

Audiovisual Correspondence: An Overview

1. INTRODUCTION

Ranging from physical connections between light and sound to musical analogy within abstract painting, attempts to establish a perceptual correspondence between aural and visual mediums have formed the basis of many artistic works. Twentieth century developments in the fields of visual music, abstract animation and film offer a range of perspectives on audiovisual unity within art, while development of cognitive and perceptual theory has allowed the discussion of cross-modal correspondence from a psychological perspective. This paper offers a background into twentieth century audiovisual art with reference to perceptual interconnection between mediums. This is followed by a discussion into recent cognitive and perceptual theory to establish the relevance of synaesthesia, sensory-to-motor response, metaphor and perceptual grouping within the creation of audiovisual correspondences. Source-cause theory from the field of electroacoustic composition will then be presented as a possible model for source bonding within the audiovisual field. The relevance of parameter mapping as a mechanism for the coupling of mediums will then be discussed, followed by an analysis of theory within the two primary areas of audiovisual discourse; temporality and colour.

2. BACKGROUND

One of the first instruments to explore a perceptual connection between aural and visual mediums was the colour organ. (Peacock, 1988) Influenced by Newton's speculation of a physical correspondence between the spectra of light and sound (Alexander and Collins, 2008), Louis Bertrand Castel proposed the *Clavecin Oculaire* (1725), in which a harpsichord keyboard could be used to reveal filtered candle light. Castel proposed a mapping system between musical note and visual colour; a modification of Newton's proposed correspondences. While it is unlikely that Castel ever completed a fully functioning colour organ, his work is said to have directly influenced the development of colour organs and related audiovisual theory throughout the nineteenth century (Peacock, 1988:401).

Colour organs and the general field of colour music acted as forbear to the late nineteenth century rise in musical analogy within painting. To many artists, music was the supreme form of creative expression; a condition to which other arts were said to aspire. (Düchting, 1997:10) The ideology of a “non-narrative, non-discursive mode of expression” prompted experimentation in musical metaphor through opposing “quasi-mystical” and “pseudo-scientific” arguments for the “subjective interaction of all sensory perceptions.” (Zilczer, 1987:101) For Wassily Kandinsky, “music's direct and emotional appeal indicated a condition to which art should aspire.” (Strick, 2005:16) A self-confessed synaesthetic, Kandinsky advocated theories of a spiritualistic association between colour and mood as a means to negate the dependency of art on “natural forms and phenomena” (Kandinsky, 1977:40) and to create a “union of all arts” (Russet, 2004). Alongside the spiritualistic and synaesthetic methodology for the creation of abstract art, existed a “parallel movement to create visual media incorporating the dimension of time” (Zilczer, 2005:25) The work of Paul Klee throughout the early twentieth century was based not on synaesthetic metaphor, but on the perception of thematic correlations between aural and visual media. (Aichele, 1986; Düchting, 1997) His use of intersecting geometry and “subtle gradation of bands of colour” are representative of the temporality and dynamism prevalent within music, (Zilczer, 2005:25) an analogy most prevalent within his latter *polyphonic painting* works. (Düchting, 1997)

The field of abstract animation, often referred to as visual music, explores the temporal nature of film to establish a visual

morphology equivalent to the dynamism prevalent within musical composition. (Evans, 2005) Modes of audiovisual correspondence within abstract animation vary greatly, ranging from strict temporal synchronisation between mediums to more contrapuntal explorations of sound and image. A key artist in the field of abstract animation was Oskar Fischinger whose explorations into non-objective form, visual morphology and audiovisual synchrony capture “the complexity, diversity, energy, and chaos of modern life.” (Brougher, 2005:108). In his later works Fischinger devised a system of drawn sound, in which geometric shapes were drawn directly onto the film soundtrack, (Fischinger, 1932) leading him to “postulate a connection, largely subconscious, between society's ornamental patterns and the sounds of what they represent.” (James, 1986:83) Concurrent developments by American animator Norman McLaren saw the development of *animated sound*, in which audio is synthesised by drawing directly onto the film soundtrack. (Jordan, 1953; McLaren and Jordan, 1953) Acting as either counterpoint to an orchestral score or sole audio output, drawn sound techniques allowed the creation of a “direct synergistic linkage between sound and image,” often employing strict audiovisual synchronisation. (Russet, 2004:113)

The parallel development of visual and aural components paved the way for a contrapuntal relationship between mediums. In *Digital Harmony: On the Complementarity of Music and Visual Art* (1980) John Whitney explores the relevance of harmony in audiovisual correspondence, arguing that theories of consonance and dissonance “function outside the dominion of music.” (Whitney, 1980:5) The notion of a proportional symmetry between aural and visual mediums forms the basis of Whitney's concept of a “multidimensional interplay of tension and resolution,” a theory he refers to as *complementarity*. (Alves, 2005:46) Ignoring direct synaesthetic mappings, Whitney's works often explore contrapuntal relationships between mediums, creating “a universe of linked senses in which all elements – sound, shape, colour, motion – are no longer merely related but are absorbed into one another.” (Brougher, 2005:145)

Ranging from phase-space audio visualisation (Gerhard, 1999; Monro and Pressing, 1998) to virtual environments, (Schütze, 2004) recent audiovisual works encompass a wide range of genres. Music videos by directors Chris Cunningham and Michel Gondry often showcase strict temporal synchronisation and notational metaphor to “influence the perception of and the emotional effect on their public.” (Fahlenbrach, 2005:7) The works of Jack Ox focus on the representation of music within three-dimensional computer graphics, (Edmonds and Pauletto, 2004) while audiovisual compositions by Adriano Abbado explore techniques for a perceptual correspondence between synthesised sound and visual components. (*Ibid.*; Abbado, 1988) The concept of parameter mapping as a system to link aural and visual elements forms the basis of many works by Ernest Edmonds and Lynn Pocock-Williams (Pocock-Williams, 1992; Edmonds and Pauletto, 2004), while abstract interactive works such as *Altzero* (2003), *Freq2* (2006) and *Driftnet* (2007) by the group *Squidsoup* and *Fijuu2* (2007) by Julian Oliver and Steven Pickles explore interactivity within the audiovisual medium.

3. SYNAESTHESIA

Zilczer argues that many late nineteenth to early twentieth century explorations of musical analogy within visual arts were rooted in the notion of synaesthesia. (Zilczer, 1987:101-102) Despite many works based on synaesthetic mappings being well received they have been largely ignored arts literature, arguably due to their limited success in terms of perceptual interconnection. (Pocock-Williams, 1992:30) While the relevance of synaesthesia within audiovisual art is questionable due to the subjective nature of the condition, the concept of synaesthetic metaphor, and sensory-to-motor mappings may prove relevant to establish innate correspondences between mediums.

Grapheme/colour synaesthesia is a form of synaesthesia in which colours are perceived when a graphic of a letter from the

alphabet is provided as sole sensory input. Based on a range of psychophysical experiments, Ramachandran and Hubbard (2001) provide proof that such integration is a true sensory phenomenon. The purported prevalence of synaesthesia within artists or increased predilection of synaesthetes to artistic endeavour, however, remains contentious. The existence of sensory-to-motor mapping is also speculated based on the *bouba/kiki* effect, (*Ibid.*) which explores connections between aural and visual input in non-synaesthetes. It is argued that such mappings are based on phonemic inflection, suggesting “there may be natural constraints on the ways in which sounds are mapped to objects,” rooted in the “evolution of the proto-language of ancestral hominids.” (Ramachandran and Hubbard, 2001:20) This sensory interaction is believed to be created by cross-modal connections in the angular gyrus, with an excess of such connectivity being present within synaesthetes. (Ramachandran and Hubbard, 2001) On this basis, “we are all synaesthetes to a degree” (Jones and Neville, 2005:57) and there exists an innate connection between certain auditory and visual stimulations. The relevance of direct synaesthetic mappings in audiovisual art, however is questionable. Any such correspondences are entirely subjective, and the connections experienced by one synaesthete would probably not correlate with those of another (Ramachandran and Hubbard, 2003:50). It is therefore highly unlikely that such mappings presented in the context of audiovisual art would be meaningful for the average spectator. (Jones and Neville, 2005:56)

4. METAPHOR

Snyder defines metaphor as a “relationship between two memory structures” that involves the “mapping of one category or schema onto another.”(Snyder, 2000:107) Such metaphorical mapping is based on the concept of image-schemas; cognitive structures “derived from dynamic patterns of interaction with our environment.” (Snyder, 2000:108) It is believed that image-schemas are “directly grounded in perceptual experience” (Snyder, 2000:109) and embody not only abstract imagery and concepts, but also muscular sensation. (Snyder, 2000:108) As such, the generalisation of human experience into image-schemas provides a basis for the formation of conceptual metaphor. The notion of synaesthetic metaphor – the metaphoric correspondence of one sensory stimuli with another (Ramachandran and Hubbard 2001, 2003) – allows the formation of audiovisual interconnections derived from implicit and culturally learned knowledge. While such connections may not be cross-cultural (Snyder, 2000:110), the role of metaphoric correspondence between aural and visual mediums may provide a grounding for the creation of audiovisual art.

The distinction between synaesthetic metaphor and synaesthesia as a condition is important in the context of audiovisual art. While the perceptual mappings of the latter are highly subjective, the former potentially offers a basis for the creation of culturally derived audiovisual connections. Alexander and Collins (2008:137) note that synaesthetic metaphor coupled with linguistic convention allows the development of learnt synaesthesia; a voluntary mapping between aural and visual mediums based on culturally learned knowledge. They go on to argue, however, that audiovisual correspondences formed through metaphoric mappings will often be so apparent that the relevance of such connections is questionable within the context of audiovisual art.

5. GROUPING

Whilst cognitive metaphor may form the basis for the audiovisual correspondences that reference long-term memory, the principle of grouping may offer an explanation for abstract connections formed within short-term memory. Discussed initially by Gestalt psychologists, grouping by proximity is the cognitive process by which elements close together in time will be grouped together (Bregman, 1994:196-198; Snyder, 2000:39) The grouping of elements by temporal spacing appears to override interconnections based on long-term memory, (Snyder 2000:40) but relies on tight synchronisation between events. (Bregman, 1994:198) As such it would appear possible to form abstract connections between events in

aural and visual domains that occur in synchrony, despite referential knowledge that would contest the perceived relationship.

Studies into perceptual correlations between temporal patterns in aural and visual mediums have shown significant sensitivity to such correspondences from a very young age. Also notable is the ability of people to “use each sense to correct the scene-analysis decisions of the other one.” (Bregman, 1994:181) Such cross-modal interactions can create a form of inter-sensory interference as seen in the ventriloquism effect: Research has shown that if light flashes are synchronised with sound pulses, the “apparent location of events in one modality can be affected by our localisation of the events in the other one.” (Bregman, 1994:183) This unconscious combining of aural and visual information is also proved by McGurk and Macdonald. Research showed that when a videotape of a face pronouncing a consonant-vowel syllable such as “ga-ga” was played in synchrony with a soundtrack containing altered phonemes such as “ba-ba”, subjects perceived an illusory blend of the two senses in this case “da-da.” (*Ibid.*) As such, the theories of temporal grouping and inter-sensory interference establish the importance of temporal synchronisation for the interconnection of audiovisual events.

6. ECOLOGY

Current discourse within the field of electroacoustic music composition has explored developments in an ecological approach to perception. Pierre Schaeffer's definition of sonic objects; sounds which can be divorced from extramusical associations, required a listening strategy capable of detaching sounds from their referential base in the physical world. One such strategy proposed by Schaeffer was the notion of *reduced listening*, a system by which listeners would focus only on sonic timbral progression, attempting to disregard connections between the sound and its source. (Barrett, 2008:233-236) Windsor argues that such non-referential perception is largely unrealistic, and that attempts to “ascribe causation to sounds are an important facet of musical interpretation.” (Windsor, 2000:9) Such discussion of ecological source-cause theory within electroacoustic music may offer a conceptual model for the perceptual linking of sound and image within complex audiovisual composition.

The field of ecological acoustics provides a system for “unmediated contact between listeners and significant environmental occurrences” (Windsor, 2000:10) that explores the evolutionary co-development of environment and organism. (Gibson, 1986:29) An ecological approach to electroacoustic music composition is one that accommodates such relationships as a system of connections between sound and the environment based on “transformations in acoustic structure” rather than pitch, spectral, or temporal information. (Windsor, 2000:13) Such connections form the basis of source-cause theory; the assumption “that we seek to relate a sound that we hear to the physical cause that brings the sound into being.” (Field, 2000:38) The perception of causal relationships between sound and environment exists not only for sounds sourced from the physical world, but also those of a synthetic nature. Windsor notes that “the notion of a 'true' causal correspondence is of limited importance,” rather that the semiotic nature of the event in terms of ecological context forms a “link between action and perception”. (Windsor, 2000:15-16) Similarly, Smalley observes that the physical gesture traditional in sound creation provides a contextual basis for the formation of a source-cause relationships. (Smalley, 1997:109)

The notion of a parallel between electroacoustic works, specifically acousmatic compositions and audiovisual art may seem counter-intuitive; acousmatic music is, after all, defined as “music in which the original source of the sound is not visually apparent.” (Hugill, 2008:9) It is arguable, however, that the relevance of extrinsic information for the

contextualisation of source-cause relationships may parallel audiovisual correspondences. Indeed the existence of ecological connections between sound and environment despite simulation or synthesis implies that such bonds remain relevant despite significant abstraction throughout the compositional process. Smalley (1997:110) defines *source bonding* as “the natural tendency to relate sounds to supposed sources and causes and to relate sounds to each other because they appear to have shared or associated origins.” Such a concept accommodates the relevance of extrinsic information – cultural or ecological – within electroacoustic music as a means to contextualise intrinsic features. An abstraction of this concept may provide the basis for an ecological approach to audiovisual interconnection. If there is to be a perceptual connection between aural and visual events in a complex audiovisual scene, extrinsic information based on ecology and culture may permit such a bond to be formed, despite significant abstraction or synthesis in one or both of the mediums. That is not to say that the success of a perceptual bond is dependent on the aural and visual mediums referencing ecological knowledge, simply that the source-cause relationships seen in electroacoustic music may provide a model for interconnections in abstract audiovisual art.

7. PARAMETER MAPPING

Ranging from spiritualistic connections between colour and timbre to accurate visualisations of audio amplitude in a waveform display, the concept of parameter mapping forms the basis of many techniques for audiovisual interconnection. Current discussions of parameter mapping theory focus primarily on the various fields of musical instrument design as a system for the conversion of physical gesture to auditory output. (Fels *et al.*, 2002; Hunt and Kirk, 2000; Hunt *et al.*, 2002) It is clear, however, that the general concept of parameter mapping is relevant as a technique for conversion between any two mediums.

Transparency may be used as terminology to provide “an indication of the psychophysiological distance, in the minds of the player and the audience, between the input and output of a device mapping.” (Fels *et al.*, 2002:2) A fully transparent mapping one in which both audience and player fully understand the interconnection between parameters without the need for explanation or instruction. Fels, Gadd and Mulder (2002) argue that metaphor enables cultural knowledge to act as reference in understanding parameter mappings. They also note that many connections are already integrated into culture to the point at which mappings become bi-directional, citing the visual and aural aspects of violin performance as an example. This cognitive link in the minds of both player and spectator allows the development of transparent mappings in musical instrument design, and by abstraction, the strength of interconnection in audiovisual art.

Generally, mapping strategies can be classified in one of three ways: One-to-one, one-to-many, and many-to-one. Through combination, many-to-many mappings may be formed, and it has been noted that these will often prove more satisfactory after a period of learning. (Bevilacqua *et al.*, 2005:85; Hunt and Kirk, 2000:254-255; Hunt *et al.*, 2002) Dannenberg (2005:28) notes that obvious connections between aural and visual mediums may provide little interpretive challenge for the spectators, and as such, may appear uninteresting. On this basis the use of more complex or obscure mappings may allow the audience to “perceive that there is some emotional, expressive, or abstract connection” that may ultimately prove more satisfactory.”

Regardless of mapping and function type, the cultural basis of any connection will often dictate its success. For example, Alves (2005:47) notes that the “literal mapping of pitch space to height [is] only intuitive because our culture has adopted that particular arbitrary metaphor of 'low' and 'high' to describe pitch.” Jones and Neville (2005:56) observe that mappings based on the physical world will often be successful, noting that a mapping between the size of a visual object and the

frequency of sound it produces may be more successful if smaller objects produce high frequencies, in a manner similar to the nature. Similarly they note that the mapping of aural amplitude to visual brightness is a transparent mapping because “amplitude and brightness are measurements of the same physical concept – intensity of stimulus” in their respective domains.

8. TEMPORALITY

Musical analogy is prevalent within the film theories of Sergei Eisenstein. His notion of *vertical montage* as a system for thematic unification in film is analogous to the orchestral score, with each component being represented by a vertical stave and the inherent temporality of the medium being the unifying factor. Such a system explores the musical analogy of counterpoint as each vertical component maintains “an independent compositional course [with] each contributing to the total compositional course of the sequence.” (Eisenstein, 1947:75) Eisenstein also discusses the relevance of inner synchronisation in audiovisual works as a means by which “the plastic and tonal elements will find complete fusion” (Eisenstein, 1947:82) Eisenstein's solution to such thematic correspondence is the concept of movement within both aural and visual mediums as a means to establish the “significance and method” of audiovisual bonds. (Eisenstein, 1947:82) The notion of movement within audiovisual composition may be separated into rhythmic and melodic categories. In the former, Eisenstein discusses the relevance of synchronisation and syncopation between aural and visual components as a means for the creation of “interesting and expressive compositions.” (Eisenstein, 1947:83) Melodic movement, on the other hand, acknowledges the relevance of synchronisation between spectral and visual morphologies through temporal correspondences between aural tone and visual colour. (Eisenstein, 1947:84)

In discussing temporal correspondence, Michel Chion (1994:63-65) argues the concept of *synchresis*; the point in an “audio visual sequence during which a sound event and a visual event meet in synchrony,” that acts as a “spontaneous and irresistible weld” between mediums. Chion goes on to argue that this synchrony acts independently of objectivity and that such temporal synchronisation will occur between thematically disparate events, although the success of a perceptual connection will vary according to source. Referencing Chion's work, Bailey, Fells and Moody (2007) argue the possibility that synchresis may still function with abstract source materials devoid of contextual information, offering that geometric shapes and sine waveforms may still appear in synchrony if a temporal synchronisation is present between events. It is on this basis that parallel motion between mediums may allow the formation of consistent audiovisual connections regardless of cultural background¹.

9. COLOUR

Theories of a direct correspondence between colour and sound may be split into two categories; physical correlation between the wavelengths of light and sound and the “psychological correspondence between the colour spectrum and the musical scale” based on the notion of synaesthesia. (Zilczer, 1987:118) There remains, however, no universal agreement on the mapping of colour to sound and vice versa (Davis, 1979; Garner, 1978; Wells, 1980). Although theories of a physical equivalence between the waveforms of light and sound persisted well into the twentieth century (Peacock, 1988), it remains questionable as an aesthetic for the interconnection of aural and visual events. (DeWitt, 1987:116, Zilczer, 1987; Zilczer, 2005) Similarly synaesthetic parallels, such as the perceptual connections between visual colour and aural timbre proposed by Kandinsky (1977), remain deeply subjective, personal and culturally influenced. (Jones and Neville 2005:56)

Colour is, however, of great relevance within audiovisual art. Speaking of colour as a “secondary factor in unifying the

¹ See also: Moody, 2006.

audible and visible” components, Potter suggests that a “great deal of latitude” is permissible in its use, noting that thematic and rhythmic correspondences remain relevant for the interconnection of aural and visual mediums. (Potter, 1947:75) Similarly, Galejev (1976) notes that in the works of the Group *Prometei*, correlations between colour and musical themes proved more successful than direct correlations between colour and individual parameters such as amplitude and timbre. Galejev concludes, however, that the most successful use of colour came from a polyphonic or contrapuntal integration between mediums; that of an “independent development of audio and visual parts analogous to the way instruments and themes interact contrapuntally in music.”

The relevance of colour in audiovisual art may be best summarised by Wells: “There are numerous ways of finding correspondences between colour and music and there is no need to limit one's thinking to the literal translation of one medium to another” (Wells, 1980:106).

10. DISCUSSION

Ranging from painting to virtual environments, audiovisual art encompasses a wide range of themes and techniques. In such an expansive field the desired audience perception varies greatly. Sound in film, for example, is often designed to accentuate connections between aural and visual elements, whilst abstract animation often explores contrapuntal relationships between mediums, thus requiring a very different artistic approach. On this basis, the success of audiovisual art can only be determined with reference to the desired artistic outcome. Within such a disparate range of works, however, it remains possible to extract identifiable themes and techniques and further analysis of audiovisual works may allow the development of an aesthetic for audiovisual interconnection.

The relevance of synaesthesia within audiovisual art is questionable. While the notion of synaesthetic response may have inspired musical analogy within many twentieth century works, such mappings are highly subjective and provide no consistent basis for audiovisual interpretation. Theories of possible sensory-to-motor mappings may, however, provide a basis for the correspondences between visual form and timbral properties. Indeed, the concept of a natural spectromorphology based on linguistic flow has proved relevant within the field of electroacoustic composition. (Wishart, 1996:237-322) Synaesthetic metaphor – the act of ascribing the features of one sense to another – may provide an insight into possible interconnections between aural and visual elements. Metaphor provides a basis of common knowledge from which audiences may derive correspondences, (Fels *et al.*, 2002) and may therefore allow for a perceptual correspondence between abstract events. Put simply, objects that are within the limits of metaphoric extension may be easier connected to an equivalent in another medium.

The inherent link between sound and environment allows the formation of ecologically based causal relationships in electroacoustic composition. (Windsor, 2000) Ecological connections between sound and source may therefore form a model for the connection of aural and visual events. Provided a correspondence exists within the boundaries of metaphorical extension, it is arguable that spectators will reference ecological and cultural knowledge for a hypothetical source-cause relationship between aural and visual mediums. Such ecological and cultural knowledge may serve as extrinsic information to contextualise the audiovisual relationship and, provided a consistent context is present throughout the work, may allow the formation of a believable audiovisual environment despite abstraction. On this basis, audiovisual correspondences may appear stronger if contextualised by extrinsic information that references ecology.

The concept of parameter mapping is used extensively within interface design, but is also relevant within the field of audiovisual art. (Jones and Neville, 2005) The concept of metaphor as a means to aid mapping transparency explores the

relevance of culture within parameter mapping. It is arguable that perceptual correspondences within any cross-modal media will require some form of parameter mapping to achieve a distinct connection between events, and that this requirement is accentuated in generative or interactive media. From a technical perspective non-linear audiovisual environments often require the mapping of variables between audio and visual rendering systems, although the complexity of such a system may vary. It is the transparency of these mappings that will dictate the strength of audiovisual interconnections within the work.

Studies into mappings within the field of instrument design have led to conclusions that one-to-one mappings are less engaging than complex mappings, (Hunt and Kirk, 2000; Hunt *et al.*, 2002) and it is possible that this is also the case in the field of audiovisual art. While basic one-to-one mappings may allow for the most interpretable interconnections, once the audience has perceived the connection the work may cease to be interesting. (Dannenberg, 2005) On this basis, it is possible that completely transparent correspondences between mediums may prove uninteresting from an artistic perspective. It is likely, however, that the use of traditional compositional techniques such as polyphony, counterpoint and structural density within audiovisual works, will inherently force the development of complex many-to-many mappings.

The principle of psychological grouping by proximity provides a mechanism by which temporal events may be grouped. Studies have established that the effects of grouping supersede long-term schema based connections and have also confirmed interference between the two modalities due to a cognitive self-correction process. It is arguable therefore, that temporal synchronisation facilitates the perception of audiovisual correspondences in that the parallel morphology of aural and visual mediums allows cross-modal events to appear interconnected despite significant abstraction. It is arguable, therefore, that the most apparent of audiovisual correspondences could be subverted if the two mediums were asynchronous by a period larger than the limit of cognitive grouping. It is also notable that despite the intrinsic temporality of waveforms, if the frequency of oscillation remains static then the medium will appear static. The distinction between temporality and temporal morphology is therefore relevant in the creation of audiovisual correspondences.

A large proportion of audiovisual works are based in the notion of a physical or spiritual correspondence between light and sound. (Zilcher, 1987) Despite many different attempts to map the chromatic scale to colours, no definitive mapping has been achieved, and many of the spiritual relationships between colour and timbre appear subjective. Indeed, the only consistent colour mappings appear to relate to luminosity or brightness. (Jones and Neville, 2005:56) It is arguable, therefore, that the relevance of colour in audiovisual art is rooted in artistic expression rather than the metaphoric correlation of mediums. On this basis, synchronous mappings between colour and audio may be derived by spectators after a period of learning, but the correspondence is not dependent on the specific mapping chosen. If, for example, a synthesised sound of specific spectral and temporal morphology were consistently presented in synchronisation with visual of specific form and colour then it is likely that the audience would derive a connection. This connection would then form the basis of their expectation throughout the duration of the piece.

11. CONCLUSION

Despite a clear perceptual basis for audiovisual interconnection, there is no established theoretical framework for the creation of cross-modal correspondences and their relevance within audiovisual art. Established associations between colour and sound appear to have no perceptual basis, whilst studies into synaesthesia offer only subjective correspondences between mediums. Temporal synchronisation provides an objective basis for audiovisual interconnection between abstract forms and sounds, indeed the strength of parameter mapping strategies arguably depend on the perception

of synchronous mappings. An important question within the field of audiovisual art is the relevance of cross-modal correspondences within the perception and appreciation of the medium. There appears to be a significant theoretical basis for artistic and expressive endeavour taking priority over the creation of profound audiovisual correspondences that disregard the notion of interpretation. Within this context, it may be possible that the field of electroacoustic composition may provide an perceptual model from which audiovisual correspondences may be derived.

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