: Approaches, Applications, and Implications*, Erkki Huhtamo and Jussi Parikka offer the following definition of this "nomadic" term:

When media archaeologists claim that they are "excavating" media-cultural phenomena, the word should be understood in a specific way. Industrial archaeology, for example, digs through the foundations of demolished factories, boardinghouses, and dumps, revealing clues about habits, lifestyles, economic and social stratifications, and possibly deadly diseases. Media archaeology rummages textual, visual, and auditory archives as well as collections of artifacts, emphasizing both the discursive and the material manifestations of culture. Its explorations move fluidly between disciplines, although it does not have a permanent home within any of them. Such "nomadicism," rather than being a hindrance, may in fact match its goals and working methods, allowing it to roam across the landscape of the humanities and social sciences and occasionally to leap into the arts. (Huhtamo & Parikka, 2011, p. 3)

Their understanding evokes digging through various types of data to unearth new information.

In a similar way I have excavated a wide range of heterogeneous source material, primarily of the past two centuries, to uncover information on apparatuses, technologies, aesthetic developments and events of musical nature, or representing the intersection of musical and moving image creation, the residual traces of which I consider to be still present in the form we know today as improvisatory Live Visuals mixing as it is practiced in collaboration with live experimental music or sound art.

The process for selecting my source material was inspired by strategies put forth by "new" perspectives for historical study referred to as Postmodern History or Experimental History and primarily associated with historians/thinkers such as Hayden White (U.S.), Keith Jenkins and Alun Munslow (U.K.). A precursor to such perspectives was British historian Edward Hallett Carr. In his famous historiographic work *What is History?* (1961) he claimed that it was untrue that facts speak for themselves:

The facts speak only when the historian calls on them: it is he who decides to which facts to give the floor, and in what order or context.... [...].The historian is [therefore] necessarily selective. The belief in a hard core of historical facts existing objectively and independently of the historian is a preposterous fallacy, but one which it is very hard to eradicate. (Carr, 1961, p.12)

His ideas led by the 1990s to a subjective and almost relativistic understanding of history where its narrative output is seen as a creative process, "an act of the imagination". According to Keith Jenkins and Alun Muslow, this imaginative, constitutive element:

gives history qua history the unavoidable status of being *fictive*. Not, let us note immediately, the status of being a piece of fiction - for in fiction the imagined goes 'all the way down' - but fictive in the sense of *fictio*; that is to say, made up, fashioned, created, fabricated, figured. (Jenkins & Munslow, 2004, p. 3)

In such a way history becomes a story based on a necessarily subjective data-selection practice. And Munslow states:

There is no objective quality to the process of evidence selection. There is no invisible yet empirical hand that directs the historian [...]. Writing a historical narrative is a creative process. It results from the historian's imagination as much as it is the garnering of any structure or meaning that he or she may or may not believe already exists in the source. (Munslow, 2001, para. 27)

Munslow designates this creative process as the historian's self-consciously made "story space" viewed for "what it is - an invention, a tool for doing things with the past that impacts back upon how we think about it and what we want out of it." (Munslow, 2007, p. 19). Hayden White, for his part, considers that different historians will seek out different facts because they have different kinds of stories to tell. Each derives his "history" from:

a plenum of documents that attest to the occurrence of events, [that] can be put together in a number of different and equally plausible narrative accounts of 'what happened in the past', accounts from which the reader, or the historian himself, may draw different conclusions about [...] the present. (White, 1975, p. 283)

Thus White sees history as plural, as does Jenkins for whom as well there are always many "histories" that tell many stories (Jenkins, 1991). All these "new" understandings of history as multiple possible histories, as creatively fabricated, echo Media Archeology's idea of various possible histories of a same media or situation.

The construction of history can then be considered as analogous to the artistic process both at the level of data selection and that of narration. Munslow suggests that:

Experimental history has an aesthetic dimension as its narrative is constructed artistically: Since what we think about the past can only be understood as we write it, then experiments with narrative become decisive. As dancers choreograph their performance, historians historiograph theirs. History is as much about the 'historian's performance' the way he or she constructs or stages his or her narrative and invites a responsive understanding from the audience as it is about the past itself. (Munslow & Rosenstone, 2004, p. 11)

He emphasizes the subjective agency of historical research and implies its creative scope.

Thus my own data selection strategy has been a considerably creative exercise. It has consisted in following a subjective and intuitive journey, informed by my practitioner's experience and knowledge of the field - and in relation to what resonates with my own practice - across a purposively chosen sample of material concerning music, art, film and technology history, music and image practice and recent documentation on VJing and Live Cinema. Thus I have sought out information in relation to the particular musical-aesthetic centered "story" of improvisatory Live Visuals I was interested to tell in this study. I consider this particular story to represent but one among many stories of the form. My choice of documentation was also determined by material I knew was available (or possible to find) by way of my personal involvement with the video scene since the early eighties and with the contemporary music milieu. Thus, for example, I have extensively used the Video History online archive project of the Experimental Television Center, in Owego, NY, the existence of which I knew about through residencies in video production I did there, that contains an incredible amount

of written documentation on early synthesizers, and processors, both video and audio, many of which were developed in its spaces.

I have consulted numerous primary and secondary sources of information - in books, journals, edited volumes, catalogues and web resources - guided by my sense of what seemed most "trustworthy" according to either my inside knowledge of the field and the authors of the accounts, articles and studies (personal or by way of relations), or to my insider's intuition. I have privileged first-hand accounts when available and material written by parties I know to have experienced the subject-matter first hand. For information relating to occurrences that took place before my lifetime or before the beginning of my practice in the field, I have, of course, frequently had to rely on whatever I could find, but have always tried to look for what seemed closest possible to the source (i.e. texts by artists, composers, inventors themselves, or reviews thereof, from their particular periods, if possible). For activities and inventions in Live Visuals and music of more recent years, especially since the middle of the 20th century, I have often had to almost exclusively depend on sources found on the web. Some of these sources are actual articles from quite obscure and very limited edition publications of particular times and milieus that are archived in specialized on-line data bases. In fact, at this time, there are more and more remarkable archival repositories on-line such as, for example for my research, the Experimental Television Center's Video History Project, the Center for Visual Music's Online Library, the Daniel Langlois Foundation website with the online component of its documentation collection and the resources of its affiliate Documentation and Conservation of the

Media Arts Heritage (DOCAM) Research Alliance². As well, many publications are now exhaustively archived online, from all the issues of journals such as *Leonardo*, to most catalogs of electronic art festivals like Ars Electronica. Then, in certain cases there was simply no information I could locate except for the personal websites of certain artists or inventors. And for very recent activity sometimes the only available information is on-line announcements or even personal blogs. Finally, in this day and age, there are more and more serious publications that are on-line only. As for published scholarly writing, particularly as to current forms of live video, live cinema and VJing, they are so young that to date there are no more than half a dozen books on the subject and very few articles.

Though my study follows a certain chronological movement, it is not intended as a mere teleological progression. It is rather meant as a succession of miniature case studies, disparate moments, interwoven into a more or less sequential order to allow separate events of approximately similar periods to interact with each other via juxtaposition and to create new meaning. Thus, in the spirit of ideas found in postmodern history and historiography, I have creatively constructed a narrative, a trajectory, that joins together all these case studies according to a logic which emphasizes certain associations at the detriment of others in relation to a subjective position that has no intention of pretending to be complete or of hiding any omissions.

My personal work and experience, not only the practice project presented in partial fulfillment of the requirements of this degree, but also my involvement

² Notably DOCAM's most instructive "Technological Timeline" directed by Dr. Will Straw www.docam.ca/en/technological-timeline.html

of over 20 years in experimental video, and of nearly 10 years in improvisatory Live Visuals and the experimental music and sound art milieu, is central to the research process and the outcome of this thesis.

CHAPTER II:

VISUALS AS VISIBLE MUSIC: FROM VISION TO REALITY

The origins of the creation of projected live imagery in the context of live music performance can be traced to many forms going back to early humans: from shadow figures made by hands in front of fire projected onto cave walls, to sophisticated shadow theater plays with silhouette puppets in various cultures, to magic lantern and phantasmagoria shows in 17th century Europe. However, while all of these are most definitely versions of live visuals, their logic basically belongs to the theatrical arts (where the artist's physical presence usually acts as the medium in some way) and/or to narrative and figurative pictorial representation, as with the images on the glass slides in Laterna Magica spectacles. The idea to "play" projected stimuli for the eyes, live, in real time, in some organized way, as music can be played by a musical instrument, only emerges in the eighteenth century basically stemming from the practice of music itself. The earliest known theories and apparatuses for the performance of live visuals are linked to aspirations of demonstrating direct correspondence(s) between tones and colors.

2.1 Scientific Theories of Correspondence

The aspiration to expressive possibilities as abstract and instantaneous as music for the visual realm is driven by the new philosophical and scientific debates about the possibility of correspondence between music and color of the early eighteenth century. These debates gave rise to a desire for the translation of music into the sphere of the visible (color).

Interest in the relationship between music and color was already found in Greek antiquity. Notably in his treatise "De Sensu et Sensibilibus" (On Senses and what is Sensed), Aristotle proposed the concept of color as a scale working much like a musical note scale. It is not until 1704, however, that English physicist Isaac Newton presented in his book "Opticks" the first ever representation of light by a color wheel. Newton distinguished seven principal colors, or degrees of color: red, orange, yellow, green, blue, indigo and deep violet (Wettlaufer, 2003). This division into seven was influenced by music's organization of sound around seven tones or notes. Newton further believed that colors and musical tones are based on common frequencies or vibrations and thus proposed to correlate the wheel's different colors with the notes of an octave.

Newton was inspired by the musicological work "Musurgia Universalis" (1650) by German Jesuit Athanasius Kircher who had addressed the analogy between tone and color and had come up with an explanation of how, if one could visualize the air movements produced by the sounds of instruments playing, the result would be a wide variety of colors. Kircher is also credited to

have provided in his "Ars Magna" one of the first known descriptions of the principle of the magic lantern (Wettlaufer, 2003; Peacock, 1988).

2.2 The first Color Organ Concept

French Jesuit monk Louis Bertrand Castel, a mathematician and philosopher who had written several well respected scientific works, was familiar with both Newton's and Kircher's ideas. He was inspired by the latter for his own optical theories claiming a correlation between the phenomena of sound and light, and between tones and colors. To illustrate these theories he developed his Ocular Harpsichord (*Clavecin pour les yeux*) (Peacock, 1988).

First proposed in an essay in 1725 in an issue of the *Mercure de France* and then constructed in 1734, Castel's Harpsichord:

consisted of a 6-foot square frame above a normal harpsichord; the frame contained 60 small windows each with a different colored-glass pane and a small curtain attached by pullies to one specific key, so that each time that key would be struck, that curtain would lift briefly to show a flash of corresponding color. [...] a second, improved model in 1754 used some 500 candles with reflecting mirrors to provide enough light for a larger audience [...] (Moritz, 1997, para. 3)

According to California Institute of the Arts professor of film and animation history William Moritz, Castel's invention meant to demonstrate that what had until then been achieved with sound only - the arrangement of different tones in such a way that its effect can be appreciated as a form of art - should be no less possible with light: whereby the arrangement of different colors would

give rise to a new art form, a music of colors (Moritz, 1997). It comes as no surprise then that its design and functioning would be based on the concept of a musical instrument.

This research into a music of colors, was for Castel, a quest to reveal physical connections between sound and light and for the "correct" translation of instrumental music into color to create its exact visual parallel. The Ocular Harpsichord was then not devised as an instrument to improvise with colored light, but rather as an apparatus to display the correspondences between music and color. While the agenda of his invention is then somewhat different from that of the improvised live visuals that can dialogue, in their own right, with music that interest me here, it opened the door to subsequent inventions and developments which contributed significantly to the form as we know it today. It launched the way for the development of a number of mechanical and later electromechanical color organs in England, the U.S., Russia, Italy, until the middle of the twentieth century, a number of which are addressed in this study. These would build not only on Castel's ideas and the musical practices of the times in their geographical locations, but also on the development of lighting technology that would dramatically expand the possibilities for the projection of color and later image.

2.3 A Development Shaped by the Evolution of Lighting

In the 1780s, the Argand oil lamp³ was invented by Swiss physicist and chemist Aimé Argand. It was able to produce a light equivalent to six to ten candles. By 1789, Erasmus Darwin, grandfather of naturalist Charles Darwin, and himself a naturalist, botanist, philosopher, poet and physician, suggested (in his *The Loves of the Plants*, 1789) that a "luminous music", as that suggested by Newton, could be achieved with the help of Argand lamps shining through colored glass and activated by the keys of a harpsichord that could produce music at the same time.

Darwin's idea was brought to realization in 1844 by British inventor D. D. Jameson whose device filtered Argand light through glass containers with liquids of various colors and reflected it onto a wall off metal plates. The same year he released the publication "Color Music" describing his system of notation for color.

By the 19th century gas lighting had spread to streets and households first in Europe and then North America. Gas jets inspired Strasbourg physician, chemist and musician, Georges Frédéric Eugène Kastner to invent, in 1869-73, his Pyrophone or Singing Chandelier (*Orgue à gaz, Flemmes Chantantes*) an internal combustion instrument that produced color and sound by gas jet lighting explosions in crystal tubes. Kastner's instrument emerged out of the Romantic spirit in music of the time, which sought greater expression of

³ The Argand burner was the first scientifically constructed oil lamp, patented in 1784 by Aimé Argand. It represented the first basic change in lamps in thousands of years, applying a principle that was later adapted to gas burners. It truly revolutionized life by providing bright light at night for the first time in history.

emotion. An 1885 article praised its complementarity with music then in vogue:

The flame organ accompanies in an admirable manner the human voice, and is most favorable to the rendering of serious, religious, solemn and choral music, but it can also play in a more lively harmony, as it has been proved at Baden Baden, where the pyrophone played a part in the "Danse des Sylphes" of Berlioz, with the Great orchestra. ("The PYROPHONE at the 'Inventious'", 1885)⁴

The incorporation of color into musical performance fit in with the period's quest for universal harmony as well as greater emotional impact.

Electricity opened new ways of achieving projected color. Bainbridge Bishop's (U.S.) 1877 "painting music" machine designed to be placed on top of a home organ made use of an electric arc lamp⁵ as source of illumination behind colored glass. Alexander Wallace Rimington's (GB) 1893 much better known *Color-Organ* (much like the one for which Alexander Scriabine wrote his 1911 *Prometheus* color-symphony⁶) employed 14 arc lamps and numerous filters that were tinted by aniline dyes and required a 150 amp power supply (Potter, 1951).

⁴ Summary taken from *Musical Opinion*, September 1885, first published in *Musical Opinion and Trade Review*, September 1885. Retrieved December 5th 2011 from *The Organ* magazine website: <http://www.theorganmag.com/archive/pyrophone.html>

⁵ The carbon arc lamp was the first widely-used type of electric light and the first commercially successful form of electric lamp that began to be used especially as street illumination in the 1870s in Europe and North America.

⁶ Rimington's colour organ was at the basis of the instrument called the Chromola by lighting engineer Preston S. Millar that was used to project the "Luce" for the 1915 New York premiere of Scriabin's synaesthetic symphony *Prometheus: A Poem of Fire*.

The primary focus of these "organs" remained either the representation of sound by color or the synchronization of music with colored light in order to obtain what was believed to be the "true" correspondence pattern, based on physical analogy, between colors and sounds. In fact each proposed its own color scale, derived according to different calculations between vibration frequency values of light and sound (some based on the diatonic others on the chromatic scale), that would be mapped to one or more keyboards with the help of which one could perform the color music of existing musical compositions by playing the notes of their scores while a regular organ played the sound of the music. (None of these instruments could even produce any sound in and of themselves except for the *Pyrophone*).

2.4 Liberation From Romantic Form

With Bishop and Rimington emerges a conception of color music as painting with light on a canvas, and both actually set up special systems of screens to project their colored lights onto. In his 1895 essay "A New Art: Colour-Music" Rimington even suggests an art of the future of pure color:

There has, in fact, been no pure colour art dealing with colour alone, and trusting solely to all the subtle and marvelous changes and combinations of which colour is capable as the means of its expression. The object of the present invention is to lay the first stone towards the building up of such an art in the future. The chief problem, then, that the new art sets itself is to introduce mobility into colour, and with this changefulness, the three great influences of Time, Rhythm, and Combination, slow or rapid and varied. (Rimington, 1985)

Thus, he says, color could be freed from the constraints of form and "dealt with for the sake of its own lovelines".

Rimington's concept can be associated with a general movement of Ideas of liberation from the Romantic era's constraints of form that were in the air across the arts at the end of the 19th century. Philosopher Andy Hamilton, in his *Aesthetics and Music* (2007), points out the interesting congruence between the different arts at the time "in their overturning of traditional aesthetic norms". While architecture rejected decoration, literature saw non-traditional forms, such as stream of consciousness writing, supplant linear narrative as well as realism and naturalism, and poetry abandoned conventional metric and rhyming patterns.

But the most interesting congruence [he says] is between visual art and music, which abandoned post-Renaissance perspective and tonality respectively. [...] painting and picturing became separated [...] In music, the 18th and 19th century "era of common practice", based on the tonal system of major and minor keys, came to an end. (Hamilton, 2007, p. 155)

Thus as painting freed itself from the strict rules of composition of the Classic and Romantic periods, music, that had until then been organized around a tonal center and metrical periodicity, underwent a complete breakdown of tonality. This breakdown, of which the precursor is considered to be Wagner with his 1857 *Tristan and Isolde*, gave way to various post-tonal tendencies, notably Impressionism, lead by Debussy, that was inspired by the Impressionist painters' sensibility developed through their focus on the optical effects of light and their abstract approach to color.

2.5 Playing Colors Just Like Playing Music

While Rimington foresaw a new art of the future of pure color, he didn't put it into practice. It is only by the early decades of the twentieth century that color or light organs not intended to reveal or express any direct association between light and sound began to appear, marking the emergence of the idea of pure light manipulation as a new art form in its own right. Though during the same period the art of motion pictures was gaining acceptance as a new form as well, it was focused on the reproduction and representation of reality through the recent possibility of showing movement, especially human movement, and soon through story-telling adapted for the movie screen, while offering no live dimension. In essence it transposed theater to the novel technology of film into a fixed form without at the time seeking to create a new visual language based on its unprecedented features, something that would only happen later with the incorporation of film to avant-garde art practices.

In 1919, in Philadelphia, American concert pianist and inventor Mary Hallock-Greenewalt developed her *sarabet*⁷ (1919) initially by way of research into how colored lighting could enhance the emotional expression of music. Very soon, however, she became interested by the possibility of an independent colored light-producing device that presented no correspondences between colors and particular notes and could be played live. She named the new form she assumed to have discovered "Nourathar", a word adapted from the Arabic words *nour* (light) and *athar* (essence). The rheostat and eight other inventions were patented by Hallock-Greenewalt for this project (Betancourt, 2005).

⁷ The *Sarabet* was named in honor of Hallock-Greenewalt's mother Sara Tabet.

In the meantime, also in 1919, in New York City, Danish-born American musician, artist and inventor Thomas Wilfred developed his "Clavilux" (derived from Latin meaning light played by key) for what he too believed to be a new "eighth art". He coined this new art of light "Lumia". It consisted in the pure manipulation of light that he considered should be performed in complete silence. While Wilfred proclaimed "Lumia" as an unprecedented performance art form, independent of music, (and even established an "Art Institute of Light" in New York City), his "Clavilux" had quite a few similarities with a pipe organ and he is said to have referred to its "keys", "stops", etc. (Eskilson, 2003). Kenneth Peacock describes Wilfred's complex device:

Wilfred's main instrument, employing six projectors, was controlled from a 'keyboard' consisting of banks of sliders. An elaborate arrangement of prisms could be inclined or twisted in any plane in front of each light source. Color intensity was varied by six separate rheostats which Wilfred operated delicately with his fingers. Selection of geometric patterns was effected via an ingenious system of counterbalanced disks. (Peacock, 1988, p. 405)

The techniques he developed would later be revisited by artists creating "laseriums" and especially "liquid light shows" of which I will speak at length further on.

Hallock-Greenewalt's "sarabet" was, for its part, according to Peacock again, an "elaborate instrument" that was "operated from a small table-like console" where "a sliding rheostat controlled the reflection of seven colored lights onto a monochromatic background." (Peacock, 1988, p. 404). Unlike all the other color organs invented until then, it was not controlled by a keyboard. Instead, says Michael Betancourt:

In place of a keyboard, the Sarabet had a console with graduated sliders and other controls, more like a modern mixing board. Lights could be adjusted directly via the sliders, through the use of a pedal, and with toggle switches that worked like individual keys. (Betancourt, 2008, p 47)

Hallock-Greenwalt used variations in luminosity in the same way nuances are used in music in order to be able to express emotions by means of timed variations of light and color. She believed that such expression was interesting for its own sake.

The "Sarabet" as well as the "Clavilux" stand out in their capacity of being designed to function autonomously from music. However, both Wilfred and Hallock-Greenwalt conceived performance on their instruments in terms of interpreting pre-composed scores. In fact Hallock-Greenwalt even patented a new notation system for her "Sarabet". While any kind of improvisatory approach to visuals is still a long way off at this point, autonomy from direct correspondence to music will open the way to concepts of this new art form that will begin to incorporate the idea of actual collaboration with music.

In this chapter my objective has been to point out how the idea of "playing" visuals, projected stimuli for the eyes, in real time, in the same way as a musical instrument, originates from the very practice of music. I have presented a number of examples of inventions of various color organs coming from approaches based in music that, as of the 18th century, have attempted to achieve a "correct" translation of tones into colors inspired by theories of physical connections between sound and light that had been around since

Antiquity. While many more inventions and apparatuses have seen the day during the period covered, I have chosen a limited selection about which information was readily available to me and that illustrate my purpose well. My brief overview has accentuated how, in spite of advances in lighting technology and electricity which contributed to the sophistication of color organ concepts, it was not until the beginning of the 20th century that any "instruments" for Live Visuals, meant to function autonomously from music, as an art form in and of themselves, are known to be devised. The following chapter will examine how over the 20th century the idea of Live Visuals as a form on equal footing with other arts will evolve with the spirit of intermediality of a number of total art movements that will mix artistic disciplines in new kinds of manifestations.

CHAPTER III:

MUSIC AND VISUALS AS SEPARATE ENTITIES: THE SPIRIT OF INTERMEDIALITY

In early 20th century Europe a number of other color organ-type inventions closely correlating colored light with music continue to appear. Their impetus, though, is no longer the goal of scientifically demonstrating color-tone correspondence of earlier attempts. Rather, they stem from ideas derived from the notion of a "total artwork", or *Gesamtkunstwerk*, bringing together all the arts into a single form, that Richard Wagner theorized in his 1849 essay "The Artwork of the Future". Wagner proposed that all the arts should cooperate in a new "complete drama", that according to him should be opera, a notion considered unprecedented and visionary at the time. Wagner's *Gesamtkunstwerk* would inspire a multitude of conceptions of interdisciplinarity, of combinations of arts, promoted by different avant-garde movements of subsequent years. Futurism, Constructivism, Dada, and Bauhaus, and variations thereof, would lead to major shifts in the period's post-impressionist art and music tendencies and would embrace the emerging technological innovations of the time such as film, radio and recording. As they came to North America after WW2, the ideas of these early 20th century European movements generated a profusion of new interdisciplinary contemporary art approaches notably Intermedia and mixed-

media that were particularly interested in integrating every possible type of new technology alongside painting, sculpture, poetry, dance, music, etc. Simultaneously electronic audio synthesis was gaining acceptance as a form of musical composition while video was becoming accessible outside the television industry motivating creative research into video synthesis as a form of performance usually in conjunction with music. Throughout all of these novel conceptions and approaches Live Visuals were increasingly considered on equal footing with music, and other art forms, and eventually gained a voice of their own.

3.1 Total Movements

Futurism, a mainly Italian movement, experimented with, and combined, an extraordinary variety of materials, techniques, art forms and media, to glorify all dimensions associated with contemporary visions of the future such as speed, technology, industry, and their derivatives like cars and airplanes. The movement originated with Marinetti's "Futurist Manifesto" of 1909, which he arranged to have published in *Le Figaro* in Paris. It soon attracted many other young Italian artists including: Carrà, Boccioni, Russollo and Balla. The Futurist spirit of innovation and rebellion spanned the years between the First and Second World Wars, attacking and integrating all possible outlets of art and technological developments of the time, including radio which was then emerging (Goldberg, 1988).

Following the publication of Marinetti's manifesto in Russian, Futurism was reinterpreted in Russia's context of reaction against the old order of both the

Czarist regime and imported art styles from Europe. Groups of writers and artists formed throughout the major cultural centers of St.-Petersburg, Moscow, Odessa and Kiev, and soon began organizing events consisting of unconventional combinations of debates, with exhibitions and various presentations of poetry, theater, dance, music, and "home-movies". Among the prominent figures of this era were Tatlin, Lissitsky, Rodchenko, Gabo, Malevitch, Pevsner, the poet Mayakovsky and the film directors Vertov and Eisenstein. They layered different media to create Agitprop propaganda and develop the theory of *montage*, that replaced sequence by fragmentation, to achieve a fusion of space, time and illusion with reality (Goldberg, 1988).

In Zurich, in 1916, Hugo Ball, a young man deeply involved in theater, and fascinated by Wagner's *Gesamtkunstwerk* concept, and his partner Emmy Hennings, opened a café-cabaret: the now legendary Cabaret Voltaire. The Dada movement grew out of the cabaret's artistic stage evenings made up of collaborative contributions, by, among others, Tzara, Janco, Huelsenbeck, Jean Arp and wife Sophie Taeuber, in productions including live reading, dance, song, costumes, and masks. It soon established itself as a "tendency in art", centered on scandal, that was ready to question the very structure of art itself as well as its relationship to the art world and society as a whole. With their multi-dimensional stage productions, where they played their own "noise music" with "instruments" such as baby rattles and jangled keys or tin cans, and read and recited simultaneous poems and manifestos, the Dadaists, like the Futurists before them, wanted to incorporate the realities of modern life into art because they believed these could speak more loudly than any painting (Goldberg, 1988).

In Germany, at the time, similar ideas were emerging. However, unlike the rebellious Futurist and Dada provocations, Walter Gropius's "Bauhaus Manifesto" (1919) romantically called for the unification of all the arts in a "cathedral of Socialism" celebrating technology. This vision was much like the Russian Constructivist politico-artistic fusion ideal. Gropius was convinced of the need to create an art practice where the unity between artist, architect and craftsman could be achieved by training not only artists and architects, but also engineers, designers and theater people, to believe in a synthesis of the arts and in the beauty of progress. In 1919, he founded in Weimar a unique teaching institution for the arts: the Bauhaus. At the Bauhaus the microcosm of the stage was the most suitable experimental field for Gropius's concept of "Total Theater" with "a great light-and-space keyboard, so impersonal and variable that it confines [the universal producer] nowhere and remains flexible to all visions of his imagination" (Moholy-Nagy, 1969, p. 53; Kostelanetz, 1968, p. 13).

The ideas of these movements forever transformed the understanding and practice not only of art but also of music as well. Thus Futurist Ferruccio Busoni's *Sketch for a New Aesthetic of Music* (published in 1907) proposed dissonant and electric sounds for musical composition, while Luigi Russolo's futurist manifesto "L'Arte dei Rumori" 1913 (The Art Of Noises) proclaimed noise as the sound of the 20th century. Russolo even built his own noise machines or "intonarumori". In the meantime, in Austria, Arnold Schönberg completely abandoned tonality (1908) and established a 12-tone technique of chromatic serial music that Futurist composer Francesco Ballila Pratella proclaimed as "futurist" in his own 1911 manifesto "Futurista Musica" (Rainey, Poggi, & Wittman, 2009).

Thus the color organs of this period incorporate all these developments and ideas. The "Optophonic Piano" (1924) by Russian painter Vladimir Baranoff Rossiné was a futurist project. With this instrument that generated sounds and projected revolving patterns, Rossiné introduced the concept of textured colored glass disks which he painted himself. Bruno Corra's and Arnalso Ginna's color piano (1911) also emerged out of Futurist ideas, and Corra and Ginna, dissatisfied by the result of simple colored lights were first to incorporate film into their color music, an idea rather similar to using "found" sounds in musical performance. Leon Theremin's "Illumovox" (1922), for its part, was designed to project colored light while functioning in conjunction with his "Etherphone" (that would later be simply called Theremin), the first known instrument to take up Busoni's idea of using electricity to make music and that was created within the climate of Constructivism in Russia. These instruments embraced the new ideas of the time and were in no way intended for the visual translation of music as had been their predecessors.

3.2 Film as Chromatic Music

As they strove for "polyexpressiveness", the Futurists held the new medium of film as the supreme art of the time because of its capacity of embracing all other art forms by virtue of its technological possibilities. They recognized, perhaps before anyone else, that film could rival the condition of music, particularly if approached abstractly. Already in 1912 Bruno Corra published a paper entitled "Abstract Cinema - Chromatic Music" describing experiments carried out with his brother Arnalso Ginna on the "chromatic piano",

mentioned above, and their use of film for the production of abstract color symphonies (Rainey, Poggi, & Wittman, 2009).

As the tendency for diverse art forms to come together into various "total" experiences spread to different art movements and countries, more and more artists began to explore the potential of the film medium and film technology, notably projection, in their multi-media experiments.

At the Weimar Bauhaus School, with its focus on the fusion of art and technology, Ludwig Hirschfeld-Mack and Kurt Schwerdtfeger were using reflected light projections to create each their own version of *Reflektorische Farblichtspiele* (Reflecting Color-Light-Play) in the context of the famous Bauhaus Lantern Festivals (Sharp, 1995). In 1923, the Bauhaus faculty was joined by Hungarian László Moholy-Nagy.

3.3 Moholy-Nagy

Moholy-Nagy had been interested in film for some time before his arrival to the Bauhaus. A year earlier he had already written his thoughts about film:

filmmakers [should] use film's resources of "color, plasticity and simultaneous displays, either by means of an increased number of projectors concentrated on a single screen, or in the form of simultaneous image sequences covering all the walls of the room." (Zinman, 2009, para. 6)

He also formulated, according to Gregory Zinman, ideas regarding "light cannons" that would project images onto clouds or gas, mobile projectors, malleable screens, and public light displays and spoke of "light composition" where light could be controlled "as a new plastic medium, just as color in painting and tone in music" (Zinman, 2009).

Thus, upon his arrival to the Bauhaus, Moholy-Nagy began to experiment extensively with light and film with his students and colleagues. There he would develop his "simultaneous or polycinema". According to Heide Hageböling, "Moholy-Nagy's Polykino was a room with various slanted or spherical projection surfaces and several acoustic levels" where different films were run simultaneously. Variable screens were also taken into consideration". (Hageböling, 2004, p. 12). While he did not work much in relation to music (aside from playing phonograph records when he projected his films), he had a major influence on alternative approaches to film projection and its live dimensions.

3.4 Oskar Fischinger

It was the interest in the combination of painting and music into a new art form of another Hungarian, composer Alexander Laszlo, based in Berlin at the time, that would indirectly contribute to one of the earliest and most important instances of multiple-projection abstract film performance with musical accompaniment. In 1925, Laszlo conceived his *Farblichtmusik* concerts for which he created his "Sonchromatoscope". The "Sonchromatoscope" generated a four-part projection that was the result of

turning disc slides, colored lights and abstract forms (Keefer, 2009; Peacock, 1988). These were combined by a complex amalgamation of technology:

The Sonchromatoscope consisted of a switchboard used to operate it, along with four large and four small projectors that were connected with one another. The switchboard was equipped with keys and levers and was described as being "similar to a harmonium". (Scheel, 2006, para. 17, "The Sonchromatoscope")

This system enabled the controlling and mixing of all the sources. Here again, however, as with some earlier systems mentioned, a precise score was followed by an operator to obtain the four-part projections for which Laszlo composed the music himself.

After first working with German painter Matthias Holl for the imagery of the slides, Laszlo soon enlisted the collaboration of the then young, Munich-based, experimental filmmaker Oskar Fischinger to provide reels of abstract films that were screened from multiple projectors simultaneously with the visuals of the "Sonchromatoscope". Cindy Keefer writes that "this became the first public multimedia event using abstract cinema, combining Fischinger's films with László's light projections, music and painted slides" (Keefer, 2005). Prior to collaborating with Laszlo Fischinger had been involved in the German movement of "absolute films". Already in 1919 Walther Ruttmann had conceived of a form of "painting in time" by way of film technology. He began presenting his abstract hand-painted film reels with live music, notably his *Lichtspiel Opus I* in 1921 in Frankfurt. In the early 1920s this gave rise to screenings accompanied by live music by a group of artists around Ruttmann interested in the idea of a universal absolute language of form in motion that

included Hans Richter, Viking Eggeling and the young Fischinger (Keefer, 2005).

Fischinger did not work long with László. He soon composed his own multiple projector shows, with a system consisting of, as described by William Moritz:

three side-by-side images cast with three 35mm projectors, slides to frame the triptych, and at climactic moments, two additional projectors which overlapped the basic triptych with further color effects. (Moritz, 2004, p. 12)

And by 1926 he created and performed several film shows titled *Fieber* (Fever), *Vakuum*, *Macht* (Power) and later, *R-1 ein Formspiel* to various live percussive accompaniment. He believed that this multi-projector performance work represented a new art which he called *Raumlichtmusik*, and later *Raumlichtkunst*, (his own version of the *Gesamtkunstwerk*) (Keefer, 2005). Cindy Keefer quotes Fischinger on *Raumlichtmusik* from an unpublished typescript:

“Eine neue Kunst: Raumlichtmusik” [The new art: Room or Space, of Light and Music]: Of this Art everything is new and yet ancient in its laws and forms. Plastic – Dance – Painting – Music become one. The Master of the new Art forms poetical work in four dimensions...Cinema was its beginning... Raumlichtmusik will be its completion. (Keefer, 2009, p. 2)

He thus underlined that his concept originated in the film medium. According to Moritz, however, Fischinger did not at all see his imagery as musical visualizations, but rather considered that its qualities were parallel to the ones found in music (Moritz, 2004).

In the late 1940s, years after his immigration to the U.S. (1936), Fischinger also invented the "Lumigraph", an instrument that can be seen as a type of color organ, which allowed to play lights to any music very simply. William Moritz explains how it worked:

His Lumigraph hides the lighting elements in a large frame, from which only a thin slit emits light. In a darkened room (with a black background) you can not see anything except when something moves into the thin "sheet" of light, so, by moving a finger-tip around in a circle in this light field, you can trace a colored circle (colored filters can be selected and changed by the performer). Any object can be used: a gloved hand, a drum-stick, a pot-lid (for a solid circle), a child's block (for a square), etc. (Moritz, 1997, para. 15)

It required two people to operate: one to make changes to colors, the other to manipulate the screen. In a certain sense this concept had many similarities with puppet (or rather marionette) theater but completely abstract and articulated around lighting. He used the apparatus for several public performances in the early 1950s in Los Angeles and one in San Francisco and would often play it, with his daughter Barbara, at his home studio for visitors.

3.5 Fischinger's Legacy in the U.S.

Fischinger is considered to be the direct link between the European avant-garde film scene and an emerging American West Coast experimental film milieu (Moritz, 1979; Zinman, 2009). In 1936, upon an invitation from Paramount Studios, Fischinger moved to Hollywood, where he would later

also work for MGM, Orson Welles and Disney (on "Fantasia"). According to William Moritz, Fishinger was the foremost influence on a whole generation of non-objective, or abstract, filmmakers in California during the 40s and 50s, from the Whitney brothers to Kenneth Anger to, more importantly, Harry Smith, Hy Hirsh and Jordan Belson who would experiment with live film performances that would set the stage for the 1960s psychedelic liquid light shows (Moritz, 1979).

Fishinger's influence is also significant for contemporary music. Indeed, in 1937 the young John Cage worked on the animation of his project "An Optical Poem" upon the recommendation of the art dealer Galka Scheyer. Fischinger's Buddhist-inspired conceptions about the inherent sound of all objects steered Cage towards his decisive life-long search for the music in natural sounds, chance noises and silence (Moritz, 2004). In a conversation with Daniel Charles, Cage talks about his first meeting with Fischinger:

He began to talk with me about the spirit which is inside each of the objects of this world. So, he told me, all we need to do to liberate that spirit is to brush past the object, and to draw forth its sound. (Cage & Charles, 1981, p.74)

This idea, says Cage, was what inspired him to explore percussion in a completely different way.

At the time, in Los Angeles, an independent film scene had begun to form since the 20s in the shadows of the Hollywood movie industry. Some of the work was simply experimental, some already non-objective. From the early

twenties Dudley Murphy had made films he called "Visual Symphonies", while Robert Florey, Slavko Vorkapich, Alla Nazimova, Boris Deutsch, Harry Hay and LeRoy Robbins had created a variety of different kinds of experimental cinema. European tendencies in art film were known through the many artists who came to work in Hollywood because of the rise of fascism. Also, the 1936 exhibition of Dada and Surrealist art at New York's Museum of Modern Art was instrumental in generating the circulation of information about European avant-garde work in magazines and newspapers (Moritz, 1996).

A significant influence on this scene was American experimental filmmaker Maya Deren who came to live in L.A., from NY, in the early 40s. In addition to producing her seminal "Meshes of the Afternoon" at the time, she also encouraged a number of young people experimenting with film, such as Kenneth Anger, Gregory Markopoulos and Curtis Harrington, to create 16mm experimental films that could be considered as artworks in and of themselves (Moritz, 1996).

Also of note, from an innovation point of view, was the "MobilColor" projector of artist-inventor Charles Dockum who settled in Los Angeles in the late thirties. Born in Texas in 1904 where he earned a degree in electrical engineering, Dockum had moved, for health reasons, to Arizona where he began developing projection machinery that could perform visual symphonies of layered movements of varied over-lapping color with abstract imagery. He named this new silent art form "MobilColor" and experimented with polarized light, crystals, filters, oil drops on water, prisms, lenses, magnifying glasses, among others. In 1936 he gave his first public demonstration at Prescott, Arizona. In California he would develop six more models of his projector until

1977. He also performed at well respected venues such as the Pasadena Playhouse and the California Institute of Technology. His performances were seen by many emerging local experimental filmmakers of the period and were greatly appreciated, notably by the Whitney brothers. Dockum also became friends with Fischinger through the Guggenheim foundation that supported both the artists' work, as well as that of the Whitneys, in the 40s when it was curated by Baroness Hilla von Rebay (Moritz 1996, 1997; Keefer, 2005).

After World War II, presentation venues for experimental and art film multiplied in Los Angeles. And in San Francisco a series of events entitled "Art in Cinema", curated by Frank Stauffacher at the San Francisco Museum of Art, began as of 1946, to present alternative, experimental and abstract film and filmmakers including the Whitneys and Oskar Fischinger. This series would inspire the then young painters Jordan Belson and Harry Smith to experiment with film (Moritz, 1999). Both Smith and Belson would later be pivotal for the development of the "light shows" of the 60s.

3.6 Improvising to a New Jazz

In the meantime, the post-war years also saw a transformation in jazz which had, with the Swing era, been the popular dance music until then. After the war, financial support declined for the big Swing bands and "Bebop" emerged. Bebop was centered on virtuosic soloists supported by small ensembles or "combos" and highlighted improvisation. According to Piero Scaruffi in his *A History of Jazz Music 1900-2000*, the new heroes were Benny Goodman's guitarist Charlie Christian, Duke Ellington's bassist Jimmy Blanton, Earl Hines'

alto saxophonist Charlie Parker, Cab Calloway's trumpeter Dizzy Gillespie, Coleman Hawkins' pianist Thelonious Monk, Count Basie's saxophonist Lester Young, Louis Armstrong's saxophonist Dexter Gordon, etc. Thus, jazz musicians who had been "first and foremost, entertainers", now "became experimenters, explorers, even scientists" he explains. While Big Band Swing had been considered to be entertainment, for dancing, Bebop was seen as art music, for listening. This structurally and emotionally more complex jazz moved from the masses to the elite and began to attract a new audience of intellectuals and artists (Scaruffi, 2007).

All of a sudden jazz would serve as a major inspiration to many art forms of the time. Painters, such as Piet Mondrian or Henri Matisse sought to re-create its rhythms and colors. In the world of classical composition French composer Darius Milhaud had already used jazz elements by 1923 in his "La Création du Monde". In 1945 Igor Stravinsky wrote his "Ebony Concerto" for the Woody Herman band. This was followed by works by Gershwin, Bernstein and many others. As well, improvisatory methods developed in Bebop opened the door to a whole new world of improvisation in contemporary music. And this improvisatory aspect would make a huge impression on a circle of writers and poets who later became known as the now infamous Beat movement (Belgrad, 1999).

The Beats found in Bebop jazz a completely different approach to the creative process. It inspired them to develop a style sometimes called "bop prosody" which is characterized by free-verse, stream-of-consciousness, clusters of words often blurted out in energetic bursts without punctuation for long passages, recreating in poetry the rhythmic spontaneity of Bebop solos. Jack

Kerouak is said to have referred to this as "blowing" (as a jazz musician) and Alan Ginsberg has described his improvisational writing technique as "composing on the tongue". On the West Coast the poets loosely related to the movement, notably Lawrence Ferlinghetti and Kenneth Rexroth, were so inspired by jazz that they began to perform their poetry readings to live jazz accompaniment at the San Francisco jazz clubs. (Belgrad, 1999; Janssen, 1994)

No less inspired by the bop music in the San Francisco scene was also the folk musicologist, painter and filmmaker Harry Smith. In the 40s he was creating bewitching abstract animations, inspired by mysticism as well as surrealism and dada, often hand-painted directly onto the celluloid. In the late 40s and early 50s he began projecting these and manipulating them live to live jazz, such as Dizzie Gillespie or Thelonius Monk, at the jazz clubs. Moritz describes Smith's process:

Jazz clubs like Bop City featured live music until late at night, and Harry Smith sometimes projected his abstractions (hand-painted directly onto the filmstrip) on the wall while the band played, as a kind of "light show." Using Hirsh's multi-speed projector, Smith could modulate the images to fit the jazz improvisations. (Moritz in Keefer, 2005, "American Experimentation" section)

Thus Smith was perhaps the first to attempt any form of improvised live visuals to live music. His "Heaven and Earth Magic" project, that he began in 1957, was intended as an expanded cinema work utilizing a diverse array of equipment including multiple projectors, magic lanterns, stroboscopic devices as well as slide overlays, special masking and colored gels over projector

lenses (Keefer, 2005). After Smith's death, artist M. Henry Jones, who closely collaborated with him on an ongoing basis since the 70s, has been recreating this and other works of his as multi-projection performances.'

Smith is furthermore considered to have laid the foundations for the psychedelic light shows as he is reputed to have been the first to devise equipment for "casting oil colors on a mirror through a projector and projecting it onto the wall, which grew into the psychedelic mixed-media light shows of the 60s" that he left behind when he left San Francisco, remembers Alan Ginsberg. Legend has it that it was this equipment of Smith's that was used by the original Grateful Dead light show (Ginsberg/Willner, 1993-94).

Also known to have created multiple-projection performances with live jazz is Hy Hirsh, who had collaborated with Smith and often lent him his multi-speed projector (Keefer, 2005). Hirsch had worked at Columbia Studios in the 30s as editor, cameraman and still photographer. In the late 40s he worked with Smith on his "Film No. 4" as well as in the capacity of technical assistance for Frank Stauffacher, Jordan Belson, Patricia Marx and Larry Jordan. By the 50s he was creating his own abstract animation films (even receiving awards at the 1958 Brussels Exposition) that he played at jazz clubs.

3.7 Approaching Projections as Composition

In the late 50's a new scene was also forming around the music department of Mills College in Oakland, California, based on the then emerging form of tape music. Tape music had been spreading throughout different cultural

centers at the time. According to François Delalande, the development of technologies for the recording of music, from the gramophone to tape, and even beginning with the invention of musical notation, has taken it from the realm of reproduction and conservation to new creative approaches to composition (Delalande, 2004). Already by 1946 when a school for avant-garde composition was established in Darmstadt, Germany, it took on magnetic tape as a new "instrument". In 1948, in Paris, Pierre Schaeffer created a laboratory for what he called *musique concrète* (music made of noises, not notes). It would soon become known as the Groupe de Musique Concrète. Here he and composer Pierre Henry collaborated on "Symphonie pour un homme seul", the first major work of *musique concrète*. By 1950 the Cologne radio station NWDR (Nordwest Deutsche Rundfunk) also began setting up an electronic music studio focused on music produced by electronically generated sounds (via generators and modifiers) that would become known as *Elektronische Musik*. Karlheinz Stockhausen worked extensively in this studio. In New York members of the "New York School" (composers John Cage, David Tudor, Christian Wolff, Earle Brown and Morton Feldman) formed the Music for Magnetic Tape Project within which Cage completed his "Williams Mix" in 1953. And in Tokyo the Japanese Broadcasting Corporation founded in 1954 the NHK Studio for electronic music. In 1955, in Milano, the Radio Audizioni Italiane (RAI) opened the Studio de Fonologia Musicale which was directed by composers Luciano Berio and Bruno Maderna. And by 1958, Pierre Schaeffer founded with Luc Ferrari and François-Bernard Mâche a new *musique concrète* group, the Groupe de Recherches Musicales (GRM), that attracted many electronic and tape music composers, notably Iannis Xenakis and Bernard Parmegiani (Holmes, 2002; Holmes 2008).

The dynamic San Francisco tape music scene that grew out of Mills College, for its part, also gave rise to a fresh approach to live visuals. Tony Martin, a young painter at the time, moved to San Francisco in 1959 after completing his studies at the Chicago Art Institute. In the early 60s he began experimenting on his own with various lenses, mirrors, prisms, glass, motors and an old variable-speed 16mm movie projector, to create non-illustrational "light in motion" in his painting studio. Friends suggested he should meet Ramon Sender who was studying at the San Francisco Conservatory (with Robert Erickson) working with tape recorders and unconventional sounds. Sender introduced him to composer Morton Subotnick who had just completed graduate studies at Mills College and was teaching there. Sender and Subotnick - both interested in electronics - formed the Jones Street group in San Francisco (at a Victorian mansion on Russian Hill) to pool their equipment together and invited Martin to join. Their equipment essentially consisted of tape recorders, audio oscillators and interactive tape systems and they were interested in the live possibilities of tape music in conjunction with live acoustic musicians. Soon composer Pauline Oliveros joined them - working on her unique tape-loop and-delay systems - as well as the brilliant technician Michael Callahan. The Jones Street group became the San Francisco Tape Music Center in 1962 and in 1963 moved to a building on Divisadero Street in Haight-Ashbury (where experimental dancer-choreographer Ann Halprin had also established her studio). The Center organized a concert series of experimental music, "Sonics", with a primary focus on tape music. Martin, who had begun collaborating with the composers ever since he met them, became the Center's visual composer (Bernstein, 2008; Martin, 2008).

Using light, various optics on a turntable, pieces of glass or other materials to create textures, an overhead, and his 16mm film projector with discarded film as an "instrument", for collaborative projects with Oliveros, Sender, Subotnick, Ken Dewey and choreographer Ann Halprin, Martin explains that he created visual compositions that were in no way meant to simply ornament the music/sound (Martin/Bernstein & Payne, 2008). According to David Bernstein and Maggi Payne:

A unique working relationship existed among these artists. In each project, they worked together toward creating a synergetic whole, a unified artistic conception fusing both the visual and the aural. Martin's influence was a major factor in the evolution of this collaborative aesthetic. The Tape Music Center was a closely knit community, which would band together to create fully integrated mixed-media works. But each of the artists working in the center always maintained his or her individuality. Martin never conceived of his light projection as accompaniment for the music or theatrical action. He created light compositions that were orchestrations of visual forms in motion inhabiting a discrete parallel universe. (Martin/Bernstein & Payne, 2008, p. 146)

Martin's compositions were both improvisatory and scored to some extent much like the music that was being developed by the composers working there. He describes his approach as "chance plus choice". He loved to incorporate natural phenomena into his compositions (using organic materials that would decay or change through chemical reactions over time) and allowing things to happen. At some point he saw Elias Romero's liquid projections (which will be addressed further) at an event and began exploring liquids in addition to the range of equipment and materials he had been using until then (Martin, 2008; Bernstein & Payne, 2008).

By 1967 the Tape Music Center became affiliated with Mills College for funding reasons and moved to Oakland becoming the Mills Tape Music Center and soon all its founding members left.

3.8 Spheres of Inter-dispersed Sounds and Visuals

Tape music was also, directly and indirectly, at the origin of a series of singular evenings, transporting live visuals to unprecedented dimensions that took place at the California Academy of Science's Morrison Planetarium in the late 50s. San Francisco based filmmaker Jordan Belson, mentioned earlier, who had been greatly impressed by the films of Fischinger, Hans Richter, Norman McLaren, the Whitneys, as well as Harry Smith and others, that he saw at the Art in Cinema, and much inspired by Fischinger's performance on his Lumigraph which he had seen at the San Francisco Museum of Art, was in 1957 asked by composer/sound artist Henry Jacobs to join forces to organize the now legendary Vortex Concerts. For these immersive concerts of avant-garde and electronic music accompanied by live visual projections, Jacobs would program the music and audio experiments, while Belson programmed the visuals (Keefer, 2009). In the Vortex 4 program notes (1958) they described their concept thus:

Vortex is a new form of theater based on the combination of electronics, optics and architecture. Its purpose is to reach an audience as a pure theater appealing directly to the senses. The elements of Vortex are sound, light, color, and movement in their most comprehensive theatrical expression. These audio-visual combinations are presented in a circular, domed theater equipped with special projectors and sound systems. In Vortex there is no separation of audience and stage or screen; the entire

domed area becomes a living theater of sound and light. ("Vortex" section, History of Experimental Music in Northern California website⁸)

Their concept was thus a total theater of pre-recorded image and sound projections combined and manipulated live where the theater itself becomes an instrument.

The Vortex evenings had initially begun as a series of music concerts featuring new recorded electronic music from avant-garde composers and ethnic music from around the world that Henry Jacobs was curating at the Morrison Planetarium. Already experimenting for several years with the early reel to reel tape recorders and their speed variation and looping possibilities for his own work, the music Jacobs was interested in programming specifically belonged to the then new field of "tape composed music" (or *musique concrète*) including his own compositions and commissioned work from a wide spectrum of international composers, such as Stockhausen, Ussachevsky, Henk Badings, Gordon Longfellow, David Talcott, Gyorgy Ligeti, Luciano Berio and Pierre Henry (Keefer, 2009).

At the Vortex concerts Jacobs could play his selections of tape music recordings through the 38 high-fidelity speaker four-track surround-sound system. According to Gene Youngblood, the speakers were clustered in equally-spaced stations of three speakers each and there were two large bass speakers on either side and one at the zenith of the dome (Youngblood, 1970). Other speakers were installed in the center of the room. This brought

⁸ Vortex 4, May 1958 (?) Program Notes. Retrieved May 8th 2011 from History of Experimental Music in Northern California website.
http://www.o-art.org/history/50s&_60s/Vortex/Vortex_4.html

the total count to close to fifty sound sources. In addition "actual movement and gyration of sound was made possible by means of a special rotary console" (Vortex 4 program notes). It is from this system that the name of the concerts came. Cindy Keefer states that the Vortex 3 program notes explained the origins of the designation Vortex:

The name – Vortex – is derived from the ability to move the sound around the dome in either clockwise or counterclockwise rotation, at any speed. Since a single program source is used this is not a stereophonic sound but an entirely new aural experience. (Belson & Jacobs in Keefer, 2009, p. 3)

This rotating sound, says Keefer, came to be known as the "Vortex Effect". It was also presented at the Brussels World Fair in 1958 to which Vortex got invited.

Jacobs invited Belson to develop the visual dimension of the evenings. For the visuals, Belson had access to the planetarium's starscape projector that could project the night sky onto the dome by the use of Xenon gas arc lamps, lights and lenses. In addition, he used conventional film and slide projectors as well as various apparatus such as rotating prisms and a stroboscopic flicker machine and quite a few other devices. Cindy Keefer describes his range of equipment:

Belson utilized c. 30 projection devices including the planetarium's star and rotational sky projectors, kaleidoscope and 'zoomer' projectors, strobos, slide projectors, rotating prisms, 16mm film projectors, and interference pattern projectors, all projecting onto the blackness of the 65 foot dome. (Keefer, 2009, p. 4)

Belson manipulated in real time filmed imagery and non-filmic geometric and polymorphous light to create gigantic abstract moving visual "scapes". He experimented with projecting the images with no trace of any frame by way of masking and filtering which created an effect of spacelessness or endless space. With all the equipment and help from the planetarium's engineering staff he was able to fill the entire 60 foot dome with images. Film footage he used included his own and that of film-maker friends such as James Whitney, Hy Hirsh and Jane Conger. The result was a "cosmic merry-go-round" is reported to have written San Francisco Chronicle's famous art and music critic of the time Alfred Frankenstein (Keefer, 2005).

For Belson and Jacobs the live dimension of these cutting-edge technological events, as well as the interaction between the aural and the visual which they generated, was critical. They wrote in the Vortex 5 program notes (1959):

Technically Vortex utilizes all known systems of projection, along with one of the most highly developed sound playback systems extant. Yet, it is a live creation of sound and image, being performed for a specific audience. Vortex is based on a mutual complement of aural and visual elements, in which they reveal unspoken meanings about one another which exist in neither alone. (para. 7, History of Experimental Music in Northern California website⁹)

The concept was truly about the live interplay between visuals and music to create something greater than the sum of its parts.

⁹ Vortex 5, January 1959 Program Notes. Retrieved May 8th 2011 from History of Experimental Music in Northern California website: http://www.o-art.org/history/50s&_60s/Vortex/Vortex_5.html

A somewhat similar concept, though on a much less grand scale, was developed on the East Coast in the mid-60s by filmmaker Stan VanDerBeek. He too was inspired by experimentation in contemporary music of the period but, for his part, much more by new developments in the spatialization of sound than by those in recording. Born in 1927, VanDerBeek had, in the late 40s, studied art and architecture at the experimental Black Mountain College which had been founded in the mountains of western North Carolina in the 30s. Because of the presence there of Josef Albers who had been recruited to form its arts curriculum, it was strongly rooted in the Bauhaus' interdisciplinary approach to the arts combining fine and decorative arts with craft, architecture, theater and music. At Black Mountain VanDerBeek met such important thinkers as John Cage, Merce Cunningham, Robert Rauschenberg and Buckminster Fuller (Dayal, 2011).

From the mid-50s he began producing films based on animated paintings and collage and by 1957 he conceived the Movie Drome, an immersive environment in a dome theater inspired by Buckminster Fuller's spheres, where the public could lie down to experience films projected all around them. He was able to build such a theater in 1963 in an abandoned grain silo near his home at Stoney Point, NY, where a small art colony had formed including John Cage, Merce Cunningham and others. There he organized multi-media events that used numerous film and slide projectors to create what he described as "a super collage or movie mosaic" (Dayal, 2011). In her article "Stan VanDerBeek's Movie-Drome: Networking the Subject" Gloria Sutton describes her experience of the "unique combination of pre-determined audiovisual and aleatory effects:"

...undulating beams of light and discordant voices mixed with synthetic noise electrifying the air, illuminating the darkened space and immersing the viewers in a continuous audiovisual flow, a visual velocity. On-the-spot illustrations (projected while they were being drawn) and roving lights were superimposed with collages of stock newsreel footage and found films. The space pulsed with the multi-directional movement of the projectors (they were affixed to a turntable or wheeled carts) and the distortion of mixed sounds and voices emanating from unspecified sources. Political speeches, newscasts, promotional announcements, and pre-recorded music tracks collided with one another, testing the quadraphonic sound system and reverberating off the curved aluminum panels that served as both the dome's exterior and interior. (Sutton, 2003, pp. 136-137)

In addition to all of these image and sound sources he would enlist his children to walk around among the audience members with tape players that would be playing such sounds as ocean waves or airplane motors.

VanDerBeek also made use of this kind of mobility in other projects he performed in conventional theaters, notably his "Movie-Murals" and "Newsreels of Dreams". There he would use five projectors that would be carried by hand around the room moving across the walls, ceiling and audience in addition to the two aimed at the normal screen (Sutton, 2003).

VanDerBeek's "inter-dispersal", as formulated by Sutton, of elements can be seen as a transposition into the audio-visual realm of an emerging concern in music composition at the time with the spatial location and movement of sound that he would have been exposed to through John Cage. In the 50s Cage was exploring ideas of individuals freely making sounds in space, indeterminate interactions of an "ensemble of soloists" spread out spatially, notably in works such as "Imaginary Landscape No. 4" (1951) for 12 radios, 24 performers, and director, or "Variations IV" for "any number of players, any

sounds or combinations of sounds produced by any means, with or without other activities".

In his seminal "Expanded Cinema", Gene Youngblood noted how real-time multiple projection cinema transcends the performance experience:

In real-time multiple-projection, cinema becomes a performing art: the phenomenon of image-projection itself becomes the "subject" of the performance and in a very real sense the medium is the message. But multiple-projection lumia art is more significant as a paradigm for an entirely different kind of audio-visual experience, a tribal language that expresses not ideas but a collective group consciousness. (Youngblood, 1970, p. 387)

This kind of collective experience is very close to what a number of intermedia and multimedia artists will subsequently explore much deeper.

3.9 Media Mixes

Since the 50s diverse practices disregarding the boundaries of a broad spectrum of artistic disciplines and fusing them together into new forms expanding into time and space were increasingly emerging in visual arts and music circles across the Western world.

Experiments at Black Mountain College, notably John Cage's famous 1952 "Untitled Event" involving multiple participants from different fields (himself reading on Zen Buddhism; Merce Cunningham, dance; David Tudor, piano;

Charles Olson and M.C. Richards, poetry; Robert Rauschenberg, painting and vinyl records, as well as slide projections) - considered by some as the first "be-in" - had launched the conceptual possibility of different activities taking place at the same time without the need for any causal relationship between one another (Harris, 2002). Along with Cage's classes at New York's New School for Social Research over the 50s, this influenced a whole generation of artists who would establish by the 60s a new aesthetic in the arts, rejecting discrete artistic disciplines and objecthood and embracing process.

Out of this aesthetic developed new hybrid forms such as happenings, performance art, assemblages, installations, Fluxus, intermedia and mixed-media. In 1965, Fluxus artist Dick Higgins wrote about the early manifestations of such hybrid forms:

In the middle 1950s many painters began to realize the fundamental irrelevance of abstract expressionism, which was the dominant mode at the time. Such painters as Allan Kaprow and Robert Rauschenberg in the United States and Wolf Vostell in Germany turned to collage or, in the latter's case, dé-collage, in the sense of making work by adding or removing, replacing and substituting or altering components of a visual work. They began to include increasingly incongruous objects in their work. Rauschenberg called his constructions "combines" and went so far as to place a stuffed goat--spattered with paint and with a rubber tire around its neck--onto one. Kaprow, more philosophical and restless, meditated on the relationship of the spectator and the work. He put mirrors into his things so the spectator could feel included in them. That wasn't physical enough, so he made enveloping collages which surrounded the spectator. These he called "environments." Finally, in

the spring of 1958, he began to include live people as part of the collage, and this he called a "happening." (Higgins, 1965, para. 8)¹⁰

It was not only painters who were involved in this invention of new forms, but also choreographers, composers, dramatists, etc. As these forms intermixed such elements as sculpture, music, poetry, dance, theater, film, in various configurations, artists were also drawn to the possibilities of all the new technologies arising or becoming more readily available at the time.

One of the most important culminations of this new aesthetic in relation to technology, and also to the development of real-time moving image practices, took place in 1966 in New York City. This was the now much talked about series "9 Evenings: Theatre and Engineering" organized by Experiments in Art and Technology. E.A.T. was a non-profit group founded by electrical engineer at Bell Telephone Laboratories, Billy Klüver, fellow Bell electrical engineer Fred Waldhauer, artist Robert Rauschenberg and technology/theater artist Robert Whitman. Active from the 60s to the 80s, E.A.T. was created to provide contemporary artists with access to new technology as it developed in research institutions and laboratories. It promoted interdisciplinary collaborations through a program pairing artists and engineers. Some 30 engineers from Bell Laboratories were recruited to participate in the interdisciplinary 9 Evenings project blending avant-garde music, visual art, theater, dance and new technologies. Artists Robert

¹⁰ Higgins, D. (1965). Synesthesia and Intersenses: Intermedia. Originally published in *Something Else Newsletter* 1, No. 1 (Something Else Press, 1966). Also published as a chapter in Dick Higgins, *Horizons, the Poetics and Theory of the Intermedia* (Carbondale, IL: Southern Illinois Univ. Press, 1984). Retrieved November 28th 2011 from UbuWeb / UbuWeb Papers http://www.ubu.com/papers/higgins_intermedia.html

Rauschenberg, Robert Whitman, Yvonne Rainer, Lucinda Childs, John Cage, David Tudor, Öyvind Fahlström, Alex Hay, Deborah Hay and Steve Paxton each created a new performance. These evenings took place at the huge space of the 69th Regiment Armory in New York City. Every single one of the 10 ground-breaking performances incorporated live projected images (slides, film, video, lights) in some form or another (9 Evenings: Theatre and Engineering fonds, 2006)¹¹.

Robert Whitman's piece "Two Holes of Water-3", used 7 automobiles from which were projected - onto a huge screen that covered three sides of the Armory, and two smaller screens - film, broadcast television and closed-circuit video of live performance scenes executed by dancers and actors. From the balcony of the Armory, Whitman could select between the different projections which images to show when and in what combinations by signaling the projectionists, thus performing a certain version of live montage (9 Evenings: Theatre and Engineering fonds, 2006).

Robert Rauschenberg's performance, "Open Score", used infra red closed-circuit video cameras to record from the balcony of the Armory the 500 hundred odd performers which were in complete darkness; the live images of these cameras were simultaneously projected on three large screens in front of the audience. Alex Hay's piece included closed-circuit real-time video recording of a close-up of his face and its minute movements projected onto a

¹¹ 9 Evenings: Theatre and Engineering fonds. (2006).

The Daniel Langlois Foundation Collection of the Daniel Langlois Foundation for Art, Science, and Technology

<http://www.fondation-langlois.org/html/e/page.php?NumPage=294>

huge screen. In his 9 part performance, Öyvind Fahlström extensively used slide projectors, film and closed-circuit video to construct a fragmented theatrical universe (9 Evenings: Theatre and Engineering fonds, 2006).

John Cage had, in his performance piece, gigantic shadows produced by stage lights projected on the audio/music performers and two large screens behind them thus creating live moving images of sorts. Lucinda Childs' piece also created a form of live moving images through the use of shadows and lights with swinging objects, notably a transparent plexiglass cube, as well as light bulbs. In addition, waves picked up by a sonar device were converted to video signals in real time by means of an oscilloscope, and projected greatly enlarged onto a screen. Slide projections were also used (9 Evenings: Theatre and Engineering fonds, 2006).

For "Bandoneon! A Combine", David Tudor used a traditional bandoneon (a type of concertina) to produce audio signals that were programmed to activate moving loudspeakers, lighting and video images. The generation of video images for this piece was achieved through a "TV Oscillator" by Lowell Cross based on a device he had built while studying electronic music in graduate school (at U of T 1965). In "Bandoneon" a monochrome projector, rather than a television set, was modified by signals produced by the playing of the bandoneon. The images were projected on three large screens. Such an approach of generating electronic image by audio signal and altering electronics was very innovative for the time. It would be explored much more with the development of audio and video synthesizers in the late 60s and early 70s (9 Evenings: Theatre and Engineering fonds, 2006).

At the time, many other artists from a broad range of disciplines were creating "intermedia" works mixing disciplines and incorporating technologies.

Choreographers Elaine Summers, Carolee Schneeman, Trisha Brown, Joan Jonas, Yvonne Rainer, in New York, and Anna Halprin, in San Francisco, combined dance with film and music. In Ann Arbor, Michigan, the ONCE Group had formed by 1960, around a circle of composers including Robert Ashley, David Behrman and Gordon Mumma, in addition to theater and visual artists, film makers and architects. Through their collaborations and their annual festival (the ONCE Festival), the group focused on creating or discovering new sounds, notably electronic, in conjunction with amplification, environmental projection, film, slides, light, dance, sculpture, speech and theatrics involving extensive audience participation.

3.10 Mixed Technological Immersion

Certain artists were interested in concentrating more specifically on the possibilities of the new technologies and media - projectors, strobe lights, black lights, audio recorders, and other electric and electronic equipment (many of which would also be exploited by psychedelic rock concerts) - to create immersive environments or sensoria. Among them were Aldo Tambellini with his electromedia environments, the USCO, Jackie Cassen and Rudi Stern's Theater of Light, and many others.

Aldo Tambellini moved to NY from Syracuse in 1959 and, after being active as a sculptor and painter, by 1963 began working with multiple projections in relation to space, light, sound and other art forms, such as poetry. He would

call this work "electromedia". In an interview in the 80s with Barbara Buckner, Tambellini explained the concept:

Electromedia was the fusion of the various arts and media; it broke media away from its traditional role and brought it into the area of modern art by bringing the other arts, poetry, sound, painting and kinetic sculpture, into a time/space re-orientation toward media, transforming both the arts and the media. ("Interview of Aldo Tambellini", 1983, para. 3)

He was one of the first to explore the amalgamation of a wide variety of technological media.

In 1967, with German artist Otto Piene (one of the founders of the Zero Movement in Düsseldorf), who had moved to New York, Tambellini founded the Black Gate in the East Village, the first theater in New York City to be specifically dedicated to live electromedia performance and installation. In his own performances, such as "Black Zero" (1965) or "Moon Dial" (1966), he combined hundreds of hand-painted films and slides and magnetic tape audio compositions with elements like live dance ("Moon Dial") or live musicians. With Piene he presented, in 1968, "Black Gate Cologne", at WDR-TV in Germany, which involved multi-channel sound, closed-circuit television and multiple-projection of films and slides onto Piene's light objects and inflatables that the audience could move around (Tambellini's website¹²).

USCO (the company of Us) was formed in 1962 in San Francisco as a radical media art collective inspired by the then completely new ideas found in

¹² Aldo Tambellini's website: www.aldotambellini.com

Marshall McLuhan's "Understanding Media: Extensions of Man". Its founding members were poet Gerd Stern and engineer Michael Callahan. Some of its many members included painter Stephen Durkee and film/video artist Jud Yalkut. Environmental activist Stuart Brand was a regular collaborator. They were interested in the coming together of different art forms into combined events and believed that technology represented a new way of bringing people together as a tribal community. In addition, inspired by Eastern approaches to art, they adopted a philosophy of anonymity. Each individual member remained anonymous in this communal collective project. "We are all one" they declared as they lived and worked together. They created multimedia, multisensory, multiscreen psychedelic environment performances using every imaginable form of audiovisual equipment and spatial effects including numerous film and slide projectors, strobe lights, oscilloscopes, liquids, audio tape machines, telephones, amplifiers, multiple speakers, closed-circuit television, computerized control systems, as well as various home-made devices (Oren, 2010). Gerd Stern recalls:

Most of it was not exactly electronic; it was like electromechanical because we were using the kind of equipment that's made for display signs and neon and so forth and cam-operated switches. It was before the days of fully electronic switching capability. (Stern/Byerly, 1996 (2001), p. 76)¹³

¹³ Gerd Stern, "From Beat Scene Poet to Psychedelic Multimedia Artist in San Francisco and Beyond, 1948-1978," an oral history conducted in 1996 by Victoria Morris Byerly, Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2001. Retrieved September 23rd 2010 from Calisphere, a service of the UC Libraries powered by the California Digital Library
<http://content.cdlib.org/view?docId=kt409nb28g&brand=calisphere>

They developed a system that could link many projectors to a single control unit and techniques for moving the sound from one speaker to another. They thus created a completely immersive sensory surround for their audience.

Gerd Stern describes one of the pieces:

We conceived this piece of film work, which we used in our performances - it was filmed simply by Judd sitting behind Jonathan on the motorcycle running down roads around Woodstock - fairly woody roads. What we did was we printed three of these identical films - and we projected them on three screens right next to each other, and we would adjust the speeds so that they would go in different directions through each other. We also superimposed slides of words on the three images. Single words in black and white. The accompaniment through four channels of sound was the sound of this incredible motorcycle which was like - somehow it reminded us also of Tibetan chants. In a big auditorium with big speakers, it was definitely an overload experience. (Stern/Byerly, 1996 (2001), pp. 82-83)

With this work they toured galleries, schools, museums, churches, across the U.S. extensively. In 1966 they were able to settle in an abandoned church, in Garnerville NY, which they transformed into an "Audio-Visual Meditation Temple".

Jackie Cassen and Rudi Stern, for their part, began creating multiple-projector performances with hundreds of slides around 1964 in New York City. First renting the Polish National Hall above the Dom on St-Mark's place, they were invited to Millbrook, the estate where Timothy Leary conducted his experiments, to create new work there. Out of this came, in 1965, the "Psychedelic Celebrations" featuring Timothy Leary, that ran every Tuesday for months at the Village East Theater, during which they presented 45

minute long pieces, first "Death of Mind", then "The Reincarnation of Christ". These evenings drew huge crowds, mostly all on LSD. The success of these performances led them to be invited to do live visuals for rock bands The Byrds, The Doors, The Rascals, but also for theater and operas (Stravinsky's *The Rake's Progress*). Around 1966 they also opened "The Theater of Light" at their studio-loft on Sixth Avenue (Stern/Gigliotti, 1999). There they presented regular performances of their audiovisual pieces that incorporated Mylar, water pools and fountains, plexiglass, polyhedral structures, front and rear projections, and light-activated sound events responding to color as well as intensity (Youngblood, 1970).

Other immersive-type projects taking place during this period in North America and Europe included Milton Cohen's Space Theater (1957-64, Ann Arbor, Michigan), Jeffrey Shaw's "Corpocinema" (1967, Holland), New York experimental nightclub "Cerebrum" (1968), the work of LA lightshow troupe "The Single Wing Turquoise Bird" which, aside from providing lights for rock concerts, created evocative immersive multimedia multi-projection performances in the late 60s and early 70s, to name but a few.

3.11 Video Explosion

In the mid 1960s, when video became accessible with the development of half inch tape intended for home use, it was immediately welcomed by the art world. Especially because of its instant playback capabilities, compared to the much less immediate film process that required developing by labs, many artists were drawn to it right away. It soon began to evolve in two general,

usually diverging, directions. On the one hand, video was embraced by artists and activists coming out of the Civil Rights Movement as a tool for social change through the creation of utopian video collectives organized into alternative communities. On the other hand it quickly became popular as a new creative medium and art form among visual, performance and music artists. The former exploited video's capacity of reproducing and documenting reality. The latter explored the new artistic possibilities of its electronic nature.

The most widely circulating myth about the beginning of video art is the purchase by artist Nam June Paik of a unit of the just released first Sony Portopak camera in 1965 and his shooting and then screening on that same day of the Pope's visit to NY. However, already by the 1950s Wolf Vostell had been using TV sets in his gallery-based "dé-coll/ages" work, in Germany, and Paik himself had shown, in 1963 at the Parnass gallery in Wuppertal, an exhibition featuring a number of "prepared" televisions (in the sense of John Cage's "prepared" pianos) using them as performance objects. Indeed at his first major exhibition Paik had presented a series of video/television sculptures. Throughout the space were scattered twelve second-hand TV sets that were modified (by magnets) to transform in real-time, in unexpected ways, the TV programs as they were being broadcast (Paik's show only being opened in the evening is probably due to the fact that at the time in Germany there was only one TV station that broadcast for just a few hours a day during dinner time) (Decker-Phillips, 1998). Both Paik and Vostell were related to the Fluxus movement.

In an article entitled "Video Journey through Utopia", Paul Ryan remarks that artist Frank Gillette, the founder of the Raindance video collective,

distinguished between two currents in early video history: the utopian current of the activist video collectives that appeared in the 60s and disappeared by the 70s and the Fluxus current (Ryan, n.d.). Fluxus, the international network of artists and composers organized by George Maciunas and inspired by composer John Cage, had developed collaborative and individual conceptual art in the form of sound/theatrical playful "Event performances" often based on "event scores" that were essentially instructions, or scripts, describing actions to be performed. It was thus natural for Nam June Paik, who had been deeply involved with this network, to explore the performance (and musical) possibilities of video, video as a performance object, as soon as it became available and accessible (Hanhardt, 2000).

Some of Paik's earliest video art pieces were collaborative video and contemporary music performances with cellist Charlotte Moorman ("TV Bra for Living Sculpture" 1969, "Concerto for TV Cello and Videotape" 1971). These exploited the sculptural qualities of television monitors while using them as active elements in the performances. The video material appearing in the monitors was pre-recorded in advance and played back during the presentations. Soon, however, Paik would devise a device to distort/manipulate the video image in real time, live. With Japanese video engineer Shuya Abe he developed, during a residency at WGBH-TV in Boston over 1969-70, the first machine that could alter existing video footage by twisting the signal: the Paik/Abe Synthesizer. The Paik/Abe Synthesizer could transform the colors and distort the shapes of the images in real-time, with the twirl of a dial. In such a way video could become as spontaneous as a painting. "This will enable us [Said Paik] to shape the TV screen canvas as precisely as Leonardo, as freely as Picasso, as colorfully as Renoir, as

profoundly as Mondrian, as violently as Pollock and as lyrically as Jasper Johns" (Decker-Phillips, 1998, p. 154)¹⁴. This instrument was intended for use in live performances. Paik considered it to be like a piano and saw it as an important breakthrough for video's potential as an artistic medium.

3.12 Control by Voltage

Paik was not alone in exploring ways to manipulate the video signal. During the same period all sorts of experimentation in the area of video processing and synthesis was happening in different locations, within different fields and by different people. The development of video processing and synthesis owes much of its inspiration to accomplishments in analog audio synthesis taking place since the early 60s as well as to the real time performance tradition of electronic and experimental music.

Since the beginning of the 20th century research had been conducted in electro-mechanical and electronic audio synthesis in Europe and North America. Harald Bode, a German engineer and designer of audio tools, designed innovative electronic music instruments as early as 1937, notably for the Electronic Music Studio in Cologne in the 50s. Bode developed ideas on modular and miniature self-contained transistor based machines and built the earliest patchable modular system with voltage control capability. Voltage controlled technology revolutionized analog sound synthesis. It is based on a method of controlling the output characteristics of oscillators and amplifiers.

¹⁴ From Paik's 1969 manifesto, *Versatile Color TV Synthesizer*, about the possibilities of his apparatus.

For example, the frequency of an oscillator can be controlled by an input voltage such that the higher the voltage, the higher the frequency of the signal generated by the oscillator. Bode's Melochord (1961) was the first voltage controlled synthesizer. A few years later Bode's ideas would be taken up and pushed further by Donald Buchla, Robert Moog, and several others (Palov, 2011).

In the early 1960s in San Francisco, engineer and inventor Dan Buchla was part of the thriving contemporary music scene, that was fascinated by electronics, revolving around the San Francisco Tape Center mentioned earlier. Encouraged and helped by composers Morton Subotnik and Ramon Sender, Buchla set out to build an instrument actually intended for electronic music performance. This was the 100 series Modular Electronic Music System (1963), the first "modern" modular synth, and the first portable sound synthesizing device, completed in 1963. The system consisted of functional modules based on the technology of transistor voltage-control of oscillators and amplifiers, "each designed to generate a particular class of signals or perform a specific type of signal processing" (Dan Buchla's website¹⁵).

Around the same time, on the East Coast, in 1965, Dr. Robert Moog, a graduate of Columbia and Cornell Universities in electrical engineering and engineering physics, was building his own customized modular systems, based on the same transistor voltage-control technology, at the Columbia-Princeton Electronic Music Center in New York City. By 1967 the Moog

¹⁵ Dan Buchla's website: <http://www.buchla.com/>

modular synthesizers I, II & III became the first commercial modular synths (Moog Foundation website¹⁶).

What was attractive about voltage controlled audio synthesis was its ease of use and relative cheapness. Thus, many of the early artists, engineers and inventors working with video were inspired to appropriate and rework methods and technologies then recently developed in audio synthesis to develop video synthesis and processing technology. Over the 60s and 70s a considerable number of video "instruments" were developed. These have evolved along two categories: those performing some operation on an incoming signal and those generating signals internally. The first category includes colorizers and mixing apparatus, able to change the color, combine and interface one or several incoming signals together, and raster manipulation devices using the principle of scan modulation to alter the geometry of an image on a monitor during the scanning process. The latter category is represented by a number of synthesizers that can generate moving images without any external signal input such as waveforms that become visible as patterns which can be processed in different ways (Furlong, 1983a). Some of these devices are much better documented than others.

The Paik/Abe, or Wobulator, actually belongs to the first category. Rather than a synthesizer, it is a processor and mixer. It is basically a black and white TV monitor where the signal that is fed to it is altered by the electronics attached to its coils. With its seven inputs it can mix and process the signals

¹⁶ Moog Foundation website: <http://moogfoundation.org>

of up to seven live cameras or sources of recorded material. In a certain sense it can be viewed as a "prepared television", "a conventional television receiver which has been electronically modified to permit a wide variety of treatments to be performed on video images" (Miller Hocking, 1978, para. 6).

At the time Paik and Abe released their device, in the late 60s and early 70s, a number of other artists and engineers were also developing their own imaging systems based on this idea of restructuring or "preparing" television sets or manipulating an existing video signal, such as broadcast television or an image from a video camera. Many of them, including Paik, were featured in the now legendary 1969 exhibition at the Howard Wise Gallery in New York City entitled "TV as a Creative Medium".

One of them was self-taught New York native Eric Siegel, who, as early as 1968, had modified a color television set in order for its images to become distorted in shape and color and soon developed his PCS (Processing Chrominance Synthesizer) permitting controlled colorizing of black and white videotapes. In 1970 he built his EVS - Electronic Video Synthesizer that could create abstract color forms, mostly geometrical, on a TV screen, without the use of any camera. In an interview with filmmaker Jud Yalkut he explained that his "instrument" was:

like the video equivalent of a music synthesizer, where you have a program board and you can start to set up a whole series of visual geometric happenings in color on the video signals - the screen - and this is designed for video compositions. (Siegel/Yalkut, 1992, para. 5)

The EVS was followed in 1971 by the Dual Colorizer that could generate hue and saturation from control input or more simply synthetically color black and white video footage (for example shot by a portopak). Siegel used these inventions for live performances during his brief career in electronic art that ended by 1972.

Joe Weintraub was another artist featured at the "TV as a Creative Medium" exhibition. His work "AC/TV" (Audio-Controlled Television) was a device which translated music into color television images on any color TV receiver. The volume of the audio controlled the brightness while the pitch controlled color. The frequencies of the audio - divided into low, middle and high ranges - regulated the color receiver's red, green and blue electron guns, generating patterns that depended on the interaction of volume and pitch. It could be simply clipped onto the antenna terminals of a regular color TV (Yalkut, 1969). Weintraub's AC/TV was a voltage control version of some of the early color organ experiments though without any specific agenda of finding the exact visual equivalent of musical sounds.

In 1971, New York video artist Bill Etra saw, at the Television Lab at WNET-TV in New York where he was doing a residency, the Paik/Abe "Wobbulator" scan modulator. After building a device based on the Paik/Abe, he approached an old high-school buddy, Steve Rutt, to expand on the concept with the idea of a "Wobbulator that Zoomed". They obtained a \$3,000 grant from the TV Lab at WNET to develop a more controllable version of the Wobbulator. Their expansion involved making their own parts from scratch, rather than using found parts from surplus like Paik and Abe, and using DC rather than AC which caused much distortion during input (Furlong, 1983a).

Although a commercial failure, the Rutt/Etra scan processor instrument, a real-time system, was used by many artists of the time (including Ed Emshwiller), especially extensively by the Vasulkas for their pioneering video and sound experiments (that I will address further on), notably by Steina for her "Violin Power" performances.

Another response to the Paik/Abe was the Jones Colorizer. David Jones, a Canadian-born video artist and engineer who had worked with the Videoheads collective in Europe, built his Colorizer because of the limited control over color the Paik/Abe offered. Jones' device is the only colorizer that is not based on a color encoder. The first version was completed in 1974. A latter version could be used until 2011 at the, now closed, Experimental Television Center in Owego, NY. Jones' innovation was to adapt the voltage control concept from electronic music to his processors. This allowed for each knob to be regulated by voltage from an external source such as an oscillator with a variety of waveforms. In this way it became possible to adjust all the knobs at the same time. By connecting multiple different control voltage devices an unprecedented complexity could be achieved. Later he also developed his own sequencer, frame buffer and keyer, all of which could be used at the Experimental Television Center's studio (Dave Jones's website¹⁷).

¹⁷ Dave Jones's website: www.djdesign.com

3.13 Images from Electric Current

Concurrently to the development of all such image processing technology, much research and experimentation was dedicated to creating devices capable of creating imagery internally without any external signal input. The aspiration was to achieve imagery just like an audio synthesizer which can create and modify analog electronic sounds from scratch.

From the mid-60s, Bill Hearn, educated in engineering at Berkley (and from the mid 70s Staff Scientist Engineer in the Electronics Engineering Department at the Lawrence Berkeley Laboratory, University of California), worked on the development of a system that could produce Lissajous¹⁸ patterns via phase-locked oscillators. By 1968 he had met some of the people involved with Experiments in Art and Technology as well as electronic music composers. Encouraged by their interest in the potential to produce and control imagery by sound signals, in 1969, he completed his "Vidium" which was intended as a "hyper Lissajous pattern generator" for control of a multi-channel video display. It was a color X/Y display that was controlled by sound input, while the color was related to the speed of electron beams. It was designed to generate images directly from audio performed by electronic musicians. It was never developed commercially but was later on permanent loan to the Exploratorium, science and technology museum, in San Francisco where Hearn would become curator (Hearn, 1992). Hearn, claimed that Dan Buchla was a major inspiration for his research:

¹⁸ A Lissajous pattern or figure is a curve traced out by a point that undergoes two simple harmonic motions in mutually perpendicular directions.

Don Buchla was the strongest influence I ever had in terms of the way he did things. if you look at this you'll see that it's very similar to his synthesizers in the philosophy of what it does: control voltages, logic voltages, signal voltages and unshielded banana jacks. so that you can stack them, which makes the flow much simpler. I think technically you can say that this machine could have been designed by Don Buchla. (Hearn, 1992, para. 13)

In addition to this image generating device, in the 70s Hearn also worked on video processing technology. He built several colorizers, the first at the request of Video Free America members Skip Sweeney, Art Ginsberg and Alan Shulman. In 1975, at the request of Bill Etra, and following conversations with Steve Rutt as well, he designed and conceived the Videolab, a highly flexible modular voltage controlled synthesizer that could accept up to 6 video images that could be switched, combined, and modified in a wide variety of ways ("Tools by Bill Hearn", n.d.).

In the meantime, during his studies in electrical engineering at the University of Illinois at Champagne/Urbana, as well as in music under John Cage at its electronic music studio, Stephen Beck began, in 1968, experimenting with oscilloscopes as a means of creating electronic imagery. Composer Salvatore Martirano who was part of the faculty there encouraged Beck in this and asked him to perform with him. From Illinois he transferred to Berkley and was soon artist in residence at the National Center for Experiments in Television at KQED-TV in San Francisco. There he built his Direct Video Synthesizer. The Direct Video Synthesizer created images solely from electrons rather than distorting or colorizing material originating from TV cameras as did many other synthesizers and processors at the time. His

synthesizer was also inspired by the Moog and especially the Buchla audio synthesizers. Beck explains:

The modular structure of the Beck Direct Video Synthesizer with its patch cord programming and control voltage system, allowed me to "play" color video images in real time, following the lead of early analog music synthesizer such as Moog and Buchla. My image model was based on synthesizing four main visual elements: color, form, texture and motion. (Beck, 2000, para. 4)

Beck's instrument was designed for performance. And from 1972 he used it for numerous large screen video performances he called "Illuminated Music" often in collaboration with composer Warner Jepson. "The composition itself was considered a form of visual jazz... in that the basic visual structure of the work remained in place from performance to performance, yet subject to the visual themes and variations changing in each interpretation" (Steve Beck's website¹⁹). In 1974 he developed the Video Weaver, a digital pattern generator that was conceived as an "electronic loom". Beck conceived this instrument as "a link between the modern (video) and the ancient (weaving) technologies". According to Beck,

Video Weavings are based on poetic mathematical rhymes, or algorithms, visualized in real time on the warp and weft of video's horizontal and vertical scanning electron beams, color phosphors, plasma cells, and LCD pixels. (Steve Beck's website²⁰)

¹⁹ Steve Beck's website: www.stevebeck.tv/ill.htm

²⁰ *ibid.*

The Video Weaver was designed as an extension of the Direct Video Synthesizer.

The Moog audio synthesizer also served as a model for Dan Sandin for his Image Processor which he completed in 1973 at the University of Illinois, Chicago, where he still teaches at the School of Art and Design and directs the Electronic Visualization Laboratory (EVL). The Sandin I.P., often referred to as "video equivalent of a Moog audio synthesizer", is an extremely subtle and delicate analog, modular, voltage controlled, real time, color, patch-programmable, video processing instrument. (Modular synthesizers use cables ("patch cords") to connect the different sound modules together. Different configurations of connections - or patches - produce different sounds). Accepting basic video signals, it modifies them in a fashion similar to what a Moog synthesizer can do with audio. And, like the Moog, it consists of numerous modules that can be patch connected between themselves in endless ways. Sandin began developing the I.P. as an electronic way to create light shows which he was interested in and practicing at the time.

I was also doing color photography, and I was interested in light shows and kinetic events. I was producing slides for those shows. I was involved in using optical and chemical processes to create images that I found interesting and it occurred to me that I could do it electronically. (Sandin in Furlong, 1983a, para. 48)

Like Beck's synthesizer, the I. P. was also designed for performance. One way to use it in performance has been to patch it together with an audio synthesizer and "play" it.

A most unique feature of the Sandin I.P. was, and still is, its non-commercial philosophy. It is a DIY (do-it-yourself) synthesizer. Sandin did not believe in gaining any profit from his invention.

I had always the idea of giving it away and letting people copy it. Long before any building started, that was my own philosophy: to give it away and take this business about being paid by the state to develop and disseminate information very seriously. (Sandin, 1992, para. 12)

Thus the I.P. was extremely well documented and plans as well as the circuit diagrams for building your own were distributed freely under an informal license known as the Distribution Religion. As a result more I.P.s were in circulation than any other art video synthesizers at the time.

Besides these well known and documented video processors and synthesizers it is worth mentioning a number of others that were being developed in various locations in North America. Custom synthesizers were built by Dan Slater as of 1966 in California. The CVI Quantizer and CVI Data Camera were developed by Glen Southworth in 1969-70, in Boulder, Colorado. GROOVE and VAMPIRE from 1970, otherwise known as Generated Realtime Output Operations on Voltage-controlled Equipment, and the Video And Music Program for Interactive Realtime Experimentation, were both developed by electrical engineer and computer music pioneer Max Mathews (with much R & D by composer Laurie Spiegel) at the Bell Telephone Laboratories in New Jersey. The FELIX was created in 1974 by Canadian-American film/video/holography artist Al Razutis with electronics designer Jim Armstrong, in Vancouver, BC, Canada. Razutis also experimented with voltage and audio modulation similar to methods employed

in audio synthesis by Buchla, Moog, or Arp synthesizers. The SAID (Spatial and Intensity Digitizer) was created by Don McArthur for the Experimental Television Center in 1975. McArthur also developed with Jeff Schier the McArthur/Schier Digital Image Generator for the Vasulkas. The Chromaton 14 was designed and manufactured by Ralph Wenger in 1977 and released by BJA systems. The Chroma-Chron (based on an Apple II clone board) was devised for real-time image processing in night clubs and for live performance by Ed Tannenbaum in 1979 in California (Experimental Television Center's Video History Project website²¹).

There were also a number of commercially released synthesizers and processors. The Scanimate, an analog computer system, was built by Computer Image Corporation of Denver, Colorado, in the late 60s and early 70s. The FairLight CVI (Computer Video Instrument), a hybrid analog-digital processor, designed by Australian engineers Peter Vogel and Kim Ryrie, was released in 1984/85 (Experimental Television Center's Video History Project website²²).

In Europe diverse synthesizers and processors were being developed in the 70s as well. In London, Richard Monkhouse, a self-taught electronics engineer, was hired by Electronic Music Studios (EMS) specializing in sound synthesizers to design a video synthesizer. His prototype instrument initially named the "Spectre" was developed into the more sophisticated "Spectron"

²¹ Experimental Television Center's Video History Project website:
www.experimentaltvcenter.org/history

²² *ibid.*

that was released by EMS in 1974 (also the Videosizer). Monkhouse began using the Spectron himself to create work inspired by the Whitney brothers films, combining it with 16mm film loops of computer generated images, video feedback and oscilloscope patterns to pre-recorded music. In 1974 he was contacted by Manchester-born video artist Peter Donebauer who was interested in the Spectron. Out of their meeting grew a collaborative relationship that lasted many years over which the two built several video instruments, including the "Videokalos Image Processor" in 1975, and toured with live video/music performances. (In 1979 Donebauer and composer/musician Simon Desorgher formed VAMP (Video and Music Performance) to present their collaborative work to live audiences, touring venues across the UK) (Handmade Cinema website²³).

In France, in 1968, was formed at the ORTF (Office de Radiodiffusion-Télévision Française), the GRI (Groupe de Recherche Image) under the direction of composer Pierre Schaeffer. There François Coupigny developed the *truqueur universel* (universal special effects device), which was used by Martial Raysse, Peter Foldès, and Jean-Paul Cassagnac to colorize the then black-and-white video images. Pierre Schaeffer was interested in providing moving image artists with similar new light and fast means as were becoming available to *musique concrète* composers. Later, over 1972-74, ORTF technician Marcel Dupouy invented the "Movicolor" synthesizer. This colorizer and special effects processor could also generate and combine synthetic, geometric or abstract shapes (Langlois/Teruggi & Didier, 2010).

²³ Handmade Cinema website: <http://www.handmadecinema.com/>

In Finland, in the early seventies, composer and inventor Erkki Kurenniemi built a number of synthesizers he called DIMI. Among them was the DIMI-S (also known as the "Sexophone") that was able to generate sound and light by contact with the skin, reacting to the emotional state of the performers. Most importantly for the subject at hand was his video-controlled synthesizer, the DIMI-O (1970-1971), which could convert any movements recorded by the video camera into real-time sounds and music, notably in the case of dance performance, a system that "anticipated David Rokeby's famous Very Nervous System by more than a decade" according to Erkki Huhtamo (Huhtamo, 2003).

All of these inventions and early commercial releases have significantly fostered the evolution of audiovisual performance. They have also shaped its modus operandi according to various approaches developed within the emergent field of electronic music.

3.14 Performing with Signals

One of the most important hotbeds for the coming into being of audiovisual media performance at the time was the Kitchen in New York City. It was founded in 1971 at the Mercer Arts Center in SOHO and was named the Kitchen because the space had in the past served as kitchen to the Broadway Central Hotel. It was created by video pioneers Steina and Woody Vasulka (with Andy Mannik), specifically as a video and performance space which they called "Electronic Media Theater". For the opening (June 15th 1971) of this new space they wrote a "manifesto" that emphasized their commitment to

the notion of composition in relation to both sound and image and to the idea of creating images from sounds and vice versa:

Welcome to the Kitchen

This place was selected by Media God to perform an experiment on you, to challenge your brain and its perception. We will present you sounds and images which we call Electronic Image and Sound Compositions. They can resemble something you remember from dreams or pieces of organic nature, but they never were real objects, they have all been made artificially from various frequencies, from sounds, from inaudible pitches and their beats. Accordingly, most of the sounds you will hear are products of images, processed through sound synthesizer. Furthermore, there is time, time to sit down and just surrender. There is no reason to entertain minds anymore, because that has been done and did not help, it just does not help and there is no help anyway, there is just surrender the way you surrender to the Atlantic Ocean, the way you listen to the wind, or the way you watch the sunset and that is the time you don't regret that you had nothing else to do.

The Vasulkas

(Vasulkas, 1971)

With this credo, the Kitchen set out to present work by video artists from around the U.S. and the world, initiating some of the first annual video and computer arts festivals, as well as showing a lot of music and performance work incorporating electronic media, notably various forms of live video and electronic/digital imagery.

The performance and live dimension of video was of major importance to the people running the Kitchen. In a 1973 interview about the Kitchen and video art with Jud Yalkut, for WBAI-FM in NY, founders Steina and Woody Vasulka

and their co-workers at the time, Shridhar Bapat and Dimitri Devyatkin, discussed this importance at length. They explained how their concept of "Electronic Media Theater" filled a vacuum in the emerging world of video, in relation to socially and politically oriented collectives such as Raindance and Global Village, and how it naturally attracted abstract or non-figurative and electronically generated forms of video art that often go hand in hand with performance. Thus Shridhar Bapat comments that:

One of the major points that comes up with our emphasis on processed imagery, image-oriented video, is the fact that this is a form of video which can be performed. We actually perform, in many cases, instead of just presenting tapes. (Yalkut, 1973, para. 8)

He brings this back to the definition of the space as it was conceived;

We are actually a performance space, and video becomes an instrument, in the same way that a musician performs. (Yalkut, 1973, para. 9)

This spirit of the Kitchen thus shaped a whole electronic media performance scene (image and sound). Artists that gravitated around the space included Nam June Paik, who was already established, Eric Siegel who worked with the Vasulkas on the development of electronic imaging tools, Rhys Chatham who was the first music director, La Monte Young, Maryanne Amacher, Emmanuel Ghent, Frederick Rzewski, John Gibson, Henry Flynt, Tony Conrad, Phill Niblock, David Behrman, Gordon Mumma, Bill Etra, Charlotte Moorman, Shigeko Kubota, Jackie Cassen, Walter Wright, among many many others.

At the Kitchen, the Vasulkas were producing their own work as well. It was during this period that Steina began to develop her "Violin Power" performance. This video/violin closed circuit performance, which has evolved throughout generations of technology to the present, focused on the correspondences between electronic image and sound. Yvonne Spielmann, Researcher in Residence (in 2003-04), within the Vasulka Archive at the Langlois Foundation in Montreal, Canada, explains:

In the first closed-circuit audio/video performances of *Violin Power* (1970 to 1978) the primary effect observed was the actual movements of the bow on the strings of the violin immediately deflecting the image position of exactly this gesture. Besides being the performer, Steina plays the violin and the video so that in intermediary ways the observer and the observed converge. The languages of the two media, music and video, are interconnected according to their abstractness where the sound creates the waveforms of the image. Furthermore, music is visually explored as a medium developing temporal and spatial features: not only does the sound spread the scan lines so that they become horizontally visible thereby exploring temporal dimensionality, but Steina also uses the Scan Processor to modulate the soundwaves until they build up spatial forms of the image. Through the Scan Processor, brighter parts of the "image" are lifted so that the horizontal lines also vertically deflect and create sculptural pattern. (Spielmann, 2004, para. 1)

In the 70s Steina used an acoustic violin and microphone to interface its sound with the analog video equipment. By the 90s she began using a MIDI violin and laser video disk technology and later a laptop running software developed by Tom Demayer (Image/ine, 1997) at Steim, Amsterdam.

Both Steina and Woody, were above all interested in exploring electronic image generation. "There is a certain behavior of the electronic image that is unique.... It's liquid, it's shapeable, it's clay, it's an art material, it exists independently," Woody has stated (Furlong, 1985, para. 26). Many of their works, at the time, however, explored the "performance of video imaging tools" and were thus presented as tapes documenting these performances which took place in the production studio, rather than actually performing in real time in front of an audience.

Live performance was the focus on weekends at the Kitchen. Steina remembers in a 1995 interview by Chris Hill how impressive amounts of equipment would be brought in by participants for these evenings.

There would be an incredible gathering of instruments and people would bring in another keyboard, another synthesizer, another camera and it would be pooled from several places. (Vasulka/Hill, 1995, p. 5)

Walter Wright, then one of the first computer animators, now multimedia improviser, was among the people involved in live synthesis, often experimenting with music driving the video or vice versa. Wright, for a time Associate Director at the Kitchen, recalls how performance was always an option in the early days:

If you could do it live in a studio, it seemed logical to take the equipment and put it in a performance space and do it during a performance. (Wright/Bainbridge, 1998, para. 5)

In the notes for a 1972 performance at the Kitchen, Walter Wright explains his own performance process and system of the time:

My tapes are made on the Scanimate 'computer' system built by Computer Image Corp. Scanimate is a first generation video synthesizer. Images are input in a number of ways--through two b & w vidicon cameras (these cameras may look at still artwork, a TV monitor, etc. or from an Ampex 2" VTR, or from a studio camera. Two of these input channels pass through a video mixer to the Scanimate CPU (Central Processing Unit) where position and size of the image is controlled. Also on the CPU are three oscillators. The CPU also controls the axis (the lines about which an image folds) and allows the image to be broken into as many as five separate sections. I play Scanimate as an instrument and all my tapes are made in real time without pre-programming. I also try to avoid editing. I am designing and hope to build a live performance video synthesizer. Most of my tapes have a score, as in music. (Wright in Yalkut, 1973, p. 7 of PDF)

In 1972 Walter Wright became (the second) Artist in Residence at the newly formed Experimental Television Center.

ETC grew out of a program called Student Experiments in Television created by Ralph Hocking originally at the campus of Binghamton University, NY, where he was at the time professor of fine arts. By 1971 the Experimental Television Center was incorporated. Its aim was to provide community access to the then new small-format video equipment (Portapak) as well as an exhibition series and workshops. It quickly became involved with artists that were interested in investigating video as an artistic medium. A research program fostered the development of new tools. It was through this program that Nam June Paik, the first Artist in Residence, had conceived and built with Shuya Abe, the Paik/Abe synthesizer previously described (Experimental

Television Center website²⁴). Part of Walter Wright's extensive residency involved showing the ETC system (notably the Paik/Abe) to a wide variety of groups, including schools, colleges, public access television centers, art centers, throughout the United States and Canada. In such a way, he pioneered video performance. He remembers that:

In order to show it off, it seemed obvious that one should show how it worked. So part of the thing became doing a performance, so I used to cart around a lot of cameras, a prerecorded soundtrack and do a performance. (Wright/Bainbridge, 1998, para. 8)

Thus he would take the Paik/Abe and later the Jones colorizer on the road, presenting performances and actively conducting workshops. From Binghamton he would often go to the artistically thriving community of Woodstock, which was nearby. There, at Woodstock Community Video, he met video artist Gary Hill with whom he regularly performed in live video/audio synthesis (using a Serge audio synthesizer with the video synthesizers) until the late 70s. Sometimes they would perform with a live dancer as well. He would later develop his own performance video system, the Video Shredder, a desktop video processor for the TARGA2000 video card.

Carol Goss was another artist with whom Wright collaborated in the seventies in live video processing performance with live music. Goss was involved in television through theater. She began by documenting musical presentations, Notably Paul Bley and William Burroughs, and became interested in using video for live performance. In 1974 she met Nam June Paik who told her

²⁴ Experimental Television Center website: <http://www.experimentaltvcenter.org/>

about the Experimental Television Center. At the Experimental Television Center she became fascinated by video synthesis and processing. It is also where she first met Walter Wright. With her husband free jazz pianist Paul Bley, she formed, in the mid-70s, the "Improvising Artists Group" that had the mission of recording music and video. During avant-garde jazz recording sessions they would set-up video synthesizers to improvise simultaneously. In 1977 they organized a performance at the Axis in Soho gallery with Sun Ra and his Arkestra and Paul Bley, inviting Walter Wright to do live video processing (with the Jones colorizer) while Carol Goss was at the live cameras. In the '90s they worked together again at the Experimental Television Center and at the Not Still Art Festival that Goss runs. During the 70s Goss also performed solo in New York City and San Francisco on instruments such as the Bill Hearn Video Lab, and the Dan Sandin Synthesizer, in addition to the Paik/Abe and the Jones Colorizer (Goss & Wright/Bainbridge, 1998).

By the 80s, however, the interest in performative video art practices in the U.S. changed focus on the receiving end, notably on the part of museums. According to Walter Wright:

From the museum end, the thing they saw as being most amenable to the way they operated was the sculptural installation, because the artists provided them with a piece. It was usually on a laseredisk at that point. It fit inside a frame or object. Or there was some plan for reproducing it in the museum. (Wright/Bainbridge, 1998, para. 13)

Thus the demand for live work diminished substantially. In Wright's opinion:

As far as performance goes, that was probably, thinking about it from their perspective, possibly the most risky thing they could get into. Because it takes so long to set up, and the equipment hardly ever worked. Who knows what you were going to get as an audience. You'd certainly never be able to do it twice, because it was so put together and it wasn't taped. And I think also the people doing it were "of the moment" people. (Wright/Bainbridge, 1998, para. 15)

He remembers how it suddenly became barely possible to even do a single performance a year within a whole presentation network that had just recently emerged and fostered the establishment of the form. So the development of video performance slowed down tremendously.

It will take the arrival of new, less expensive and lighter, technologies and tools, and a new generation of artists, in the following decades, to revive an active live video performance scene in the context of experimental and electronic musics.

In this chapter my aim was to suggest the extent to which musical ideas and aesthetics have permeated and shaped the evolution of the desire to play or compose moving visuals live and how different concepts of intermediality that emerged with the beginning of the 20th century gave them permission to begin gaining a voice of their own. From the 19th century to the 1970s it seems that some important relationship to the art form of music is present in every incarnation or vision of Live Visuals. However, until the end of the 19th century the conceptions of apparatuses and systems permitting the live "playing" of visuals saw the visuals as illustration or accompaniment for music. With the wave of total art avant-garde movements, inspired by

German composer Wagner's idea of *Gesamtkunstwerk*, that swept Europe in the early 20th century, visuals gained respect for their own sake. As Futurism, Constructivism, Dada, Bauhaus, re-invented every possible form of artistic presentation in a spirit of intermediality they embraced all the new techniques and technologies in sound, light and image of the time. From new kinds of performances like the Futurist 's provocative events, the Dada cabarets, or the Bauhaus Lantern Festivals, and from the period's technological advances, emerged new approaches to Live Visuals. Film became a favorite medium because of its "polyexpressive" nature and was soon adapted to various concert formats, to create, in conjunction with live music, "paintings with time", notably by Moholy-Nagy with his "simultaneous polycinema" and Fischinger with his multiple projector shows. Fischinger's move to Los Angeles in the 1930s brought such avant-garde ideas to the U.S. West Coast where they developed among a nascent experimental film and music scene that included John Cage. Concurrently the post-war years ushered a transformation in Jazz music from big band orchestras to small "Beebop" combos that emphasized improvisation and solos. Beebop strongly inspired other art forms and gave rise to new tendencies. The poets who later became known as the Beats sought to develop a word-based equivalent to jazz improvisation that they performed alongside live jazz music while film artists improvised projections. Harry Smith's real-time film manipulations to live jazz of the 40s and 50s are considered to be at the origin of the psychedelic light shows of the 60s. In the mean time the advent of magnetic tape recording and developments in electronic music synthesis paved the way to new directions in composition and performance. A number of sound/music research labs were opening over the 1950s in Europe and North America and giving rise to different genres of tape music (*musique concrète*, electroacoustic, etc.). This brought about new

concert formats and new ideas about Live Visuals. Thus at the San Francisco Tape Music Center Tony Martin's real-time projection work using films, slides, liquids and shadows was regarded by the tape-music composers he collaborated with as "visual composition". And out of a desire for a different kind of experience for the presentation of tape music were born the now legendary multi-dimensional audio-visual Vortex concerts organized by Henry Jacobs and Jordan Belson at the California Academy of Science's Morrison Planetarium. These later lead to further experiments in immersive inter-dispersed sound and visuals such as Stan VanDerBeek's Movie Drome, the USCO multi-media performances, Jackie Cassen's and Rudi Stern's Theater of Light and Aldo Tambellini's Black Gate Theater. At the same time, significantly influenced by ideas stemming from music, notably John Cage's indeterminacy, as well as Fluxus and the notion of Intermedia, other mixed-media forms were emerging, such as happenings of all sorts, not necessarily centered on technology. Though technology was at the center of perhaps one of the most important intermedia events of the time. This was the "9 Evenings: Theatre and Engineering" with new works by John Cage, David Tudor, Robert Rauschenberg, Robert Whitman, Yvonne Rainer, Lucinda Childs, Öyvind Fahlström, Alex Hay, Deborah Hay and Steve Paxton, where every single piece featured some form of live image projection and/or manipulation. By the mid-sixties video became accessible to artists. One of the first to explore it as an artistic medium was Nam June Paik who had studied composition with Stockhausen and John Cage. While many artists welcomed video and used it to create different kinds of work especially exploiting its capacity to capture reality, Paik devised the first video synthesizer with engineer Shuya Abe. Subsequently, developments in audio synthesis inspired much research in video synthesis and the 1970s saw

numerous synthesizers invented by artists and engineers, such as the Rutt/Etra and the Sandin, among numerous others. Synthesizers truly enabled one to "play" video like an instrument, by way of voltage control, in the same way as the Buchla or Moog for audio. This fostered an era of extensive video performance exploration. A hotbed for video performance was The Kitchen founded by then film artist Woody and violinist Steina Vasulka in New York city in 1971 where much activity at the intersection of music and image took place such as Steina's own "Violin Power". Many other centers sprung-up all over North America forming a whole network for performance and research which unfortunately folded because of lack of funding. The examples of inventions, concepts and practices presented here are of course drawn from numerous possible others. I have selected cases from artistic traditions and currents that I consider most in-line with aesthetics still present in Live Visuals as we know them today and with which I associate my own practice, often focusing on the best documented or the most accessible to me. Thus a large part of this section, from the 1940s on, mostly concerns North American examples which I am most familiar with and relate to best, not only because of readily available archives but also through the memories of people I know or have personally known. The next chapter will examine the evolution of the present era of improvisatory Live Visuals where they have gained acceptance as a form in its own right, or rather as different variations thereof such as liquid lights or light shows, live cinema and VJing.

CHAPTER IV:

POLYSENSORY FUSION: VISUALS AS EXTENSIONS OF MUSIC

Much of the acceptance of Live Visuals as its own art form and much of its development since the 60s are the result of their incorporation by more popular genres of music such as Rock and different types of dance music. Indeed, Live Visuals were embraced enthusiastically by Rock concerts, discotheques, clubs, and raves, but from a different perspective than intermediality. They were rather seen as a means to enhance the experience of listening and feeling within a single sensory whole centered on the music. Pulsating to different rhythms, they have evolved in various aesthetic directions, from psychedelia to experimental collage and appropriation of mainstream media material, to computer animation, sophisticated "theatrics" and "live event visual amplification", and have become more and more of a standard fixture in an ever-increasing number of contexts. The dramatic advances in electronics and computers of the last 50 years has stimulated the development of a wide range of tools and concepts for the production of Live Visuals many based on approaches coming from contemporary music and audio practices. More recently the ever-greater accessibility and ease of new digital technology has led to more and more practitioners creating their own, sometimes completely maverick, tools for their specific personal needs. In the

21st century, as new technologies emerge and spread, the practice of Live Visuals keeps re-inventing itself as it adapts to their new possibilities.

4.1 Liquid Lights - A West Coast Flavor

In early 1950s San Francisco, artist Seymour Locks, a professor at San Francisco State College, interested in the projected image sets of the European avant-garde theater of the 20s and 30s (Futurists, Bauhaus), attempted to recreate some version of them for a conference. To do this he experimented with empty slide cartridges filled with pigment as well as institutional Viewgraph overhead projectors he usually used in his classroom. He found that the Viewgraph enabled him to project in real time the stirring and swirling of paints in glass dishes placed onto its translucent base. To this he could add glass plates and hand-made slide transparencies obtained from fluids and solids and create moving patterns of light by their manipulation. Based on these experiments he developed a studio art course which he called "Light and Art". Young painter and poet Elias Romero saw some of the performances Lock's students created around Los Angeles using his techniques and became very interested in the possibilities of the overhead projector and slides. Soon he moved to San Francisco and began to present his own performances based on Locks' liquid light technique, in combination with film reels, to live music, poetry and dance, at the parties, art studio events and other venues of the bustling city. These live light and pigment improvisations inspired by the improvisatory jazz and poetry usually present at events of the time would later come to be known as "light shows" (Riley, 2008).

The manager of the building where Romero lived in San Francisco was Bill Ham, then an abstract expressionist painter. Romero sometimes enlisted him to collaborate on his shows. In the light show technique Ham right away saw the possibility of transposing "action painting" to "painting" directly with projection. He soon began to explore this on his own in his studio:

Working in his studio with live and recorded sound, Ham developed a technique of spontaneous projection painting (electric action painting) involving simultaneous composition - execution - and presentation. [...] Viewer "participation" for such a "present tense" art, suggested attendance not only for occasional public presentations, but during studio "sessions" as well. As one cannot rehearse spontaneity, the studio sessions have never been related to as "rehearsals", rather as "shared" experience. (Bill Ham's website²⁵)

After much experimentation, in 1966, he began presenting his multi-projection "electric action painting" work publicly, assisted by Robert Fine and with music by William Spencer and Oscar Daniels. He soon became somewhat of a light show specialist.

With the rise of the new hippy movement of the time, a whole new music scene was emerging in San Francisco. Building on the improvised bop jazz and beat culture of the clubs and lofts, and on the confluence of blues, acoustic folk-rock, and the electric amplification of instruments, it also embraced the sudden free circulation of hallucinogens, especially LSD, and their effects on perception. This scene would become known as Psychedelic Rock or Acid Rock. Groups such as The Charlatans, Quicksilver, and especially The Grateful Dead were developing a sound that was known for its

²⁵ Bill Ham's website: www.billhamlights.com, "History" section, para. 3

long free-form, group jams, much like bop jazz improvisation, and at the same time meant to convey the various pulsations of an LSD trip. Their concerts became so popular that they filled large concert halls and auditoriums for all-night festivals (Scaruffi, 2009a).

The Avalon Ballroom was one of the most important San Francisco spaces of the era. It presented such iconic bands as Big Brother and the Holding Company with Janis Joplin and Quicksilver Messenger Service. The Avalon's music promoter Chet Helms invited Bill Ham to create light shows for its evenings (McLure, 1995). Ham's shows - that included numerous slide and film projectors, overheads, strobe lights and other effects - had tremendous popular impact and would have an important bearing on the further development of the form.

The Avalon had to close its doors in 1968 when it lost its lease. Ham then formed, with San Francisco jazz musicians Fred Marshall and Jerry Granelli, the audio visual multimedia group Light Sound Dimension (LSD).

Their parallel experiments with electric sound, and their ability to improvise, provided an unusually rich opportunity for collaboration. [...]. Ham's electric action painting, with the musicians' electronic "orchestral" sound, proved capable of sustained audio visual improvisation. They were joined by Beverly Bivens, Noel Jewkes, and Flip Nuñez. Playing almost daily, they perfected their unique ability to improvise integrated "abstract" audio visual compositions of unusual intensity and richness. (Bill Ham's website²⁶)

²⁶ Bill Ham's website: www.billhamlights.com, "History" section, para. 7

They soon opened the Light Sound Dimension Theater which presented weekly performances of totally improvised visuals and sound for over a year. Ham and Marshall continued to perform together as LSD up through the 1990s.

During the same period, Tony Martin of the San Francisco Tape Music Center, was for his part, invited by impresario Bill Graham to do the projections in his Fillmore West Auditorium. There Martin created the first multi-projector light shows for the Grateful Dead, Jefferson Airplane, The Great Society, Muddy Waters, The Paul Butterfield Blues Band, The Mothers of Invention, Them, Junior Wells, James Cotton, and others. At the time, the Fillmore became the focal point for psychedelic music and counterculture. At the same time he continued collaborating with more avant-garde composers at the Tape Music Center. He remained at the Fillmore until 1966 (Pearlman, 2002).

By then many more light shows were flourishing in California and all over the West Coast. Essentially these light show groups revolved around the thriving rock scene. Their basic idea was to visually enhance and augment the psychedelic music of the day in order for concerts to become live multi-sensory experiences. Every light show artist and group had their own personal approach, their own secret recipe. Tony Martin remembers:

Every person who contributed to the techniques and improvisational "light shows" - few of us used this latter term - had his own development of those methods. As a basic mix, all used a projector combination, usually liquids, intermingling oil and water, solvents and color mediums, and dry substances in motion in large clock faces on overhead

projectors, and 8 and 16 mm film. Film could originate as camera work, or be painted by hand, or recycled from any source. The way these elements were combined and handled made various amalgams with different feeling and meaning. (Martin, 2008, p 142-143)

Thus each light show formation became known for its own particular identity and flavor. Among the best known of these were, in San Francisco, Glen McKay's "Headlights" (that were Jefferson Airplane's main light show), "Brotherhood of Light" (that worked with everyone from Hendrix, to Joplin, to the Doors and the Grateful Dead among many others), "Little Princess 109" (Bill Graham's house light show), "Abercrombe Lights" (that lit most of the San Francisco bands over the years), as well as the "The North American Ibis Alchemical Company", the "Holy See", and many more. "The Single Wing Turquoise Bird" worked in Los Angeles and Venice, California. In Seattle were "Union Light Company" and "Lux Sit and Dance" (Oppenheimer, 2009). Much like the psychedelic acid rock that inspired it, the West Coast light show explosion developed alongside the spread of the hallucinogenic LSD and was initially rooted in the aspiration to visually simulate the experience of acid trips.

4.2 East Style Light Shows

For its part, the New York City countercultural scene in those years was not quite the peace and love hippy world of the West Coast. In the late 50s and early 60s New York had been an important center for the folk movement (notably with Bob Dylan) and home of the Village "beatnik" culture. And while it had witnessed the first Beatles concert in 1964, the New York

countercultural music of the mid-sixties brought a different harder urban edge, from the more political folk-rock, to the biting satire of the Fugs, to the dark decadent poetics and sounds of the Velvet Underground.

Nevertheless a number of new clubs, interested in the psychedelic rock phenomena, were opening in the Big Apple as well. Among them were the Peppermint Lounge, Max's Kansas City and especially Fillmore East that Bill Graham launched in the East Village in 1968 as a counterpart of his Fillmore West. The infamous Electric Circus, which gained the reputation of the city's ultimate mixed-media pleasure dome, even featuring hallucinogenic light baths, hired Tony Martin, who moved to New York in 1967, to create its visual systems. These clubs brought in the West Coast acts as well as rock bands from all over the country. As a result New York saw its own light show groups form. These included "Lights by Pablo" and "The Pig Light Show" and the now renowned, and most complex, "Joshua Light Show" that was the Fillmore East's house light show.

The "Joshua Light Show" became known for its elaborate visual shows run by a crew of several people collaboratively manipulating a wide range of equipment including overheads, color wheels, liquids, slides, film, and using rear projection. Filmmaker Joshua White, founder of the "Joshua Light Show" recalls:

Because of our situation and where we were at the Fillmore, we were able to improvise on a very large, thirty to forty foot, canvas behind the musicians as they performed. We had a knowledge of their music but we weren't following any score, we were just improvising, making something

visual using our tools. So improvisation is the key. (Del Signore, 2007, para. 4)

With visual improvisation as its focus, the Joshua Light Show (which later became Joe's Lights when White left the group), was a huge production. It involved a large group of people who had been students at Carnegie Tech in Pittsburg and Columbia University including, in addition to White, Bill Schwarzbach, Tom Shoesmith, Cecily Hoyt, Ken Richman, Allan Arkush, Dennis Clark, Becky Smith, Jane Rixman, and Amalie Rothschild. Installed on a scaffolding behind the large rear projection screen, each had their own specific role in the organization and creation of the show. Thus Cecily Hoyt was in charge of the patterns obtained by oils and inks, Ken Richman ran most of the projectors, Tom Shoesmith took care of lumia effects inspired by Thomas Wilfred using mirrors and reflections towards the higher levels of the scaffolding, and Joshua White acted as a conductor overseeing the whole. They communicated with each other by means of head-sets (Pouncey, 2005; Jubilart, 2009). Some of the best known music acts for which they did light shows were: Janis Joplin with Big Brother and the Holding Company, Jimi Hendrix, Led Zeppelin, The Who, The Grateful Dead, The Doors and Frank Zappa (1967-71).

4.3 Inevitably Plastic

Meanwhile, in April 1966, Andy Warhol was putting on his "Exploding Plastic Inevitable" (EPI) evenings on St. Mark's Place at the Dom, a Polish community hall and ballroom. The Exploding Plastic Inevitable were multimedia performance nights incorporating multiple projections of Warhol's films,

strobes and a range of other lights, dancers simulating sadomasochistic rituals (Gerard Malanga, Mary Woronov) and live music for which he hired the Velvet Underground and Nico. In a 1999 Frieze issue, Edwin Pouncey quotes Warhol from *Popism*:

I'd usually watch from the balcony or take my turn at the projectors, slipping different-coloured gelatin slides over the lenses and turning movies like Harlot, The Shoplifter, Couch, Banana, Blow Job, Sleep, Empire, Kiss, Whips, Face, Camp, Eat into all different colours. Stephen Shore and Little Joey and a Harvard kid named Danny Williams would take turns operating the spotlights while Gerard [Malanga] and Ronnie [Tavel] and Ingrid [Superstar] and Mary Might [Woronov] danced sadomasochistic style with the whips and flashlights and the Velvets played and the different-colored hypnotic dot patterns swirled and bounced off the walls and the strobes flashed and you could close your eyes and hear cymbals and boots stomping and whips cracking and tambourines sounding like chains rattling. (Warhol in Pouncey, 1999, para. 5)

The Plastic Inevitable evenings were beyond concerts with lights shows. They were also far from hippy celebrations. All the participants were cutting-edge musicians and artists who were well aware of all the avant-garde movements of the time.

When Warhol took the Plastic Inevitable on the road, it became clear how different they were from the West Coast psychedelic movement. Mary Woronov recalls:

People on the West Coast hated [us]. They thought we were odd, weird, dark and evil. There was a big dichotomy: they took acid and were going towards enlightenment; we took amphetamines and were going towards

death. They wore colors, we wore black; they were barefoot, we wore boots. All they ever said was "wow" and we talked too much. It was the old NY is smart and LA is stupid routine. (Woronov in O'Brien et al., 2005, "Mary Woronov on dancing at the Dom" section, para. 6)

And, indeed, what further distinguished this concept was its fusion of rock music, at least a certain form of dark, atonal, improvisatory rock, with tendencies developing in the "serious" visual art world like happenings, and performances.

The Exploding Plastic Inevitable evenings were also technically quite elaborate and, though not really psychedelic, no less a polysensory experience. Branden W. Joseph describes all the elements the evenings involved:

At the height of its development, the Exploding Plastic Inevitable included three to five film projectors, often showing different reels of the same film simultaneously; a similar number of slide projectors, movable by hand so that their images swept the auditorium; four variable-speed strobe lights; three moving spots with an assortment of colored gels; several pistol lights; a mirror ball hung from the ceiling and another on the floor; as many as three loudspeakers blaring different pop records at once; one to two sets by the Velvet Underground and Nico; and the dancing of Gerard Malanga and Mary Woronov or Ingrid Superstar, complete with props and lights that projected their shadows high onto the wall. (Joseph, 2002, p. 81)

All of this technology and simultaneous activity created for its public total sensory overload.

The Plastic Inevitable can be seen as expanding on avant-garde immersive experiments such as the Vortex evenings, Stan VanDerBeek's Movie-Drome or USCO's intermedia events while pre-figuring a new kind of rock concert idea based on "theatrics".

4.4 Early Rock Theatrics: European Psychedelic Aesthetics

Light shows, for their part, were developing not only in the United States at the time. As psychedelic rock arrived in Europe, notably in the UK, in the latter sixties, so did light shows begin to develop in clubs that presented it. The best known of these were the lighting and visual effects of The Pink Floyd and the projections by Mark Boyle and Joan Hill for The Soft Machine that emerged out of the London pop music scene's short-lived (1966-67) UFO Club.

In their early years, the Pink Floyd, originally consisting of Roger Waters, Nick Mason, Richard Wright, and Syd Barrett, was appreciated as much, if not more, for their visuals as for their music. "With us," Waters said, "lights were not, and are not, a gimmick. We believe that a good light show enhances the music." The visuals, or lights, and their music were all part of a single whole. Syd Barrett said that for them "the music and the lights are part of the same scene" with the one enhancing and adding on to the other (Walsh, 1967). In fact, it was their elaborate, for the time, light show that was their initial claim to fame. Light and visuals shows were extremely popular with the London underground scene of the era. So much so, says Mike McInnis, that promoters would often advertize concert events based on the visual acts as

much as the music, or even with more emphasis on the visuals. Thus in 1968 Nick Mason commented that he sometimes thought that the band got as many gigs "only because we have lots of equipment and lighting, and it saves the promoters from having to hire lighting for the group" (McInnis 2004).

From the beginning the style of the Pink Floyd was based on the use of special effects both audio and visual. Several people worked on the creation of their visuals. The earliest was architect Mike Leonard, who was renting rooms in his house to some of the band members and was a lecturer at Hornsey Art College. At the time many faculty members at Hornsey were experimenting with combining light projection with music. Interested in pop music, Leonard jammed with the band improvising visuals live that he made from shapes cut out of pieces of colored cellophane, attached to a rotating drum through which light was projected to create moving blobs of color. He also invented experimental projectors and optical devices based on the principle that light projected through polished but strangely shaped perspex (acrylic) lenses can be bent, fractured, dissipated and dissolved into an endless series of shifting patterns. Leonard's early involvement with the band is considered to have shaped the now legendary audiovisual aesthetics of the Pink Floyd.

By 1966 others replaced Leonard at the Pink Floyd lightshow. Joel and Toni Brown, Americans from Timothy Leary's Millbrook Institute, showed up to one of their concerts while visiting London with a projector and psychedelic slides. They are reputed to have introduced the Pink Floyd to the U.S. West Coast lightshow look and approach. At this time the band's stage shows became ever more complex with slides, film clips, and psychedelic patterns projected

onto a large circular screen. Peter Jenner, then Pink Floyd manager, with partner/investor Andrew King, devised the band's first custom lighting rig from common domestic light bulbs shining through pieces of colored plastic mounted on a simple wooden frame controlled by light switches bought at a hardware store. This lighting system launched the bands creative expressionistic use of shadows. Jenner recalls the original Pink Floyd lighting rig he and Andrew had built:

[...] the low-powered lights we set them up so they'd throw a huge shadow. It was all very unlike the stunning high-tech flash of the Fillmore. But, in a way, the Floyd's was more imaginative. (McInnis, 2004, para. 32)

The band members took advantage of these shadows, making them shrink, grow and dance with the music as they intermixed with the other visuals.

The rig was soon refined with micro-switches by Joe Gannon/Jo Cannon, a former student of Leonard's, who also added other elements notably various slides and strobe lights as well as prisms to split flickering beams of pure white light into rainbows. Syd Barrett's roommates Peter Wynne Wilson and Susie Gawler-Wright took over building more custom lighting gear, using equipment discarded by West End theaters where Wilson had worked as a lighting operator, as well as a lightboard that could control spotlights by being played like a keyboard. From 1968 the lighting and visuals duties were assumed by John Marsh who had been Gannon's and then Wilson's assistant. As the visual dimension of the Pink Floyd shows became more elaborate, additional special effects were added, including lasers, pyrotechnics and oversized balloons (notably the giant pig balloon for the

"Animals" album tour). By the 1990s the Pink Floyd tours were huge productions, employing large teams just for the visuals and lights (for some shows up to 200 people) and many kinds of ultra-sophisticated technology such as lasers, aircraft lights, smoke machines, extremely high-end stage lights, computerized control, and various props.

Another strand of British light shows emerged from the completely different scene of the margins of London's contemporary art world. Gustav Metzger, who had escaped Nazi Germany, was concerned with political and ecological issues such as the nuclear arms race and ever-increasing environmental destruction and believed in art as activism. In 1959 he had developed his concept of Auto-Destructive Art urging the use of "Ballistics, Explosives, Glass, Mass Production, Pressure, Stress". Auto-Destructive Art was intended as an attack on the destructive nature of industrial societies. Through his investigations of destruction he also explored its opposite force in Auto-Creative Art processes. In the 1960s his increased interest in technology and science led him to experiment with chemical and physical processes. Out of this experimentation emerged his Liquid Crystal Projections. Heated liquid crystals produced images that were projected on multiple screens creating ever-changing organic shapes and color fields over time. Their self-generative reality provided a counterpart to his Auto-Destructive Art by evoking transformation and endless possibilities. Metzger used this technique for projections for Cream, the Who and the Move at London's Roundhouse in the mid-sixties (Watling, 2012).

Also interested in destruction as creative process were Mark Boyle and Joan Hills (later known as Boyle Family in conjunction with their son and daughter).

This British husband and wife team of artists who had been working and exhibiting in a variety of forms since the late 50s, began, in the early 60s, experimenting with projection. For some four years, in their home, they explored and showed to friends images and sounds originating from boiling liquids, burning slides and all kinds of chemical and physical reactions. These were obtained through combining, usually by chance, various substances, often found in their kitchen, placed inside special containers they created for use with their projectors that were rigged with contact or other microphones to amplify the aural component as well. In 1963 they began to present public performances of such experimentation and by 1966 were showing a work they called "Son et Lumiere for Earth, Air, Fire and Water" in London and elsewhere in England and Holland, under the name "Sensual Laboratory". Another performance soon followed: "Son et Lumiere for Insects, Reptiles, and Water Creatures" in which the life, and death if it should occur, of live specimens of insects, reptiles and other creatures were projected onto walls or screens with the help of micro-projectors and epidiascopes, and amplified by audio equipment. This latter piece was first presented at the Destruction In Art Symposium organized by Metzger at Jeanetta Cochrane Theatre, London, in 1966. After a presentation of "Son et Lumière for Earth, Air, Fire and Water" at the UFO Club, at the end of '66, they were asked to become the venue's house light show. There they met the band Soft Machine with whom, feeling much mutual affinity, they began collaborating and touring, until 1968, to various UK and European locations, including a Canada and U.S. tour of which Jimi Hendrix was also a part. In the meantime they created "Son et Lumière for Bodily Fluids and Functions" which examined, through a micro-projector, their saliva, tears, blood, sweat, vomit, earwax, phlegm, urine,

feces, sperm, to the sound of their amplified breathing and heartbeats (Locher, 1978).

Boyle and Hills were primarily interested in allowing naturally occurring processes, or natural processes provoked by them, such as chemical reactions, movements of living substances, and other phenomena, like burning for example, to unfold at their own rhythm and to speak for themselves. Their intervention mainly consisted in the choice of which processes to use in any given situation and making these processes clearly visible by way of hugely enlarged projection and sometimes by the addition of some color or pigment to enhance the clarity of reception. Otherwise, rather than trying to alter anything, they simply let whatever happened be. As well, they did not attempt to synchronize their visuals with the music as they found that the illusion of synchronization took place regardless when images and sounds were presented at the same time. Mark Boyle stated that:

Although the light environment was not in any way synchronised with the music the audience were invariably convinced that they were synchronised. As the light environment consisted of chemical and physical reactions with no manipulation or interference from the performers the only possibility of genuine synchronization would be that sound waves might interfere with the reaction or that the group were influenced by the lights. (Locher, 1978, p. 78)

The brain, he said, forced the two things together. Such a concept is in many ways similar to the dance/music pieces by Merce Cunningham and John Cage where the dance and music were created independently but presented

simultaneously simply taking place in the same place and time leaving any connection to the audience's imagination²⁷.

Elsewhere in Europe lightshows were less prominent. Düsseldorf was an important German cultural center at the time. The club Creamcheese opened in 1967. Joseph Beuys and his students from the Düsseldorf Art Academy would congregate there. Ralf Hütter and Florian Schneider, who would later become Kraftwerk, had their first concerts there and the club featured performances by bands such as Pissoff, Kluster, Can and Tangerine Dream. Creamcheese had a fairly elaborate light show set-up that included slide images of Ferdinand Kriwet's concrete poetry, multiple projections of slides and film, a video wall and closed-circuit video feedback. Düsseldorf was also where the ZERO group was based. The group was founded in 1957 by Otto Piene and Heinz Mack who were joined in 1961 by Günther Uecker. From 1959 Piene began working with light developing his "Light Ballet" (1960) and in 1964 the group created the kinetic light installation "Light Room (Homage à Fontana)" for Documenta III. (A few years later Piene would move to NY to work with Aldo Tambellini on "electromedia" theater).

²⁷ "In our collaborations Merce Cunningham's choreographies are not supported by my musical accompaniments. Music and dance are independent but coexistent". John Cage (1990). An Autobiographical Statement. *Southwest Review*, 1991. Retrieved, February 14th 2013 from: http://johncage.org/autobiographical_statement.html

4.5 Post-Punk Multi-Media

In reaction to the mass commercialization of the music industry, a new musical tendency had begun to appear by the early seventies. Inspired by the DIY urban bohemian attitude of NY countercultural artists like The Velvet Underground, Patti Smith and the New York Dolls, the punk rock movement emerged. Bands such as The Ramones, The Sex Pistols, Blondie, The Clash, with their angry, aggressive and confrontational messages against consumerism, hit stages in North America and Europe. Punk soon gave rise to a multitude of alternative music genres. A fresh generation of avant-garde post-punk, and even post-rock, music/art groups surfaced in its wake. Influenced by the multi-media frame of mind of the time, several of these fused alternative music with visual arts, performance and theater, and embraced the possibilities of live image projection for their concerts. Their approaches had nothing to do with the abstract image processing by synthesizers which had continued the tradition of the psychedelic light shows of the 60s experimental music and rock scenes. In fact, much of their imagery was of figurative nature and often derived from found slides and footage such as old movies, newsreels, educational and industrial training films, etc.

Among the most interesting groups of this era in relation to the use of live images were Cabaret Voltaire, Throbbing Gristle, Test Dept and Tuxedomoon. Yet, while their "Industrial" and "New Wave" sensibilities brought different aesthetic directions, some nevertheless saw in them a mere new version of psychedelia. In a 2003 issue of *The Village Voice* music critic Simon Reynolds has proposed:

Thesis: Industrial music, in its original late-'70s incarnation, was the second flowering of an authentic psychedelia. ("Authentic" meaning non-revivalist, untainted by nostalgia). There was the same impulse to blow minds through multimedia sensory overload (the inevitable back-projected, cut-up movies behind every industrial performance—attempts at "total art" only too redolent of 1960s happenings and acid-tests). And industrial, like psychedelia, believed "no sound shalt go untreated"; both adulterated rock's "naturalistic" recording conventions with FX, tape splices, and dirty electronic noise. (Reynolds, 2003, para. 1)

For Reynolds post-punk was a continuation of art-rock. According to him, industrial music came out of an interest in avant-garde electronic experiments such as tape music, *musique concrète*, synthesizers, sequencers, white noise, etc., with a punk spirit of provocation and transgression.

Indeed, inspired by Dada, and named after the Zurich nightclub where the early Dada movement congregated during WWII, Cabaret Voltaire was formed in Sheffield, England, in 1973, as a performance art group. Initially composed of Richard H. Kirk, Stephen Mallinder and Chris Watson, Cabaret Voltaire became a seminal industrial band. In a 2009 interview Richard H. Kirk explained that, from the start, the project, in a multidisciplinary spirit, used live imagery.

It was always a multi-media thing. It started out with the slides I'd did and Standard 8 film and then slowly graduated into video projections when video equipment became a bit more accessible in the early 80s. [...]. (Watson, 2009, para. 46)

In the same spirit as their music, which combined recorded samples of sounds, voices, and tape manipulations, their imagery combined elements

from different visual sources.

By the early 90s the group acquired low cost video editing equipment. In a 1994 article by Richard H. Kirk they commented upon how this equipment was similar to electronic audio tools:

We bought a special Panasonic video mixer and effects generator and just set to work with it. It's like an audio mixer, only you hook up two or three VHS players to it instead. It's got a digitizing section and costs only £500, and it meant we could do most of the visuals at home. When we first started working in that field 10 years ago, you would have paid £5,000 or £10,000 for a toy like that. We've gone back to using video projections after the 16mm stuff we used when we were on EMI and had a huge budget to play around with. Now we use our imagination more. (Kirk, 1994, para. 13)

With this equipment they were able to prepare reels in advance as well as to do live montage during their performances, much like the techniques they used for their music. Cabaret Voltaire used fragments of their own footage and found (from television) figurative material. Combining these, they would create non-narrative "stories", real-time experimental "movies", that would interact to the rhythm of their music.

Throbbing Gristle evolved in 1976 (in Kingston Upon Hull, England) out of a Fluxus-inspired performance art and music group that called themselves COUM Transmissions formed by Genesis P. Orridge and Cosey Fani Tutti later joined by Peter Christopherson and Chris Carter. They claimed that their mission was to challenge and explore the darker and obsessive sides of the

human condition. Piero Scaruffi describes the multiple dimensions of their disturbing work:

Their focus was on the traumas of ordinary souls, souls lost to the machinery of the industrial society. Their manifesto and masterpiece, *Second Annual Report* (1977), was subtitled "music from the death factory". Its pieces used cacophonous electronics, terrified screams, atonal guitars and found sounds, to create a ritual of therapeutic shock and cathartic liberation. They employed free-jazz improvisation and winked at the avant-garde techniques of "musique concrete" and Karlheinz Stockhausen. The sound of the metropolis that came alive in their suites was the sound of the lives sacrificed to the machines, not the sound of the machines that used those lives. Their performances coupled this "noise" with multimedia shows that were no less provocative. (Scaruffi, 2003, p. 203)

Their transgressive performances incorporated confrontational visuals including pornographic imagery and photographs of Nazi concentration camps in multi-projector film and slide mixes.

After Throbbing Gristle disbanded, in 1981, Genesis P. Orridge started *Psychic TV* with Alex Fergusson of *Alternative TV*. *Psychic TV* continued with disturbing imagery in the form of video projections, slides and back-projected film. The origins of the use of extreme political imagery by Throbbing Gristle, as well as several other Industrial bands after them, including Laibach, Einstürzende Neubauten, Skinny Puppy, and Death in June, can be traced to the Situationist International concept of *détournement* rather than Dada. They can be seen as "sampling" visual culture signifiers to complement the "sampling" of sound. Indeed, Debord encouraged the practice of *détournement*, that involves taking spectacular images and language and

turning them around in new presentations that de-stabilize the flow of the spectacle of the capitalist super-structure and its image-mediated power relationships. The idea was to recombine recognizable symbols and to subvert their original meaning, often in a shocking way. The result then was a collage aesthetic based on the appropriation and recombination of cultural fragments - both auditory and visual - transforming their original meaning. Throbbing Gristle's multi-media can also be traced back to Futurism with its enthusiasm for dynamism, its fetishization of technology, its patriotic militarism and its celebration of noise and warfare (Leigh, 2008).

First released by Throbbing Gristle's industrial label, and also from Sheffield, was another electronic/industrial group calling themselves Clock DVA. Formed in 1978 by Adolphus "Adi" Newton and Steven "Judd" Turner, Clock DVA was from the beginning interested in both sound and visuals. Adi Newton explains:

The mission of DVA was and still is to push the envelope of sonic and visual mediums, by experimentation and research and development of sound and visual mediums. From the first performance of DVA, visual information was utilised in the form of films and slide projections. These visual mediums along with artwork for sleeves were integral to the concepts and the corresponding sound. Film was treated as an equal discipline, not merely as a lightshow for stage work. Over the years the use of Film and Video has developed within DVA, resulting in a number of films that are foremost Film & Visual works. (Newton in Konings, 2011, para. 7)

Clock DVA lasted a mere three years until 1981. In 1983 Newton reactivated the group as simply DVA.

Test Dept., for its part, while also associated with the industrial rock scene, emerged in 1981, in the London area, out of a very different ideological context. Core members of the group Angus Farquhar, Graham Cunningham, Paul Jamrozy, Paul Hines and Toby Burdon saw themselves as a collective and were involved in politics of protest that embraced ideas of the left. They became known for their use of unconventional instruments such as scrap metal and industrial machinery, or anything they could make music with, mainly discarded products of industry, as sound sources, which was fueled both by lack of money and dislike of traditional rock instruments. They were noted for large-scale events in unusual site-specific locations, such as railroad stations, castles and disused industrial complexes, and in concerts for such causes as opposing the Conservative assault on the trade union movement and supporting the striking of various unions like the miners, ambulance workers or print makers.

In their live shows they would combine their music with the use of multiple lo-fi 16mm film and slide projections, and later video, designed by their visual director Brett Turnbull. These films and images presented various details of industrial machinery in action as well as people (often the band members themselves) at work with machines. Music critic Simon Reynolds suggests that their aesthetics can be seen as the reflection of their political views:

Test Dept's metal music sounded like a Soviet factory. Or at least the idealized propaganda version: comrades inter-locking like cogs in a single engine... an absolutely perfect machine. (Reynolds, 2005, p. 488)

Indeed, a strong influence on their work was Constructivist aesthetics, which they were interested in re-visiting within a Postmodernist context.

Other UK post-punk bands were known for their use of elaborate live film projections and teamwork with filmmakers. The Monochrome Set, formed in 1978, worked with experimental filmmaker Tony Potts. The band 23 Skidoo, that collaborated with William Burroughs, worked with live multi-projection run by filmmaker Richard Heslop.

Somewhat different was the post-punk aesthetic climate at the time in California. Piero Scaruffi relates the scene at the edge of the already striving high-tech environment of Silicon Valley:

[...] California had been one of the cradles of experimental rock since the heyday of Frank Zappa. During the 1970s, freaks turned into punks and hippies switched from LSD to heroin, but the creativity kept flowing. Interactions with other forms of art were at a peak. Avant-garde clubs of all kinds spread all around San Francisco. California's new wave was more experimental, but the underlying theme remained the somewhat hallucinated and neurotic representation of a catastrophic present/future, of a horrible mutation of the human race. Their music was even less related to punk-rock and to New York's intellectuals. California's new wave exhibited an amateurish tone that was unique. The "visual" aspect often prevailed. The Residents, Chrome and Tuxedomoon formed the San Francisco triad that created the third pole of the new wave [...] (Scaruffi, 2003, p. 180)

Tuxedomoon were especially interested in the visual dimension of the concert form.

Tuxedomoon resulted from the meeting, at an electronic music class at San Francisco City College in 1976, of Blaine Reininger and Stephen Brown. By 1977 they formed Tuxedomoon as a multimedia performance experience with visual art and elements of theater. Their unique style came from an incredibly broad range of musical influences including Brian Eno, David Bowie, John Cage, Philip Glass, Bernard Herrmann, Giorgio Moroder, Nino Rota, Roxy, Igor Stravinsky and Ennio Morricone. Reininger and Brown were soon joined by Peter Principle (Dachert), as well as other members who would not stay long, such as Tom Tadlock, Gregory Cruikshank, and vocalist Victoria Lowe. From the start, the eclectic group incorporated into their live shows projections by film/video artist Bruce Geduldig as well as theatrical touches by performance artist Winston Tong who would come and go over the years (Tuxedomoon/Gill, 2007).

Simon Reynolds proposes that some of Tuxedomoon's roots could be found in the Cabaret form which, according to him, became around 1980 a popular alternative model for rock concerts.

Organizations like Cabaret Futura in London, groups like Kid Creole and the Coconuts, even synthpop idol Gary Numan, all looked back to pre-rock ideas of showbiz, while simultaneously glancing sideways to performance art and multimedia. Entertainment that was costumed, scripted and choreographed, that didn't hide its artifice but *reveled* in it, began to seem more honest than rock's faux spontaneity. Tuxedomoon arrived at just the right moment to tap into this shift. (Reynolds, 2005, p. 203)

In addition to this new cabaret model, cinema played an important role on the aesthetics of the group, particularly film noir, as well as surrealist and to some

extent classic horror films, not only from a visual perspective but also quite significantly in terms of the soundscapes. Cinema inspired the lighting, scenography and staging of their performances as well as the choice of film and video imagery that they used. Their shows often included a combination of a wide variety of projected figurative film and video footage, both found and expressly shot by Geduldig, that echoed the no less wide variety of influences present in their music (Tuxedomoon/Gill, 2007).

Though they were signed to the Residents' Ralph Records label, they moved to Europe by the early 80s, establishing themselves first in Rotterdam and then in Brussels. During the 10 years they spent in Brussels, which at the time was a hotbed for music, arts, dance and theater, they further refined the visual elements and the multimedia character of their elaborate performances. In 1982 they became involved for three years in an ambitious "opera without words" project in Italy, "The Ghost Sonata". Geduldig recalls:

It all started when we were approached for a project by two different parties : Image Video in Brussels and Il Teatro in Polverigi. We imagined creating a body of music and at the same time shooting an episodic story on video. We would then transfer the video to 16mm film for large live projection, and add taped musique concrete and an orchestra. I don't exactly recall the inception, except that Winston liked the title 'Ghost Sonata'. (Bruce Geduldig in Tuxedomoon, 1997, para. 3)

The opera was a complex spectacle fusing neo-classical music with silent theater performance, special stage effects, and highly sophisticated video projection for the time. An anonymous reviewer ("spacefrog"²⁸) on the internet

²⁸http://www.epinions.com/review/The_Ghost_Sonata_10_10_by_Tuxedomoon_876623005025/content_118065106564?sb=1

has described the resulting CD as the weird soundtrack of a strange movie. To this day, Tuxedomoon continues to work on projects together although their three core members live in three different parts of the world.

In all of these examples the filmic and photographic elements became an important integral part of the live performances of the bands in question, in that sense much like Pink Floyd before them, but in a completely different independent aesthetic spirit. They would establish a tradition of experimental visuals as part of experimental rock concerts before the existence of any VJ hardware or software that appeared only some twenty years later.

4.6 Dance Floor Visuals

As the various sub-genres of rock music of the 70s, from mainstream to alternative, continued to explore ever more variations of guitar solos and blues-inspired rhythms, and dominate the airwaves, people still wanted to dance. It was Funk, Soul and Latino music that would provide the spirit and energy that those interested in dance, notably New York City gays and African Americans, were looking for. This interest in dance resulted in a movement that would give rise to disco music and revive the discotheque-style nightclub (thriving in the 60s) which the rock public of the time had left behind in favor of music halls and bars. By the mid-70s, nightclubs dedicated to dancing appeared all over the U.S. (and eventually the UK) (Scaruffi, 2009a). These clubs, centered around dance floors and featuring disk jockeys smoothly mixing disco hits all night long through powerful audio equipment and using elaborate lighting systems pulsating in synch to the music, created

a whole new scene with its own hedonistic conventions, fashions and drugs. However, by the early 80s disco music's popularity already declined and the clubs began to play other genres of danceable music including rock, punk, post-punk, new wave and no wave, while also showcasing live performances of bands.

The most famous New York city clubs of the late 70s and early 80s, in addition to hosting live acts by some of the leading alternative music artists of the time, also featured presentations by literary icons such as William Burroughs and Allen Ginsberg, art exhibitions by the likes of Keith Haring, Jean-Michel Basquiat, Kenny Scharf, fashion shows by emerging designers, as well as attracting countless cultural personalities as clientele. They also began incorporating video in various ways to visually amplify the music.

Hurrah is considered to be the first nightclub to place video monitors all around its space. Video artist Merrill Aldighieri remembers:

HURRAH was the first club to make a video installation as a focal point of the club environment, but until I came they were just turning it on occasionally to play films. I asked if I could experiment to create a real-time constant flow of visuals to work with the DJ's music so when my film played, the flow would not stop. When they offered me my first paycheck, the word VJ was born as we looked for how to note what I was doing. (Alsighieri's website²⁹)

While Hurrah focused on monitors, the Ritz was first to use video screens, notably one measuring 30 feet, and one of the earliest models of video

²⁹ Alsighieri's website: http://artclips.free.fr/cv_eng_merrill.htm

projectors. Danceteria, for its part, opened a Video Lounge designed by video artists Pat Ivers and Emily Armstrong who first ran it. Later Kit Fitzgerald and John Sanborn took over the design and programming (at a second incarnation of Danceteria) eventually passing it on to Merrill Aldighieri. The Video Lounge presented an eclectic live mix of archival material from concerts, horror film clips, Kung Fu movies, found footage, early music videos, and artists' work (e.g. Kenny Scharf, Keith Hering, David W., John Sex, Frank Hennenlotter, Robin Schanzenbach, etc.). Mixing & juxtaposing all these kinds of imagery created a totally "surround" video environment (Schaefer, 2010).

In his article "The Roots of VJing: A Historical Overview", Bram Crevits claims, for his part, that the term VJ (Video Jockey) was first used in New York's Peppermint Lounge club (Crevits, 2006). The Peppermint Lounge in question is the second version of the club that opened in 1980 as a music club focused on alternative rock and the then emerging hip hop scene (the first Peppermint Lounge, a twist and gogo discotheque, closed in 1965). The Peppermint lounge featured an entire wall of video monitors and numerous other monitors scattered all around its spaces for which Video Jockeys would live mix between real-time coverage of the concerts, recordings of previous acts, original material by themselves and other video artists and early record company promo video clips. Paul Spinrad, in his 2005 *The VJ Book: Inspirations and Practical Advice for Live Visuals Performance*, asserts that the Peppermint Lounge was extremely significant for the evolution of the club video genre, serving as what he calls a "VJ University" to the early practitioners of the time. However, by 1981, when MTV was launched, the term VJ became associated with the hosts who selected and introduced or

provided commentary on the videoclips they aired, modeled on the personalities referred to as DJs on radio shows.

4.7 Scratching the Surface of Television

At the time, the appearance on the market of affordable consumer-grade VCR decks opened up a completely new horizon enabling the capturing of material from television, the trading of this material via VHS cassettes, and simple editing by using two such decks. Soon emerged a scene of people creating their own alternative mixes of images at home - from political, to subversive, to simply decorative - that, before long, dance clubs which had video equipment began to show. Thus club video emerged as a genre and with it a whole club video culture that would be greatly enriched by a generation of video hardware that was being replaced by a new one at leading television networks (and other institutions) leaving a quantity of much cheaper used equipment circulating on the market for the taking of the new group of artists working in the sector. In a conversation with Mike Kelley, Tony Oursler recalls:

I had been really active in the club scene in New York as a video artist, it was just another venue which we naturally gravitated to. I always got into the clubs for free because they showed my tapes. [...] those early rock films or videos, how simply fantastic. All of the VJ's were hip to the fact that the most interesting videotapes were made by people who called themselves video artists. Some video artists were even hired by the clubs. John Sanborne was at Danceteria; John Miller did some exhibitions at the Mudd Club. In retrospect it was a magic in-between time in a lot of ways, performance, music, video, all in the clubs - but it was too loud to talk. . . . MTV came along and siphoned off much of the

video talent from that world and marketed it safely to the suburbans. . . . Nothing else existed. Artists saw it as a way to get some of their images out there. (Oursler & Kelley, 1999, p.17)

Oursler underlines how the arrival of MTV had a huge effect on the nascent club video scene, not only by promoting video as a creative medium, but also by recruiting the talent of many established video and film artists. MTV gave rise to a certain style of sophisticated effect-filled video. Through its commercially driven significant budgets, it made available high-end production and post-production equipment to the artists that created its content.

At the same time, a low budget video collage movement known as Scratch Video, taking their name from Hip Hop music's record "scratching" technique, emerged in the UK in parallel to the club video scene. It arose mainly in opposition to broadcast TV, as a critique of its commercialization of culture and news in general, and MTV and "youth culture" in particular. Between 1983 and 1986 emerged a group of London based artists who were eager to put to use the newly available video editing technology at art colleges and video coops. They drew inspiration from techniques found in the early NY Hip Hop albums that had recently appeared in Britain (notably sampling and cutting-up of second-hand material by the likes of Grandmaster Flash and Afrika Bambaataa) as well as the Situationist concept of *détournement*, William S. Burroughs' theories of Electronic Revolution, and Bryon Gysin's cut-up concept. Thus they began experimenting with editing together diverse pre-existing video footage, especially recorded directly from television, but also ripped from other sources such as archives and old feature films. They were the first to create montages of "samples" and sequences of video that

used the actual synch-sound of these to construct often elaborate rhythmical soundtracks (Hart Snider, 2000; Duvet Brothers website³⁰).

The Scratch Video collage style with its dynamic and repetitive looping of images and sounds with simple graphical overlays and special effects can be seen, on the one hand, as simply a direct response to the malleability of the emergent VCR format. On the other hand, it can also be viewed as a definitely political form of taking action, of "culture sampling", by appropriating and re-purposing the official media discourse, in relation to the rigidity of the socio-political climate of the time that was marked by Thatcherism, the Cold War and Reagan led American influence on global foreign policy (Duvet Brothers website³¹). Some of the main figures of this movement were: The Duvet Brothers, George Barber, Kim Flitcroft & Sandra Goldbacher, Gorilla Tapes, among many others. In the beginning, the main audience for Scratch Video was at nightclub performances by "industrial music" bands (mentioned earlier) such as The Anti-Group Company, Cabaret Voltaire, Nocturnal Emissions, Psychic TV, SPK, Test Dept, Autopsia, etc. Later various venues across London would screen the videos, including the Ambulance Station, the Fridge nightclub and the independent Brixton Ritzy Cinema, which is said to have housed a large amount of recycled color televisions. These screenings also provided the opportunity to significantly distribute works on VHS tapes. In many ways Scratch can be considered as a major precursor of the later manifestation of VJ culture.

³⁰ Duvet Brothers website: <http://www.duvetbrothers.com/>

³¹ Ibid.

4.8 Ecstatic Tools and Techniques: Rave Culture

By 1984/85, the sophisticated MTV-style effects, for their part, became more accessible to independent artists, or at least club artists, through the relatively inexpensive (compared to broadcast video equipment) Australian-made hybrid digital-analog Fairlight CVI (\$6,500.00 vs \$100,000.00 or more). The Fairlight CVI was released by Fairlight Instruments, the same company, founded by duo Peter Vogel and Kim Ryrie, that had brought, in 1979, the Fairlight CMI (Computer Musical Instrument) the world's first commercial sound sampling electronic/digital musical instrument that could also be used to create new sounds by drawing sound waves on its screen with instant playback. Similarly to its audio counterpart, the visual analog/digital CVI, Computer Video Instrument, and paint box, could process video in real time with a number of effects including: solarization, polarization, superimposition of graphics, the possibility of "painting" directly over the top of video footage as well as "with" video footage. Most of its effects were completely unique, so unique in fact that its "signature" quickly became too readily recognizable. The Fairlight CVI enabled the club VJs to process the video material they were playing in different ways while they were actually mixing or simulcasting it, much like what audio samplers and sequencers were doing for sound (AudioVisualizers website³²; Fairlight CVI community webpage³³). Such possibilities were early steps in the direction of taking the VJ practice into the realm of performance and improvisation. This was also the case with the

³² "Video Synthesizers" subsection in "Tool Shack" section of AudioVisualizers website. Retrieved October 10th 2010 from: <http://www.audiovisualizers.com/toolshak/vsynths.htm>

³³ Fairlight CVI community webpage: fairlightcvi.com

Chromascope, designed in 1981 especially for discotheques by Chromatronics in Essex, England.

A significant influence on the development of live VJing was also the advent of a new direction in club music which grew out of Rap and Hip Hop. Annet Dekker suggests that in the late 70s and early 80s "a new sound surfaces in both Europe and the United States":

A sound that had its origins in disco. The early discotheque was not just a place where you could dance, it was a custom made environment, where the décor and the ambience were as important as the music. (Dekker, 2005, para. 14)

And this new sound was to a great extent the result of the arrival of new technology-based techniques. Hip Hop evolved over the 70s out of the manipulation of music on vinyl records with turntables by Bronx block party DJs. The logical next step was to embrace and incorporate the novel possibilities of the new electronic audio tools appearing at the time.

Indeed, by the early 80s, the digitization of audio equipment enabled the possibility of real-time "sampling" (the capture of a portion, or sample, of a recorded sound, for re-use in a new recording, a technique first developed in the 50s by *musique concrète* composers but with tape and splicing). Soon after the arrival in 1979 of the Fairlight CMI, the first digital audio sampler and synthesizer mentioned earlier, which was only accessible to mainstream musicians because of its high cost, many much less expensive alternatives appeared on the market. In 1982 Em-U Systems released their Emulator, and

in 1984 Ensoniq introduced the Mirage sampler-synth. By 1985 Casio launched its extremely inexpensive low tech SK-1 keyboard/sampler. During the same period appeared the first portable drum machines. The LM-1 Drum Computer by Linn Electronics used samples of live drums while the very affordable Roland TR-808 was the first such device to be programmable. The new possibilities provided by these technologies would become defining elements of ensuing Hip Hop and subsequent music genres. According to Dekker, they created a taste for a more electronic feel thus clearing the way for House, Acid and Techno musics and for the type of imagery that came with them (Dekker, 2005).

Many consider that the rise, in the late 80s, of Acid House and Techno music, that had emerged in Chicago in the early 80s and spread internationally, starting in clubs and evolving to massive warehouse parties and eventually raves attracting thousands of people at a time, corresponded to a new youth movement (Hutson, 2000). Demographically concerning primarily people between the ages of 15 and 25, the explosion of this peaceful movement, (with its PLUR "Peace Love Unity Respect" credo, or PLE "Peace Love Ecstasy"), that was at its height from 1988 to 1995, has been dubbed "Second Summer of Love" (Reynolds, 1999).

This Second Summer of Love, or Rave Nation, is renowned for its widespread use of mind-altering drugs during rave parties, especially ecstasy (MDMA). For Reynolds ecstasy is at the core of rave aesthetics, much like LSD was at the basis of most psychedelic rock and its imagery (Reynolds, 1999). Thus, Rave culture brought with it a new approach to music and visuals. Raves became more and more centered on the experience of communal rapture,

fuelled by ecstasy, rather than on the music per se. Raves were a reaction to a deteriorating society and provided a place to get rid of the anger and frustrations of everyday life. "The initial spirit of the House scene" says Annet Dekker, "was one of togetherness, happiness: the gateway to collective community action and euphoria" (Dekker, 2005). The music and soon the visuals were meant to induce and sustain such a trance-like state of euphoria. For non-ravers such music and images were often seen as completely lacking any depth. For ravers, however, they were attempts at reproducing the experience of ecstasy which is reputed to cause effects similar to people suffering from synesthesia, a condition that blurs the senses which can cause one to "see" music or "hear color" (as the wet shows of psychedelic rock aimed to re-create the hallucinogenic experience of acid trips). Thus rave culture aspired to merge music and optical experiences into a synesthetic whole, to create a real-time continuity between image and sound. At the same time it embraced technology as part of its philosophy. As DJs reached speeds of up to 160 bpm with the help of drum machines, VJs strove to switch at the same rate. According to Adrian Shaughnessy in "Last night a VJ zapped my retinas: the rise and rise of VJing" in Michael Faulkner's 2006 book *VJ: Audio-Visual Art + VJ Culture*:

[...] In the synaesthetic meltdown that happened when the dance floor became the new focus of the youthful sub-cultural expression - what the music critic Simon Reynolds, in his book *Energy Flash*, called "the Dionysian tumult" - the live video mix added a third component to form a trinity with psychotropic drugs and dance music. The VJ didn't have to tell a story; didn't have to make sense; wasn't even sure that the audience was looking at what was being shown; all they had to do was add to the "tumult". (Shaughnessy, 2006, p. 11)

Thus the visuals in rave culture started out as a part of the "sensory overload" that, ravers believe, serves to overwhelm the senses and create a transcendental experience.

Much of the imagery used by VJs at early raves consisted in abstract computer-generated material and 3D animation or surreal footage that pulsated to the rhythm of the music as visual reinforcement. (In fact the "synch to beat" feature, now available in most VJ software, developed out of rave culture's taste for seamless synchronization between sound and image rhythm). Peter Rubin, an American who has lived in Europe since the 80s and is credited to be the world's first live-mixing video jockey, remembers the period well. He designed and directed the multi-media environment at Amsterdam's legendary club Mazzo from 1979 to 1988, the house and techno temple of the time, as well as being the official VJ for all of the Mayday raves and all the Love Parades. He comments, in an article on Annet Dekker's vjcultuur.nl website, about the ideology of rave culture's early video mixing artists:

Everything about New Wave and early House and Techno culture was about people, communicating with and supporting each other. Supporting values and activities relating to street reality. Relating to the new subcultures' identity, growth and development. The early video mixing artists were simply attempting to participate in and further that spirit of togetherness and community solidarity. And the music and the visuals, perceived as equal supporting elements, joined together to reinforce these feelings. New Wave and House culture took their energies and identity from inclusiveness, not separation. As a result, a global movement arose, the global House Nation. My House is Your House and Your House Is Mine. The early video mixing artists didn't try to get their work shown in every club in town in order to become famous. There were no stars nor, God forbid, any desire for superstardom. Quite

the contrary, the star system and superstardom were what everyone was fighting against. (Rubin, n.d., p. 2)

The visuals, he explains, were always structured on a secondary level, to intensify the music, the catharsis.

4.9 Group Dynamics

With this new rave culture as well as the development of further forms of dance music such as trance, hardcore, drum&bass, and an ever more popular DJ club scene more and more opportunities for artists to create live visuals at events arose. Alongside a growing number of VJs perfecting techniques to follow and reinforce the DJs' music, a different breed of artists, for whom image represented an element to consider on equal footing with sound within the audio-visual whole, also entered the picture. Some of the best known of these were, perhaps in the spirit of inclusiveness and anti star system mentioned above, A/V groups or collectives such as Emergency Broadcast Network, Addictive TV, Hex, The Light Surgeons, D-Fuse, among others.

Emergency Broadcast Network--or EBN-- was a multimedia performance group formed in 1991 by Rhode Island School of Design graduates Joshua Pearson, Gardner Post and Brian Kane. Following to some extent in the footsteps of Scratch Video they exploited the art of remix. Their first video project was a musical remix of the Gulf War. According to EBN themselves their inspiration came from the audiovisual display style of major (Television)

corporations. They described themselves in a clip available on YouTube as:

an alternative video, music and performance production company which specializes in the development of advanced audio/visual display systems which are used for the live performance of EBN material. These performances create a high-impact barrage of fully-integrated video/music created from network television sound bites and presented with the aid of specially-designed delivery systems... ("EBN 11 Operational Report" [video file], in randomguyrandomstuff, 2009)³⁴

EBN was known for using fragments from broadcast television in rhythmical musical remixes where "the lyrics were "sung" not by a singer but by half-second sound clips from TV, spliced together". "Media are a weapon," says EBN front man Josh Pearson (Deacon, 1996).

Active since 1992, UK's Addictive TV also exploited scratch philosophy and the remix of commercial television and cinema. For twenty years they have been putting on live AV shows that (in their own words from their Facebook page):

delve deeply into movies and videos hunting for sounds and images to sample, creating dance music that fuses everything from fidget and electro to drum 'n' bass and rock. Borrowing from hip-hop's cut 'n' paste methodology... as British newspaper The Guardian put it, "Addictive TV continue to take hip-hop's scratch philosophy into the cyberpunk age". They create their music by keeping the audio and video samples together, so their fans get to see more than just a DJ, more than just graphics or visuals; they get to experience music in a genuinely unique way. Everything from the World Cup to Star Trek gets remixed. (Addictive TV Facebook page, ca. 2009, "About" section, para. 4)

³⁴ randomguyrandomstuff. (uploaded 2009, April 4). EBN 11 Operational Report. [Video file]. Retrieved February 16th 2012 from: <http://www.youtube.com/watch?v=JcwyQBn-3vU>

They were the first group to officially remix a Hollywood film and in 2008 were invited to remix the Olympics live for television.

Hex, for their part, was a multimedia group formed in London in the early 1990s by artist Robert Pepperell, coder Miles Visman and the DJ duo Coldcut (Matt Black and Jonathan More). Bringing together their command of programming, animation and video design with their knowledge of club culture, they worked across a wide range of media from computer games to art exhibitions to the initiation of new hybrid forms such as live audiovisual jamming, computer-generated audio performances, and interactive collaborative instruments as well as creating the first pop music video produced entirely on home personal computers (Amiga and Apple). They disbanded in 1997 and re-formed as Hextatic comprising the duo Stuart Warren Hill and Robin Brunson (Robert Pepperell's website³⁵). One of the new formation's first projects was the hugely successful trilogy of AV cutup videos with Coldcut, "Natural Rhythms Trilogy", that included Frog Jam, Natural Rhythm and the best known, award winning, Timber.

The Light Surgeons are another still active UK collective of filmmakers and designers that were established in 1995. They were reputed for using lo-tech technology such as Super-8 and slide projectors for their club visuals. When they began, they explain in an interview, video technology was inaccessible to them, whereas Super-8, 16mm and slides were available cheaply at various second-hand markets. In an anonymous article in a 2001 online edition of The

³⁵ Robert Pepperell's website: <http://www.robertpepperell.com/hex.htm>

Guardian they talk about their electronic music-inspired use of such analogue sources:

We used film in a lo-tech way, differently to the way it was being used. We approach film from the back door, playing with it creatively by putting it into a space, making up and appropriating material and film loops, approaching it as you would music. Sampling images, layering and creating references and juxtapositions. (Dodson, 2001, para. 5)

This distinctive style of collaged cine-film and slide projections has since evolved to combining analog and digital media, and to manipulating both audio and video in their performances. They define themselves as audio-visual architects.

D-Fuse, founded by Michael Faulkner, emerged in London by the mid-1990s as well. They too began their live cinema work with much exploration of 16mm film and slides, as video projectors were so rare at venues at the time, and gradually expanded to large-scale multi-screen audio-visual performances. D-Fuse have evolved into a rather large group of designers and artists who work, says Faulkner:

[...] in a trans-disciplinary method with cutting edge technology. Exploring a wide range of creative media, from mobile media, web and print to art and architecture, live A/V performances, TV and film, D-Fuse encourage their audience to reflect on the key relationship between sound + image. They continuously endeavor to explore the possibilities of digital art through their desire to develop a unique language for the needs of the digital world. (d-fuse, 2006, p. 091)

Over the years D-Fuse has collaborated with a wide variety of musicians, from electronic artists Scanner and Leftfield to contemporary classical composer Steve Reich and the Italian ensemble Alter Ego.

In the U.S., O.V.T. (for Optique Video Tek) similarly came out of lo-tech approaches. Formed in Chicago by Vello Virkhaus, in the mid-nineties while he was at the Art Institute of Chicago, with Brian Dressel and Brien Rullman, O.V.T. was one of the first VJ Arts companies in America. Their early performances integrated 60s psychedelic light show techniques of oil and water and 16mm film loops. They soon updated these techniques with original video and digital animation elements (Young, 1998).

In New York City, in the early nineties, the duo Missy Galore and Feedback (FeedBuck Galore), among many others, were creating live video for clubs and discos, as well as art events, by combining U-Matic decks with broadcast video mixers and presenting them on monitors, combined with slide projections and strobe lights. Around the same period Benton-C Bainbridge formed, in the early nineties, the video performance group 77Hz with Philip R. "Bulk Foodveyor" Bonner, Jonathan "Naval Cassidy" Giles, Eric Scheffer and Michael Schell, later joined by Nancy Meli Walker. The work of 77Hz was also based on lo-tech and vintage analog equipment using a variety of interconnected cameras, switchers and processors to improvise multi-monitor visuals. In 1995 Bainbridge and Walker would go on to form another "video band", with Angie Eng - the Pooool - that continued in the lo-tech direction of 77Hz and soon integrated digital and projection technology that was becoming more and more accessible at the time. Both 77Hz and the Pooool

were active in the experimental music and visual arts scenes rather than in clubs (Bainbridge, 2001).

A number of collectives came out of electronic music traditions. In France, the Cellule d'Intervention METAMKINE was founded in Grenoble in 1987. Its three members, Jérôme Nottinger, Christophe Auger and Xavier Querel, have developed their own approach to audio-visual performance based on multiple 8mm and 16mm projectors that they use as sources for both the sound and the image, in conjunction with mirrors, vintage synthesizers, audio loops, and amplified objects. Still active today, they present their performances mainly at concert venues, festivals, contemporary art spaces and galleries (Metamkine website³⁶).

In Austria, Farmers Manual emerged out of the early nineties Viennese electronic music scene. The core members of the collective were Mathias Gmachl, Stefan Possert, Oswald Berthold, Gert Brantner and Nik Gaffney. Gmachl defines the group as:

[...] a pan-European, multisensory disturbance conglomerate that presents a stream of constructions since 1995, continuously expanding their practice from music concerts to interdisciplinary cultural, aesthetic and political experiments. (Gmachl/Loop.pH website³⁷)

Their work was one of the earliest examples of computer-based interaction between programming, electronic music, both coming from recordings and

³⁶ Metamkine website: <http://metamkine.free.fr/>

³⁷ Gmachl/Loop.pH website: <http://loop.ph/bin/view/Loop/MathiasGmachl>

generated, and live visuals, also consisting of both generated graphics and recorded imagery, often triggered by software analyzing the music, such as a volume tracker, with web design. It also explored alternative collaborative structures based on sharing information, skills and resources among the partners.

Also in Austria, in 1991, Kurt Hentschläger and Ulf Langheinrich formed the now defunct project Granular Synthesis a term that originally derives from sound design. Their digitally constructed live works deconstructed image and sound, by way of algorithmic operations, to their most infinitesimal components resulting in endless repetitions of video and audio noise often at almost complete standstill within an intense and immersive light, image and sound projection environment. The work explored audio-visual re-synthesis via live manipulation (Granular~Synthesis page in V2_archive website³⁸).

According to Austrian journalist/critic Heinrich Deisl, the interaction between image, sound and the artists is at the heart of both Granular Synthesis's and Metamkine's work:

As both bands use image and sound track as equal transmission matrices, this allows a concise, real-time experience which transfers live media art to a performance context where live interaction between the two media and the artists becomes the performative compositional premise. (Deisl, 2006, para. 15)

³⁸ Granular~Synthesis page in V2_archive website:
<http://v2.nl/archive/organizations/granular-synthesis>

For him they represent what he calls live-generated sound and image art, or audiovisual manifestations, that have nothing to do with VJ culture.

These collectives were some of the most distinctive among many other groups and configurations of artists working with live visuals in different parts of the world during this period, which there is no space to address here. They are particularly interesting because they approach live visuals as an art form in its own right rather than secondary to the music or as its optical reinforcement.

4.10 Hard and Soft Into the Present

In the meantime live visuals were gaining popularity on many fronts. In nightclubs and at rave and dance parties they were increasingly becoming a standard fixture. In addition, more and more interest came from various forms of contemporary music as well as from the visual arts. This would foster a continuous development of ever more new techniques for live image mixing and manipulation and of technologies, both hardware and software, making them possible.

By the early 1990s, the first generation of consumer-grade video electronics (such as video-8 and VHS camcorders and decks) arrived on the market. These smaller and more affordable devices were quickly adopted by live visuals practitioners for their improvised mixing set-ups alongside various hardware elements from the broadcast TV industry (such as switchers and keyers).

At the same time computer technology was making incredible advances in sound and image production capabilities. Already in 1982 Commodore had launched its C64 personal computer which enabled users to create computer music at home. The Atari ST, the first PC with built-in MIDI ports, had become a respected tool for digital music composition. With the arrival of the graphical user interface much audio and soon image (animation and video) software was being developed for the PCs of the time: Apple Macintosh, Atari and Commodore. In 1985 Commodore released the Amiga. The Amiga's innovative operating system had impressive graphical, audio and multi-tasking capabilities that revolutionized computer image and sound. It was capable of video-compatible color animation and stereo audio and so became popular with producers and artists who had no access to high-end facilities. The Amiga and the other personal computers quickly found their way into a wide range of live music/sound and live image performance situations (clubs, music concerts, art venues).

The advent of the computer dramatically transformed moving image production and practices. From the beginning the early PCs enabled the creation of simple animation. Soon computer technology also merged with video technology and digitized the post-production process. In 1990, appeared Newtek's Video Toaster, a video compositing console that ran off the Amiga. The Toaster was an all-in-one video editing and graphics package that was capable of replacing video production switchers and allowed a wide variety of wipes and 3D transitions. It was as sophisticated as many professional post-production suites of the time for under \$6 000.00 (vs. \$100 000.00). At the same time digital non-linear editing was introduced in the broadcast video world first by Editing Machines Corp. but mainly by

Macintosh platform-based Avid. Its random-access capabilities, until then unthinkable in video editing, brought with it a whole new universe of editing and processing possibilities. The popularity of such professional software made it develop relatively quickly for personal computers. And by the mid-90s much more affordable non-linear editing software, such as Adobe Premiere for the Macintosh, became available.

According to Tom Sherman, non-linear editing gave rise to completely new video aesthetics that have much in common with aesthetics developed in 20th century Western musical composition:

Non-linear editing has engineered the increasing use of repeat structures in video. "Phrases" of images and sync-sound are repeated or recombined to establish the form and substance of video compositions. The analogies are minimalist musical structures, or more profoundly genetic recombination, where the elements of DNA are reassembled in seemingly endless combinations to yield the diversity of life. [...] Video permits [...] to build on repeat structures initiated in experimental film (montage/collage) and minimal music (Steve Reich, Terry Riley, Philip Glass). There are traditions at the base of our recombinant cultures. Audio tape recorders and VCRs had permitted artists like John Cage, Edgar Varese and Nam June Paik to play with literal memory. As Marshall McLuhan was fond of saying, the instant replay was the most significant development of the 20th century. (Sherman, 2002, para. 2)

And VJs were quick to integrate and exploit the repeat capabilities of all of this technological development in various ways to reproduce with image what the new electronic audio equipment could do. They were able to achieve this either by using computers live or using the editing software to create source material in advance that could be mixed live with an analog mixer in performance. Some focused specifically on sampling like Holland's Eboman

who, from the early nineties, based his entire video-audio practice on taping, sampling and repeating, developing over the years his own software and sensor interfaces that enable his current audiovisual interactive digital sample composition work.

Before long, however, VJs and other live visuals practitioners, began to feel the need for equipment more specifically suited to their own needs. Some adapted existing elements of hardware to their techniques while others simply developed their own systems. The first known software designed for and by a VJ was VuJak. It was created in 1992 by artist Brian Kane for use by the collective he was part of (Emergency Broadcast Network mentioned above). VuJak was written with an early version of Max (then from Opcode Systems) and intended as a non-linear video editing and real-time performance tool. An article in a January 1995 issue of Billboard magazine describes the tool's capabilities:

The system actually can be used to record visual sequences of standard QuickTime images (and sound) culled from television or videotape sources. The audio portion is 16-bit-quality sound, and depending on the hardware being used, VuJak can display full-motion, broadcast-quality video, says product manager John Petit.

The images are loaded into the system memory (eight megabytes or more are recommended) and one can then assign video riffs to various keys on a computer, MIDI keyboard, or a MIDI-driven guitar, drum kit, telephone keypad, power glove, or body suit.

Then the user can loop and replay the bits in countless combinations, creating completely original video out of existing source material.

[...] Club-based VJs now can follow in their audio counterparts' footsteps, with the potential to popularize a new form of entertainment known as "video scratching", Petit says. (Russel, 1995, p. 32)

Indeed, VuJak was a video sampler, a VJ remix and mashup tool, that made it possible for others to reproduce the multimedia performance group Emergency Broadcast Network's signature "video scratching" technique. It was one of the first interfaces to introduce, to the world of VJing, MIDI (Musical Instrument Digital Interface), a communications protocol that allows electronic musical instruments to interact with each other.

Most of the early subsequent VJ software was developed by practicing VJs or performers initially for their own needs. Thus in 1999, the London-based duo Coldcut, comprised of Ex-art teacher Jonathan More and computer programmer Matt Black, released with their album "Let Us Replay", a free CD-ROM with VJAMM, a video sample software they had developed for visuals to accompany their own live shows of electronic dance music based on re-mixing, sampling and cutting-up a broad spectrum of music including hip hop, break, jazz, spoken word, Egyptian pop, etc. Like their approach to music, the PC software could loop, scratch and chop samples into moving audiovisual collage. Coldcut also released freeware audio auto-chopper software called Coldcutter (Coldcut section in Ninjatune website³⁹).

In France, composer Jean Michel Jarre teamed up with Arkaos, a young Belgian company developing visual software generated by music, to create a unique software, JArKaos, to be included on his "Odyssey Through O2" CD in

³⁹ Coldcut section in Ninjatune website: <http://ninjatune.net/artist/coldcut>

1998. With this software you could create and play your own images and animated paintings synchronized to Jarre's CD on your home computer keyboard. This was the first version of the now well-known ArKaos VJ software ("Odyssey Through O2", 2012).

Other softwares that were influential for VJs of the time were audio reactive pure synthesis programs (as opposed to clip-based, like VJAMM) based on music visualization, such as Cthugha by Australian Kevin "Zaph" Burfitt (1994), Aestesis (1995), and the organic A-life sound-responsive program Bomb by software artist Scott Draves 1995. MoonSTER, one of the first live 3d/2d/MIDI/Video VJ softwares ever made for the Windows platform, was intended to easily synchronize video and animations to music in real time with a cheap home PC. Advanced Visualization Studio, a music visualization plugin for Winmap, designed by Winmap's creator Justin Frankel, also appeared in the late 90s as freeware and was made open source in 2005. Commercial software would soon also begin to surface on the market. First among these was Motion Dive from the Japanese company Digital Stage (375 Wikipedians, 2010).

No less important than this early software, were the hardware breakthroughs appearing at the same time. The arrival over the 90s of a number of prosumer video mixers released for the home video editing and low-budget production market (institutional, community) fostered unprecedented advances for the evolution and proliferation of live visuals mixing. Suddenly, a number of much more affordable mixer models with digital effects, such as Panasonic's WJ-MX50, WJ-AVE5 and WJ-MX12, the now infamous Videonics MX-1, and especially Roland/Edirol's 1998 V5 Video Canvas, made the video transition

and processing possibilities of professional post-production TV and film studios available to people outside the industry (375 Wikipedians, 2010). Mixers were quickly appropriated by practitioners working in live visuals performance, soon becoming the central building block of most mixing set-ups. In performance these devices were used to mix between several decks (usually VHS) which played video material prepared beforehand with editing software or hardware. Soon, live camera sources and the output of computer software were integrated to the mix as well as other peripherals such as graphic tablets to paint or draw on the video material.

Seeing the popularity of mixers in general and of its V5 in particular, Roland/Edirol realized that hardware for video performance was an emerging market and by 2001 released the V4 Video mixer specifically for VJing. The V4 integrated DJ mixing technique possibilities to standard video mixer features. Its MIDI control capabilities permitted interfacing with digital music equipment. It immediately became the standard VJ mixer and led the way for other corporations such as Korg (Kaptivator for video sample playback and Entrancer for realtime effects), and Pioneer (scratchable DVD-players DVJ-X1 and DVJ-1000), as well as Edirol (visual generation CG8) to develop dedicated hardware for the proliferating practice of VJing (375 Wikipedians, 2010).

4.11 Tools for Artists by Artists

Meanwhile, computer technology was evolving significantly, notably as to portability. Over the 1990s notebook style laptops, introduced in the late 80s,

matured in operating capabilities, processing power and lightness making them extremely popular among Live Visuals practitioners. In fact, with the laptop Live Visuals could acquire truly musical instrument status both in terms of capability and portability. The spread of laptops along with the continued advances in home PC processing power, brought about a new direction in audio and visual software. With these new powerful and affordable personal computers more experimental artists began developing their own software-based applications for themselves and their colleagues outside of the club economy. Image/ine and NATO, both based on concepts stemming from research in music software, are among the earliest examples.

In 1996-97, Steina Vasulka, Tom Demeyer and Michel Waisvisz collaborated on the development of Image/ine at Amsterdam's STEIM (the studio for electro-instrumental music), the only independent live electronic music center in the world exclusively dedicated to the performing arts. Image/ine was the first real-time image sampling and processing software for personal computers that enabled users to manipulate uncompressed video (at the time 320X240 and 10 frames per second) in real time. It was the visual counterpart of LiSa (Live Sampling, developed by Michel Waisvisz and Frank Baldé) enabling real-time sampling and processing of sounds on stage. Image/ine was available for free on STEIM's website (Spekle & Waisvisz, n.d.).

In 1999, the mysterious Netochka Nezvanova (still uncertain whether "she" was a collective or the New Zealand artist and composer Rebekah Wilson, or somebody else), launched, after the short-lived visual software applications, m9ndfukc.0+99, k!berzveta.0+2, kinematek.0+2, nebula.m81 and !=z2clja.0+38, the now legendary nato.0+55+3d. NATO was a suite of

externals, a collection of modular computer code objects enabling control of real time video, that worked by way of IRCAM's MAX programming environment (which until then had been used for musical and interactive applications). Operating on the Macintosh platform it incorporated recording, playing, combining, creating and manipulating video as well as image generation, 3D, internet and network integration, text and sound (all media types supported by QuickTime). NATO was quite amazing but sold for a prohibitive price for the average artist or VJ, and support was problematic, so it didn't spread too widely nor stay around very long (Bernstein, 2000; "nato.0+55+3d", 2012; "Netochka Nezvanova (author)", 2012).

These two products marked the beginning of a new era in AV programs of software tools created by artists for artists. They also inspired a new breed of proprietary and open modular programs and programming environments such as, best-known, Jitter (2003) developed by Cycling'74 the makers of Max/MSP, GEM (Graphics Environment for Multimedia) an open source version within the equally open source PureData, and equally open source Processing. With these "the focus shifted from predefined tools for production to tools for the production of tools, instruments, interfaces and personalized artworks" (Barrett & Brown, 2009). This shift has enabled hundreds of artists and artist collectives to work consistently with these new tools in their own creative practices and to customize them to their needs. Many have shared their achievements with other practitioners either for free or selling them as stand-alone applications. A good number of well-known VJ and live AV programs widely used today were developed by artists.

Isadora is NY interactive performance dance company Troika Ranch's

proprietary software for Macintosh and Windows. Not quite a "plug and play" program, Isadora is an open-ended and flexible graphic programming environment enabling users to link together a variety of code building blocks for the customized interactive control of digital media somewhat similar to Max/Msp & PureData. Inspired by Image/ine, it was initially developed by Troika Ranch's co-director, composer and media artist Mark Coniglio for the company's own needs and subsequently released commercially by popular demand (Isadora description on TroikaTronix website⁴⁰).

SoftVNS, a third-party package for visual processing that works with Max/MSP was developed by Canadian media artist and composer David Rokeby also for his own interactive artistic projects. SoftVNS is a software adaptation of his 1986 installation "Very Nervous System" based on a computer and hardware setup that could trigger sound and music, in response to the movement of human bodies, that he released on the market in 2002. It has become over the years the most respected program for work with real-time video tracking such as presence and motion tracking, color tracking, head-tracking, and object following (Schedel, 2005).

The very popular VDMX software by Vidvox is another example of an artist, Johnny DeKam, at the time a graduate student at Rensselaer Polytechnic in Troy, NY, creating a "hardwareless" application with Jitter/Max/MSP originally for his own audio-visual performances and then releasing it for sale as a stand-alone program (Cohen, 2001; VDMX website⁴¹). The no less popular

⁴⁰ Isadora description on TroikaTronix website: troikatronix.com/isadora/about/

⁴¹ VDMX website: <http://vidvox.net/>

open GL VJ software Module8 was developed by Swiss (Geneva-based) video artist Boris Edelstein with engineer/software architect Yves Schmid ("Module8", 2012; Module8 website⁴²).

By the early years of the 21st century, laptops and personal computers became ever more powerful and affordable making it possible for them to serve at the same time as players, samplers, processors and mixers (instead of these tasks necessitating several large heavy pieces of equipment). With the concurrent miniaturization and the drop in prices of video projectors, real-time visuals practices and VJing proliferated dramatically. As a result virtually hundreds of visual performance and VJ softwares have sprung up. Developed by entities as small as one-person operations and as large as full-fledged commercial companies, or cooperatively by entire international communities (in open-source environments like PureData, or platforms like Linux), they span every platform (Mac, PC, Linux) and every budget (from completely free to considerably expensive). Some of the most popular include: Resolume, VisualJockey (VJo), Motiondive, VVVV, Grid, Cell DNA, AVmixer Pro, Pixelshox, among many many others.

On a basic level every visual performance and VJ software can mix a least 2 moving image sources together (pre-recorded video clips, animations, live camera input). Some of the softwares are better players and mixers of existing clips, others can manipulate input material from one or more live video cameras on the fly, yet others are especially strong at the most varied forms of realtime image processing and/or compositing, while still others are

⁴² Module8 website: <http://www.modul8.ch/>

best at generating digital imagery by way of musical visualization algorithms or mathematical axioms. There is a very wide range of options. An artist's or VJ's choice will be for the most part motivated by what s/he wants to do and how much s/he is willing to spend (and of course the platform used).

4.12 Live Visuals into the Future

As I write this study, improvisational live visuals continue to evolve and expand in multiple directions of technology and techniques. Some have strong ties to musical aesthetics and technologies others go off on their own tangents perhaps drawing their inspiration more from emerging forms such as social media, locative media or gaming, and other recent devices, than from any established art traditions. One direction is towards an ever greater mobility of tools. Another area focuses on diverse new techniques and technologies for projection. Alternative interfaces for mixing visuals are a major research direction, as are alternative image input devices. There is also a significant amount of experimentation into ways of connecting different devices to work together, notably by wireless means. As well, there is much interest in new forms of collaboration made possible by technological developments of recent years.

A huge current trend in live visuals mixing is towards ever more portable devices that literally enable visualists to carry their performance tools in their pockets for "Guerilla VJing on the go". Following the lead of an incredible variety of music and sound "apps", countless live visuals applications are being created for the new all-encompassing mobile technologies that have

emerged in the last decade such as i-pods, i-phones and other smartphones, and i-pads and other tablets. Another trend is diverse locative media. A number of dedicated devices are also appearing on the market such as the Korg KPE1 Kaoss Pad Entrancer, a MIDI-able AV effects unit and sampler, based on the earlier audio-only Kaoss pads.

Since its dramatic drop in price over the past decade, projection is a new frontier for live visuals research and development into space. This includes various multi-projection approaches that can be seen as paralleling audio and musical explorations of multi-channel, surround and ambisonic techniques. Another trend is experimentation with new projection possibilities such as mobile wireless projection with palm beamers notably for "guerilla VJing" mentioned above. It also includes the recent technique of projection mapping. Projection mapping permits to shape a projection onto one or multiple surfaces within the projector's beam by way of software. The projection can be made to closely fit architectural details or to precisely follow contours of static and even moving objects. Interestingly, at the same time, the spatial mapping of audio is an ever more popular focus in music and sound art.

A most dynamic area of visual performance research is into various interfaces that can transform the physical experience of mixing visuals for the practitioner in the spirit of musical instruments' connection to the playing of music. These can be relatively straightforward implements like the Lemur Multi-Touch Interface which provides tactile control of software by way of an intuitive tactile tablet the size of an i-pad. They can also be interfaces appropriated, and often hacked, from gaming, such as the Nintendo wiimote, various joysticks and consoles like the Xbox, or the recent Kinect 3D motion

sensing device. Completely unusual interfaces are being developed by independent designers and artists as well. Thus the nonconventional VJ performance system "rhythmism" uses, according to its inventors the Japanese media designers Satoru Tokuhisa, Yukinari Iwata and Masa Inakage:

an original maraca based device that has 2 different functions, material maraca and effect maraca. Rhythmism uses the structure characteristic and the operating characteristics of maracas and adopts the interface to ensure the freedom of the user's physical movement and to realize the powerful attraction of the performance itself and aims to attain the multi-functionality and the arbitrary controllability (Tokuhisa, Iwata, & Inakage, 2007, p. 204).

Rhythmism's musical instrument inspired multi-functionality is meant to provide a more flexible performance experience than commercial interfaces.

Even less conventional is the VJacket, a wearable controller for live video performance, developed by new media artists Andreas Zingerle (Innsbruck, Austria) and Tyler Freeman (San Francisco, USA). The VJacket has bend, touch and hit sensors built into it that enable the VJ to wirelessly interact with the VJ program of their choice via OpenSoundControl or MIDI. With the Vjacket the VJ can thus dance to the music to manipulate his/her visuals. On their website which, in true DIY spirit, features detailed instructions to make your own VJacket, Zingerle and Freeman explain their concept:

We sought to extend the gestural concept, past just the hands to all parts of the body, to enable a VJ to control video simply by dancing. We embedded sensors into clothing to insure minimal interference from the

interface. The VJacket allows for wide, imprecise movements with a precise rhythmic response. The VJ will not have to fumble for knobs and buttons, will not have to look at the screen to be sure he's clicking on the right thing - he will be freed to control the video using his body movements alone. Since it is wireless, the VJ will be free to interact with the audience and musicians - on stage or even walking through the crowd [...] (VJacket website⁴³, para. 12)

Their objective with this project, they say, was to create an interface allowing the VJ to become an "actual live performer".

There are also a number of completely maverick interfaces, that are typically one of a kind, designed by artists usually for personal use. One example is the VideoBass, invented by Swiss media artist Michael Egger in collaboration with Maïté Colin, that plays moving images instead of sound. Another interesting example is the Sync Armonica, a handmade A/V synthesizer, by the New York City based interdisciplinary artist duo LoVid, comprising Tali Hinkis and Kyle Lapidus. Their 9 ft. sculptural, analog, audio/video instrument is capable of synthesizing video and audio simultaneously from the same signal.

Other practitioners are experimenting with a wide range of alternative input devices for live image capture. Among these are all sorts of specialized cameras (sports, night vision, macro), the most diverse surveillance apparatus and equipment from different branches of science and medicine, such as marine biology under-water recorders, digital microscopes or various medical diagnostic instruments. This again parallels the ever-increasing use

⁴³ VJacket website: <http://vjacket.com/>

of alternative audio capturing devices in experimental music and sound art, such as hydrophones, piezos, binaural microphones, etc.

In addition, much research is being conducted on ways of synching various devices together wirelessly for performance. One usefulness for such synching is for a single performer to be able to operate two or more applications at the same time. Another is for several people in a common space using disparate devices to be able to collaborate on the same project (for example, each being able to send their signal to a combined mix of visuals (or sounds, or both). And the most recent experimentation concerns the possibility of audience participation, via social media, in a live performance - as for example integrating audience members' text messages, or twitter tweets, into the live video mix of a performance. Such research is based on bluetooth and other wireless protocols. Korg has developed WIST (Wireless Sync-Start Technology) based on Bluetooth. WIST allows for wireless sync-start between two WIST-compatible apps on two iOS devices located near each other (i-phone, i-pad, i-pod). These protocols are as much used in the field of audio and music as in visual performance.

From the point of view of expanding collaborative practices, an interesting experimental project in recent years has been the "KeyWorx" software developed in the late 90s by the Waag Society, Institute for Art, Science and Technology, Amsterdam. The "KeyWorx Patcher & Realizer", now terminated, was a multi-user cross-media synthesizer that functioned over the Internet and other networks. According to Waag it was:

a distributed application that allowed multiple players to generate, synthesize and process images, sounds and text within a shared realtime environment. As an instrument it allows communities of players to dynamically control and modify all aspects of digitized media in a collaborative performance. (KeyWorx website⁴⁴)

A networked collaboration project, it allowed disparate participants (that could be in different parts of the world) to send images over the Internet in order for them to be mixed in a common live visual jam. This initiative was a visual equivalent of the idea of planet-wide online musical jamming first developed in the mid-nineties by the ResRocket Surfer Project collective and has continued into the present with research projects such as SoundWIRE group at Stanford University's CCRMA, the Distributed Immersive Performance experiments, SoundJack and DIAMOUSES. Further visual Internet-based multi-place collaboration projects much like this one, and more complex, will certainly see the light in years to come.

Today, as the practice of live visuals grows ever more popular not only at concerts of various music genres and in dance clubs, but also in the most diverse settings such as theater, opera, museums, parties, fashion shows, retail stores, corporate events, education, weddings, anniversaries, birthdays, and even churches and temples, improved or new tools to create them keep developing at a rapid pace. Thus video mixing keeps being adapted to many emerging technologies, especially personal technologies such as smart phones and diverse tablets as well as new devices announced to come in the near future like combined palm camera/tablet/projectors. At the same time, many artists working in the area use unique hybrid approaches combining

⁴⁴ KeyWorx website: <http://www.keyworx.org/apps.php>

newer and older technologies and tools, newer and older techniques and methods, from digital to mechanical and optical - that could be as temporally distant from each other as the *lanterna magica* and a gaming console - often including their own inventions as well, to create timeless live mixes of moving images defying any classification of media, technology, form, era, or origin.

This chapter has followed the evolution of Live Visuals in their interrelation with more popular music genres since the late 50s. I have accentuated the influences of various aspects of the spirit of these musical genres. I have also tried to underline the importance of these influences on the development of earlier and more recent tools and technologies specifically designed for the mixing of Live Visuals, often by artists themselves, and examined the current situation as well as emerging directions. Though originating out of techniques artist and professor Seymour Locks thought up in the 1950s, in San Francisco, to recreate a version of the theatrical experiments of the European avant-garde movements of the 20s and 30s, "light shows" developed into a performance art by his students were quickly adopted by the thriving West Coast popular music scenes of the time. New music genres stemming from bebop jazz, blues, acoustic folk and the electrification of instruments arose with the emergence of a youth movement, its hippie subculture and its interest in hallucinogenic mind-expanding drugs. Psychedelic Rock and Acid Rock became so popular that they filled large halls and auditoriums and created a new kind of concert culture that gave rise to a new breed of venues. These venues, such as the now legendary Avalon Ballroom or the Fillmore West, focused on offering a different experience than a dance hall and so were most enthusiastic about light shows to supplement

concerts. Thus, the art of light shows, often based on visually simulating an LSD trip, flourished and proliferated all over California, with every artist or group having their own secret recipe among liquids, slides, film, strobe lights, overhead projectors. Soon the art of liquid lights crossed the country to New York City. Though the atmosphere and music had a different urban edge, with more political folk, satire and dark poetics, psychedelic rock clubs found their way to the Big Apple as well, notably with the Electric Circus, Max's Kansas City and the Fillmore East that hosted legendary "Joshua Light Show", but existing alongside hard core avant-garde multimedia performance events such as Andy Warhol's Exploding Plastic Inevitable at the Dom. As Psychedelic Rock spread to Europe, so did the light shows. The Pink Floyd were hugely influential for the advancement of light shows in the UK and internationally because of the sophistication of their visuals techniques. This paved the way to the idea of elaborate rock concert theatrics. By the late seventies surfaced a new generation of post-rock, post-punk, avant-garde, music/art groups that fused alternative music with visual arts and theater in multimedia performance such as Cabaret Voltaire, Throbbing Gristle, Test Dept or Tuxedomoon. They too were most interested in live image projection but figurative, often derived from found footage, rather than abstract, as in psychedelic rock, and developed a certain cinematic approach to concert visuals often emulating classic film genres. By the 80s MTV appeared launching the new form of highly sophisticated effect-filled video clips. Many musicians and artists had strong reactions against the commercial nature of MTV and introduced collage lo-tech forms, such as Scratch video, based on the then new technology of the consumer VCR and "culture sampling" content from the official media. In the mean time Funk, Soul and Latino music revived the discotheque-style nightclub with disk jockeys mixing hits with powerful

audio equipment, rather than live bands, and incorporated newly available video equipment in various ways. Soon the Video Jockey or VJ was born as a visual equivalent of the DJ. With the arrival of new video technology like the Fairlight CVI VJs could mix and improvise material live. By the mid-80s disco evolved into Rap and Hip Hop and eventually Acid House and Techno. The sampling techniques they introduced were soon emulated and re-interpreted by VJs with images in various ways. Acid House and Techno brought Rave culture, known as a Second Summer of Love, with its night-long communal rapture parties and widespread use of the new mind-altering drug ecstasy. The main focus at the "Rave Nation" parties was "sensory overload" and visuals pulsating to, and reinforcing, the music, became indispensable. VJs began to perfect many techniques and set-ups to follow the all night music of the DJs interfacing early computers for looping and animation with video and projection. At the same time emerged collectives of live-image-mixing artists, groups of visualists similar to music bands with loads of equipment, as much in the club and party scenes as in the alternative concert network and the art world. Out of all this ever-increasing activity, and often inspired by DJing approaches, began to develop dedicated technology specifically suited for the creation of Live Visuals. Some of the earliest Live Visuals hardware and software was the result of tools created by VJs and visualists for their own needs. While commercial companies soon also began to launch novel electronic and digital alternatives for the thriving form, many of the best solutions to this day were designed by artists for artists. By the early 2000s, as computers became more and more central to Live Visuals performance, and with the rise of laptops, the broader circulation of modular programming environments, such as Max/MSP, originally developed by IRCAM for musical interactive applications, with its newly-launched Jitter visual component, and

the open-source PureData and Processing, brought about a new era of production tools for the production of personalized tools. In recent years, alongside much personal software made by artists for their own work have sprung up virtually hundreds of visual performance and VJ softwares. At the same time Live Visuals continue to develop in new directions of emerging technologies such as hand-held production and projection devices, projection mapping, novel interfaces, wireless networking and new forms of collaboration. The period covered by this section mostly spans my own lifetime. As the study progresses towards the present, it penetrates more and more the territory of my own memories or of those of close older friends or relatives. Thus the selection of many examples was motivated by what I personally remember seeing, using (i.e. technology), reading about, hearing about or being told by others and being fascinated by. Some examples of the latter case are Grateful Dead or Pink Floyd concerts I never saw, or the Exploding Plastic Inevitable and Danceteria evenings I never attended, but that have always inspired a mythical fascination from so many first hand stories I heard, just as did the infamous Fairlight CVI video instrument that I never got to use when I began working with video. Of course some examples were chosen over others because they were better documented. By the mid-80s I began to be myself involved in video art and started to keep informed about all the technological and aesthetic developments either by experiencing them first-hand or by reading about them. Because of my interest in the possibility of mixing video live since the early 90s, I have followed the emergence of the VJing scene closely. I have also closely followed the emergence of new video, audio and computer technologies often by experimenting with them for my own work. Thus most of the examples I bring up were practices or technologies I knew about in some way at the time they

appeared. My research has then consisted in finding more precise information about them and drawing connections, related to my subject, between their different dimensions.

CONCLUSION

This study was inspired by my artistic practice of the past decade. Since the early 2000s, my work veered from single-channel and installation video art to live video performance in the context of collaboration with improvisatory experimental music or sound art, a turn that has led me to completely new dimensions of creation. My beginnings in Live Visuals were right in the years when advances in computer and projection technology fueled it to thrive in a wide range of artistic and non-artistic situations. As improvisatory live visuals mixing has grown in popularity, it has started to find its way into academic discourse. When I began to follow the nascent discourse I found it to mainly frame Live Visuals within the continuity of its affiliation with pictorial and cinematic traditions or to concentrate only on the recent digital era. While I regarded such discussions as most instructive, to me they never seemed to truly address what my own experience of Live Visuals is, either as a practitioner or as a spectator, an experience having much more to do on many levels with music and musical performance, perhaps because of the live nature of the practice. Thus this study has stemmed from a desire to locate the musical roots of improvisatory Live Visuals and to better understand their role in the evolution of the practice as we know it today. It set out to revisit the history/ies of Western classical and popular music to trace occurrences that can be considered essential for the coming into existence and expansion of the form. By excavating conceptions, aesthetic traditions, developments, technologies, events and practices, and drawing connections

between these and different incarnations of real-time image practices, it has attempted to examine their significance in the shaping of the contemporary media art form of improvisatory Live Visuals.

The Media Archeological theoretical-methodological approach has provided me with a most productive framework to explore the multiple and diverse music-related forces at play within the development of the practice of improvisatory Live Visuals. It has inspired me to view Live Visuals as a field of potential trajectories and interactions between aesthetic traditions and technological developments, past and present, while considering Western classical and popular music history as the context from which to "excavate" some of the constitutive elements that make up these trajectories and interactions. Media Archeology's accent on "alternative histories", derived from New Historicism and Postmodern and Experimental History, gave me permission to adopt a relativistic strategy for my historical research and a certain creative freedom as to the selection of my "cases" and source material. Thus with this study I have undertaken to recontextualize the evolution of improvisatory Live Visuals by creating cross-associations, and emphasizing certain junctures I deem pivotal, between aspects of its optical-pictorial transformations and conceptions, apparatuses and occurrences from its musical heritage that are often neglected or forgotten by the prevailing cinematic and technological discourses. In such a way I was able to construct my own "story" of Live Visuals, or rather the one I was interested in telling to fill a gap I feel deserves attention at the present time. This story then is a collection of miniature case studies from the past 300 years of Western "civilization", chosen for their relevance to my subject, that are joined together by a certain narrative thread highlighting certain associations at the detriment

of others in relation to a completely subjective position that has no intention of pretending to be complete or of hiding any omissions.

My study begins in the seventeenth century where I situate the first instance of the idea of "playing" projected stimuli for the eyes, live, in real time, in some organized way, as music can be played by a musical instrument. The first chapter emphasizes how this idea is intricately linked to the practice of music itself and a belief in a direct correspondence between tones and colors hypothesized since at least the times of Aristotle. The earliest color organs are invented to demonstrate this correspondence and to show what is thought to be the scientific visual equivalent of musical expression. Thus, from Castel's *Clavecin pour les yeux*, conceived in 1725 in response to the sound-light theories of Kircher and Newton of the 1600s, to much more sophisticated color organs integrating technical advances in gas and electric lighting built over the next two centuries, these inventions seek the "correct" translation of music into color. It is only in the beginning of the 20th century that appear any color-organ-type apparatuses that are not meant for the transposition of tones to hues but rather as instruments for the performance of what is seen as a new visual art form in its own right.

The subsequent chapter follows the different conceptual and technical incarnations of Live Visuals from the early years of the 20th century to the 1970s. It draws attention to the extent to which musical ideas and aesthetics are central to the coming into existence and evolution of a form of visuals that can be played live. As Wagner's notion of "total artwork", theorized in 1849, sweeps Europe and inspires the arts to come together in new combinations and manifestations, the form moves away from simple illustration or

accompaniment of music to gain a voice of its own. It begins to develop within the spirit of intermediality championed by the ensuing avant-garde movements - Futurism, Constructivism, Dada, Bauhaus - that seek to re-invent every possible form of artistic presentation and embrace every technological advance of the time. Thus as noise and magnetic recording find their way into music, the new medium of film is adopted for Live Visuals in different multi-projection approaches, like those of Moholy-Nagy and Fischinger. Spreading to North America around WWII these avant-garde film practices intersect with the live jazz improvisation of Bebop combos. Within this budding jazz scene of the 1950s, experimental film artists, notably Harry Smith among the earliest, begin to improvise projections and manipulate film in real-time to the live music. At the same time, alongside new understandings of composition and performance ushered by experimentation with magnetic tape recording and electronic audio synthesis in contemporary music, real-time projection work becomes live "visual composition" at tape music concerts and soon attempts to mirror the novel "surround" spatial acoustic possibilities by multidirectional projections combining different media (film, slides, lights). This early experimentation in inter-dispersed sound and visuals paves the way for the immersive multi-media, often psychedelic, experiences of the 1960s such as Stan VanDerBeek's Movie Drome or the USCO performance/environments. Meanwhile, growing out of John Cage's experimental composition idea of indeterminacy and Fluxus thought, the concept of Intermedia gives rise to new mixed-media forms, like happenings, revolving around the simultaneous coexistence of different disciplines including moving and projected images. Video technology that appears in the late 60s is enthusiastically absorbed by Intermedia practitioners often for its documentary capabilities. However Nam June Paik, a student of Cage and

Stockhausen, sets out to explore the emerging visual medium in the spirit of electronic audio synthesis research then increasingly in vogue in contemporary music circles and devises the first video synthesizer. Subsequently many artists and engineers invent a wide variety of video synthesizers inspired by voltage control principles developed in audio synthesis design. Synthesizers enable video to be played like an instrument and foster a new dynamic video performance scene, commingling with experimental music, around electronic art research and presentation centers such as The Kitchen founded in NYC in 1971 by violinist Steina and film artist Woody Vasulka, perhaps the most important site at the time among many others all across North America.

The final chapter moves away from "high" culture to track a parallel trajectory of Live Visuals within more popular music spheres from the 60s to the current computer era. It stresses the significant influence of the particular spirits of a number of musical genres on the development of the conceptions, techniques, tools and technologies for the live mixing of visuals that we know today and addresses its most recent directions. The emergence of an unprecedented youth movement in the early 60s brings with it a new music scene rooted in bebop jazz, beat poetry, blues, acoustic folk-rock, and electric instrument amplification that soon embraces a nascent hippy subculture and its fascination with hallucinogenic drugs like LSD. The concerts of the resulting Psychedelic and Acid Rock become so popular that they fill entire large halls or auditoriums and create a need for a new breed of venues. These venues seek to offer a different perception experience from dance halls of the past and enlist some of the young artists then exploring improvised projected film and experiments with overhead projectors and

various liquids at art salons to create psychedelic visuals. This marks the birth of the concert light show that evolves into an art of ever more complex combinations of slides, film, overhead projectors, liquids, strobe lights, developed by ever more individual light artists and light art groups, with ever more flavors depending on personal styles and particular geographic locations. As rock concerts turn into an industry of huge auditorium spectacles, light shows become "theatrics" based on the orchestration of extremely sophisticated effects and technologies such as the elaborate Pink Floyd spectacles. As a reaction against the domination of Rock in the 70s, the discotheque-style nightclub is revived with disk jockeys, rather than live bands, mixing Funk, Soul and Latino hits, and later disco, with powerful audio equipment. The nightclubs are quick to incorporate recently available video equipment to play diverse tapes on numerous monitors for visual enhancement. Soon, the club DJ, inspires the invention of the VJ (Visual Jockey) as the person in charge of selecting and playing the different video tapes according to the music, a role that evolves to actual mixing with the arrival of video switchers and effects units. When in the 80s dance music veers towards Rap, Hip Hop and gradually House and Techno, the sampling techniques it introduces are re-interpreted by VJs to create corresponding rhythmic visuals to project by means of the beamers then rapidly replacing video monitors. Such sound-image rhythmic synchrony is further pursued into the ensuing Rave culture of the 90s and its focus on all night "sensory overload" parties where the projected visuals are meant to reinforce and fuse with the music and other stimuli into a single trance-like experience emulating the effects of the newly adopted mind-altering drug ecstasy. To keep up with the demands of such night-long events, VJs perfect equipment combinations and techniques and turn to the incorporation of personal computers for new

possibilities such as looping and digital animation. This soon leads to the development of their own dedicated hardware and software, often borrowing *modus operandi* from electronic and digital audio, which eventually forms the basis of a whole VJ tool market. From the early 2000s, the computer's centrality in the area of improvisatory visuals brings about a new direction for their creation. Modular programming environments, originally meant for the development of interactive musical applications, become readily available allowing more and more artists and VJs to relatively easily design their own custom tools according to their personal needs, alongside a proliferation of commercial digital and electronic solutions that is intensified by the spread of the laptop. As I write this, Live Visuals are evolving beyond computers to explore, in parallel with current musical development, the possibilities of the new technological frontiers of mobile, smart and locative devices of all sorts, hand-held projection, participatory social media, the latest gaming interfaces as well as completely novel, hybrid, poly-media devices in the process of being invented that present utterly unprecedented performance situations.

With its broad overview and numerous examples, this study succeeds in demonstrating some of the key musical roots of the practice of Live Visuals and their undeniable importance in its shaping. It also shows the incredibly wide variety of musical influences and no less wide diversity of ways they connect to the form.

Though much of the information presented in this survey is by no means new, its particular personal amalgamation of cross-associations around its specific musical focus offers, I believe, a novel alternative perspective for thinking about Live Visuals. Live Visuals come out as a rich hybrid form descending

from centuries of intersecting artistic and musical expression directions, cutting across the boundaries of vision and sound as well as the aesthetic, scientific and philosophical ideas of their times, rather than as simply a recent digital trend or an outcome of film culture. Such a result implies the possibility, and the interest in terms of contribution to knowledge, of re-telling the "story" of the evolution of Live Visuals further, from numerous other perspectives. Additional aspects of the subject could be illuminated from the vantage points of, for example, the transformation of scientific thought, the progress of engineering, the development of lighting and electricity, ideas about the role of art and/or entertainment in society, cultural specificity in relation to geographic location, etc.

At the same time, the breadth of the scope of this study leaves much information considerably approximate. Its panoramic stance generalizes and synthesizes sometimes leaving mere glimpses of inventions, developments, and events that don't always do them the justice they deserve. In fact each miniature "case study" could serve as starting point for a detailed study in and of itself. Were I to start anew, I would most definitely reduce the reach of the research, either in terms of time-frame, or geographic location, or even narrow it down to just a few inter-connected cases that I would explore much more extensively. Furthermore, this generalizing approach, along with the subjective nature of the research, result in a study backbone consisting of a selection of occurrences that neglects many people, places and practices. Certainly some such omissions could be held against me since for other scholars the key elements of the evolution of the practice of Live Visuals might be completely different than the ones I chose to put forth.

Another area of possible contention is my lack of musical and musical/audio-technical background. Indeed, this research was conducted from the position of my experience as a practitioner of visuals and so my relationship to musical ideas, practices and technologies is one of mere observer, or perhaps of second-hand participant by way of my collaborative work with music and sound artists. My lack of specialist musical/audio knowledge once again limits the study to a more general level where such knowledge is concerned. While my insider's experience brings a most precious wealth of awareness and subtle nuances to all the visual aspects of the study, without doubt, a more expertly musically informed frame of reference could take the inquiry much deeper as to some of the relationships of the physical, theoretical and technological foundations of sound and music to conceptions and developments in Live Visuals.

Everything considered, however, while this study is by no means exhaustive, and perhaps lacks some musical-technical depth, I believe it presents a valuable basis for probing the implications of the art of music on the evolution of improvisatory Live Visuals in new ways and points to new avenues of research. The fertile outcome of my subjective and relativistic archeological foray, in terms of fresh perspectives and novel junctures of information, confirms the interest of a line of approach based on creatively constructing one's own "history", or "histories", according to personal motivation, for the pursuit of new knowledge. By its sheer breadth, the study introduces numerous potential narrower subjects that deserve to be addressed independently and investigated further thus opening a whole network of possible future paths of exploration. Finally, the thought-provoking findings generated by its examination through the lens of its connection to the context

of a different artistic discipline suggests the usefulness of contemplating Live Visuals from the standpoint of the contexts of still other connected fields of practice and inquiry, artistic or not, to uncover ever more complex meanings and ramifications of the form.

Such interdisciplinary and cross-disciplinary research approaches will, in my view, prove to be invaluablely productive for the examination of real-time forms of visual, and digital in general, performance to come. Indeed, the evolutionary trends of improvisatory Live Visuals revealed by this study, and the form's current ongoing growth in popularity, lead to believe that the future will bring its continued expansive development into myriad new directions, by way of many kinds of new technologies, that will keep increasingly intersecting and fusing with sonic arts and other disciplines. While technology in the form of ever more devices and interfaces is becoming more and more prevalent, applications for the production of moving images and music with all such devices are proliferating and becoming more user friendly. These are merging with web, network, gaming, social media and new hand-held sound and image presentation possibilities in diverse forms of instantaneous mobile collective collaborative audiovisual creation. Already numerous new practices are emerging, from Guerilla VJing, to visual and audio jamming via internet, various versions of networked participatory performance, and social media based events, among many others. Their resulting experiences are re-inventing our definitions of live visuals, music and performance, and challenging our conceptions of context, space, time, as well as authorship and audience. As practices will continue to grow more complex, beyond the currently imaginable, ever more complex hybrid research approaches, moving accross disciplines, eras, media and technologies will be vital to analyze and

understand them. My hope is that this study is a small step in that direction in relation to improvisatory Live Visuals practices and technologies to date and that it will be regarded as a worthwhile contribution for forthcoming scholarly investigation.

Moreover, on another level, the exercise of this investigation has been for me a most instrumental process to reflect upon the place of my own Live Visuals practice within the vast web of possible artistic influences and approaches. Since I began exploring improvisatory Live Visuals over a decade ago, real-time visual performance has caught on tremendously and established itself into a thriving field more and more often referred to by the broad designation "VJing" which is used interchangeably with other terms like "live cinema" or "visualist" practices. For my own part, while it is no less concerned with the real-time creation and/or manipulation of imagery in combination with live music, I never felt that my live video mixing work belonged within the world of "VJing", nor was I ever comfortable with calling myself a "VJ", without really being able to say why. This has perhaps been a secondary, subconscious, motivation for my inquiry. By its circuitous journey across different origins of Live Visuals, this research has enabled me to map out the background artistic traditions that have intrinsically shaped my work in the form. From my roots in video art I can trace back direct connections with intermedia approaches that evolved out of "total" avant-garde art movements and their related musical ideas that embraced technological advances as new means of expression while calling for new modes of presentation bringing together different art forms in interaction on equal footing amongst themselves (rather than any one being subservient to any other). Thus from the onset my vision of Live Visuals has stemmed from a conception of dialogue, conversation, between

imagery and music on par as active co-creators of a happening presented to an attentive audience in a dedicated viewing/listening situation. Though expanding the boundaries of sight, sound and time, and based on recent expressive possibilities, this kind of presentation follows a performance lineage derived from recitals, concerts, plays, and even ballet or opera. In fact, during a recent interview on live performance practices a UK scholar conducted with me, he asked how I would define the type of performances I'm involved in and how I perceive myself in the live music-live visuals collaborative improvisatory equation. My answer was that I see the performance as basically a "concert" and myself very much as another kind of "musician" participating in the jam with a different "instrument", an instrument playing images, colors, rhythms, in responsive interaction to the sounds, and definitely not as accompaniment or visual illustration. At the outcome of this study I realize how different in spirit this is from the no less interesting quest for symbiosis between sounds and images by way of synchronization found in VJing that has developed around rock and dance musics, where visuals seek to amplify or enhance the music into a single multisensory entity often focused, as in the case of club culture, on audience participation by seeking to stimulate dancing. According to Brazilian Communications scholar Arlindo Machado, quoted by Daniela Tordini, "videoclips addressed to the clubbers" are conceived as "retinal stimulation patterns very similar to the rhythmic patterns of the music" (Machado in Tordini, 2007, para. 3). Here visuals are meant to merge into the psycho-active ambient groove and not take any attention away from the music or other stimuli. This changes the function of the content, be it narrative or abstract. "In places where audiences go mainly to dance" says Machado, "it does not make sense to project images that demand involvement, contemplation, fixed attention at the screen" (Machado,

Tordino, 2007, para. 3). This is an altogether different paradigm of work with image projection concentrated on encouraging social interaction within the club space (Bernard, 2006). In hindsight, then, my artistic affiliations have intuitively taken me along various paths mainly through territories in tune with my pre-conceptions and away from a whole other captivating understanding of Live Visuals which I have merely skimmed the surface of from my own biased aesthetic standpoint. And so at the very end of this long process that leads me to distinctly situate my practice within a certain artistic genealogy I arrive to what seems to me now as a much more interesting starting point from which to contemplate Live Visuals were I to begin today. But perhaps this is the very nature of research: to take us on long winding journeys that bring us to new beginnings for further inquiry.

To complement this study, notes about my personal practice and the creative component presented as partial fulfillment for the Doctorat en Études et Pratiques des Arts degree are included in the following appendix.

APPENDIX:

MY OWN WORK IN LIVE VISUALS

My own experimentation with improvisatory Live Visuals, in collaborative performance with experimental music, began in the early 2000s. My current practice is a process technically based on real time "mixing" or "montage" done with a laptop via a personally designed virtual mixer of sorts running within the Jitter and Max/MSP visual programming environment that can take different forms depending on my different projects. Much like many of the historic practices addressed in this thesis, my initial inspiration for Live Visuals also came from music, for my part from improvisatory genres of "new" music. Of course a no less important influence was the time-based form of video art which had been my main expressive medium since the late 80's. Thus, my Live Visuals aesthetic is very much shaped by my varied work in video over the years, and to a certain extent even by my earlier work in painting, sculptural assemblage and installation. In addition, the development of electronic and digital technology of the last 15 years is of major significance for the evolution of my mixing practice. In this section I attempt to recapitulate the origins of my Live Visuals practice. I then discuss the different approaches to live video I have explored, and/or continue to use which I illustrate by a number of examples from among my projects and collaborations to date. Finally I describe the creative project I have presented as partial requirement

for this doctoral degree in the study and practice of art (Doctorat en Études et Pratiques des Arts) and end by its relationship to my PhD thesis.

Origins

My artistic career began in the early eighties with drawing and painting and gradually moved into various types of assemblages combining found objects with painting or into sculptural compositions with found objects and diverse materials I shaped in different ways. From the beginning, my very colorful work moved between lyrical abstraction, somewhat figurative expressionism and conceptual tendencies (usually where found objects were involved). By the late eighties I became more and more interested in multidimensionality which took me in the direction of the installation form with its spatial considerations and before long temporal multi-media elements, first sound and then moving image with video. Soon I focused almost exclusively on video as my expressive medium creating both single-channel and installation works.

While assemblage had enabled me to take painting into the realm of volume, video represented for me its extension into movement and time (and, with video installation, into space). My early video work was intended as moving painting. It transposed to this new medium interests from my past practice in the visual arts. Thus it ranged from nearly abstract moving textures and colors (obtained by capturing, with the video camera, myriad minute details of life around me), to conceptual - non-narrative - *mise-en-scènes* of various inanimate and animate elements (sometimes incorporating human

characters). The time-based nature of this medium and of my non-narrative projects led me to turn to all sorts of free-form "scores" to develop my ideas. It was these scores that first made me think of my work as visual composition in time. And this, as well as my collaboration with composers for the soundtracks of my video works, ignited a dream of somehow being able to improvise moving images live in the same way as musicians of the kinds of music I was interested in - improvisatory "new" and electronic music - could spontaneously improvise notes and sounds in real time. In the late 1980's, however, I didn't see at all how this could be possible with the limited (and very cumbersome) state of video technology and computers of the period, and even less so with the much less spontaneous mediums of film and slides. (I didn't know then about the potential of overhead projectors, as their rock-concert "light show" applications had been popular before my time).

Live Video

In the 1990s I began to see, both in North America and Europe, mostly at rave-style techno and dance parties, video material being edited (or "mixed" in the same way as DJs mixed music) and projected in real time. I was, of course, extremely intrigued by the practice. However I was quickly faced by the realization that it entailed a huge production. A typical setup usually consisted of one or more of the large mixers of the time, a number of effects units, such as keyers or colorizers, several player decks (U-Matic or Betacam), preview monitors and signal scopes and more - basically the entire content of a video editing studio. Such configurations not only weighed a ton (and required a truck or van to transport) but were then worth hundreds of

thousands of dollars, as were worth over a hundred thousand dollars the enormous tube video beamers used to project the video. This type of system for live video mixing was thus, for me, both unthinkable on a financial level and, because of the size and weight of the equipment, a far cry from the spontaneity I yearned for which I imagined should be more akin to something like a saxophone or guitar a musician can just bring along in a case to a jam. Subsequently, with the development of video/computer interface possibilities, live video setups diminished somewhat in size and cost, but only slightly as the required powerful desktop computers with high quality video cards were still quite huge and considerably costly.

At the end of the 1990s I first saw, at experimental music concerts, artists using laptops to create live video. The laptop was not a standard piece of equipment at the time and no one yet envisaged how common it would soon become. To me, however, it immediately appeared as the long sought for solution that could make live video, somehow close to how I had dreamt it, possible. It was not only very portable, even more so than many musical instruments improvising musicians use, but also affordable enough for me to conceive getting one, in comparison to the studio video equipment that was being used until then. The laptop could be easily carried around and spontaneously used at a jam (as long as a beamer was around), like a clarinet or a violin. And around this time video projectors being around at a venue was becoming an ever more probable possibility because they had started getting much smaller and dramatically went down in price, and so were more and more widespread.

Now that I had found the hardware I began to research software alternatives for live video performance that would work on a laptop. Several "VJ" programs had then recently appeared on the market such as Arkaos or VJAMM. These were not very interesting to me, though, as they were primarily designed to create fast-paced graphical and rhythmical imagery to accompany techno or dance music at rave-style events by way of numerous pre-set effects, to a large extent automating the process. The first software that really caught my attention was NATO.0+55 that ran on the Max/MSP visual programming framework. But NATO's life span was so short (a mere 2 years) that it was already discontinued by the time I saw it at work (2001-02).

In 2003 I was fortunate to be selected to be part of an extended 3 months workshop in interactive media for a group of artists (at Vidéographe, Centre de création, de diffusion et de distribution, in Montreal). A major emphasis of this workshop was Cycling'74's modular Max/MSP visual programming environment and its set of extensions for video then just released under the name of Jitter⁴⁵. During this workshop the project I focused on was to develop via Max/MSP/Jitter a personal virtual tool, basically a piece of custom software, for live video performance suited to my own specific interests and needs.

From when I first imagined performing video live, "playing" it, I envisioned it as an extension of my video art work and as its expansion to new dimensions

⁴⁵ Jitter was one of the first graphical programming environments facilitating the development of custom software without needing any extensive coding experience. It was launched as a toolkit for modular patching enabling users to create modules, within the Max/MSP environment, capable of realtime video, 3-D, and matrix processing according to their own needs and aesthetics.

of dynamic collaboration with live music and to the possibility of on-the-spot public improvisation. I thought of it as the equivalent to improvised music vs. scored music in relation to my "fixed" video works (single-channel tapes and installations). I was interested in being able to create video in real time like a musician can improvise music during a jam session. Thus the tool I had in mind should enable me to easily "jam" with the formal elements of video, basically to do montage live, directly in front of an audience, in responsive interaction with live music.

My earliest idea was for my live video to be created from existing footage shot by myself (as opposed to found footage of any kind) much like my process for fixed video art works. Thus what I first concentrated on with Max/MSP/Jitter was a "patch"⁴⁶ that could function as a "virtual mixer" able to mix between up to 3 pre-recorded video sources and add a few minimal effects. I configured this virtual mixer in such a way that it would be completely intuitive for me to use. Coming from a 15 year background in video that had evolved from analog to digital non-linear, I used the metaphor of an A-B-C-roll editing studio for its logic and design. Each source of pre-recorded footage had its own preview window, much like preview monitors in an editing suite, to view and select sequences or fragments of sequences before sending them "out" to the live mix. The sources were inter-connected by two switching modules enabling mixing between them (one between sources A and B, and the second between whichever source was selected by the first switcher and C). I

⁴⁶ A "patch" is basically a program obtained by connecting software "objects", building blocks consisting of a self-contained entity with a certain behaviour, within a visual canvas called a "patcher". The objects are connected with patching cords much like different pieces of equipment with different functions in a physical audio or video equipment set-up that can be connected in different ways depending on the desired purpose of the set-up.

deliberately kept this virtual tool simple, limiting its functionality to the few effects that I wanted to work with at that time: speed control, brightness and contrast control, color control and sharpness/blur control, in addition to the most basic dissolve capabilities. I had no interest at all in the possibility of having numerous effects at my disposal, as is the case with most commercial VJ softwares, for I personally find these much more distracting than conducive to creativity or spontaneity. This basic mixer "patch", which I began to develop in 2003, serves to this day as the basis for the different approaches of my live video work for which I still use Jitter. Subsequent projects have built upon it and complexified it into a number of variations with different added functionalities.

My Work in Live Visuals: Different Approaches

Depending on the specific experimental music/sound art (or other, e.g. dance) collaborations and/or projects, my live video practice revolves around two general approaches. One consists in a relatively straightforward live montage process intermixing between pre-recorded video material only. The other integrates all sorts of live cameras to my Jitter "mixer" to capture chosen live "events" (on the concert stage) in real time and thus make these become the main content of my visuals.

The first approach is based on the mixing and processing of pre-recorded clips in response to, and in dialogue with, live music. In this approach, by way of my Jitter "patch", I select, combine and manipulate, in real time, video sequences from a body of material I (usually) decide in advance to use for the

project or performance at hand. All the footage I use is entirely personal, shot by myself - as opposed to any kind of found or archival footage which is popular among many VJs and visualists - an aspect that has been central to my process since I began work in this area.

When I started performing video live I assembled a great deal of material to use for my mixing. This was a considerably vast database, or library, of diverse footage I had shot since first owning a video camera in the early nineties and in many cases had never utilized. Some footage was out-takes from previous projects and some just fleeting moments of life around me that I had shot in passing, over the years, in the most varied circumstances, at home, or during trips and excursions, in urban or natural environments alike. I organized this broad range of material into a series of folders in relation to a range of thematic categories (for example: "fauna", "flora", "landscape", "water", "public transportation", "machines/motors", "crowds", etc.). The idea was to be able, during a concert, to choose and amalgamate different clips from these folders according to what the improvised music or sound inspired me. Over the years this database has grown to hundreds of clips as I continuously keep adding to it. In recent years I mainly resort to this extensive repository when I find myself in situations of improvising video "on the fly", without any prior meeting or preparation, with the sound/music artists (for example at festivals when I am "blind dated" with musicians I don't know, or when I'm asked by artists I do know to join in with video for a concert at the very last minute...). When the opportunity is there to install a collaborative relationship with a sound/music artist via "rehearsal" sessions or discussions, I usually create a specific database - that will serve as my "palette" or "scale"

- especially for work with that artist, either from new material I shoot expressly or from footage that I find among my personal video archives.

Since 2003 my simple "patch" has evolved with the addition of a number of subtle possibilities. Early on, I incorporated the option to input one live camera to use for adding feedback effects to my mix. The camera re-shoots my video output from the projection screen or from the main mix preview window of my patch on my laptop display. This live feed becomes a supplementary image source in the patch which, when superimposed onto the original output image, creates a light feedback effect that adds a very painterly ethereal and dreamy quality to my visuals. The other possibilities that have been added are: the ability to digitally zoom into a selected clip; the option to flip a clip horizontally and/or vertically; the capacity to specify "in" and "out" points in a clip typically for looping; compositing via luma-key rather than dissolve (which I almost never use); and a few mild effects such as a certain "smearing" of the image and a form of posterization.

This very basic approach can be compared in many ways with how the audio program Ableton Live functions for live sound performance. Live consists in a virtual interface permitting the real time playback, and simultaneous multi-track combination, of existing field recordings or other audio clips from one's database of pre-recorded material. These can be manipulated by diverse effects and filters either individually, one track at a time, or as whole.

Some of the composers and sound artists I have worked with and/or continue to work with within this approach since 2004 include: Phill Niblock, Al Margolis

(a.k.a. If,Bwana), Shelley Hirsch, Keiko Uenishi (a.k.a. o.blaat), Anne Wellmer, Chantal Dumas, André-Eric Letourneau, Emilie Mouchous, Jim Bell, Kristin Norderval, Monique Buzzarté, Anthony Coleman, Tom Hamilton, Leslie Ross, Gill Arno, Vortex (Satoshi Takeishi + Shoko Nagai), Margarida Garcia, Barry Weisblat, Audrey Chen, Thomas Lehn, Tiziana Bertoncini, Angelica Castello, André Gonçalves, Martin Janicek, Alessandro Bosetti, Marina Rosenfeld, Lars Graugaard, Robert Dick, Dorit Chrysler, among many others.

The other direction of my live video practice is based on mixing between the live feeds of several cameras capturing some "event" in real time. By "event" I mean something that happens, a discernable entity of action. Examples of events I have worked with include: the movement of a musician's body part (such as the hand) or implement (e.g. a bow) on an instrument, natural phenomena such as physical/chemical reactions (oil pigment in water, fire burning a twig, a melting ice cube, etc.) staged for the camera, and moving objects - either self-powered (mechanical toys, diverse motors) or moved by an external motor (such as lightweight objects blown by an electric fan). An interesting dimension of working with live "events" as content material for video improvisation is that it adds a supplementary layer of "chance" to the process. This approach is at the center of a number of collaborative projects I have developed since 2006. I will here describe some of my favorite ones as examples.

My earliest exploration of such a strategy was a collaborative project with NY composer/musician David Watson (guitarist and experimental bagpipe player) that we entitled "Bagpipe Extrapolations". I was interested in experimenting with the idea of attaching miniature surveillance cameras directly to the

instruments or body parts of musicians in action to obtain a palette of multiple real time points of view from which to construct my live video mix. After trying many alternatives, we mounted two cameras on different parts of Watson's bagpipes: one oriented towards his hands fingering the pipe section, the other aimed at his mouth. A third camera, with a powerful zoom, was placed on a fluid-head tripod beside me so that I could follow his movements from my own perspective. The result was a large scale projection with live visuals of extreme close-ups of details of his playing manipulated in real time, serving as the only lighting for the performance, in dialogue with Watson's actual body at work in the space and with his improvised bagpipe music. "Bagpipe Extrapolations" was presented in May 2006 at Roulette Intermedium NYC and in 2009 at the CAPC - Musée d'Art Contemporain Ville de Bordeaux, France.

A slightly different example of work with multiple cameras was a project with Japanese sound artist Hitoshi Kojo. I met Kojo in the summer of 2006 at an art residency program in Estonia. There we collaborated on a series of spontaneous video-music improvisations for which Kojo used objects found on the premises of the residency location to produce the sound. From these experimentations we developed the concept of creating collaborative live work based on a set of found objects and materials that we would collect together. These objects and materials - which he should find interesting in relation to their sound-producing qualities, as "instruments", and that I should find interesting as to their visual qualities - would become both the source of the music and the content of the image by way of recording technologies in addition to electronic and digital processing. Thus we came to work with different glass and metal objects, in addition to different lights (LEDs,

flashlights, candles), which Kojo used as musical instruments and that I captured with several live cameras and mixed, processed and projected in real time. For the performance Kojo sat on the floor amid the objects which he "played", and I placed several small cameras at different angles around him. By this time I had added to my Jitter patch the capability to "record" the live feed of a camera to the cache of the computer, much like audio sampling. Thus I could mix visuals not only between the live feeds but also from samples of earlier moments of the performance. The premiere of this work took place in spring 2007 at White Box Gallery NYC, in the form of a "live installation" performance of over 2 hours. It was presented later the same year at Issue Project Room NYC and again in 2009 at Espai Ubu, Barcelona, Spain, in the context of the Loop VideoArt Festival.

Still another example was a project with NY electro-acoustic chamber music duo Zanana (featuring, Monique Buzzarté, trombone, and Kristin Norderval, soprano and electronics). In 2008 Zanana and I received a commission from Minneapolis 2008 Electric Eyes: New Music and Media Festival to create a new evening-long collaborative audio-video piece to be presented at the city's beautiful hundred year old Southern Theater. The piece we developed, *Sub/veillance*, sought to explore the theme of on-site recording in a surveillance oriented world and attempted to bring our practice and awareness of listening, looking and reacting in the "now", closer to the audience through the use of portable live feeds. We summarized our concept as:

an arrangement of equipment, site-specific to every presentation venue where it may be displayed, consisting of various cameras and

microphones, as well as video and audio players, projectors, mixers, a sound-system, both capturing and transmitting in real-time the 'natural' events of the space (audience, passers-by, etc.), and playing-back previously recorded material in the same space, in interaction with live music and video interventions, in reaction to the present moment, by the artists. In *Sub/veillance*, the feed feeds the response and the response feeds the recording devices for a nonstop feedback loop where boundaries between previously recorded and live performance become completely blurred.

Thus the two music artists had wireless microphones that incorporated the close-up recording of their acoustic performances to their live collaborative electronics mix. They were also equipped with tiny portable surveillance cameras that allowed them ample movement around the space. I made special rigs for the surveillance cameras. For the trombonist, Monique Buzzarté, I fashioned a mount for the camera that fit right on the slide of the trombone which could yield a perspective either on her head or on the space, depending on her swiveling the camera 180 degrees on its base, that moved back and forth as she used the slide. For the soprano, Kristin Norderval, I used a harmonica neck rack to affix a camera pointed at her face that could also swivel towards the room. These two cameras thus provided feeds of footage that was constantly moving with the movements of the musicians. Two other cameras held by microphone stands in the middle of the space could yield feeds of stationary video material if/when the artists moved into their fields. Finally I used one more powerful zoom camera on a fluid-head tripod beside me to focus on various details of the performance from where I was at the edge of the stage area. The cameras I chose for this project were tiny infrared wired surveillance cameras. Infra-red (night vision) technology was selected as it resolved the lighting problem. Thus we could use the video projections as the main light source with just a few discrete theater lights.

Besides, the image from the infrared cameras is more or less black and white, which suited the theme of surveillance well. I opted for wired rather than wireless cameras as wireless surveillance video technology switches to the projector's background screen if for some reason the camera loses remote contact with its base, something that could have completely compromised our performance. And here again the extremely long cables that always followed the performers actually better reinforced our theme. For this piece I created a special patch that could output a screen presenting four feeds at the same time, in four windows, like a typical surveillance monitor view in a building security office. I could move around which feed went to what window or send the same feed to all windows, etc. I could also alternate between the four-window view or select to just output a single feed full-screen. In addition, to each side of the huge main projection on the back wall of the theater, we set-up 2 more smaller projections that were based on the closed-circuit live feed of two more night vision surveillance cameras pointed at the audience. Thus the audience's watching activity captured by these cameras also became part of the content of the piece. Unlike the other two projects mentioned above, *Sub/veillance* was a structured improvisation piece where we followed a loose overall plan with a number of sub-parts of different flavors in relation to the performers' vaguely predetermined movements around the stage space.

Yet another, and again different, example was a collaboration with NY-based visual/sound artist Richard Garet. Garet's performance work is concerned with real time explorations of audiovisual processes, emphasizing the experiential and the sensorial. The non-representational video and audio material he presents in his solo performances is usually generated live by

processes he sets up between image and sound electronics interacting between themselves and processed/manipulated via laptop and effects. After exploratory research, we developed a two projection collaborative concept (one projection controlled by each of us) based on the exchange and re-use in real-time of each other's improvised material. We used a variety of visual and audio components combining analog and digital processes (production of video by audio voltage-control, feedback, light...) to generate material that became part of a single multi-projection and multi-channel live mix. For the visuals the idea was to merge both our work into a continuous flux of appropriating each other's imagery that was then reprocessed in the moment and fed back into the space of the performance. Thus, during the performance, both of us created our own visuals while at the same time sampling the other's visual output (via live cameras re-scanning the other's projection) and mixing it in with our own, each using our personal, yet complimentary, manipulation approaches. As a result our two adjacent projections were in constant dynamic causally related dialogue with each other. This projected visual content in turn served to inform the sonic experience in terms of translating modulated light into sound. For my part, the basis of both my visuals and sound were three condenser karaoke microphones hanging from a microphone stand in front of my powerful zoom live camera. As they slightly swayed from the air blown onto them by an industrial strength electric fan, they generated sound by virtue of the audio feed-back that formed between them and the room's equipment as they picked up Garet's sound at the same time, which I could control with an effects unit and a small mixer. My camera's extreme close-up shot of the moving grills of the microphones created a completely abstract quivering visual environment that I processed mostly by video feed-back (obtained from

having positioned the hanging microphones in such a way that the projection of my video material served as their background within the field of my camera). A second camera captured a different angle of the microphones, also with the projection as background, while a third was pointed at Garet's projection. This project that we entitled *Polymedia/Live Mix* was part of NYC Roulette Intermedium's 2011 Mixology Festival.

These two main approaches, the live montage intermixing pre-recorded material only, on the one hand, and the capture via diverse cameras of live events in real time, on the other, along with combinations thereof in certain cases (amalgamating live feeds with pre-recorded material together), form between them the body of variations of my Live Visuals performance work in collaboration with live experimental music/sound over the last 10 years.

For the practice component of my PhD in the Study and Practice of Art my ambition, then, was to come up with a project introducing as many as possible dimensions of my Live Visuals work described above within the constraints of my available modest budget. Thus I opted for a concert/performance evening with different parts addressing different facets of my process.

My PhD Practice Presentation

The creative project I presented as partial fulfillment of the PhD in the Study and Practice of Art (Doctorat E.P.A.) on 21 September 2011 at the Agora Hydro-Québec, Coeur des sciences, of the Université du Québec à Montréal

(UQAM) was an evening featuring work representing both of my main approaches to Live Visuals performance. It was a two-part concert consisting of two "sets" with two different experimental music collaborators each of which focused on one of the two approaches.

Because of my extremely limited budget, from all the composers and sound artists I had worked with over the years, I chose among those who were located close enough to Montreal for their travel expenses to be affordable. (The other important consideration was that the two music collaborators be related to different enough visual processes on my part). Thus I ended up selecting two composers from New York City: Phill Niblock and David First.

The first set was a live project I have been developing over several years with minimalist composer Phill Niblock. In this collaborative project while Niblock mixes live between sound collage pieces, based on field recordings that are very different from his characteristic drone music compositions, I mix from a specific selection of video sequences, that could be defined as visual field recordings. Many of the video sequences I use in this project were captured in the same general locations as Niblock's audio field recordings during numerous projects and trips together. Here, aside from slow dissolves, I use only very minimal effects: some speed manipulations such as slow motion and acceleration, as well as slight blurring and subtle feedback. The result is a conversation between Niblock and myself, and between sounds and images originally coming from objective reality, that creates a non-narrative, yet not abstract either, live audio-visual flow that poetically re-constructs the realities it is based on. The duration of this set was around 35 minutes.

The second set was with minimalist composer and guitarist David First. It was based on work created in collaboration for a performance entitled "Mountain/Reflex and River/Wind" for the Roulette Intermedium (NYC) 2008 yearly Mixology festival. For this performance First had developed a new system of targets, tunings, loops and gestures originally inspired by the 108 movements found in Taoist Tai Chi for guitar and laptop. The original "Mountain/Reflex and River/Wind" was a two-part very loosely structured improvisation piece. In its first part my live visuals were obtained by way of a real time closed-circuit image capture and feedback setup using surveillance equipment and a collection of suspended objects - small laboratory glass containers, glass crystals, metal nuts and bolts - that were moved by the air of an electric fan. This setup created ever-changing patterns of shapes and colors. In the second part the moving electric fan itself became the content of the image material. For my PhD presentation concert we decided to focus solely on the second part, with the electric fan, and to develop it further. I devised a new setup where I could vary the lighting on the fan by switching between different small lamps (LED, tungsten) of different color temperatures and could regulate the speed of the fan's movement. As well, I added a second miniature battery-powered "color matrix LED" fan which creates different patterns of colored lights when its blades turn. Two firewire cameras on fluid head tripods were aimed at the fans and a third was used exclusively for feedback purposes. During the performance I mixed between the live feeds of the "chance" activity of the two fans and sampled clips of the fans, while controlling the fans' speed and movement and alternating between different light sources. Here the projection strategy was a two-screen concept. The main, larger, projection screen was re-scanned and re-sized by another separate surveillance camera connected directly by closed-circuit to a second

projector. Providing a detail of the main screen, this second projection thus presented a very similar yet different viewpoint from the first. As it divided the center of visual attention between two focal points in an intermedia spirit, it extended the live video into space. This set lasted around 25 minutes.

With its two distinct parts, this concert succeeded in introducing the public to a certain overview of the main tendencies of my improvisatory Live Visuals process in collaborative performance with experimental music/sound. While it presented variations of work developed for past performances, it was completely unique by the fact that it featured two distinct visual approaches, with two different music/sound collaborators, within a single concert. The usual situation of my practice is to perform a single set with a single collaborator (or collaborative ensemble) during a concert, either by itself or as part of an evening of several sets by diverse artists. The bringing together of two separate and unrelated short performances into a single evening program offered a more complete perspective on the breadth of my live video work while contrasting characteristics from its extremes of strategy, chance, structure and spontaneity.

From Practice to Thesis

It is this artistic process that is at the root of the subject of my thesis. Or rather, it is my curiosity about how this form I embraced as practice came to be and how it developed, as well as my own experience of it, that steered my research to the exploration of its musical aesthetics. My intuitive certainty of improvisatory Live Visuals' important musical heritage and the lack of

discussion I found about it inspired me to focus on this subject. And a conviction of the need to begin to fill the gap left by this lack motivated me to choose to consider the form in general rather than to provide an exhaustive analysis of my personal practice in particular. This also prompted me to opt to address my own practice in a separate, yet detailed, appendix at the end of the thesis rather than to interrupt the essentially general flow of my study by detailed descriptions of my own work. My personal practice, however, permeates and informs my study throughout. It is my insider's knowledge of the field, my understanding of its mechanisms, procedures and techniques that has guided my trajectory to often obscure or remote aspects of the form. And it is my own experience as a practitioner and a member of a community of "visualists" that has led my way to certain people, places, inventions and events. The result is thus truly an intersection of my background and continued involvement in Live Visuals with my research into their "story" from the earliest known inception of the idea of "playing" visuals in real time, like music. Without the prelude of my personal practice, this result could never be the same.

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