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SIGNED..........................
THESIS TITLE: Formal experiments in silent film music: Reading early abstract film texts as musical scores

Many abstract (non-narrative, non-representational) films from the silent era claim an analogy with music. My hypothesis is that their spatio-temporal characteristics are systematically modelled after musical processes and forms. I have sought to explore this phenomenon through practice, by composing music to a selection of films by Hans Richter, Viking Eggeling, Walter Ruttmann and Ralph Steiner. All but one of the chosen works are animations. All of them reject montage, in favour of spatial subdivisions and a polyphony of visual elements.

During my research I developed a method for interrogating the films musically. I begin each piece by treating the visual patterns as a set of instructions or ‘score’, which I ‘perform’ by composing a fragmentary single line of music. This very close, imitative reading then becomes the structural bedrock and material basis for a multifaceted, polyphonic musical response. The finished pieces seek to illuminate detail and articulate structure, for example through shadowing, punctuation and temporal partitioning. However, there are also layers which exaggerate visual gestures, superimpose additional rhythmic complexity and move at their own pace.

Engaging with the film texts in this way stimulated a rethinking and reinvention of my compositional language. Over the course of the PhD I gradually move away from a style dominated by repeating patterns, block chords and harmonic superimpositions. Instead, pulsating rhythmic and melodic elements are layered at different speeds, resulting in temporal ambiguities and collisions. Pitch centres remain important, strengthening musical unity and directionality. However, there is an increased concern with melodic variation and fragmentation.

The Portfolio consists of five musical scores for silent film and two concert pieces. The Commentary begins with a discussion on silent film re-scoring; this first section also offers a historical account of the 1920s artists’ avant-garde cinema and its aesthetic origins. In later chapters, each piece in the Portfolio is reflected on and analysed.
In summary, then, the research questions being pursued in the Portfolio are as follows:

1) How far are the spatio-temporal characteristics of early abstract films systematically modelled after musical processes and forms?
2) Can I develop a method for interrogating the films musically, by reading them as 'scores'?
3) How might close, analytical engagement with the structural and behavioural aspects of the film texts stimulate a rethinking and reinvention of my compositional language?
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WORD COUNT: 35,151
List of portfolio works (including links to Soundcloud and Vimeo)

-Sabotage Radio - for string quartet (score, audio - 5’)
https://soundcloud.com/tom-a-reid/sabotage-radio

-Rhythmus 21a - for flute and cello (score, video - 3’)
https://vimeo.com/192054570/0712396222

-Rhythmus 21b - for flute, clarinet, viola and cello (score, video - 3’)
https://vimeo.com/192055259/d275b1e6b6

-Symphonie Diagonale - for three MIDI pianos/audio playback (score, video - 7’)
https://vimeo.com/tomreidcomposer/symphoniediagonale

-Lichtspiel Opus 3 - for piano, vibraphone and audio playback (score, video - 3’)
https://vimeo.com/439863906

-Mechanical Principles - for 14 players (piccolo-flute 1-flute 2-clarinet-alto sax-baritone sax-electric guitar-bass guitar-vibraphone-piano-violin 1-violin 2-viola-cello) and audio playback (score, processed video - 10’)
https://vimeo.com/184021761/7facdbef88

-The Hammer Revisited - for flute, clarinet, piano, violin and cello (score, audio - 4’)
https://soundcloud.com/tom-a-reid/the-hammer-revisited-new-music-players1

Total: 35 mins

See also

https://linktr.ee/tomreidcomposer
https://vimeo.com/tomreidcomposer
https://soundcloud.com/tom-a-reid

For the links to the Appendix files (experiments, alternative versions referred to in the commentary) see Appendix 3 (p. 160).
THESIS INTRODUCTION: Silent film music in the present day

Following a period of neglect after the arrival of sound (particularly in the West), silent film music practice has been gradually renegotiated and reinvigorated in recent decades. The turning point is sometimes considered to have been the 1980 Thames Television presentation of Abel Gance's Napoleon (1927), with music by Carl Davis. While the rediscovery and performance of historical works at film festivals, such as Shostakovich's score for The New Babylon (dir. Kozintsev, 1929) and Edmund Meisel's score for Battleship Potemkin (dir. Eisenstein, 1925) also generated a great deal of interest and enthusiasm at around this time, the seeds were sown for an ongoing 'remediation' of archival material and to this day modern composers remain 'captivated by the challenge of silent cinema'. In the 1980s new scores were widely commissioned to accompany re-releases of silent films in theatrical, televisual and video formats. By the 1990s, the 'accelerating pace of interest in silent film sound' had become 'nothing less than exhilarating'. Contemporary, re-interpretative silent film music practice is in many ways a different proposition to 'sound' film music. The absence of a living director produces an unusual degree of artistic freedom - at least in theory. There is no dialogue or diegetic sound - only, in the case of narrative film, title cards (and sometimes implied sound effects). This leaves a great deal of sonic breathing space, and opens up the possibility for more or less unconstrained musical development. As Benedict Mason comments in his programme note for ChaplinOperas (1988): 'The freely creative possibilities of combining live music with silent film offer a different field in which to work.' Russell Lack argues:

To watch a performance of a silent film with a live piano or orchestral accompaniment is to experience 'silent' cinema in its primal and complete form. Perhaps from our present day perspective it is not so important what is played as long as the mood supplied by the pianist fits

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the film context. The accompanist becomes our guide, his performance an assertion, a declaration of values about the cinematic events.  

The notion of the musician as translator, 'asserting' or 'declaring' the meaning of onscreen images attests not only to the mutability of silent film music, and to the liberty and scope afforded to composers, but also to the cultural power and responsibility which rests with them as agents of communication. Accordingly, there is a recurrent debate among theorists and practitioners regarding the ideal relationship between a historical silent film and musical materials. The silent film music historian Martin Miller Marks has opined that music should be historically appropriate; music 'of the time of the film's making or earlier'.  

This not as prescriptive as it may seem, since no particular style is specified; presumably popular/vernacular and classical would be equally acceptable. Piano accompanist Philip Carli takes a similar view, arguing that a historically appropriate style mediates outmoded dramatic conventions which a modern score may inadvertently accentuate. So, for example, some overly melodramatic acting may seem perfectly natural when paired with pastiche Romanticism, but laboured and ridiculous when accompanied by electronica, because of the unconventional framing. Piano accompanist Ben Model, while still advocating a fairly conventional, traditional approach, is less doctrinaire, feeling that historical pastiche 'locks the film in a bygone time'. My own view is that while it is possible for contemporary musical styles to be applied insensitively, and historical pastiche pieces may effectively simulate the past by providing a 'window' into historical presentation practices, they frame silent cinema as a museum culture, and cannot meaningfully contribute to contemporary debates around musical and audio-visual aesthetics.

Once the discussion moves beyond the 'problem' of perceived anachronisms and toward audio-visual aesthetics, a somewhat predictable consensus begins to emerge among the practitioners surveyed. Ben Model opines: 'You don't want music that is so busy or pretty that people are aware of what you're doing...[the score] should direct your attention back to the

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9 Martin Marks, 'Treasures from American Film Archives', booklet contained in 4-DVD box set (San Francisco: American Film Preservation Foundation, 2000), vii.
screen.' For Jack Hardy, a good musical accompaniment will underscore and 'blend in with the film', giving it the 'correct feel'. Stuart Oderman remarks, flippantly, that the silent film accompanist is 'like the air conditioning. When it's working, you don't notice.' These remarks are somewhat mundane, blandly reminiscent of traditional Hollywood approaches to film music. The ideal multimedia model for these practitioners would appear to be the 'unitary conformance' which Nicholas Cook outlines in *Analysing Musical Multimedia* - one medium predominates, and the other media conform to this. I recognise that film music criteria are necessarily different to concert music criteria, especially where narrative films are concerned. The views expressed by the practitioners above may be self-effacing, but they have almost certainly been shaped by the reactions of audiences and curators, not academic theory. In any case, their actual practice is probably not as dogmatic as these remarks imply. Cook points out that genuine instances of unitary conformance are 'vanishingly rare'; it is virtually impossible for music not to add some qualities of its own. Yet the notion of music, which completely 'serves' the picture, not exhibiting any critical or independent function, seems very one-sided and extreme even as a theoretical construct.

It should be possible to compose (or improvise) music which offers unfamiliar perspectives, questioning or unconventionally framing the images without completely overwhelming them or detracting from the narrative or visual style. Music can be sensitive to its context without being passive; responsive without becoming slavish. Resorting to pastiche is unimaginative and has become a cliché, especially for silent comedies - historically appropriate vernacular styles might instead be alluded to but filtered through a contemporary lens. The British composer Paul Robinson achieves this, as he effectively blends a contemporary classical idiom with 1920s pop styles and jazz fusion in his score for *The Lodger* (dir. Hitchcock, 1927). Furthermore, it is easy to underestimate the expressive range and formal flexibility of contemporary classical music. In their well-known treatise-polemic *Composing for the Films* (1947), Hanns Eisler and Theodore W. Adorno argued that modernist, or post-tonal music from the early and middle decades of the twentieth century has developed new resources and techniques that really correspond to the technical requirements of the motion picture...as music becomes more pliable through its own structural principles, it

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12 Ibid.  
13 Jack Hardy, interviewed in Ibid.  
14 Stuart Oderman, interviewed in Ibid.  
16 Ibid., 102.
also becomes more pliable for purposes of application to other media...modern music is especially qualified to construct consistent precise short forms, which contain nothing superfluous, which come to the point at once, and which need no expansion for architectonic reasons.\textsuperscript{17}

An overly dogmatic adherence to an atonal aesthetic might lead to some jarring juxtapositions if applied to a particularly sentimentalist Hollywood film. Yet the structural elasticity and potential precision in the music of the twentieth century composers Eisler and Adorno cite (such as Schoenberg, Webern, Bartok and Stravinsky)\textsuperscript{18} cannot be denied. Post-tonal music does not rely on large-scale tonal contrasts, harmonic goals or 'unambiguous definite inevitable resolutions'\textsuperscript{19} in the same way as Western classical music from the Common Practice era. If film sequences are to be closely followed or mimicked by the music, there is little room for 'real tonality in the sense of the disposition of functional harmony over long stretches'.\textsuperscript{20} Whereas a Stravinskian block form, for instance is infinitely flexible and malleable. For a second example, relatively audience-friendly and sonically a long way from atonality but nonetheless staying within the confines of twentieth century art music, one might look to the 'readily extensible' qualities of American minimalist styles and their ability to 'foster emotional neutrality and distanciation', for example in the film scores of Philip Glass and Michael Nyman.\textsuperscript{21} Lest my comments on this matter seem dated, I should also acknowledge that many post-modernist composers, such as John Zorn have pushed the notion of 'flexibility' to the absolute limit in their music.

The assumption that there is only one 'right' way to read a silent film is problematic if not downright pernicious. The continued popularity of silent film screenings with newly commissioned scores or improvisations attests to the continued public appetite for fresh musical perspectives. While stylistically these contemporary music-sound components may appear anachronistic to some, the lack of fixity and notion of music-as-event is historically authentic in a different way, without aesthetic implications, for as Martin Miller Marks points out, music for the silent film was an 'independent, ever-changing accompaniment'.\textsuperscript{22} While there was a shift towards orchestral accompaniments from 1910, many cinemas in small

\textsuperscript{17} Theodor Adorno and Hanns Eisler, \textit{Composing for the Films} (New York: Oxford University Press, 1947), 21, 22, 26.
\textsuperscript{18} Ibid., 21.
\textsuperscript{19} Ibid., 123.
\textsuperscript{20} Ibid., 123.
\textsuperscript{21} Mervyn Cooke, \textit{A History of Film Music} (Cambridge: Cambridge University Press, 2008), 478.
\textsuperscript{22} Martin Miller Marks, \textit{Music and the Silent Film} (Oxford: Oxford University Press, 1997), 6.
towns had limited resources. Consequently, the tradition of 'makeshift' musical accompaniments continued right up until the arrival of sound in the late 1920s in many provincial picture-houses. These accompaniments would range from improvisations by local musicians, to scores compiled from pre-existing music. According to Marco Bellano:

The existence of multiple interpretations created a tradition based on the continuous renovation of film music: a tradition of novelty.... The idea of the ‘tradition of novelty’ does not identify a historical series of musical documents, but a way of looking at a silent film as a potentially perennial source of musical inspiration.

This 'tradition of novelty' might be invoked to provide a stronger theoretical justification for experimental and 'critical' contemporary scores, which exist alongside and contrast with historical scores and contemporary pastiche scores. It does not necessarily imply an anarchic free-for-all; rather, it acknowledges the value of multiple perspectives and interpretations, including those which may conflict slightly with audience expectations and widely held views about the 'appropriate' function of film music.

In the same article, Bellano proposes a comparative approach to silent film music analysis, which would involve assessing different musicians' responses to the same visual sequences in order to bring about a 'deeper comprehension of film language' and audio-visual functions.

He argues that

audio-visual functions can bring into focus both the visual and the narrative content. An audio-visual function works like a gloss on the director's work: it is the result of a musical interpretation of the images. It conveys a composer's point of view on a certain fragment of a film. It is, of course, the point of view of an individual; a different musician could see the same fragment in a completely different way - and completely different would be the audio-visual message that reaches the audience, too. To compare two different musical readings of the same sequence is like starting to draw a map of the hidden potential of a film, better rationalizing its dramaturgical value.

Silent film screenings with live musical performances of different musical scores in swift succession are quite rare. But the growth of home broadband and video streaming websites like Youtube and Vimeo since approximately 2005 (combined with the increased availability

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24 Ibid., 208-13.

25 Ibid., 212.

26 Ibid., 212.
of video editing software on home computers) have enabled this tradition of novelty to expand further. It has become quite easy for a plethora of different audio-visual 'messages' to reach a wide audience, albeit via a secondary, reproductive medium (video), which re-packages the film sound as a fixed entity, concealing its true nature under a 'veil of synchronicity and reversibility'.

Multiple interpretations of the same visual material have become even more inevitable and desirable now than they were in the previous age of home video (pre-internet but post-VCR). Hierarchies still exist - a commissioned score for a well-known ensemble which is performed live at a festival and released on DVD will almost certainly become more well-known and critically acknowledged than an 'amateur' effort which resides only online, for example. However, if there ever was any such thing as a definite or 'fixed' musical interpretation of a silent film on home video, this notion has faded; all archival film material is now essentially 'fair game' for musicians, both professional and amateur. This situation is not entirely free from aesthetic and even 'ethical' problems; moreover, online film archives are far from perfect sites for presentation, with picture quality and contextual notes not always afforded high priority.

However, while it may be going too far to claim that silent film sound/music has returned to its origins and come 'full circle', there are certainly parallels between the mobile, fluid present day situation and its original status and mode of existence.

Besides the enabling of a comparative approach to soundtracks, the growth of online archives, in tandem with high quality DVD re-issues and the increase in silent film festivals has arguably enabled a shift in the perception and reception of silent cinema itself. While this is difficult to properly quantify without collecting audience data, it is undeniable that there are more opportunities to experience silent film than ever before - especially experimental and non-mainstream works. Danny Birchall, writing in 2009, notes: 'The internet may have finally delivered avant-garde film-makers the audience they always claimed they wanted....Since broadband became a domestic reality, the proliferation of moving image online...has swelled to bewildering dimensions.'

Rather than a substitute for seeing films as they are intended to be seen, the online archive can function like an art library, as a reference for resource. This means that an audience might educate themselves and become

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27 Ibid., 213-14
29 Ibid., 12.
30 Ibid., 14.
acclimatised to silent and avant-garde film languages before they even enter a cinema. It would be very surprising if the proliferation of archive material has not accelerated the process of self-education and discovery on some level. Moreover, there are a number of mainstream silent films which have arguably become so well-known and iconic, thanks to a combination of the online archive, home DVD releases and repeated festival screenings, that they no longer really need to be 'introduced' to an audience. This frees musical scores from the burden of 'objectivity'. The best example of this phenomenon is probably *Metropolis* (dir. Fritz Lang, 1927). Thomas Elsaesser comments:

The desire to ‘perform’ *Metropolis*, instead of putting it in a critical or historical perspective, is largely responsible for lending new life to the vision of Lang and von Harbou….. As a film that one now inhabits rather than interprets, it is as much an experience to dress up and be seen in, as it is a film to be seen and be addressed by.  

Benedict Mason also made the case for Charlie Chaplin as far back as 1998: '...Chaplin is so much a myth now, and his comedy routines so well known or predictable, that they have no need of the original type of music his films were used to.'

While audience expectations may create a new and different type of burden, this level of acquaintance with silent film texts is largely to be welcomed, because it frees musicians to avoid the obvious and develop interesting, alternative approaches to film scoring - to explore musical defamiliarization. Any attempt to create an archetype or set a 'standard' is fraught with aesthetic problems. The BBC television series *Paul Merton's Silent Clowns* (2006) is in the best tradition of popular documentaries; Merton and piano accompanist Neil Brand's enthusiasm for their subject is infectious, and the programme informs and entertains in equal measure. In the first episode, Merton opines that 'Buster Keaton is one of the finest surrealistic comedians who ever lived'. He certainly has a point; the films are more than just choreographed pratfalls. Unfortunately, the screening of *Keaton's* film *The Goat* (1921), which closes the programme, has a musical score by Neil Brand which, while well-crafted, contains so many allusions to circus music that it completely undermines Merton's claim.

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Instead, all of the 'lowbrow' silent comedy stereotypes and clichés are re-asserted. Perhaps a more avant-garde approach, which retained the energy and humour but took its cues from the formal collisions in early Stravinsky, the manically virtuosic gestures of bebop jazz or the asynchronous sound aesthetic in the work of Mauricio Kagel, might have avoided this contradiction.

Inhabiting a historical artefact involves a process of excavation and remediation. The alternatives to unitary conformance and historical pastiche range from subtle forms of complementation and stylistic convergence, to critical, 'polemical' excavations and forced marriages, which might result in bracing, incongruous juxtapositions. There is also the possibility of music which exhibits neutral or 'anempathetic' qualities for dramatic effect. An unconventional musical approach need not be perverse or iconoclastic though - quite the opposite. A musical approach involving very close analysis of archive film may 'create an analytical structure which highlights the film's key parts with a sort of director's eye', as opposed to dealing with the film 'as if you were part of the audience and being guided by your emotions'.

British composer Ed Hughes' 2005 chamber score for Battleship Potemkin (Eisenstein, 1925) avoids emotional heavy-handedness, unlike the older score by Kryukov. Instead the focus is on the drama of the situation. During the opening scene, The Men and the Maggots, the obsessively repeating figures and emphatic rhythms evoke excitement and nervous energy, not tragedy as such. The pulse resembles a ticking time bomb, the heartbeat of history. The tonality gradually darkens as the melodic patterns evolve, heralding more violent, confrontational filmic events to come, but the importance of layered rhythmic cells in the creation of large-scale musical momentum remains striking.

The films I have chosen to work on for this project are all non-narrative, and mostly non-representational and German. Their visual aesthetic is derived from the abstract visual art movements of the period, but their notions of time structure are frequently drawn from music. Unlike most narrative and/or photographic films, which have at their disposal an 'infinity of visual phenomena', these abstract films tend to explore a very restricted range of materials. The film-makers are concerned with 'the development of an opaque, baroque and

It is rarely obvious what type of sound/music might be considered historically appropriate or 'authentic' for these abstract films and, in one instance, questionable whether it should be used at all (*Symphonie Diagonale*). A vigilant and critical stance should be maintained, and Bellano's 'tradition of novelty' should be kept in mind when addressing these types of problems. Clearly there is a syntactical gulf between the commercial, narrative silent cinema and the non-narrative avant-garde - and consequently soundtracks for feature films and experimental shorts cannot be subject to exactly the same criteria. However, stereotyping, clichés around media pairings and misplaced passivity still need to be carefully guarded against.

The composition of new musical soundtracks for historical silent films is to engender new modes of formal elucidation and conceptual mediation, whatever the genre. The pieces in this portfolio are formal experiments, perhaps even provocations. I am hopeful that audiences will find my work stimulating and an effective commentary on the visual material, but accept that some may be troubled by the self-assertiveness of the musical rhetoric. I should emphasise that I never intended to create scores which function as musical 'accompaniments' in the conventional sense. That said, my work is motivated by and takes as its starting point a very close, scholarly reading of the films, the aforementioned 'director's eye' - I am not concerned with novelty, mannerisms or perversity for their own sake. Rather, my approach is 'analytical', or at least always begins from an analytical premise or foundation. My music seeks to offer fresh and unusual perspectives on the films, but the research process has not been all one-way. The visuals have forced me to re-evaluate my compositional techniques through the technical challenges they have presented, fundamentally transforming and re-shaping my compositional language in the process, especially in the areas of pitch and rhythm.

Phenomenological reflection on my own part as a composer will form a significant part of the commentary. I will reflect on the films as autonomous pieces of kinetic visual art and compare the effect they produce when presented silently to the effects which emerge when my music is added. I will begin with a synoptic view of musical analogies in the visual arts,

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which segues into a comparison of the German abstract film-makers Hans Richter, Viking Eggeling and Walter Ruttmann, in order to trace the origins of the 1920s artists' avant-garde cinema. This is followed by a discussion of film music aesthetics, and my personal compositional aesthetic at the start of the PhD. Then I begin to analyse each piece, carefully charting not only my reading of each film text, but also considering how engagement with the abstract visual patterns is stimulating a rethinking and reinvention of my compositional language.
CHAPTER 1: Musical analogies in the visual arts and early artists' film - a synoptic view

Traditionally, visual art has been defined as motionless and soundless, whereas music is time-based and invisible.\(^{38}\) In this chapter, I will argue that the notion of 'music for the eyes' - abstract visual representations of musical concepts, unfolding over time - really comes into being with the birth of abstract cinema. There were antecedents, such as the scroll painting, the colour organ and the lightshow.\(^{39}\) However, with the exception of the scroll painting, these phenomena have not survived in a fixed, reproducible format. Colour organs were conceived, quite literally as the name would suggest, as instruments which used a piano-style keyboard to produce patterns and combinations of coloured light instead of musical pitches. Often there was a music/sound component included alongside the visual. The first colour organ was reportedly invented in 1725 by Louis Bertrand Castel, a French Jesuit priest; it used candlelight and fabric to achieve its effects.\(^{40}\) Further models were created in 1870 by Frederic Kastner (Germany), who used glass tubes filled with gas and by Bainbridge Bishop in 1888 (America), who used coloured glass windows.\(^{41}\) Probably the most famous colour organ is the electric model developed by British inventor and art professor Alexander Rimington. This device was presented publicly in London in 1895, with a musical accompaniment provided by pianos and organs.\(^{42}\)

It would be glib to simply dismiss these pioneers based on personal scepticism, although it is worth noting that their devices were not universally acclaimed by the public.\(^{43}\) Their experiments were inspired and informed by the colour-sound theories of Aristotle, Newton and Goethe, all of which emphasised colour-pitch class correspondences (unfortunately different in each case).\(^{44}\) Castel's colour organ was admired by Telemann and Rameau, and Rimington's colour organ formed the basis of the illustrative lightshow which Scriabin used in the New York premiere of *Prometheus: The Poem of Fire* (1915).\(^{45}\) The immateriality of

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40 Ibid., 52.
41 Ibid., 54.
43 Ibid., 61.
45 Ibid., 56.
coloured lightshows and their extension of visual arts into the realm of temporality prefigured much of what was to come. However, the obsessive preoccupation with absolute, fixed colour-pitch class correspondences seems narrow, one-sided and excessively deterministic, particularly in an audio-visual context with two media unfolding concurrently. Furthermore, it is too speculative and subjective to be called 'scientific'. In *The Unity of the Senses*, Lawrence E. Marks reports that there is very little consistency in the colour-pitch class correspondences experienced by synaesthetes - 'everybody tends to have his own scheme for ascribing colours'. This certainly accords with the widely divergent colour-pitch class associations, both 'psychological' and 'cultural' claimed by the historical figures mentioned above, as well as more recent figures, like Scriabin, Kandinsky and Messiaen. In any case, I personally can see no reason why 'harmony' between two media should be the ideal, any more than it is within music itself of the modernist/post-modernist era. To argue for a 'harmony' across different sensory categories - as opposed to a less narrowly defined, yet still meaningful relationship - seems old-fashioned.

Another problem with absolute colour-pitch class associations is purely phenomenological - rapid changes in sound (especially pitch) are much easier to process than rapid changes in colour. Reviewing a performance of the Remington colour organ, a contemporary critic complained: ‘When the keys are played at all rapidly, the effect is almost blinding.' In the context of musical performance practice the word 'colour' is sometimes used to refer to harmony, but most commonly it applies to timbre. This seems very appropriate, given the arguably more tactile, less precisely codified qualities of timbre. Colour combinations cannot be developed and 'resolved' over time in the manner of musical pitch combinations.

I am fairly sure that even if the historical colour organ experiments had been recorded and were viewable today, I would not be influenced by them. All of the films I have worked on for this project are in black and white, except for the work by Ruttmann, which uses simple tinting. I will discuss the scroll painting in more depth later as I believe this to be of much

48 Ibid., 32.
50 David Bowman, *Rhinegold Dictionary of Music in Sound* (London: Rhinegold Publishing Ltd, 2002), 35: ‘A word sometimes used to mean timbre...Messiaen often used the word in reference to [organ] registration, instrumentation and modality.’
greater significance, particularly in relation to my chosen film works. I will also consider the phenomenological correspondences between musical register and visual brightness, and the concept of cultural synaesthesia, or 'quasi-synaesthesia' as I believe these to be of greater importance. The arguments presented above might then be channelled in a more positive direction.

Unlike the colour organs and lightshows, abstract cinema was cast in a fixed, reproducible and easily transportable format. Many, but not all of the films survive to this day. Cinema is kinetic, so movements are experienced as 'real', not metaphorical or implied as with the scroll painting. Also, while many of the titles referenced music and musical accompaniments, the abstract cinema was viewed by many of its practitioners as an autonomous art form - as a 'silenced' form of visual music. Accordingly, they developed it with a modernist zeal, almost 'scientific' in its rigour, as we shall see later. This partly reflects the impact of aesthetic and political changes in the broader art world. The years before and after the First World War saw the emergence of iconoclastic, anti-Romantic campaigns such as Futurism and Dada. However, there were also more idealistic and formalist manifestos for change, such as Constructivism and De Stijl. (Care must be taken in order to avoid caricaturing these tendencies or implying a mutual exclusivity across the board. In spite of its formal destructiveness, the inclination of Dada to challenge assumptions 'created a stream of new formal possibilities for art' and in Berlin and Zurich many artists participated in Dada and Constructivism simultaneously. Nevertheless, it would be perverse in a general sense to deny the implicit contradictions in a simultaneous 'negation' and 'renewal' of the fine arts.)

Many visual artists became attracted to music; Kandinsky in particular was enticed by what he regarded as the uniquely sensuous qualities of music. For him it was the art form most removed from the world of tangible, concrete perception, as it avoided the 'reproduction of natural phenomena'.

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52 Ibid.
56 Paul Auster, Ground Work: Selected Poems and Essays (London: Faber and Faber, 1990), 129.
Music enjoyed a high status in the visual art world, with artists from a variety of different aesthetic persuasions creating work which responded to a specific piece of music - Gustav Klimt’s *Beethoven Frieze* (1902), Kandinsky’s *Impression III (Concert)* (1911) - or attempting to translate musical processes directly on to the canvas - Frantisek Kupka’s *Amorpha: Fugue in Two Colours* (1912), Paul Klee’s *Fugue in Red* (1921), to name but two. Klimt’s work requires the viewer to move along a series of panels in sequence.\(^{59}\) This makes it rather similar to a scroll painting; the temporal element, while still metaphorical is much more an integral, unavoidable part of the work than in a conventionally framed picture. On the other hand, Paul Klee's 'polyphonic' painting uses layers of coloured shapes to create a blurring effect which 'vibrates' the canvas. It has been argued that this allusion to music calls attention to the media-specific limitations of the painted surface.\(^{60}\) Kupka's piece does not simulate motion or temporality but is more oppositional; two curved, interwoven, partially complementary formations are starkly polarized using contrasting colours. These visual examples are very striking; however, it was not just painters who aspired to musical form. James Joyce gave the poetry collection he published in 1907 the title *Chamber Music*. Ezra Pound's explication of Imagism implored poets to conceive their rhythms 'in sequence of the musical phrase, not in sequence of the metronome'.\(^{61}\) Music had temporality, mobility, dynamism and fluidity - yet by the same degree it was undeniably abstract and immaterial in essence. The dawn of abstraction in the visual arts meant that, for the first time, painters and sculptors could formally experiment, free from the burden of representation. Real-life visual and aural phenomena could impact their work in subtle, allegorical ways now that they were no longer pressured to 'imitate' the world.\(^{62}\)


\(^{60}\) Ibid., 58.


Kandinsky went further still. While a proper consideration of the diverse origins and far-reaching consequences of his 'vibratory modernism' and the ideas expressed in his landmark treatise *Concerning the Spiritual in Art* lie outside the scope of this thesis, a brief discussion may help to shed further light on the early abstract film-makers' attraction to music and the musical analogy in the visual arts more generally, at least during the period under consideration. Kandinsky was influenced by Theosophy and in particular a book by Annie Besant and Charles Leadbetter, *Thought Forms* (1909). The book proselytises that everything in the universe consists of a single substance, which vibrates. It would follow that if all sensation can be attributed to mere vibration, then 'all sensory modalities are essentially the same - all are stimulated by the events of a common type'. Kandinsky's famous verbal description of a Moscow sunset draws heavily on musical metaphors:

*The sun dissolves the whole of Moscow into a single spot, which, like a wild tuba, sets all one's soul vibrating. No, this red fusion is not the most beautiful hour! It is only the final chord of the symphony, which brings every colour to life, which allows and forces the whole of Moscow to resound like the fff of a giant orchestra.*

In general, Kandinsky seems primarily concerned with harmony, i.e. simultaneous phenomena. These phenomena 'resonate', i.e. vibrate together. The chronology of Klimt's *Beethoven Frieze* and the 'blurry' simulation of motion in Klee are conspicuous by their

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64 Ibid., 24.
65 Ibid., 26.
absence. In particular, his response to Schoenberg (Impression III of 1911) was grounded in the 'vertical' notion of simultaneous vibrations, not sequential elements (in so far as the two phenomena can be separated in music). The painting 'embodies time in a single instant'. The result, while still slightly figurative, points towards the notion of an art based purely on shapes and colours. It has the appearance of spontaneity; it does not seem 'made to measure' or calculated. It is, perhaps, a representation of the 'ideal' reception of a musical phenomenon, not an interpretation of its structure. This would accord with Kandinsky's theosophical beliefs; his paintings, for him, represented 'ideal' vibrations of the soul.

Example 1.3 - Kandinsky, Impression III (1911)

While many painters were drawn to music for its abstraction and supposedly 'cosmic' immateriality, a more prosaic explanation for the persistence of musical analogies in abstract cinema is offered by the later-generation film-maker and theorist Malcolm Le Grice:

It is difficult to think of music, certainly instrumental music, as ever having been other than essentially abstract, and considering that film like music is a time-based medium, it is not surprising that the analogy with music should be used.

While this by no means negates the influence of painting and the ideas above, it does suggest that the musical analogy in non-narrative cinema is fundamentally rooted in medium-specificity; the analogy would probably have come about whether or not the visual art world was 'interested' in music. Prior to the twentieth century, concert music was the only time-

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based art form in existence which could truly be called abstract or non-representational; it is difficult to imagine where else the early experimental film-makers could have found usable technical models for structuring time. Film-making is like musical composition in the sense that visual motifs have 'legs'; they have to lead somewhere. John Whitney, another important later-generation film-maker who also studied twelve-tone composition, argued that 'architecture in motion lies at the root of our enjoyment of music' and 'structured motion begets emotion'. Soon we will see how the early abstract film-makers faced up to these problems, and solved them. Regarding the 'problem' of motion in the static visual arts, there were figures who went even further than Klee or Kupka without necessarily resorting to musical analogies. The Futurist movement was prompted by societal and technological change, not mysticism. Like many of the verbal documents bequeathed by the Futurists, the Technical Manifesto of Futurist Painting bristles with novel ideas, its eloquence eclipsed only slightly by its macho aggressiveness. The programme rejects notions of form and colour 'as they have been understood hitherto.' Instead:

The gesture which we would reproduce on canvas shall no longer be a fixed moment in universal dynamism. It shall simply be the dynamic sensation itself. Indeed, all things move, all things run, all things are rapidly changing. A profile is never motionless before our eyes, but it constantly appears and disappears.

Commentators such as Theodore Adorno and Clement Greenberg were critical of artistic practitioners who, as they saw it, demonstrated an insensitivity to the material realities of their chosen medium. Greenberg approvingly characterised modern, especially abstract painting as a 'progressive surrender to the resistance of its medium'. Adorno even coined a term for what he saw as the wrongheaded use of cross-media analogy in creative work - 'pseudomorphosis'. The synaesthetic colour-pitch class 'correspondences' outlined above are probably an example of this. While I would not level the same accusation at Kandinsky - or Klee, Kupka and Klimt, for that matter - the influence of mystical, theosophical ideas on the 'musicality' of the abstract cinema should not be overstated. The most significant organisational principle shared by music and film is linearity/rhythm; material operates in a

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71 Clement Greenberg, 'Towards a Newer Laocoon', *Partisan Review*, New York, VII, no. 4 (July-August 1940), 300.
sequential framework, is arranged on a 'time canvas'. While Henry Cowell demonstrated in *New Musical Resources* that rhythm and pitch are implicitly related through overtone ratios, neither film nor music have the ability to 'embody time in a single instant' like a painting.

This was clearly understood by the very first painters to seriously attempt an artists' cinema, drawing on the musical analogy. In 1913, the Russo-French Cubist painter Leopold Survage produced evocative designs for an abstract film, including hundreds of drawings of coloured forms ranging from curved to hard-edged. In the project description he writes: 'It is the mode of succession in time which establishes the analogy between sound rhythm in music, and coloured rhythm - the fulfilment of which I advocate by cinematographic means.' Also, in 1916 the Italian Futurists Bruno Corra and Arnaldo Ginna experimented with colour organs and hand-painted film, vividly laying out their aesthetic in a written document, 'Abstract Cinema - Chromatic Music' in which elements 'move spasmodically...crashing against one another, shattering...interpenetrating, deforming....disintegrating'. Unfortunately, the Survage film was never realised (World War I intervened) and the works of Corra and Ginna are no longer extant. Yet both of these verbal-visual documents demonstrate great imagination, and a fairly sound theoretical understanding of the cinema's medium-specific properties; its sequential framework and morphological possibilities. The analogy to music also seems genuine and deep-rooted, not merely decorative or status-seeking. It is unlikely that Survage and the Futurists were aware of one another's experiments; nevertheless, the aesthetic climate outlined above must have played its part in shaping their respective approaches.

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CHAPTER 2: The 1920s artists' avant-garde cinema

In order to avoid confusion, some film historians use the categories 'narrative avant-garde' and 'artists' avant-garde', in order to distinguish European and Soviet non-commercial feature films - such as the work of Eisenstein (USSR), Abel Gance (France) or Fritz Lang (Germany) - from the structuralist, graphic experiments in montage and animation undertaken by painters and photographers during the interwar years.\(^77\) It should be stressed that these are retrospective categories; at the time 'individuals moved between the two camps, ideas were exchanged between them, and they were collectively seen as part of a new cinema outside the commercial genres'.\(^78\) However, whilst many of the narrative avant-garde films attracted an international audience almost as large as the Hollywood-led mainstream they opposed,\(^79\) the works of the first artists' avant-garde, produced in France and Germany in the early 1920s, remained comparatively obscure and rarely seen outside of, for example, France's ciné-club movement.\(^80\) In an article on Hans Richter, one such prominent German practitioner, the critic Richard Suchenski indicates one possible reason for this, as he writes:

> In deliberate opposition to the naturalizing, indexical tendencies of the popular cinema, the highly reflexive films of the first [artists'] avant-garde emphasized the medium-specific properties of cinema by drawing attention to its capacity for spatio-temporal transformation. The focus was on the nature, properties and functions of the camera, film strip and screen, rather than on human actors or narrative flow.\(^81\)

While the narrative avant-garde works questioned Hollywood ideology and aesthetics, the artists' avant-garde interrogated features of the film medium itself, such as perception and time-structure, resisting feature-length drama and literary values.\(^82\) In this sense, it was more self-consciously experimental and less audience-friendly; an entirely new phenomenon, perhaps, rather than a subversive variation on an already-existing one. Perhaps inevitably, this resulted in it impacting less on cinema as a whole. However, as Malcolm Le Grice reminds us, there is no 'inevitability' in cinema's history; the dominance of theatrical and

\(^78\) Ibid.
\(^79\) Ibid.
literary values, rather than those of the plastic arts - painting and sculpture or music - can be attributed to 'social and economic pressures'.\textsuperscript{83} Moreover, it has been noted that when cinema began '...the first focus of attraction for a paying public was the machinery itself, its novelty, its intricacy, its basic effects. Only subsequently was this fascination displaced to the stories, the stars, the spectacular and the specular.'\textsuperscript{84} The most significant 1920s practitioners of experimental film in France were involved in (or at least, associated with) the Dada movement; these included the expatriate American photographer Man Ray, the conceptualist Marcel Duchamp and the painter Fernand Leger, who collaborated with the American cameraman Dudley Murphy on \textit{Ballet Mécanique} (1924). According to Peter Bürger's well-known thesis \textit{Theory of the Avant Garde} (1974):

\begin{quote}
...with the historical avant-garde movements, the social subsystem that is art enters the stage of self-criticism. Dadaism, the most radical movement within the European avant-garde, no longer criticises schools that preceded it, but criticises art as an institution, and the course its development took in bourgeois society.\textsuperscript{85}
\end{quote}

While the cinema is obviously a much younger medium than either painting or sculpture, the dogged pursuit of medium-specific properties might be viewed as an implicit opposition to the new 'institution' (of film), represented by Hollywood (and also the commercial film-makers of continental Europe). Whilst non-narrative, many of the French works juxtaposed photographic and abstract elements, and prioritised rhythmic montage over evolutionary growth. However, the German films were not only non-narrative, but also non-representational and painterly, placing them even further from the filmic mainstream and closer to the artists discussed in the previous section, especially Kandinsky and Klee.

The most significant practitioners of the artists' avant-garde in Germany were Hans Richter (1888-1976), Viking Eggeling (1880-1925) and Walter Ruttmann (1887-1941). All three came to the cinema via the medium of abstract painting and committed themselves wholeheartedly to the notion of self-referential graphic abstraction, or the 'absolute film', modelled philosophically after 'absolute music'. Films such as \textit{Rhythmus 21} (Richter, 1921/4), \textit{Symphonie Diagonale} (Eggeling, 1924) and \textit{Lichtspiel Opus I-IV} (Ruttmann, 1920-25) have

\begin{itemize}
\item \textsuperscript{83} Malcolm Le Grice, \textit{Abstract Film and Beyond} (London: Cassell & Collier Macmillan Publishers Ltd, 1977), 7.
\item \textsuperscript{85} Peter Bürger, \textit{Theory of the Avant Garde} trans. Michael Shaw (Minneapolis, MN: University of Minnesota Press, 1984), 22.
\end{itemize}
been called 'integral works' which 'reveal form, motion and temporality as their sole and sufficient filmic content'\footnote{A.L. Rees, 'Movements in Art, 1912-40', in Stuart Comer (ed.), 
*Film and Video Art* (London: Tate Publishing, 2009), 31.}. Richter and Eggeling collaborated; they knew the work of Ruttmann, and vice versa. A selection of all their films was screened together in Berlin in May 1925\footnote{Thomas Elsaesser, 'Dada/Cinema?', in Rudolf E. Kuenzli (ed.), 
*Dada and Surrealist Film* (New York: Willis Locker & Owens, 1987), 15.}. However, the three artists were not a 'group' in the strict sense\footnote{Malcolm Le Grice, 
*Abstract Film and Beyond* (London: Cassell & Collier Macmillan Publishers Ltd, 1977), 20.}.


Hans Richter was an extremely well-connected painter, initially influenced by Cubism and then later Expressionism. He would later be associated with nearly all of the interrelated avant-garde art movements of the 1920s - Dada to Surrealism, Constructivism to De Stijl\footnote{Michael O'Pray, 
*Avant-Garde Film* (London: Wallflower Press, 2003), 8.}. Following a brief period of military service during World War I, he had been involved in the foundation of Zürich Dada, alongside the highly pivotal figures such as Tristan Tzara and Hans Arp. However, it was his creative partnership with the Swedish abstract painter Viking Eggeling (especially between 1918 and 1921) and the influence of Constructivism in
particular which drew him into film-making; he does not seem to have been aware of the earlier Cubist and Futurist experiments. Like Kupka, he did use an effect which suggests 'rhythm' in some early paintings such as *Cello Player* (1914); the visual polarities of black and white, solid and void create unmistakably stark areas of contrast through a kind of metaphorical 'flickering'. These structural oppositions might be said to 'rhythmically articulate the surface of the canvas'. Dynamic friction between oppositional black-and-white surfaces would later re-surface in Richter's language and and fuse with pure abstraction to form the basis of his first film, *Rhythmus 21*.

Constructivism was an extremely utopian endeavour, seeking to create a totally new, abstract, systematic visual language which would embody universal perceptual criteria. By generalising the principles of form and transcending individualism, it was hoped that a 'lawfulness' in the making of art would be revealed. Like the Soviet Constructivists, Richter and fellow artists Lissitzky and Theo Van Doesburg (De Stijl) felt that art should be used to 'organise the progress of mankind'. However, they did not share the Soviet preoccupation with 'industrial' materials and production processes. Viking Eggeling's aspirations were similarly idealistic; stimulated by figures such as Kandinsky and Malevich, he sought a unique and depersonalised language through reduction, arguing: 'Artistic richness is not to be found in arbitrary innovation, but in formal transformation of the most simple motifs.'

Utopian and revolutionary credentials notwithstanding, it seems reasonable to assume that a 'scientific' approach to the problems of abstract art would be useful at this point in its history. In order to create a formal system, or language which many artists could draw on and use, complexity would need to be strictly regulated and combinatorial, carefully and transparently built from the ground up. Eggeling was devoted, above all, to the line, and he was working towards his goal of a universal language built from reduced elements in a rigorous series of drawings and charts. In these he investigated the expressional values of line and the myriad possibilities of linear combinations, seeking a form 'alphabet' for the purpose of regulating abstraction - a theory of harmony or figured bass of painting. The polar contrasts which

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92 Ibid., 130.
93 Ibid., 129.
Eggeling used included 'empty, filled, assembled, extended, open, closed, small, large'. These served as 'formulas' and 'invariable units'. Composite forms were sought which could function as 'communication signs'.

Richter was immediately struck by the systematic and quasi-scientific nature of Eggeling's work in 1918; he was particularly impressed by what he called the 'functioning between the different form units'. He declared that Eggeling's 'didactic qualities' resulted in a 'new understanding of the elements of expression'. Eggeling's theories and drawings were also admired by such luminaries as Hans Arp, Klee, Lissitzky and Van Doesberg. His schemes enabled him to build complex visual 'clusters' and create sequential developments, using variable arrangements of repeating units in space, stimulated by additive-subtractive procedures and subdivisions which regulated compositional growth, unity, density and mass. This is evident in his sketches, scroll drawings and, in particular, the one film which he completely and successfully realised, Symphonie Diagonale. The schemes embody an absolute precision of intent and clarity of expression somewhat more advanced than Richter's simple black-and-white polarities, though these were certainly effective within the context in which they were deployed. From a musical perspective, one is reminded slightly of Nicolas Slonimsky's Thesaurus of Scales and Melodic Patterns (1947), a systematic compendium of different tone successions, or perhaps Cowell's theories of polyrhythm and tone-clusters as outlined in New Musical Resources (1930), where simple, isolated elements are combined and built up to produce complex new musical phenomena. Like Eggeling, Slonimsky and Cowell sought to not only systemise existing materials, but also to suggest new ones.

Eggeling was extremely tenacious and single-minded in his pursuit of aesthetically significant but potentially rather dry and theoretical formalist goals; Richter, by contrast seemed perennially restless and in need of constant stimulation from outside. None of this is to denigrate the younger artist; he was perhaps just slightly more voguish, and less of a theorising personality. Their artistic collaboration revolved around a series of scroll drawings, and proved fruitful.

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96 Ibid.
As previously related, the scroll drawing presents visual material in a sequential framework. The scroll is a Far-Eastern model of art, whereas the mainstream of Western art is characterised by the bounded frame. While the concept of rhythmic movement remains implied and suggestive, existing as 'dynamic potential' rather than 'actual kinetic movement', a scroll cannot be taken in all at once and therefore the eyes 'actively participate' in forming its rhythm. Eggeling and Richter sought to convey their artistic processes through analytical demonstration, revealing the development of forms and displaying 'a series of variant solutions to a single pictorial problem, without according some solutions greater value than others'. Abstract, time-based linearity suggests not just film, but also music. Clearly this was no mere accident of formal equivalence or coincidence, as Eggeling knew the Italian composer-musicologist Ferruccio Busoni well, and had discussed with him the possible parallels between music and visual arts on more than one occasion. Busoni had recommended that Eggeling and Richter study J.S. Bach's *Anna Magdalena Notebook*, a collection of short, easy keyboard pieces. In a fairly well-known, regularly cited quotation, Richter recalls:

> For both of us, music became the model. In musical counterpoint, we found a principle which fitted our philosophy: every action produces a corresponding reaction. This, in the contrapuntal fugue, we found the appropriate system, a dynamic and polar arrangement of opposing energies, and in this model we saw an image of life itself: one thing growing, another declining, in a creative marriage of contrast and analogy.

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108 Hans Richter, 'Dada and the Film', in Willy Verkauf (ed.), *Dada - Monograph of a Movement* (Teufen, Switzerland, 1957), 64.
Musical counterpoint involves the integration of vertical (simultaneous) and horizontal (consecutive/successive) concepts.\textsuperscript{109} The concept of elements developing over time, answering, reciprocating or 'reacting' to one another on a spatio-temporal canvas is very musical, recalling the principle of imitation. It might be problematic to characterise imitative counterpoint as an arrangement of 'opposing energies'; whilst there is certainly an element of differentiation at work in a texture of this sort, Bach-style contrapuntal combination exists within a tonal framework and 'promotes integration and unity', unlike a post-Stravinskian superimposition, which preserves or even intensifies separation and conflict.\textsuperscript{110} Richter may of course be referring to tonal conflicts, or thematic contrasts. But these take place on a slightly larger scale, and the 'action-reaction' phrase seems to imply a process at the local level. On the other hand, the preparation and resolution of dissonance might be characterised as a localised series of actions and reactions or 'opposing energies', along with contrary motion - melodic movement in opposite directions, 'one thing growing, another declining'. Minor ambiguities notwithstanding, Richter's statements on this matter are very interesting and revealing. His (and Eggeling's) aesthetic principles are derived from suggestive, partially valid formal correspondences and spatio-temporal conceptual affinities between music and visual abstraction. To interpret Richter's statements on the subject pedantically and over-literally, however, as dogma, would constitute a formalist error.

\textsuperscript{110} Arnold Whittall, 'Andriessen's Recent Music: Three for All', \textit{The Musical Times}, Vol. 142, No. 1875 (Summer, 2001), 15.
A section of Eggeling's scroll, *Horizontal-Vertical Mass* is reproduced above; an interesting perspective emerges when the work is subject to a 'musical' reading. Initially, the recurring orthogonal 'L' shapes answer one another but do not intersect, instead forming a gradual 'crescendo' as they are inverted, 'retrograded' and 'transposed' (i.e. re-positioned in space). The large, imposing curve is set in opposition to the 'L' elements, like a second theme, and articulates the darkening or filling in of space. At this point the 'L' shapes are also super-imposed to form combinatory intersecting/interpenetrating shapes, which increases the visual intensity - perhaps akin to increasingly rapid entries of a melodic idea in music (stretto). There is a subsequent 'release' of tension as the forms become orientated more horizontally and the darkness/heaviness recedes, forming something like a 'decrescendo' of a long held chord. Also, the two sections 'answer' one another consecutively, and on a larger scale - if the scroll is tilted the large horizontal formation at the 'end' (on the right) resembles the 'staircase' formation from the 'beginning' (left). One could imagine a rather effective graphic score being made from this work. However, for the affinities between Eggeling and Richter's artistic practice and music to become properly apparent on a phenomenological level, a turn to film would be needed.

Not all of the practitioners in the artists' avant garde were as theoretical as Eggeling and Richter. Walter Ruttmann did not come to film through the scroll drawing. He was an accomplished cellist and studied music as well as visual art at the Academy of Fine Arts,

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Munich. His interest in film dates back to 1913, when he wrote an article arguing for the augmentation and diminution of shot lengths, fragmentation, darkening and brightening - in short, for a vigorously formal approach to film in which the representational aspect played only a subordinate role. His early conception of non-narrative cinema seems similar to the Futurist cinema and unrealised Survage project discussed earlier, but I have not found any evidence that he was influenced by their work. Ruttmann would become the most 'professional' of the German abstract film-makers, working as an animator for Lang and Reiniger. While certainly a modernist - the influence of Kandinsky can be clearly discerned in his mode of painterly abstraction - he was never associated with Dada or Constructivism, and his aesthetic was considerably less ascetic and 'didactic' than his fellow German practitioners. His notion of 'visualised music' is also somewhat different; Richter and Eggeling sought to use musical processes and forms as technical models for plotting simultaneities and for pacing or chronology. Eggeling experienced the cross-media analogy in terms of an 'idea relation'. Ruttmann, on the other hand saw his work as a subjective, emotive visualisation of music; a contemporary reviewer of his Lichtspiel Opus I compared the work to a dance choreography. Therefore his efforts sit more comfortably within nineteenth century aesthetics and the legacy of colour organs and lightshows discussed earlier, as well as Kandinsky's Impression III - as 'ideal' visual representations of how music might be emotionally received by an audience, not visual analogues of musical structures.

The films in his Lichtspiel Opus series contain a definite 'expressiveness' and 'sensuousness'. This is mainly due to their softer, more curvaceous forms and fluid movements, but is also a consequence of their being in colour. Colour plays an important structural role in Ruttmann's work, as a means of differentiation between forms and movements. Colour is used as 'an element in choreography, almost like stage lighting' and

Richter apparently admired Ruttmann’s technical accomplishments in the Lichtspiel Opus series; however, he was critical of what he perceived as his impressionistic tendencies and the lack of an 'articulate language'. The first film in the Lichtspiel series, Opus I (1920) embodies a painterly aesthetic; it resembles a painting in motion. It is highly notable as probably the earliest surviving example of abstract cinema. The film was premiered with a live, late Romantic-style musical accompaniment for string quartet by Max Butting, which was composed after the film was complete. Contemporary reviewers marvelled at the 'rendering of light and colour as sound and the transformation of music into visible motion', but also remarked on the film's 'decorative, "Arts and Craft" taint and 'troubling bent towards cuteness'. Opus I has been described as 'vivid, cogent, dynamic and rhythmic' but I think that in the case of this first film, Richter's criticisms - and the comments of the second reviewer - have some validity. The forms frequently seem like amorphous 'blobs', and when they are more clearly defined they are uncomfortably reminiscent of tropical fish swimming around a tank; the biomorphic tendencies are at times awkwardly obvious, undermining and trivialising the notion of abstraction. Some sections of the film have aged very badly, appearing like a computer screensaver or lava lamp (I am not the only one to have picked up on these retrospective associations).

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119 Ibid.
121 R. Bruce Elder, Harmony and Dissent: Film and Avant-garde Art Movements in the Early Twentieth Century (Ontario: Wilfrid Laurier University Press, 2008), 120.
the inherent 'musicality' of the visuals when the sound is turned off, and while movements are controlled in an assured and 'professional' manner, gestures are often not particularly differentiated, especially in the opening section. However, the conflict between circles and 'stabbing' triangles in the middle section provides some drama and purpose; during these sections the film becomes slightly more rhythmic; gestures are more differentiated and dynamic. The influence of Kandinsky is easy to spot here - 'For Kandinsky, the fundamental polarity is between the circle and the triangle: their interaction creates a mysterious pulsation'.

Example 2.4 - Film stills from Walter Ruttmann, Lichtspiel Opus I (1920) – Redacted (copyright) https://www.youtube.com/watch?v=aHZdDmYFZN0

The conflict between different types of shapes and gestures would recur more definitely in Ruttmann's later films, in which he used simpler tinting and did not prepare special music - this allowed the films to be more easily and widely screened. These later films are tougher, more sectionalised and motivated by oppositions and conflicts; they synthesise the quasi-mathematical asceticism, grid-like structures and dialectical, 'musical' qualities of Eggeling and Richter with Ruttmann's spontaneity, verve and slicker animation style. (Interestingly, Kandinsky was also moving towards a more geometric aesthetic by the 1920s, partitioning the canvas like a grid.)

R. Bruce Elder draws attention to the films' 'stark architecture' and

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127 R. Bruce Elder, Harmony and Dissent: Film and Avant-garde Art Movements in the Early Twentieth Century (Ontario: Wilfrid Laurier University Press, 2008), 156.
'complex musical structures'. Malcolm Le Grice has identified what he calls the 'kinetic empathy' of the dance-like movements and anthropomorphic figures; these are juxtaposed with more geometric forms and machine-like movements. Lichtspiel Opus III is the strongest film in the series, characterised by split screen effects and a remarkable rhythmic freeness and fluidity. Taken together with Opus IV, which A.L. Rees considers 'staggering' in its control of space and rhythm, it might even be regarded as the aesthetic pinnacle of all 1920s German abstract animation.

Overall, then, the films of Hans Richter, Viking Eggeling and Walter Ruttmann, while essentially 'painterly' in style are suggestive of a variety of different musical techniques. My hypothesis is that their spatio-temporal characteristics are systematically modelled after musical processes and forms. The use of spatial subdivisions and contrary motion within the frame is possibly analogous to traditional notions of musical counterpoint, functional harmony or dynamics and engenders a polyphony of visual elements. However, the subdivision of time using short, repeating fragments seems more of a modernist strategy and also to prefigure contemporary looping practices. In addition to this, their flickering geometry has a notational quality; at times the graphic patterning comes close to musical notation, particularly in the work of Eggeling.

Close analyses of the films’ formal construction, internal relationships and aesthetic qualities are undertaken in later chapters in order to determine how far the musical analogy can be pushed, partly on a phenomenological level but also, more crucially, as an interpretative strategy. The new musical scores I have composed are considered and analysed concurrently.

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CHAPTER 3: Audio-visual relationships and my personal compositional aesthetic

During the Introduction, I commented approvingly on the unique degree of artistic freedom and rhetorical space afforded to composers writing new music for silent film. In *Analysing Musical Multimedia*, seeking to formulate and test new analytical strategies, Nicholas Cook makes a very striking analogy between the interaction of musical elements (like pitches, rhythms) and the perceptual interaction between individual components in multimedia. He writes:

> When we analyse music, we are dealing with commensurable elements; pitches, rhythms and dynamics, that is to say, can be related directly to other pitches, rhythms and dynamics. And from there we can go on to conjecture about the more incommensurable relationships between categories - to ask how, in a given style, genre or piece, pitches relate to rhythms or rhythms to dynamics. In principle it is possible to do exactly the same with multimedia: to analyse the relationships within each medium, and then to draw out relationships between one medium and another. In other words, we might think of each medium as an independent variable, and look for the relationships between these variables that hold in any given context.134

While posed here as an analytical strategy, his thinking is also powerfully suggestive of radical compositional strategies for the alignment of music and moving images, which might be drawn on consciously during creative work. Eisenstein evokes similar analogies in 'Synchronisation of Senses' (from *The Film Sense*) when he outlines his theory of vertical or ‘polyphonic’ montage, which is both visual and audio-visual. The theory is not perfectly formulated - I agree with later commentators, particularly Cook that Eisenstein's notion of 'correspondence’ can be both confusing and inconsistent135 - but nonetheless I find this particular passage compelling:

> In order to diagram what takes place in vertical montage, we may visualise it as two lines, keeping in mind that each of these lines represents a whole complex of many-voiced scoring....It is interesting to note that in principle these sound-picture relationships do not differ from relationships within music, nor do they differ from relationships within the structure of silent montage.136

What Eisenstein seems to be implying here is a kind of wrap-around polyphony, or heterophony, which reaches across different sensory categories. While it is possible to conceive of musical notions, particularly 'rhythm' and 'counterpoint' working across different

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135 Ibid., 58, 85.
media in this way, obviously musical and visual elements cannot be measured by exactly the same standards, and subject to exactly the same criteria.

However, it is possible to envisage a dense audio-visual fabric, in which there are not only significant 'internal' relationships within each separate medium (i.e. between pitch and rhythmic material, or visual forms and motion) but also meaningful connections between pitch and visual forms, rhythm and visual motion, musical texture and visual shot composition, and so on. During the work, relationships between these elements may be set up and subsequently changed, or even abandoned. Nothing stays fixed, although there may be temporary and incidental constraints in certain areas in order to avoid overloading the texture, or to mitigate conflicts elsewhere. The important point is that it is possible for many different types of relationships and networks to exist simultaneously in an audio-visual artefact.

A more systematic terminology is required for analytical purposes. In *Analysing Musical Multimedia*, Nicholas Cook argues that similarity is the starting point for a 'transfer of attributes' between two media (especially music and film).\(^{137}\) Meaning is created from a 'limited intersection of attributes', not 'complete overlap or total divergence'.\(^{138}\) Three basic models of multimedia are proposed. Conformance is when the two media virtually duplicate one another, in a somewhat static and imitative manner; in theoretical terms, this might relate to historical notions of synaesthesia.\(^{139}\) A good 'lowbrow' example of conformance might be the imitative cartoon device known in common parlance as 'mickey-mousing'. Contest is when the two media are in direct conflict, perhaps superimposed; the relationship is very dynamic and contextual.\(^{140}\) This tends to occur more in avant-garde contexts, for example the earlier films of Jean-Luc Godard,\(^{141}\) or Mauricio Kagel.\(^{142}\) Complementation is the mid-point between these two extremes; involving neither consistency nor contradiction; the difference between the two media is recognised, but obvious, direct clashes are avoided because each is allocated a different function within the work.\(^{143}\)

\(^{138}\) Ibid., 82.
\(^{139}\) Ibid., 98-103.
\(^{140}\) Ibid., 98-103.
\(^{142}\) Björn Heile, "Composition with Film": Mauricio Kagel as Film-maker', in Robynn J. Stilwell and Phil Powrie (eds.), *Composing for the Screen in Germany and the USSR: Cultural Politics and Propaganda* (Bloomington, IN: Indiana University Press, 2008), 106.
Historical practices

In the mid-1990s, the film music theorist Rick Altman unearthed new evidence suggesting that commercial, mainstream silent films were sometimes shown without music or sound effects, particularly in the pre-1910 era. This overturned the conventional or received wisdom that 'mute' visuals have never been accepted by audiences.\(^\text{144}\) Returning more specifically to films from the 1920s artists' avant-garde, however, it is important to note that few were ever shown silent. Perhaps surprisingly, given the apparent desire for 'autonomy' amongst the German practitioners in particular, \textit{Symphonie Diagonale} was the exception and not the norm.\(^\text{145}\) That said, quite often the films did not have music specifically composed for them and frustratingly little is known about the types of pre-existing or improvised music which must presumably have been drawn on. Specially composed music was certainly not a high priority for Hans Richter. He provides an interesting curators' glimpse into the first retrospective screenings of the 1920s films, writing in 1947:

> I believe firmly that music for the silent avant-garde film is \textit{essential}. Of course it depends what music. With my own \textit{Rhythmus 21} and Eggeling's \textit{Diagonal Symphony}, I play Bach. With Duchamp's film - Ravel. With Leger's - first African drums, then a polka, and then a boogie-woogie. This is just to show you that I have no inhibitions about using whatever music there is.\(^\text{146}\)

Out of the three early German practitioners explored in this project, only Ruttmann collaborated with a composer (Max Butting) to produce the musical score for \textit{Lichtspiel Opus I}, and here the musical style is somewhat conservative. As noted in the previous chapter, the later films in the \textit{Opus} series did not have specially composed soundtracks. In 1926, Oskar Fischinger briefly collaborated with the composer Alexander Laszlo on an audio-visual project, and subsequently produced multiple-projector film shows which were performed with music, such as \textit{Vakuum}, which was presented with a live percussion ensemble.\(^\text{147}\) However, these works do not seem to have been recorded (or reconstructed) and are not readily available for study.

Fischinger's work notwithstanding, Jamie Sexton has a point when he comments that the actual use of music to accompany the German abstract animation films was 'not particularly noteworthy' and in general 'not a great deal of thought was put into the use of sound by avant-garde directors' during the silent era.\textsuperscript{148} It seems that practitioners were heavily preoccupied with developing the visual language of film and, in any case, practical obstacles such as synchronisation often prevented real progress being made on this front.\textsuperscript{149} Two of the more notable exceptions by well-known, avant-garde composers are Erik Satie's score for \textit{Entr'acte} (1924, Clair) and George Antheil's piece for \textit{Ballet Mécanique} (1924, Leger-Murphy). Both of the films are from the French artists' avant-garde, and best summarised as montage experiments. Overall, their musical scores embody a similar aesthetic, making use of a very Stravinskyan block form founded on repetition; an 'illustrative' approach is scrupulously avoided.

Satie's piece was presented with the film to great acclaim as part of the ballet work \textit{Relache}.\textsuperscript{150} Although the film \textit{Ballet Mécanique} and Antheil's piece were intended to be presented together, the film-makers and composer apparently neglected to consult one another during the creative process, resulting in timing discrepancies.\textsuperscript{151} There were also technological problems on a purely musical level (the synchronisation of multiple player pianos) which meant that the Antheil score for \textit{Ballet} was not actually performed in its original intended form, synchronised with the film until May 2001.\textsuperscript{152} While both works are artistically challenging and highly original on a film music level, arguably their historical significance overshadows and outweighs their aesthetic worth.

A subtler, more fluid and somewhat overlooked pairing of sound and image can be found in the 2008 Filmmuseum Munchen/Deutschland Radio Kultur reconstruction of Hanns Eisler's

first piece of film music, 'Prelude in the Form of a Passacaglia' (1926), which was composed for Walter Ruttmann's *Lichtspiel Opus 3* (1924). The ensemble is a sextet: string trio, two clarinets and trumpet. (The work would later be adapted and incorporated into the *First Suite for Orchestra* Op. 23.) The chamber version received its premiere with the film at the Baden-Baden Musical Festival in July 1927.\textsuperscript{153} Berndt Heller classifies the piece as a ternary form, with the A section motoric and contrapuntal and the contrasting B section more harmonic, with 'exceptionally expressive' melodic writing for the violin.\textsuperscript{154} The music is witty and playful, with chromatic melodic patterning and half-formed cadences. Sometimes the tempo is highly flexible, elsewhere it is strictly metronomic. At certain junctures, there is a nuanced rhythmic-contrapuntal relationship between the two media (or at least as it unfolds in this particular performance-reconstruction). The film is remarkable for the fluidity and freeness of its visual rhythms (this is covered in more depth during Chapter 6).

The most interesting moment lasts from 03:02 to 03:15. First, the overall tempo of the music abruptly slows down (to about crotchet 110) and the dynamic level drops. The triplet minimis combine with the wind trills and glassy-sounding string tremolo to produce a tentative, swirling irregularity, which emerges in spite of the music's overall harmonic slowness and regularity. Meanwhile, there is an increase in visual activity as the film emphatically speeds up; the visual patterns 'pulsate' at about crotchet 130 from 03:07 and then at about crotchet 180 from 03:12. The combined, multimedia effect is one of temporal ambiguity, as the friction between these contrasting elements produces a set of subtly dynamic relationships.

\textsuperscript{154} Ibid., 543.
Examples 3.1 and 3.2 - Hanns Eisler, final page of 'Prelude in the form of a Passacaglia' (1927), with my annotations and film stills from the ending of Walter Ruttmann, Lichtspiel Opus 3 (1924).

Eisler's later, more well-known score, *Fourteen Ways of Describing Rain*, which was composed in 1941 for Joris Ivens's 1929 film, is fascinating. His analysis of it in the Appendix chapter of *Composing for the Films* deserves close attention. However, certain aspects of the work have attracted controversy. The composer Ed Hughes points to the 'concentration and breathless rapidity' of Eisler's No. 4 (Scherzando) in *Fourteen Ways*. The music at this point 'weakens the effect of the equally rapid montage because one is overloaded with information from both domains'.  

There is an even more forceful moment slightly earlier, in No. 3 at bar 52, when a gust of wind strikes a sheet of canvas over a shop doorway, prompting fortissimo crashing chords and trills. This musical exclamation effect is perhaps something of an over-reaction. However, the sudden dynamic drop at bar 57 following this outburst, as the film cuts to a slow-moving shot of leaves drifting in a pond, creates a wonderfully witty formal contrast, demonstrating how localised effects of this sort may serve a more large-scale, structural purpose.


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Contemporary practices

I have not encountered a great many contemporary musical scores for films from the German artists' avant-garde, during the course of my research. However, I have noticed a tendency, especially on official DVD releases and at film festivals, for silent film music practitioners to adopt quite a repetitious, static musical style when approaching these works. Two examples are considered below.

The only officially 'sanctioned' contemporary soundtrack for *Rhythmus 21* which I have been able to experience is the piece created by American rock musician Sue Harshe for the Raymond Rohauer Avant-Garde Cinema collection (Kino Video, 2005). Musically, it is unfortunately quite rudimentary; the intricate, if uniformly rendered visual choreography is paired with an unvarying drum loop and arpeggiated riff played on bass guitar and piano. The same musician's work for *Symphonie Diagonale* is based on similarly undistinguished material. A synthesized snare drum roll accompanies a very simple ostinato, which endlessly repeats throughout the film's seven-minute timespan. Gradually the pattern is doubled in fifths, and simple counter-melodies are layered over the top. Occasionally the melodic instruments drop out, leaving the drum pattern by itself. The music and film share a 'metronomic' quality but it is difficult to find any other connections or meaningful tensions between the two media. Overall, I find myself rather baffled by Harshe's approach to these works.

Minima is a British instrumental rock band which creates and performs live musical soundtracks for avant-garde silent films; their work is perhaps a more elegant representation of the trend towards stasis and repetition. Their repertoire includes *The Seashell and the Clergyman* (Dulac, 1927); *H₂O* (Steiner, 1929); and also a score for *Symphonie Diagonale*. The music for *Symphonie Diagonale* is constructed around a repeating electric guitar pattern in E minor/Aeolian, which has an irregular 5/8 feel although the underlying metre is a slow 6/8. The instrumentation is tasteful, with a sustained cello melody complementing the guitar pattern, underpinned by a soft, yet propulsive drumbeat. Harmonically the piece is quite static, although there is a contrasting B section which hovers around a perfect cadence in E minor.
Although it is fairly well-crafted the music feels excessively polite and inconsequential at times, especially given the austere modernism of the visuals and their inscrutable inner logic. It also seems reductive, reinforcing the outwardly uniform qualities of the visuals instead of unlocking them, as a more 'analytical' approach might have done, or contributing additional mystique, which a more solemn or abrasive style of music might have provided.

In fairness to Minima, their minimalist-flavoured approach is more successful when applied to non-narrative films which themselves embody a less developmental, more 'meditative' aesthetic. Their work for H2O (1929) contains some highly effective moments, for example when the electric guitar line is processed with swirling and pulsating electronic effects (such as flange, chorus and delay-tremolo), which complement the gently undulating patterns of water reflections and ripples in the film.

In general, though, perhaps some of these practitioners are too ready to assume that detached, static, repetitious musical styles convey neutral, impersonal, understated and self-effacing qualities. While this may be true up to a point, films such as Symphonie Diagonale and Rhythmus 21 are severely modernist, exploratory and even studious in character. There is a danger that simple, anodyne styles of music will seriously detract from the intellectual qualities of these historically revolutionary modernist artworks, sanitising the uncompromisingly complex visual language and framing them as ornamental novelties. It is not my intention to prescribe any particular style of music or scoring, setting myself up as a genre policeman or guardian of 'highbrow' culture. In any case, as I argued in the Introduction, multiple musical interpretations of archival cinematic artefacts are to be welcomed as they provide contrasting perspectives, allowing multiple audio-visual 'messages' to reach an audience. Silent film musicians working on commission do not enjoy the same musical freedoms that I do within an academic university environment. However, I do find this particular trend deeply problematic. If 'neutrality' is sought, then it would be more fitting to record the ambient sounds of an art gallery or concert hall and use them as the soundtrack, not insert music which makes the visual content appear superficial.

My personal compositional aesthetic

In Chapter 1, I expressed scepticism about colour-pitch class correspondences, but hinted at other types of relationships between parameters across different media which I found more auspicious. Nicholas Cook notes that '...any alignment of music and moving image that reaches a threshold of similarity between the two can readily effect a transference of kinaesthetic qualities between one and the other.'\(^{157}\) As an example, he cites William Penn's reference to the way in which 'the steps of a march seen on a screen can seem to synchronise with the music even when the tempo is quite different'.\(^{158}\) It has been observed that visual activity, taken by itself, lacks the percussive 'edge' of sounding rhythm; it has no transient bite.\(^{159}\) However, when coupled with sounds, visual rhythms 'spring forward from the screen with a quite remarkable immediacy, vitalized, dynamic and organic'.\(^{160}\)

Rhythm and pulse have always been essential elements in my music, but my approach to them has significantly changed over the course of the PhD, as a result of my close engagement with abstract film texts. *Sabotage Radio*, the first piece in the Portfolio is a short, single movement piece for string quartet and epitomises my compositional aesthetic at the start of the project (September 2011). The title refers to a small, two-way radio designed for use by resistance movements in World War II. The music unfolds at breakneck speed, presenting a terse conversation among the players, although there are a few sustained moments which offer some respite. The piece is dominated by repeating patterns, block chords and harmonic superimpositions.

Around this time I was very influenced by Dutch composer Louis Andriessen's forceful instrumental texture of 'collective' unison.\(^{161}\) It has been called, appropriately 'the idea of collective strife...embodied in sound'\(^{162}\) and represents the notion of collective solidarity. This is particularly prominent in pieces such as *Workers' Union* (1975) but also occurs in certain passages of *De Staat* (1976). While the middle section of *Sabotage Radio* does contain some polyphonic passages, there is no complex rhythmic counterpoint or temporal dissonance. The

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\(^{158}\) William Penn, 'Music and Images', quoted in Ibid.
\(^{160}\) Ibid.
\(^{162}\) Ibid., 72.
piece does feature metre changes, syncopations, hocketing, interlocking
polyrhythms/hemiolas and a few imitative passages; there is a lot of rhythmic energy and a
strong degree of irregularity. However, the texture is fundamentally chordal; the piece has a
very one-sided time character.

During the early stages of the PhD, as I sought ways of building polyphonic textures in which
contrasting layers of activity are clearly discernible, I became more influenced by Conlon
Nancarrow. In Nancarrow's music, time is 'manipulated into something that can exist in
multiple ways at once'. This is particularly apparent in a piece like Player Piano Study No.
21, also known as 'Canon X'. The combination of an accelerating lower line and decelerating
upper line is highly visceral. However, it also evokes strong visual associations, such as
slanting diagonals, colliding planes and shifting or ambiguous perspectives. There is an air of
permanent flux, of formal imbalance and unresolved tension. Temporal ambiguity dominates
the piece; it is impossible to 'reconcile' the two separate layers of activity, or determine a
'central' pulse. Eric Drott refers to the '....disorienting effects of temporal dissonance' which
create a '...transparent formal contour'.

Another composer whose music features a great deal of temporal dissonance is Elliott Carter.
Paul Griffiths writes of Elliott Carter's music:

......because the music is happening in several speeds simultaneously, it has no speed of its own,
and therefore allows no presumption that it speaks or sings (or, given the abundant pulsed
rhythms, dances) the thinking of one person at one time.

This 'polyphony of tempos' means that the music moves at several different rates
simultaneously, resulting in a 'liberation from psychological time'. None of my own music
is as complex as this; occurrences of temporal dissonance are relatively brief and there are
usually only two, or occasionally three different speeds operating simultaneously, not four. I
am not especially influenced by Elliott Carter in any case. However, Paul Griffiths'
description here summarises exactly why I have been attracted to these techniques and ideas

163 Dominic Murcott (Festival Artistic Advisor), Programme Note, The Music of Conlon Nancarrow: Impossible
Brilliance Festival, (London: The Southbank Centre, the London Sinfonietta and Trinity Laban Conservatoire of
Music and Dance, 21st-22nd April 2012), 2.
164 Eric Drott, 'Conlon Nancarrow and the Technological Sublime', American Music, Vol. 22, No. 4 (Winter,
2004), 541-2.
166 Ibid., 57.
in writing for avant-garde film. I wanted to avoid fixed viewpoints, and project a polyphony of perspectives instead.

My pitch vocabulary has also undergone a fairly significant change over the course of the PhD as a result of working with abstract films. Elaborate melodic patterning and layers of dense counterpoint were not significant features of my style or compositional processes at the start of the PhD. I was much more interested in chords and repeating figures, as evidenced in Sabotage Radio which is not very intricate melodically; the main emphasis is on mobile harmonies. Patterns are often just transposed and forcefully restated in a new 'key' or harmonic context. A brief analysis of the piece follows below.

The form of Sabotage Radio is quite sectional. The 'Exposition' lasts from bars 1-57, and the 'Development' from 58-148. There is also a 'Recapitulation' (149-84) and Coda (184-end). All of the pitch material is basically contained in the first 40 bars, which can be divided into four 'blocks'. The motivic elements within these blocks all relate to one another, but function as discrete entities.

The first block lasts from bars 1-16 and contains an oscillation between two loud, closely voiced chords, both of which feature open strings and hocketing. I will refer to these chords as a1 and a2. The a1 chord is derived from notes in the C Lydian mode; the a2 chord is more dissonant and chromatic.

Example 3.7 - Sabotage Radio, bars 1 and 7
The second block lasts from bars 16-24. The diminished figure in the violins, which I will refer to as b1, descends over a sequence of ascending minor thirds in the viola and cello, which I am calling b2. The trichord which is formed at the end of the sequence I will call b3.

![Musical notation](image)

Example 3.8 - *Sabotage Radio*, bars 16-17

In the third block (bars 24-32) the b1 figure is verticalized (i.e. expressed as a chord.) Meanwhile the viola plays an arpeggio-like figure entirely derived from the a1 chord - the 'a1 figure'. The ascending cello pattern, labelled 'c figure', shares characteristics with all of the previous motivic elements, particularly the ascending semitones in the b2 sequence of dyads. However, it has a slightly different shape. There is a harmonic tension between the b1 chord and a1 figure. (Even when removed from their traditional, functional role in a tonal context, diminished triads still convey a dynamic quality.)
Example 3.9 - *Sabotage Radio*, bars 28-29

The fourth block (bars 32-40) contains a distinctively shaped viola melody, which I have labelled 'd figure'. All the notes in this melody-figure are derived from the a1 chord except for the E, played by the cello. Also within this block is a high, intermittent two-note violin semiquaver figure, a tritone above the bass note. This fragment is from the b1 figure.

Example 3.10 - *Sabotage Radio*, bar 32

To reiterate, all of these motivic elements are related to one another, sharing intervallic and scalar properties. However, they function as separate entities. Not all are equally important within the piece, but more or less everything which happens subsequently can be traced back to them.
There is also one additional significant motivic element outside of the opening, which plays an important, independent role in the piece. This is a variant of the b1 figure, introduced in bar 58 which I will refer to as 'b1 figure variation.'

Example 3.11 - Sabotage Radio, bar 58

The ‘Development’ (bars 58-148) contains some restatements and transpositions of earlier material in new harmonic contexts. However, it also features exploratory episodes which are constructed using more polyphonic, layered textures. During these sections, the motivic elements from the four blocks are transposed and super-imposed over one another, creating a sense of continuous harmonic movement through contrasts and dissonance.

The lines were all composed simultaneously. For the most part, I sought to preserve the identity of each element, not disguise or reinvent them through complex variation techniques. So the techniques of transformation used were more or less exclusively harmonic; the pitch patterns are presented in a variety of different harmonic contexts, and clearly projected even as they collide. Some 'mirror' forms are used, such as retrograde but there are no inversions or leaping intervals. There is some fragmentation, but it comes across more as quotation or interruption, i.e. the figures are cut off before they have finished 'speaking'.
Example of a polyphonic, exploratory episode:

Example 3.12 - Sabotage Radio, bars 62-71

Example of a restatement:

Example 3.13 - Sabotage Radio, bars 120-24
Over the course of the PhD, my very close reading of complex, abstract film texts resulted in a desire to ‘catch’ as much detail as possible in the music, which led me towards melodic variation and fragmentation, and away from harmonic development. Viking Eggeling's devotion to the line\textsuperscript{167} and the endlessly re-configured geometric patterns which occur in \textit{Symphonie Diagonale} proved especially inspirational in this regard. The influence of Nancarrow and electronic instrumentation also nudged me in this direction. In \textit{Composing for the Films}, Eisler remarks that in film music ‘...Quickly changing musical characterisations, sudden transitions and reversals, improvisatory and 'fantasia' elements should be predominant'.\textsuperscript{168}

Repeating patterns, block chords and harmonic superimpositions do not entirely disappear from my later music by any means. Repeating figures, in particular remain an important part of my compositional language. However, my music becomes less dominated by harmonic concerns, such as the maintenance of multiple, mobile pitch centres and dissonance, and more by rhythmic textures and melodic re-shaping.

Harmonic processes and large-scale contrasts, whether tonal or post-tonal, need time to register and establish themselves. On the other hand, an elaborate, densely loaded musical line with sprawling, roaming contours is infinitely malleable and thoroughly gestural. I wanted forms to become more elastic; therefore, outright repetitions and note-for-note transpositions of large blocks of material gradually become rarer in my music. Instead, the focus shifts towards melodic and rhythmic variation. Harmonies are often reduced to mere splashes of colour and projections of melodic material, which help to decorate or unify an elaborate texture of mostly staccato melodic lines. This reflects the influence of Nancarrow as, according to Kyle Gann, much of his music 'moves too quickly for harmony to register'.\textsuperscript{169} However, it also relates to Hanns Eisler's theoretical conception of film music as characterised by '....irregularity, fluidity and absence of repetitions'.\textsuperscript{170}

CHAPTER 4: Rhythmus 21

There is some controversy about the dating of Hans Richter's early films. Whether it was finished in 1921 or 1924, however, *Rhythmus 21* is certainly a radically austere milestone in early experimental, abstract cinema. The rectangular, geometric forms and reduced colour palette which subdivide the screen seem most obviously reminiscent of Malevich, or Mondrian. However, it is the interaction between these elements on a spatio-temporal canvas which really epitomises the aesthetic of the film. As Richter confirms, the forms themselves are basically a means to an end:

> The definition of form refers to one’s perception of the formal quality of a single object, or several single objects; but, when you repeat this form over and over again and in different positions, then the relationship between the positions becomes the thing to be perceived, not the single or individual form. One doesn’t see the form or object anymore, but rather the relationship. In this way you see a kind of rhythm.

Standish D. Lawder, writing in 1975, notes the 'maximum graphic clarity' which is achieved with the squares and rectangles, enabling a work of 'pure visual rhythm' to emerge in which space and time become interdependent, through the 'counterpoint of contrasting opposites'. While Richter's notion of rhythm as 'relationship' encompasses both simultaneous and consecutive/successive movements, it is the simultaneous, 'contrapuntal' movements (i.e. composite rhythms) which are most unique and sophisticated, and epitomise the film.

My own detailed shot analysis of the film (see Appendix) reveals Richter's close and systematic engagement with musical ideas. Nearly all of the movements occur in contrary motion and are ‘imitative’, or 'canonic'. Squares and rectangles grow and recede simultaneously, travelling at the same rate of movement or at different speeds. Often a visual process will occur, then repeat, or simultaneously play out in reverse, upside down, on the opposite side of the screen. As Lawder recognises: ‘No single form seems to move in isolated activity.... the movements of each form seem inexorably linked to movement elsewhere...’

Even more interestingly, the film embodies an unresolved tension, as the ever-changing

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175 Ibid., 52.
arrangement of the elements onscreen engenders a 'pictorial composition of constant imbalance'. As a spatio-temporal characteristic, this suspension, or avoidance of 'resolution' and points of repose is even more musically suggestive than the polyphony of visual elements.

Unlike some other films from the artists' avant-garde, such as Ballet Mecanique, Rhythmus 21 does not fetishize the machine in a Futurist manner. However, in spite of its choreographic complexities, the overall crudeness and impersonality of the forms and the simplicity of the animation style - the 'lo-fi' quality resulting from Richter's 'surrender' to the 'technical difficulties' of the film medium - engenders a rawness in Rhythmus 21. This rawness almost - but not quite - amounts to an anti-aesthetic tendency, similar to that found in Duchamp's ready-mades. Really the film is closer to Constructivism than Dada though; as previously noted, the simple forms are a means to an end. Malcolm Le Grice notes that the film's rawness enables it to express some of the 'fundamental dynamic qualities inherent in rapid changes of shape' and the 'simultaneous presentation of elements moving at different speeds'. A quick comparison with Walter Ruttmann's early work serves to further elucidate these points. Lichtspiel Opus 1 (1920) is perhaps the antithesis of Rhythmus 21. It is professionally crafted, with coloured forms and a fluid animation style; in other words, polished and 'hi-fi'. However, the interplay between the formal elements is much less interesting; the film's compelling visual materials and dramatic poise cannot completely conceal or compensate for this. It dazzles the viewer, but lacks structural depth.

Rhythmus 21a

I sought to interrogate the film musically by composing two sharply contrasting musical scores. Both take the detailed shot analysis as their starting point. However, they react to this stimulus in different ways. In the Appendix chapter of Composing for the Films, during the section entitled 'Survey of the work done', Adorno and Eisler reflect on musical approaches to both narrative and non-narrative film, and conclude:

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176 Ibid., 52.
178 Ibid.
The contrast between music ‘about’ an event, from which it emphasises its difference, and music that draws its impulses from the event in question defines the possible fundamental attitudes of music toward the motion picture, but admits manifold variations.\(^{179}\)

I began *Rhythmus 21a* (for flute & cello) by seeking to establish points of emphasis and repetition. My pre-compositional methodology involved the creation of a click-track, and keyboard improvisations with non-pitched percussion instruments on Logic. Many of the visual elements repeat rapidly in slightly shortened forms, in a manner not dissimilar to contemporary looping practices. As the film progresses, there are more spatial subdivisions and the polyphony of visual elements becomes more erratic and complex. The palette of polyphonic techniques expands; besides the contrary motion, there is also a form of 'oblique' motion in some of the visual patterns. (In musical counterpoint, oblique motion is when one part remains on the same note, while the other moves towards or away from it.) However, the principle of repetitive, additive-subtractive looping remains prominent throughout.

The music draws virtually all of its gestural impulses and formal outline directly from the visual patterns. The film is treated like a 'score', or frame-by-frame set of instructions. Short, repeating patterns and imitative, polyphonic textures align themselves with analogous visual activities to create a relationship between the two media which is choreographic and very localised. However, this choreography is embedded within a fragmented musical form, something akin to a Stravinskian montage. The austere quality of the visual materials, the lack of colour or varied forms can lead to a perceptual sameness over time, even monotony, especially for viewers unacquainted with Richter's conceptual ideals. The music's abrupt rhythmic and harmonic discontinuities seek to mitigate this, temporally partitioning the film by inserting and exaggerating sectional breaks.

However, there is also outright friction between the two media; rhythmic patterns within the music accelerate and combine/interact, producing surges of activity. The rhythmically dissonant musical texture both inhabits and pushes against the metronomic regularity of the visual patterns, and the symmetrical phrase structures which temporally align the two media. The result is that a more fluid picture-music relationship gradually emerges, and the straight, even rhythms of the film are invested with a greater dynamism and momentum through the

superimposition of these additional rhythmic complexities and instabilities. It leads to a more varied, erratic pacing within the work as a whole; the visual patterns are 'played with rubato'.

As detailed in my shot analysis, the film is basically constructed after two spatio-temporal visual motives. Motive x, the 'wiping' gesture is 'flat', but Motive y is suggestive of depth and three-dimensional movement. The music grows from two separate blocks, or 'types' of material. Type A is characterised by the stepwise, chromatic filling in of two major thirds, spaced a tritone apart, in contrary motion. This material opens the piece and marks the first appearance of visual Motive x. At bar 6/9.0", the musical pattern and the visual pattern are both reversed. Each bar of music is synchronised with a new visual loop, but unlike the film the music is not repeated outright. The rhythmic ratio between the two lines changes as the melodies gradually speed up; 5:7 to 5:8 (5:4) to 7:10 (7:5). The cumulative effect of these temporal shifts is a gradual acceleration and increase in intensity. However, the sequence is experienced as a series of jolts, not a smooth tempo curve. The lower line is always faster than the upper line; the music is propelled forwards by the bass, resembling the engine of a large machine.

At bar 8/13.0", visual Motive y, the white square receding or rushing backwards, is paired with the second musical block or Type B music, which is characterised by a slow, three-note, ascending melodic line, simultaneously doubled a semitone lower in inverted form. The two lines are again in contrary motion. The lines are closely voiced when the square in the picture is 'close' (semitone apart), and gradually become more widely voiced (minor ninths) as it moves away.
Example 4.1 - *Rhythmus 21*, stills from opening

Example 4.2 - *Rhythmus 21a*, opening bars

Example 4.3 - Stills from *Rhythmus 21*, 13.0"

Example 4.4 - *Rhythmus 21a*, bars 8-11
When the visual 'wiping' motive (x) returns at bar 11/19.0", the image is inverted/flipped sideways; the Type A music also returns here, but transposed a fifth lower than before, responding to the new position of the image. Changes in pitch centre often punctuate inversions of the image, see for example bars 17-20/30.0"-36.0", bars 32-38/59.5"-1'11.5" and bars 40-60/1'12.7"-1'54.0".

Musical materials are not aligned with specific visual elements in a leitmotivic fashion. However, the association between the Type B music and the growing-shrinking visual Motive y is maintained throughout the piece; the pairing recurs at bar 21/38.0", bar 32/59.5", bar 44/1'22.7", bar 50/1'35.2", bar 92/2'58.2". Likewise, the punctuation figure consisting of syncopated leaping octaves and minor ninths, an outgrowth of the Type B music first introduced at bar 28/51.0", is strongly identified with the stop motion squares. It also aligns itself with the broken L shape as the work progresses.

There are additional punctuation figures which only occur once in the piece. In bars 76-81/2'27.0"-2'36.5" the two instruments stray into one another’s ranges; the cello line is briefly higher than the flute, reflecting the reversal of the film negative. The diagonal lines at bars 82-84/2'37.5"-2'41.5" are playfully shadowed by rapid, scalar passages on the flute. Passages like these sail dangerously close to a 'mickey-mousing' effect. Overall, the piece might be criticised for presenting an overly literal interpretation of the film; gestural imitation can become monotonous when over-used. Although there is friction between the two media, the music does not really have an aesthetic identity of its own and does not really work without the film. The pitch language is somewhat repetitive and rigid, even though in many ways it is merely a 'prop' for the choreographic audio-visual framework and the rhythmic-textural schemes in the music. This reflects the influence of Nancarrow; according to Gann, the pitches in some player piano studies are 'little more than an arbitrary string with which to manifest the tempo structure'.

Overall, the piece remains at the laboratory stage, but foreshadows later efforts, in which I increase the number of melodic lines and, in addition superimpose overlapping rhythmic patterns and tempos, building on the divisive rhythmic techniques and acceleration ideas first

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explored in this piece. In later pieces I also cultivate a melodic style which is more fluid and less repetitive, aiming for greater formal elasticity.

**Rhythmus 21b**

*Rhythmus 21b: Quartet of Looming Shapes* (for flute, clarinet, viola & cello) has a somewhat different character. The piece is much more chordal, defined and shaped by harmonic factors, like *Sabotage Radio*. On a purely musical level, *Rhythmus 21b* is also more continuous and potentially autonomous than 21a. It is still quite synchronised with the visual rhythms of the film, but in a less rigid and heavy-handed manner. Instead, the music seeks to inhabit the same aesthetic and structural world by sharing with the visuals a generalised, over-arching structural principle - there is a parallelism of process, the music is ‘about’ the film.

As previously noted, Richter described his philosophy of film-making in the early 1920s as stemming from music - ‘in musical counterpoint....every action produces a corresponding reaction....one thing growing, another declining...’ I have sought to reflect this in *Rhythmus 21b*: the piece grows from a post-tonal cadence, which functions as a harmonic motive. The cadence represents two distinct mini-worlds or opposing energies within the piece; one 'acting' and 'growing', the other 'reacting' or 'declining'. In the opening bars the two chords are voiced in four part.

![Example 4.5 - Rhythmus 21b, opening](image)

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181 Hans Richter, 'Dada and the Film', in Willy Verkauf (ed.), *Dada - Monograph of a Movement* (Teufen, Switzerland, 1957), 64.
However, in their prime or reduced form they are really trichords. The middle or top note of these trichords is frequently doubled at the octave and becomes the central, dominant pitch, almost like a 'tonic'.

Example 4.6 - Rhythmus 21b harmonic motive, transpositions

All twelve possible transpositions of the cadence are explored, and the chords are rotated and re-voiced throughout the piece. The cadence is usually presented a couple of times before a ‘modulation’ to a new pitch centre takes place. The second chord is slightly more dissonant than the first, which establishes a polarity of sorts. Perhaps the best analogy is an oscillation, or alternation between major and minor triads in tonal music. However, in this post-tonal context, chords built from seconds, sevenths and ninths are used instead.

Staggered note entries are a significant feature of the texture in Rhythmus 21b; this creates a similar effect to spread chords on a keyboard instrument. There are also changes in tone colour which result from the differently voiced chords and contrasting registers. The staggered note entries are usually ascending for the first chord and descending for the second. Crucially, however, the two chords are always presented as a cadence; unlike the motivic materials in Sabotage Radio, they are never super-imposed on top of one another. The only two high-speed exceptions to this rule briefly occur at bar 89/2’37.7" and 93-4/2’46.0". The contrast between closely and widely voiced chords in high and low registers might be considered parallel to the contrast between solid and void, light and dark in the visuals.
The music sometimes complements the spatial composition of the visuals, e.g. a wide melodic leap in the two woodwind parts at bar 33/1'01.5" coincides with an abrupt inversion of the image. At bar 51/1'35.5" the loud, closely voiced low chord in the strings and clarinet coincides with the sudden appearance then recession of the huge white square (visual Motive y).

There are moments of rhythmic synchronisation. For example, the pizzicato cello notes at bar 28/52.5", which gently punctuate the stop motion squares. However, rhythms are kept simple most of the time, in order to focus attention on the evolving harmonies and registral-timbral distributions. This rhythmic simplicity also distinguishes the piece from *Rhythmus 21a*, and indeed all of the other pieces in my PhD portfolio.

Dynamic changes often follow the film. For example, at bars 53-4/1'39.5"-1'41.0" there is a musical crescendo as the large white square grows, followed by a sudden drop in sound volume to mark the abrupt transition to a much smaller shape. However, the two chords do not habitually ‘grow’ and ‘decline’ at the same rate as the visual elements; especially in the first 40 bars of the piece, the harmonic architecture of the music is almost completely independent from the flow of visual events.

From about bar 40/1'14.7" onwards all the elements of the music gradually become more synchronised with the picture, and the harmonic rhythm quickens accordingly, with the ‘key’ changes becoming more frequent. By bar 71/2'12.2" the music has become ‘Agitato’ and is quickly and strictly synchronised with some of the miniature flashing squares; the climax of this process is reached with the *sforzando* chord and general pause at bar 77/2'21.2".

During the final section which follows, the same vertical harmonic processes from earlier in the piece continue, but at double and quadruple the speed, so that the perceptual focus shifts from the vertical to the horizontal. For the final ‘crescendo’ of the film (2:54-8), in which ‘all of the disparate shapes of the film briefly coalesce into a Mondrian-like spatial grid before
decomposing into a field of pure light’, I have used fast hocketing and layering of material to achieve a dense summing up of the piece (bars 97-9).

Example 4.7 - *Rhythmus 21*, 2'54.0"

Example 4.8 - *Rhythmus 21b*, bars 97-8

The main approach used in *Rhythmus 21b* is complementation, as the music generally unfolds at its own pace. (Complementation means that the film and the music are allotted different functions within the work, as I outlined in Chapter 3, on page 38 when discussing Nicholas Cook's theories of multimedia.) Rhythmic conformance/imitation is evident nearer the end, but the device is mostly used incidentally. While the music is certainly not 'indifferent' to the

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film's gestural framework, neither is it subordinated to the visual patterns in a bar-by-bar, frame-by-frame sense.

The results are coherent, with a subtle yet meaningful interaction between the two media. However, by framing the ending of the film as a 'climactic' summary of what came before, the piece risks imposing a Post-Romantic aesthetic, which has little to do with Richter's ideas. An unrelated and somewhat spurious teleological trajectory may have been mapped onto the visuals. The harmonic changes and sense of musical growth which they project are perhaps too sweeping; the piece may also be too lyrical. While the music is not tonal, I have not entirely succeeded in expunging tonal connotations; if a perfect fifth is added to the 'central' note of each cadence, the chords start to sound triadic.

While it effectively demonstrates alternative possibilities, overall the piece is less original and radical than 21a, both in terms of its musical language and in its relationship to the visuals.

Conclusion

The two contrasting scores for Rhythmus 21 were performed in concert as a two-movement suite on May 26, 2012 by the Brighton-based Tacet Ensemble. The film was projected onto a screen behind the performers as they played, and the conductor used a click-track for synchronisation purposes in both pieces.

Standish D. Lawder has written of the complex spatial illusionism that derives from the dynamic interplay of contrasting areas of black and white. Which forms are foreground figures, which are background elements? At any given moment, these spatial relationships are purposefully ambiguous and constantly changing.

This relates back to the film's 'pictorial composition of constant imbalance', discussed earlier in the introduction to this chapter. The two pieces of music may contrast quite sharply with one another aesthetically, yet both seek to musically embody the notion of structural-perceptual imbalance and unresolved tension. In this sense, both pieces are 'about' the film.

184 Ibid., 52.
The embodiment is pursued through conflicting and fluctuating pulsations in *Rhythmus 21a*, harmonic tension in *21b*. While the attempt misfires slightly in *21b*, in *21a* the music is highly visceral in its effect. Its relationship with the film is much more perceptually striking.

It may be that polyrhythms and layered pulses convey tension and momentum while maintaining a more expressively neutral stance than harmonic or melodic devices. Also, the loud, relatively flat and unvarying dynamic in the recording of *Rhythmus 21a* is highly effective, as it matches the rawness and impersonality of the visual language. The expressive performance style and contrasting dynamics in *21b* mean that it does not have the same unity of effect.

The composition of two contrasting scores for *Rhythmus 21* enabled me to consider certain musical parameters, such as rhythm, in isolation from the other musical elements, but not in isolation from the visuals. I am reminded again of the Marc Bellano passage I cited in the Introduction: 'To compare two different musical readings of the same sequence is like starting to draw a map of the hidden potential of a film..." This led me to wonder what the two scores or 'maps' would sound like layered over the top of one another, and played simultaneously with the film. Whilst, unsurprisingly, the result of this forced marriage between the two different audio-visual 'messages' is somewhat overloaded and dense, the sensation of different layers of musical activity unfolding concurrently creates a vertical juxtaposition, projecting or superimposing dynamic, multiple perspectives onto the visuals in a way which goes far beyond what I achieved in *Rhythmus 21a*. It creates a musical polyphony of perspectives.

[Media file: 'TR_Appendix 3_Rhythmus 21a & 21b layered.mov']
https://vimeo.com/579568442/795210957e

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CHAPTER 5: Symphonie Diagonale

Of all the principal figures in the artists' avant garde, Viking Eggeling is probably the most distant from the filmic mainstream. *Symphonie Diagonale* is intensely frame-based and completely rejects montage.\(^\text{186}\) Like *Rhythmus 21*, the film is uncompromisingly austere and abstract. However, in its use of comparatively complex linear formations and endless re-configurations, along with a perceived lack of three dimensional movements, *Symphonie Diagonale* is more studiously developmental and much less visceral than Richter's work. For Eggeling, film was an 'output medium', it was not in itself the goal.\(^\text{187}\) The effect is one of extreme sobriety and rigour, of mathematical workings out, of animated pencil drawings - indeed, the film began life as a scroll drawing, similar to the one analysed earlier in Chapter 2. The forms might be characterised as a 'recurring family of shapes on a flat surface'\(^\text{188}\) and composite structures arise from pairings.\(^\text{189}\) The viewer's attention is directed to the transformations occurring within the forms, which are always additive-subtractive.\(^\text{190}\) Sections of the film repeat themselves, usually with some kind of inversion.\(^\text{191}\) Most notable of all from a musical perspective is the film's 'exhaustive use of reciprocal movements'.\(^\text{192}\) This is another feature which the film very obviously shares with *Rhythmus 21*. The film makes use of many devices derived from cinema’s temporal component, such as polyphony and morphological evolution.\(^\text{193}\)

Unlike in Ruttmann's work, any tendency to anthropomorphise is radically closed off.\(^\text{194}\) The static animation style and constrained visual materials see to that. However, Eggeling's abstract visual style can also be perceived as more expressive and playful than Richter's. Although they are abstract, Eggeling’s configurations allude to ‘real world’ objects in a way which Richter’s do not. Online commentators have picked up on this quality most of all:

\[^{192}\text{Ibid.}\]
\[^{193}\text{Ibid.}\]
The complete figures are drawn in a vaguely Art Deco style and could be said to resemble any number of things, an ear, a harp, panpipes, a grand piano with trombones, and so on, only highly stylized. The tone is playful and hypnotic.\textsuperscript{195}

Michael O'Pray has noted that Eggeling's complex abstractions occasionally resemble everyday objects like combs and jugs, as if they were 'symbolic' traces of existent objects, as Charles Harrison has described Kandinsky's paintings.\textsuperscript{196} He also notes that Eggeling's use of the diagonal is interesting for its 'obvious expressivity....the shapes push and pull against the screen's rectangularity'.\textsuperscript{197} Eggeling's 'delicacy of line' and 'diagonal matrix' might be contrasted with the more regular, basic shapes in the films of Ruttman and Richter.\textsuperscript{198} So, while the kinetic and formal asceticism of the film limit its appeal somewhat, its content generates associations which place it closer to the French films such as \textit{Ballet Mecanique}, in which ordinary, everyday objects are divorced from their familiar surroundings and provocatively aestheticised.

It has been hypothesised that \textit{Symphonie Diagonale} was intended as only the first movement of a longer, four-part 'symphony'. According to Bengt Edlund: 'It has an ingeniously developed imaginative sonata form with a wealth of imitative work. Diagonals and sharp angles play a visually dominant role and contrast with softer visual motifs.'\textsuperscript{199} I find this prognosis problematic, because there is insufficient differentiation between the hard and soft visual motifs on a phenomenological level. The film has no colour; the animation style has been called 'extremely static' and the movements 'extremely muted'.\textsuperscript{200} The film has a continuous, unbroken quality, aesthetically closer to Baroque music or certain forms of atonal modernism than a Classical-Romantic aesthetic, with its dramatic contrasts.

My own close reading of the film is indebted to R. Bruce Elder’s descriptive shot analysis and diagram of themes (Ex. 5.1).\textsuperscript{201} I generally follow his sectional divisions, except towards

\textsuperscript{196} Michael O'Pray, \textit{Avant-Garde Film} (London: Wallflower Press, 2003), 16.
\textsuperscript{197} Ibid.
\textsuperscript{201} R. Bruce Elder, \textit{Harmony and Dissent: Film and Avant-garde Art Movements in the Early Twentieth Century} (Ontario: Wilfrid Laurier University Press, 2008), 450.
the end of the film when I insert additional ones. (See also Ex. 5.10). In terms of the visual
material, Elder identifies twelve shapes or 'master themes' as he terms them. Shapes 1 and 2
(and 12) contain no curved lines. Shapes 7 and 11 contain no straight lines. All of the other
shapes are a mixture of the two.

Example 5.1 - R. Bruce Elder's diagram of themes in Symphonie Diagonale (Harmony and Dissent).
Reproduced by permission of Wilfred Laurier University Press.

Although it is perfectly valid to pinpoint the building blocks of the film for analytical
purposes - and the analysis in Elder's book is admirably thorough and methodical, very much
in the spirit of Eggeling - I would question whether all of these shapes are perceived as
separate 'themes' on a phenomenological level when the film is playing. Sometimes the
contrasts in the film are very subtle and the lack of colour only increases this. Shapes 1 and 3
are quite similar - both resemble a comb-like object or staircase in shadow. Shapes 8 and 9
are derived from shapes 1 and 5. Shapes 7, 10 and 12 all share similar characteristics. Shapes
4 and 11 are identical except for the black rectangle on shape 4. Shapes 1, 3 and 6 all feature
rows of parallel lines - which incidentally also carries connotations with a musical stave, and
beamed quavers in musical notation. There is also perhaps an allusion to a string or
percussion instrument, maybe even a piano keyboard. Shape 5 also features parallel lines, but
they are curved. Shapes 3, 4, 6, 7, 10 and 11 all derive their outline from a single, smooth
curve. The right-angles/orthogonal lines in shape 2 form the letters 'F' and 'L' (upside down);
shape 4 resembles the letter 'E'; shape 5 resembles the letter 'S'; shape 7 the letter 'V' (as noted by Elder) or an accent in musical notation, and shape 10 resembles a 'C' and a 'V'. It might make more sense to talk about 'types' of *material content*, rather than discrete 'themes'. This would allow for a more straightforward categorisation of different material oppositions - curved vs. straight lines, thick vs. thin, short vs. long and single vs. repeated/parallel lines.

As a musical composer reading the flow of images, I am not only concerned with the precise 'content' of the formations and their interaction but also, equally, with the scale and density of the shot compositions, the speed and direction of movement (particularly the entrances and exits of shapes), the number of repetitions and recurrences, tempo and metre. I am also more concerned with large-scale contrasts and correspondences between sections.

Formal unity and differentiation are sometimes only secondarily a result of the image 'content'. For example, the section of the film which lasts from 1'11.0" to 2'05.3" is thoroughly dominated by the slow erasure of lines and shapes; I experience it as a single sequence. However, there are numerous shape formations involved in this activity; many distinct 'themes' from the diagram above make an appearance. In order to reflect this, Elder separates the section into seven sequences. Another example is at 4'42.2"; I experience this moment in the film as a sectional break due to the subtle tempo modulation but Elder does not. I have adopted Elder's system for analysis because it allows for a more thorough-going appraisal of the motivic elements in the film and I greatly respect his analytical rigour. However, my music reflects a slightly different conception of the film structure.

Certain commentators have been at pains to dissociate the musical analogy from notions of sound accompaniment. The following remark by Adolf Behne (1921) is uncannily reminiscent of critics who espouse the ideal of ‘absolute’ music:

> Here is a pure lesson in film as an independent art. It is characteristic that the film, a technical collaboration between Eggeling and Hans Richter, not only exists without musical accompaniment but quite rejects the need for one. A logical unfolding of abstract forms of geometric precision, this film is quite certainly an original work, one which is formed fully complete within itself.202

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R. Bruce Elder, writing in 2009, remarks: ‘Diagonal Symphonie....was not a piece whose dynamics could be matched to any musical composition....its formal evolution cannot be matched point by point with the structure of any plausible musical composition.’

Obviously I would contest both of these statements, particularly the second one. However, I accept that a sound accompaniment goes against Eggeling’s intentions, which is not the case with the other films I have worked on in this project. To return to some of the points I made in the Introduction, the mobile, present-day situation regarding silent film music allows a plethora of different audio-visual 'messages' to reach the public. Video technology enables silent films to be viewed privately at home; the user can mute or change the soundtrack if they are committed to film as an 'independent' art. On the occasion of my piece being presented in a concert, I might request for the film to be screened silently as well, or point the audience towards an online streaming website like Vimeo or a DVD release where the film can be viewed silently, or with music by a different composer/musician.

Like Rhythmus 21, the film can seem uniform and even a little monotonous when viewed silently. The lack of colour and obvious sectional contrasts can make the structure hard to decipher. The movements are jerky and spasmodic at times, but also studious and measured and rhythmically rather unvarying. A particularly subtle issue is the tension between the quasi-mathematical rigour of the film and its 'real-time' quality. Lines are drawn and erased as if by an invisible pen, almost as though the film were a live theatrical performance. The improvisatory rhetoric, or illusion of spontaneity in the execution contrasts sharply with the actual materials and their orderliness.

**Compositional techniques and electronic instrumentation**

*Symphonie Diagonale* was the piece in which my compositional aesthetic changed fairly significantly and my film music ideas assumed a sharper focus. The rhythmic superimpositions used in *Rhythmus 21a* are retained and developed, while there is simultaneously a conscious effort to engage with the internal structural logic of the film and

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build a more substantial, autonomous piece of music, as in *Rhythmus 21b*. The finished piece choreographs many of the visual gestures in an exaggerated manner. It superimposes additional rhythmic complexity and ornamentation, instils a stronger sense of directionality as pitch patterns are repeated and transformed, marks the appearance and disappearance of the shapes more dramatically, temporally partitions many of the film sequences or ‘panels’ more emphatically and draws attention to the return of a short repeating fragment. The music gradually gains a degree of autonomy along the way, as it freely reworks material; however, precise background rhythmic contact with the visuals is always maintained. I wanted my music to not only articulate the film’s structure, rendering it less opaque but also to inject a highly visceral, dynamic quality.

There were two crucial factors which enabled all of this. Before *Symphonie Diagonale*, I typically began a piece by sketching complete material, usually the first thirty bars or so. Then I would improvise variations on it, making transposition charts in order to develop it harmonically. (See the analysis of *Sabotage Radio* at the end of Chapter 3.) This time, however I composed the music in two stages. I began by watching the images with a metronome, as with the *Rhythmus 21* pieces. Then I composed a fragmentary single line of music, which covered the entire film and was meticulously subordinated and synchronised to the visual patterns; I tried to 'catch' as many details as possible. This very close, imitative reading was subsequently transformed, becoming the structural bedrock and source material for a multi-faceted, polyphonic musical response to the film. This approach allowed scope for greater complexity, including overlapping elements; it enabled absolute compositional control without ever losing precise contact with the picture. The somewhat predetermined formal design also allowed for 'spontaneity' and large-scale formal detours and surprises to be conceived at a much earlier stage in the compositional process. The single line is on the Piano 1 stave; in this piece it functions as a 'main' or central line. The timbre is sharper and the dynamic slightly louder than the other two pianos. The counter-melodies and chords played by the other two pianos are materially derived from the Piano 1 part.

The second factor which transformed my approach was the turn to electronic, MIDI instrumentation. This allowed for unprecedented levels of rhythmic complexity and melodic agility as, like the player piano, an electronic sequencer is able to execute polyrhythms extremely precisely and negotiate fast melodic leaps and glissandi completely effortlessly. In *Modern Music and After*, during a section on Nancarrow's player piano studies, Paul Griffiths
refers to the ‘joys and comedies of heavy loads lightly carried’, linking this phenomenon to cartoons and animation more generally. Animation techniques create the ‘illusion of motion’, rather than ‘recording motion through live action’. Eric Drott notes the striking ‘psychoacoustic effects’ at the ‘extremes of textural and/or rhythmic density’; for instance, the ‘exceedingly fast speed allowed by the player piano may transform a melodic sequence into a sensation of timbre’. Meanwhile, the percussive attack sound ‘concretizes the mechanical nature of the instrument, its status as the musical automaton par excellence’.

The timbre of the MIDI pianos I have used in my score for *Symphonie Diagonale* is very percussive and dry. The Piano 1 sound (Kontakt player - grand piano bright on Sibelius 5) has a narrow dynamic range (i.e. loud) and barely responds to dynamic markings or note velocities.

![Screenshot of Kontakt Player settings, Sibelius 5](image)

It is similar to one of Nancarrow's modified mechanical pianos, with their 'brilliant, piercing sound'. A less clipped, less forceful, more orthodox piano sound would be too mushy and

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208 Ibid., 534.
reduce clearness.\textsuperscript{209} The portfolio version of the piece has no dynamic markings in the score; when I want to bring out a particular line or phrase I use octave doublings instead, or re-voice widely spaced chords as staccato cluster attacks. Admittedly, this means that the music has a narrow dynamic range. However, as Standish D. Lawder reminds us, there is no three-dimensional movement in the picture.\textsuperscript{210}

This ‘flat’ dynamic, combined with the music's timbral uniformity not only conforms to the ‘flatness’ of the visual style, it also complements the other visual constraints - uniformity of rhythm and lack of colour. It aligns the music with the extreme impersonality and severity of the film's visual aesthetic, and its 'lo-fi' qualities, its technical or technological rawness. It not only reinforces these qualities, it perhaps even mitigates or camouflages rhythmic and aesthetic tensions which occur elsewhere in the audio-visual texture. Experimentation showed that dynamic markings actually weakened the effect of the music with the film; the music became too 'expressive' and the highly unified effect was lost. There is an alternative version of the piece which demonstrates this; see the media file 'TR_Appendix 3_Symphonie Diagonale - version with dynamics.mov'.

Audio-visual analysis

The music makes frequent use of leaping, compound intervals, which may conceal the pitch-class organisation. Therefore, all of the pitch fields have been labelled in the score, for the purposes of analysis. The chromatic filling in of larger intervals is very common, especially major thirds, e.g. [C-E]. Elsewhere, the filling in does not occur and the trichord [0,1,6] is structurally significant. Here only the central/lowest pitch is indicated, e.g. [C]. Markings below the system indicate a vertical grouping or centre which applies to the whole ensemble.

I have called the chromatically filled in major third 'Motive a'. The most common pitch patterns derived from Motive a are shown in the diagram below. I have called them Motive a1, a2 and a3. I have called the trichord 'Motive b'.

Example 5.3 - Motives/pitch patterns in *Symphonie Diagonale*

There are also pitch patterns in the piece which are contained within the major third, but slightly different to the patterns in the diagram, usually with a couple of pitches swapped round or inverted. Overall, semitones, whole tones and thirds are very prominent in the piece. The semitones are often displaced by an octave, resulting in sevenths and ninths. The Dutch composer-theorist Ton De Leeuw describes how the interval as such 'acquires constructive significance' for the first time in early twentieth century works such as Debussy's *La Mer* and Stravinsky's *The Rite of Spring* (1913), displacing traditional forms of thematic development. The interval possesses 'a sort of material kinship with the capacity to bind together the most divergent melodies'. He also notes the 'high degree of chromatic balance' that can be achieved by 'filling in chromatic fields'.

The re-ordering of pitches contained within a major third might be considered analogous to the splitting and re-configuring of visual patterns in the film. However, while the musical

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212 Ibid., 136.
213 Ibid., 140.
patterns operate within intervallic restrictions, their organisation is less methodical than the visual configurations. There are some pattern variations which only occur once or twice, for example and have little structural significance; they are not really developed. Here are some examples:

Example 5.4 - Bars 28, 35, 78, 145.

This pre-meditated 'spontaneity' introduces a more playful perspective, pushing against the closed, occasionally sterile world of the picture. There are also brief passages in the music which push against the film gesturally. For example, in bars 30-43/51.7"-1'08.3", the film is much more repetitive than the music, which here is characterised by rhythmic fluidity and irregular phrasing. Overall, there is perhaps a sense that the music does not take itself quite as seriously as the film.

In the opening bars, Motive a1 forms an angular, V-shaped melodic contour. An affinity is immediately established between this musical pattern, and Shape 1 - the 'comb'. This connection stays fixed throughout the piece. The intervallic content (ninth, semitone) ensures that it is clearly perceptible as a sharply defined, hard-edged musical figure, which alternates between upward and downward motion, and between wide leaps and stepwise motion. This assertive quality is further reinforced by the extremely hard-edged timbre and mechanical performance style of the MIDI piano; all of the notes are struck with the same volume and intensity, and there is no rubato whatsoever. The 'plucking' or 'grinding' quality of the music here provocatively reinterprets and contests the visual rhythm. As the shape 'recedes', the
chromatic, stepwise motion of the music makes the visual gesture seem more forceful and machine-like; when watched silently, the movement is comparatively smooth.

Example 5.5 - Stills from the beginning of *Symphonie Diagonale*

Example 5.6 - The opening bars of *Symphonie Diagonale*
There are similar examples of this phenomenon later in the piece. For example, at Figure G/2'05.3", the music is very synchronised with the visual gestures. Each appearance of the formation of curved lines is articulated with a widely spaced, dissonant chord, a vertical projection of Motive a2. However, each time the formation undraws itself, the music wildly exaggerates the downward motion with a glissando. The piano glissando is stepwise not smooth, so in this sense the music conflicts quite violently with the visuals although it is still temporally and gesturally aligned with them. Here, the music contributes a stronger sense of directionality and a harsh momentum which the image sequence does not really possess when watched silently.

Example 5.7 - *Symphonie Diagonale*, 2'05.3"

Example 5.8 - *Symphonie Diagonale*, bar 83
Elsewhere, fast, transposing melodic sequences confer a directionality onto certain visual patterns which they do not necessarily have when played silently. For example, at bars 35-8/57.7"-1'01.7"; Figure H/2'23.3"; Figure P/4'42.2"; bars 174-8/4'55.5"-5'02.3"; Figure T/5'52.9" and bar 228/6'42.6".

Probably the most radical aspect of my score for *Symphonie Diagonale* is the rhythmic layering. Repeating melodic figures are played against one another at different speeds, which creates brief episodes of temporal ambiguity. The music both imitates and conflicts with the visual patterns during these sections, as one line adheres to the visual ‘pulse’ while another pushes against it. For example, at Figure K/3'06.7", Piano 3 plays percussive chords at crotchet 105 (notated as septuplets). This cuts across the restatement of Motive a1 (retrograde), creating a polyphony of perspectives.

![Example 5.9 - Figure K/3'06.7"

A similar effect is achieved at Fig. P/4'42.2" and Figure U/6'11.5" as additional rhythmic complexity is projected onto the regularly pulsating visual patterns.
Example 5.9 - Fig. P/4'42.2"

Example 5.9 - 4'42.2"
Conclusion

There is certainly no leitmotivic system at work in *Symphonie Diagonale*, but by the end the following associations or affinities have been strongly established:

Refrain/Motive a1 = Shape 1  
Chromatic glissando/Motive a2 = undrawing, Shapes 5 and 6  
Motive a3 = undrawing, curved lines  
Motive b = Shape 8/visual cluster, large scale image

Also, the overarching structure of the film slightly resembles a musical rondo form, marked as it is by a continually recurring fragment - Shape 1. The music temporally partitions the film by punctuating each recurrence with a return to the main musical motive, or 'theme', a1. The table below (Ex. 5.10) is a large-scale overview of the film sequences and musical panels.
Example 5.10 - Overview of Symphonie Diagonale: FILM SEQUENCES & MUSICAL PANELS

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**Bold** = Shape 1 in film (Shape 3 at Fig. D). ‘Refrain’ fragment (Motive a1) in music

**Bold & underlined** = ‘Refrain’ in home ‘key’ (A flat - as above)

*= Visual subdivisions added by me

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The design of the melodic patterns was influenced by Webern's Quartet Op. 22 (for violin, clarinet, tenor saxophone and piano). As noted earlier, the film is remarkable for its 'exhaustive use of reciprocal movements'.\(^{215}\) I modelled Motive a1 so that the elements within it mirror or answer one another in a similar way. This is not a real-time effect; it is an underlying aesthetic that permeates the whole piece, in the manner of the post-tonal cadence in *Rhythmus 21b*. This musical motive (a1) can be described as being 'about' the film.

Example 5.11 - Webern, Quartet Op. 22,\(^{216}\) with my annotations.
Anton Webern “Quartett für Geige, Klarinette, Tenorsaxophon und Klavier op. 22”

Overall, *Symphonie Diagonale* marked a real turning point in the project. My musical style is no longer dominated by repeating patterns, block chords and harmonic superimpositions. In *Sabotage Radio* I relied on harmonic development and additive-subtractive rhythmic schemes to create tension and momentum. In *Rhythmus 21a* I began to develop my use of complex rhythmic textures, but there was no layering of multiple lines or inward re-configuring of melodic patterns. In *Symphonie Diagonale* I was able to play with rhythmic superimpositions much more confidently. The melodic variation and fragmentation enabled more formal flexibility and mobility. Pitch patterns are not just transposed and layered over the top of one another, or recalled. They are also inverted, subdivided and inwardly re-shaped. There is no

'cutting and pasting'. Eggeling's endlessly evolving visual clusters and linear configurations inspired a significant sea change in my music.

In spite of these strong technical parallels, I was a little puzzled that such a studious, measured film as Symphonie Diagonale should inspire or 'instruct' me to compose what was probably the fastest, most frenetic piece of music I had ever written up to this point. However, it is worth recalling an experimental study undertaken by Willmann (1944), in which musicians were asked to compose music for several contrasting visual themes, expressed as line drawings. They 'overwhelmingly responded to the angular and irregular images with louder sounds, faster tempos and syncopated rhythms'. Maura McConnell argues that 'the faster the music, the sharper and more angular the visual image'.

The lack of 'human' expression and the extreme rhythmic precision in much music written for the player piano and electronic sequencers also perhaps, when paired with film, calls attention to the visual medium as a machine activity. When the British composer Thomas Adés was directing the Aldeburgh Festival, he presented some Nancarrow works in a cinema. He argued that watching a mechanical piano, with no-one on stage is a 'cinematic experience....not a theatrical one'.

I continued to develop the ideas from Symphonie Diagonale in the rest of the pieces in the Portfolio. I wanted to reintroduce live performers and explore even greater levels of rhythmic complexity. I also wanted to aim for a greater compositional unity within the music itself.

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CHAPTER 6: Lichtspiel Opus 3

_Lichtspiel Opus 3_ was produced in 1924, the same year as _Symphonie Diagonale_ (and perhaps _Rhythmus 21_). The structure of the film is simple, repetitious and very sectional. Ruttmann does subdivide the screen; forms and movements do answer one another in some sequences. Generally, though there is more of a sense that the forms and movements have aesthetic significance in and of themselves; they are not merely functional units (as in _Rhythmus 21_). Therefore, it might be tentatively proposed that these sections of the film embody a form of 'visual homophony', in contrast to Richter and Eggeling's visual polyphony. While movements are elegantly controlled and dynamic and screen compositions evolve, the forms are quite simple shapes, not combinatory, complex linear formations (as in _Symphonie Diagonale_). Gestures repeat in a mildly capricious manner. The structure of the film is aesthetically rather than didactically or analytically motivated; the film is absolutely not a 'demonstration of a theory of art'\(^2^2^0\) or an experiment in perception.

_Symphonie Diagonale_ has been characterised as the visual embodiment of a sonata form; earlier I argued that this was problematic due to its lack of explicit formal contrasts. Instead, I would argue that it is Ruttmann's later abstract works which visually embody the dialectical concept of two contrasting ideas or 'themes' interacting, and clearly communicate the concept on a phenomenological level. _Symphonie Diagonale_ has a continuous, unravelling quality, perhaps more comparable to what Charles Rosen calls the 'seamless, almost uniform flow'\(^2^2^1\) found in much of J.S. Bach's instrumental music. However, the conflicts between pointed and rounded shapes, geometric and curved forms, pumping pistons and smooth gestures are dramatized and made much more obvious in _Lichtspiel Opus 3_. The curved forms are not introduced at all until halfway through (1’18.7’’). They are only 'reconciled' and allowed to merge with the geometric elements during the closing sequences.

The film is especially remarkable for its rhythmic freeness and fluidity, differentiating it further from the work of Eggeling and Richter, which is quite primitive and metronomic by comparison. This fluidity can be interpreted as a form of 'rubato' (flexible interpretations of the beat), found mainly in performances of Classical and Romantic music. Alternatively, it


\(^{2^2^1}\) Charles Rosen, _The Classical Style_ (London: Faber and Faber, 1971), 43.
can be read as a series of written-out rhythmic accelerations and decelerations, relating to modernist techniques of musical composition. The former would seem to accord more with other elements in the film (the interaction of two 'themes', the 'melodic units') and in all probability is what Ruttmann was consciously trying to emulate. However, the latter suggests a rhythm fixed in time and utilised as part of the compositional structure, as opposed to an improvisatory feature added on afterwards by a performer for purely expressive purposes; therefore, it is a better analogy. Either way, Ruttmann seems much more concerned with producing an emotional reaction in the viewer, unlike Richter, and especially unlike Eggeling.

Audio-visual analysis

The music 'toughens' the film without completely neglecting its lighter qualities. It has an improvisatory, humorous sensibility, with allusions to jazz rhythms and a figure in the middle section which evokes the feel of a waltz. However, the end result is nervously playful rather than 'pretty'. Visual gestures are embellished or exaggerated, and the musical patterns which result are gradually woven into the semi-autonomous polyphonic fabric of the music.

I have responded to the rhythmic freeness and fluidity of the visual language with lively, marked accelerations and decelerations within the musical textures - wandering lines get caught up in new phases of rhythmic activity, and thus propelled forward. The overlapping of musical phrases played at different speeds momentarily obscures the pulse. The rhythmic density and fluctuations in the music help to increase friction between the two media and imbue the visuals with extra dynamism due to the high level of synchronicity.

There is also a productive tension between buoyant, dance-like figures and densely layered rhythmic textures, as the former are frequently engulfed by the latter. For example, in the passages beginning at bar 6/10.0" and bar 32/1'01.7". This is vaguely intended as a musical representation of the visual contest between geometric, machine-like elements and softer, more anthropomorphic gestures and curved motives.

As with *Symphonie Diagonale*, I began the piece by composing a fragmentary single line of music, rigorously subordinated to the visual patterns and sequences. (This is highlighted red in the score.) I then composed the surrounding parts. I wanted to build on the complex,
contrapuntal textures of *Symphonie Diagonale*, in order to project multiple musical perspectives onto the picture, emphasising the polyphony of visual elements and spatial subdivisions. However, *Lichtspiel Opus 3* is a more lyrical film than *Symphonie Diagonale*; therefore, I have used less harmonic dissonance, avoiding devices such as cluster chords. Melodic patterns are still constantly fragmented and re-shaped, which invites the viewer to examine the images more critically, drawing attention to transformations which take place within them.

The music moves at its own pace for brief periods in order to allow for musical dovetailing; however, an outward synchronicity is always maintained. For example, see the passages from bar 21/39.7" to bar 27/52.2" or bar 38/1'12.7" to bar 41/1'18.7". The film has an 'organic' unity akin to music, as visual gestures and sequences are recalled and transformed. In order to truly complement this, the music needed space to find its own artistic pace and rhythm, despite its unrelenting outward synchronicity.

**Musical interrogation of the film text**

The music begins at 10.0”, just as the ‘III’ graphic stops moving.

The bassline in bars 6-7 contains two significant motivic patterns. The second pattern can be interpreted as a re-ordering or inward re-shaping of the first; the two have many notes in common. The semitone is the most common interval.
Throughout the piece, both of these patterns are further reduced, re-shaped and split into fragments, which are often inverted. The chromatic filling in (or virtual filling in) of tritones occurs quite regularly. However, the patterns are also recalled in their original form from time to time. Also, the accented, syncopated rhythm of the first pattern becomes a distinctive figure in its own right. Although the semitone is horizontally the most prominent interval, I explained in the introduction above that I wanted to avoid stacks of semitones in the harmony in favour of something more sonorous for this piece, to align the music more with the lyricism in Ruttmann's visuals. In bars 6-7, the first pattern is harmonised with major and minor thirds \([0,3,4]\); the second with a whole tone sonority \([0,4,6]\).

The film begins properly at 14.0”/bar 8, at which point the music abruptly changes as the strongly established unison texture disintegrates. The visual activity from 14.0” to 20.0” is dominated by a succession of (nine) blue vertical-upright rectangles over a black background, each one presented slightly higher and further right than the last - a diagonal path is traced across the screen and the visible volume of each shape is greater than the last.

The visual tempo complements this increase in intensity as the sequence speeds up. It ends with the last blue rectangle slowly narrowing then receding to nothing in the centre of the shot at around 18.0”. The music complements, even exaggerates this visual crescendo and accelerando with increases in rhythmic complexity, harmonic density/speed and dynamics. The bassline continues at the same rate as before, although the increased relentlessness affects a doubling of the tempo, and in any case the underlying pulse is concealed by triplets and then quintuplets. The upper lines play quintuplets, effectively establishing a counter-pulse of crotchet 150 and then septuplets (crotchet 210). The pitch pattern from bar 6 is embedded within these triplets, which provides some underlying continuity during this disorientating surge of activity.
The visual sequence ends with the last blue rectangle narrowing, then shrinking and fading to nothing in the centre of the screen (between 18.0” and 20.0”). The music thins and winds down at this point – all of the instruments drop out except for the vibraphone, which plays two transpositions of the pitch pattern from bar 6.

![MIDI of vibraphone](image)

The final four sonorities are descending, which vaguely complements the falling, shrinking visual gesture here.

As the blue rectangle fades in and out at 20.0”/bar 11 (surrounded by a dark blue frame), the music reiterates a figure originally buried in the texture of bar 8, consisting of major and minor sevenths. Here it is isolated, and offered as a concluding gesture.

![MIDI of major and minor sevenths](image)

Meanwhile the vibraphone remains. As the screen goes blank - William Moritz calls this a 'visual silence'²²² - the gently chiming dyad provides a transition into the next section through a combination of rhythmic deceleration and harmonic stasis.

From 22.5” to 32.5”, the same visual gesture is repeated four times as a snaking arrow traces a diagonal path across the screen and merges into a rectangle, which fades to black. With each repetition there is an increase in intensity, as the arrow travels further across the screen and the rectangle increases in size, finally breaking apart from the central shape and morphing into a trapezoid.

The music imitates and complements this increase in visual intensity. It does so by repeating and elongating an ascending figure in the bass and using melodic variation, transpositions, rhythmic ornamentation and a crescendo to increase momentum and directionality. The increasingly angular melodic variation and spasmodic rhythmic ornamentation suppresses any sense of regular pulsation. The flurry of musical activity ceases each time the screen fades to black; only the vibraphone continues with its soft, pulsating dyads.

The repeating musical pattern in the bass is made up of two fragments, derived from the pitch pattern in bars 6-7.

For each repetition, the figure begins on a higher note. Also, the second (chromatic) part of the figure is extended each time it is repeated. The upper lines never double the figure exactly; instead they play increasingly complex and ornamented variations on it. This localised heterophony increases the intensity of the music. The variations are always pitched a whole tone, major third or tritone above the bass.

A fragment from the bassline in bar 8 is used as a counter-melody.

The placement of this counter-melody is not motivated by the film; it is there for purely
musical reasons. This is a good example of a musical gesture originally motivated by the picture being reworked and absorbed into the independent fabric of the music at a later point.

The counter-melody is subsequently split in half; each trichord is subject to retrograde in bar 14.

Meanwhile the vibraphone continues to play major sevenths, providing a weak sense of pulsation and temporal ambiguity which only clearly emerges in between each repetition of the figure, when the screen fades to black. In bars 15-17, after the third and fourth repetitions, the counter-melody begins to intrude on this space, increasing the intensity of the music. The concluding figure from bar 11 sneaks in at bar 17.

At 33.5”/bar 18, there is quite a dramatic change in the picture as a new sequence begins. A new colour scheme is introduced (black and white/cream) and a new shape (the square). There is another repeating gesture, more forceful this time, as the square appears to rapidly advance and flash, engendering an incisive unheard ‘pulse.’

As it does this, it creates ‘ripples’ at a fairly regular tempo; the screen ‘vibrates’. The music imitates the rhythm of this visual gesture fairly closely in the bass line of the electric piano and the vibraphone, but introduces some metric ambiguity in the form of quaver subdivisions. The pattern (in bars 18-20, electric piano lower stave) runs 3+3+3+4+3+3+4. Pitch-wise, it is
another oblique variation on the material from bars 6-7.

The music here creates a gesture analogous to the ‘ripples’ through syncopation, as the vibraphone line is placed a semi-quaver behind the bass. Meanwhile free melodic elaboration on earlier figures continues in the upper lines. In bars 19-20 the melodic elaboration in the harpsichord proceeds at its own pace (quintuplets - crotchet 150). This superimposed additional rhythmic complexity collides with the bassline and visual ‘pulse’.

From 39.7”/bar 21 to 52.2”/bar 27, the film and the music follow slightly more independent trajectories, although some rhythmic and metric contact is maintained. The music continues to elaborate melodically and rhythmically on earlier patterns during this sequence, carving out a small timeslot to rebalance itself internally.

The visual sequence from about 41.0” to 48.7” is similar to the preceding one, as three black squares are each rapidly filled in, with flashes of red light.

However, the activity in the background relates back to the snaking arrow gesture (22.5”-32.5”) and the succession of pulsating rectangles (14.0”-18.0). The squares are arranged diagonally which also recalls earlier shapes and gestures.

From 50.2”/bar 26, the picture and music are rhythmically locked back together. The composition of the shot remains the same, but from 48.2” the red arrow gesture becomes
more emphatic and repeats, initially at quite a regular, insistent rhythm. As the shapes grow and shrink slightly the rhythm becomes more irregular and the tempo accelerates slightly – for a brief moment around 58.2” it becomes very rapid indeed. This freeness and fluidity recalls the sequence from 14.0” to 20.0”.

![Image](image1.png)

The music complements the acceleration sequence and enhances its momentum primarily through rising, chromatic pitch sequences. The rhythm is energetic and dance-like, and initially conforms to the pulsating then accelerating quality of the visuals. However, at the last moment the music ‘gives up’ imitating the picture and thins slightly (around bar 30/58.2”), allowing the uncompromisingly irregular visual rhythm to assert itself.

At 1’01.7”/bar 32 there is a split screen effect for the first time and a pulsating, machine-like sequence begins. The gestures and screen composition here are a little reminiscent of Rhythmus 21.

![Image](image2.png)

I have created a close synchronicity between the two media, as a major seventh aggressively punctuates the downward motion of each ‘piston’. This musical attack sharply exaggerates the visual gesture. In between each punctuation, free melodic elaboration continues in the surrounding parts.
After each punctuation the pitch centre changes. First the music ‘modulates’ up a tritone from G to C sharp, then down a third to A. These three pitches form the pattern [0,4,6], which relates to the whole tone sonority in bars 6-7. This lends a kind of circularity to the visual sequence.

Initially the music matches the visual patterns with a strong pulse. However, as the sequence develops, this pulse begins to become submerged as quintuplets and septuplets smudge the texture, and free melodic elaboration starts to take over. The music becomes more independent again, and takes some time out to rework material according to its own internal structural principles. The pistons are no longer punctuated so heavily and aggressively. From bar 38/1’12.7” the rhythmic layering becomes very thick, with the quintuplets completely obscuring the underlying pulse.

1’18.7”/bar 41 sees the first appearance of curved lines or shapes in the film, and a kind of elision or overlap between the two visual sequences. On the left hand side of the screen the curved lines are amalgamated into a variation on the previous pattern, as two revolving circles grow out of two tall black vertical lines. Meanwhile, on the right side the ‘piston’ hits once more at about 1’21.0”, then stops.

The music reacts to this new visual activity with variations on the seventh motive in the bass.
This figure has by now been firmly established as a concluding phrase. There is an increase in rhythmic dissonance and layered complexity, from 5:4 in the first half of the bar, to 7:6:5:4 in the second. These superimpositions are another example of temporal ambiguity, which is briefly superimposed onto the visuals. The tentative, fluctuating melodic pattern at crotchet 105 (septuplets) in the middle of the bar connects the two rhythmic textures in a somewhat unstable manner.

At 1’23.7” the shot composition changes quite dramatically, as the screen is split diagonally from the lower left corner to the upper right. This is one of the most remarkable moments in the film, where the rhythmic freeness and fluidity are most apparent. Curved shapes move up the central dividing line. Their movement begins to accelerate and becomes more irregular at 1’28.7”/bar 44:3, then decelerates around 1’31.7”/bar 46. From about 1’30.7”, the diagonal line begins to 'wilt', morphing into a curved one.

The music changes very abruptly at this point. There is a sudden drop in the dynamic level and the texture becomes more vertical, dominated by the quintuplet dyads. There are still multiple, layered pulses, but their ratio changes back to 5:4 and the domination of the quintuplet dyads sounds like a tempo change (to crotchet 150). The pitch centre drops down a major third, from C to A. All of this renders the visual change much more dramatic; in effect, the music temporally partitions the visual sequence from 1’01.7” to 1’37.7”. It is much more smooth and seamless when watched silently; this lack of differentiation is partially due to the colour continuity. The music also examines the visual material from multiple perspectives or 'viewpoints' simultaneously.

There is a more slow-moving section in the film which begins at 1’39.7”/bar 49, during which earlier musical material is restated and varied at half-speed. The arrival of the familiar
rhythmic cell from bar 6 in the bassline at 1’59.7”/bar 55, (with different pitches) heralds the return to a more active texture.

At 2’11.7”/bar 58, a curved figure emerges from the vertical black line and begins to ‘dance’. The motion is slow and regular. This is the most 'anthropomorphic' gesture in the whole film so far, yet it can be traced back to the earlier movements of curved forms from 1’23.7”. The music undergoes a tempo change/metric modulation here (to crotchet 90) and there is also an implied time change as a humorous, stuttering, waltz-like figure emerges (notated as triplets). The figure is related to the major seventh from the 'piston' sequence (1’01.7”/bar 32).

The surrounding melodic lines superimpose rhythmic dissonance and irregularities not really present in the visuals. There is a definite tension within the music, between the 'waltz' figure and the other parts. Both the music and the picture are quite cyclical and repetitive. In the music, pitch centres alternate between F, G and B. This forms the trichord [0,2,6], another whole tone grouping similar to [0,4,6], the trio of pitch centres familiar from the 'piston' sequence.

At 2’37.0”/bar 67 these pumping 'pistons' return, along with familiar musical material. At 2’51.0”/bar 74, the material from 33.5”/bar 18 is reprised and varied. At 2’55.0”/bar 76 the brutal accented sevenths figure is turned into a sequence, very synchronised with the visual patterns. From 2’59.0” the tempo of the film and music accelerate. Earlier visual and musical material is restated and compressed. At 3’02.2” and from about 3’09.4” to the end, the geometric and curved elements in the film are merged together for the first time. In the
music, fast, dotted rhythms and frenetic electronic flourishes confront one another head-on.

Ensemble workshop

The piece was tried out in a composition workshop at the University of Sussex and recorded. However, there is also a polished, electronic MIDI recording which I created myself, on Sibelius 7. The score is exactly the same for both versions. The electronic recording is the one which I have included in the Portfolio. The live workshop version is the media file entitled 'TR_Appendix 3_Lichtspiel Opus 3 - live workshop recording.mov'.

When working on the computer with MIDI, you can allow the machine to impose itself on the musical material by playing it back in a robotic fashion. Alternatively, you can override
this and put in detailed dynamic markings (velocities) for individual notes. This human intervention results in a ‘simulated’ performance, although the subtle rhythmic nuances which a real performer would provide are absent - a mechanistic precision remains. My score for Lichtspiel Opus 3 is fast, percussive, electronic, rhythmically complex and precisely synchronised with fixed, mechanically (electronically) performed visual media. Emotional expression and interaction come from the rhythmic textures and their relationship to the visuals. A computerised performance locks in the choreographic, synchronised gestures more tightly than human instrumentalists would be able to. It also means that the complexity of the musical rhythms and their confrontational relationship with the picture are intensified rather than softened. The primary function of dynamic contrasts in this context is to reveal and foreground different layers of activity in the music, not to operate as a mode of expression.

Nancarrow's Toccata for Violin and Player Piano (1935) pits a human instrumentalist against a machine. The patterns which the violinist has to execute are audibly difficult and tiring, whereas the player piano can fire off flurries of notes completely effortlessly. As Andriessen reminds us: 'In the human machine, humans must expend more effort and energy to accomplish what a machine, effortlessly, does mechanically.' The ensemble writing in Lichtspiel Opus 3 features an increasing amount of differentiation and tension between the instrumental parts and the electronic lines, in an effort to make them more stylistically distinct from one another. This polarisation is intended to musically represent the visual contrast between geometric, machine-like elements and softer, more humanistic gestures and curved motives in the picture. It links back to the productive tension between buoyant, dance-like figures and densely layered rhythmic textures, briefly discussed near the beginning of this chapter.

The performance instruction for the vibraphone part is 'machine-like'; however, the piano is 'soloistic and dynamic'. The use of hairpins, abrupt dynamic changes, trills and tremolo is intended to foreground the expressive qualities of a human pianist, juxtaposing these against the robotic, mechanical qualities of the electronic lines. In the live ensemble version of the piece, the electronic lines do not have such detailed velocity markings, and are therefore much more 'flat' dynamically. Trills and tremolo have a more 'uneven' and unpredictable

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quality in the hands of a real pianist; on the computer they just sound like electronic pulsation, and are always compositionally controlled.

The last few bars in the piece have quite an arresting effect, as the electronic parts take over, swamping the musical texture with increasingly rapid, impossible-to-play patterns as the live instrumentalists drop out. However, because I felt unable to relax my grip on the rhythmic framework of the composition or depart from the notion of a strict pulse, the rest of the time the confrontational relationship between the human and machine performers is much too subtle. It might have been more apparent if I had, for example, allowed the pianist some rhythmic or improvisatory freedoms.

However, I was slightly taken aback by the violence and fierceness of the 'human' element which emerged during the workshop performance. I had imagined that the re-integration of human performers might soften the music, but if anything the opposite happened. The MIDI parts are nonchalant, with an expressive indifference; the two instrumentalists perform with a nervous energy, tending to rush ahead slightly. There was a severely limited amount of time in the workshop and the performers were virtually sight-reading their parts, so a degree of rawness and 'panic' were inevitable. Nevertheless, I suspect that even a more rehearsed, polished performance would result in the humanly performed lines having a similarly visceral effect, and slightly overwhelming the MIDI parts. This is partly due to the timbral richness and forcefulness of the acoustic instruments, especially when pitted against the thin, computerised timbres emitting from loudspeakers. Perhaps if the electronic parts were played on a mechanical, acoustic device, such as a player piano or an orchestrion, they would be able to compete more effectively with the other lines and convey a more 'threatening' quality.

Nevertheless, the juxtaposition of human and machine gestures, while flawed in this piece, would form an important part of my thinking in the next piece in the Portfolio, *Mechanical Principles*. It is an interesting, experimental way to combine live performers with MIDI; it is an ensemble-specific texture, which cannot occur elsewhere. The simultaneous presentation of fixed visual material and musical performance in a concert setting is itself a forced marriage between live and pre-recorded media. By applying these ideas within the musical ensemble I have sought to extend the concept further. The theorist Marion Saxer observes:
Composing music to a film is always a kind of collaboration with a machine. Film as a completely technical medium has its own terms of use and characteristics. Not only the composer, but also the film as a medium, composes. Hence one could speak of a sort of distributed agency between the film and the composer.²²⁴

In this piece, it might be said that the film ‘plays’ the live musicians via the MIDI parts and the headphone click-track.

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CHAPTER 7: Mechanical Principles

Ralph Steiner, as an American working in the early 1930s, stands apart from all of the German film-makers I have considered thus far. In many ways, his early films are only tenuously connected to the European avant-garde. They seem to perfectly embody an American aesthetic, which proclaims that artistic form and forms in nature, or artistic form and other forms built by humans 'have similar ontological and aesthetic status'. This stands in opposition to the European modernist principle of radical transformation, which aims to 'transcend the furniture of the material world'. However, while in these theoretical terms they are completely at odds, there are aesthetic overlaps between the non-narrative film work of Steiner and the German abstract animators. Admittedly, the connections are more apparent in Steiner's first film, \( H_2O \) (1929) than in the film I have chosen to work on, \textit{Mechanical Principles} (1931/33). The film begins with fairly simple, static shots of moving water. Gradually, however these become more abstracted and harder to identify as the camera zooms in on the reflective surface of the water, using large-focus lenses, and eventually the film resembles a frenetic, linear animation, almost like a hand-painted piece by Len Lye. Amazingly, no artificial effects are used - the images are all 'raw', exclusively the result of close-ups and framing.

Example 7.1 - Stills from \( H_2O \) (1929) – Redacted (copyright) https://vimeo.com/146103095

During this swirling end section, there are shots in which the visual patterns are so fast and ephemeral that it becomes impossible to clearly discern individual movements. This opacity perhaps has something in common perceptually with Ligeti's 'micropolyphony', a 'dense

\begin{footnotesize}

226 Ibid.

\end{footnotesize}
counterpoint' in which 'one can no longer hear the individual voices', but is simply 'aware of changing degrees of activity'. The film has been called a 'simple study of the patterns of light and shadow on water,' by the Museum of Modern Art, but Scott MacDonald's description of it as a 'visual phantasmagoria' seems much more fitting. The term 'new realist abstraction' also seems quite appropriate. Images and motions reflect, invert and overlap one another. This lends the film images a certain continuity, in spite of their lack of narrative, or organised evolutionary growth.

Steiner was trained as a photographer, not a film-maker and in many ways his films can be viewed as an extension of his still photographic work. He was, as he himself put it interested in the ‘unbounded possibilities for the use of film as a visual poetry of formal beauty’ Like H₂O, Mechanical Principles might be characterised as a 'mini-encyclopedia of visual explorations'. The film was inspired by an exhibition at the New York City Science Museum, consisting, according to Joel Zukor, of ‘various displays of small wooden machine parts (gears, shafts, levers, wheels, and pistons)’. These wooden models were called “eccentrics”. Some of the ‘eccentrics’ are similar to parts found in steam engines, Swiss watches, pile-driving machines and children's toys. In essence, the film is a succession of documentary-style kinetic photographs, with a form of unity conferred through affinity. The sense of scale is always ambiguous. Although they are all close-ups, the shots are ‘straight’ and relatively unmediated by the camera until about two thirds of the way through, when there is a move towards assemblage and optical illusion. The unfolding of the film is additive, not evolutionary. There are some small continuities and discontinuities between the shots on a local level - often what appears to be a succession of different mechanisms is actually the

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230 Ibid., 209.
same one, photographed from different angles and then unexpectedly juxtaposed with something else. (This links back to the earlier point about images reflecting and overlapping one another.)

Often mechanisms are filmed from different angles. This is not always particularly clear; sometimes what appears to be a succession of different mechanisms is actually the same one.

Example 7.2 - Stills from *Mechanical Principles* (1931/33) - 24.5"; 46.5"; 1'29.5"-1'49.0"-1'58.0".

New types of mechanism are gradually introduced into the flow of images, whilst already-familiar objects are revisited and sometimes reframed. Although anthropomorphic and
biomorphic figures and movements feature throughout the film, they are most obvious during the shots featuring gears and cogs (which mostly occur in the middle of the film).

The film can also be divided into sections according to tempo and editing pace, with a gradual increase in range and dynamism (although here this is a relative term). The opening section is set at a moderate tempo, with a smooth continuity and shot lengths averaging about 10 seconds. The first mild rupture occurs at 2'18.0", with an abrupt cut to a shot of a vigorous rotary object, which only lasts five seconds.

Example 7.3 - Mechanical Principles, 2'18.0"

The film quickly returns to its moderate pace, but then from 3'06.0" to 4'59.5" the mechanisms move more slowly and shot lengths are typically 15-30 seconds. When the moderate pace returns, the three rates of movement are subsequently alternated (much in the same manner as the three types of mechanism), with the fast punctuations increasingly prominent and frequent towards the end of the film.

According to Jan-Christopher Horak, the 'machine parts are imbued with a strong sense of the anthropomorphic, romantic endeavour to reintegrate technology with the realm of nature'.

The film is slow and graceful much of the time, almost balletic, not violent or aggressive - although there are some abrupt discontinuities between shots, for example at 2'18.0". There are moments of whimsical, anthropomorphic humour, for example the 'antics' of a shaft which continually grasps a 'helpless bolt by the head' in a sequence beginning at 4'50.5".

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Example 7.4 - Mechanical Principles, 4'50.5"

There are also vaguely sensual movements, such as the mechanism at 4'13.0", which has mildly phallic implications.

Example 7.5 - Mechanical Principles, 4'13.0"

The film has a mysterious dimension, which enhances the sense of abstraction in the images. As Scott MacDonald points out, Steiner's use of close-ups obscures the reason for the movements; ‘.....we know that in any machine one part makes another move, but it is difficult to see what is moving what in the models.’

It might almost appear as though all of the cogs, gears, wheels and other mechanisms are part of one gigantic machine, powering itself for no particular purpose (although this is actually not the case). The 'eccentries' are not real machines, and therefore it is difficult to read the film as a Futurist ode to the machine, like for example Ballet Mécanique.

Steiner's images have a more neutral, enigmatic quality about

241 Ibid.
them. Scott MacDonald argues that the stopping of the two ovular gears in the final shot of the film calls attention to the implicit parallel between the machinery Steiner has photographed, and the machine responsible for the illusion of film: the projector.242

Example 7.6 - Mechanical Principles, final shot

I noticed that this gesture is anticipated earlier in the film, at 8'23.0"; MacDonald does not account for this in his reading.

Example 7.7 - Mechanical Principles, 8'23.0"

Energy in the cinema appears in order to 'nullify, disguise and revalue movement', not to transmit, transfer or transform it.243 If the cinema really is nothing more than a machine which 'transforms the useful energy of cogs and transmission belts into a useless energy of illusionist simulation'244 then Mechanical Principles is a very literal representation of this process of becoming.

242 Ibid.
244 Ibid.
Apparently, in the original title credits of \( H_2O \), Steiner used the word 'composed' - 'Photographed and Composed by Ralph Steiner'. The composer Aaron Copland was also involved in the editing process for both \( H_2O \) and \textit{Mechanical Principles}. Steiner recalls: ‘I persuaded him that a composer should know about unity and progression, and that these had to be important to film editing.’ Disappointingly, not a great deal more is known about the nature or degree of Copland's involvement. However, the film \textit{was} presented in a concert organised by Copland, at the Broadhurst Theatre, New York on 15 March 1931, with music by the maverick, Eastern-influenced American composer Colin McFfee. It was never recorded, and sadly, the score is now lost (according to the Pytheas Centre for Contemporary Music).

The title card shown below appears at the beginning of the film on the \textit{Unseen Cinema} DVD.

![Title Card](image)

Example 7.8 - \textit{Mechanical Principles}, title card

While there is unmistakably a real-life 'process' occurring in each individual shot, there is nothing inherently 'musical' about a 'repetitive visual form'. In spite of Copland's involvement, the musical analogy, on close examination, is hard to justify in \textit{Mechanical Principles}, unless we retrospectively apply criteria from later periods. Close analysis reveals


\[247\] Ralph Steiner, \textit{Ralph Steiner: A Point of View} (Middleton, Conn.: Wesleyan University Press, 1978), 12.


\[249\] Ibid., 226.

little systematic organisation of material. The individual shots are too raw and static; the overall structure of the film is too open and somewhat shapeless. There is so real sense of organised evolutionary growth, or even of more open-ended compositional processes such as additive patterning.

However, there is an unmistakably strong, insistent, unheard visual 'pulse', albeit one which becomes monotonous and oppressive in its unrelenting sameness by the end of the film. This is another difference between Mechanical Principles and the European works; there is little sense of rhythmic differentiation between shots and sections. However, the interplay between curved and straight lines in the films of Eggeling and Ruttmann perhaps finds its ciné-sculptural analogue in the conversion of vertical motions to rotary ones in Steiner's 'eccentrics.' There is certainly a form of interlocking contrary motion in many of the images, which conveys energy if little else. 'Rhythm' within each shot or, rather, the repetitious activity which plays on the spatial subdivision of the image, is more important than the rhythm of conjoining shots. As in the German animations, montage can hardly be said to exist.

Audio-visual analysis

I used similar techniques to interrogate Mechanical Principles musically as I did for Symphonie Diagonale and Lichtspiel Opus 3. I began by treating the film as a set of musical 'instructions', and composed a single, fragmentary line of music, looking again to Nancarrow for inspiration. In Player Piano Study No. 5, Nancarrow juxtaposes accelerating impulses over steadily repeating ones.251 Also, the gaps between repeating flourishes gradually contract, until the pattern repeats continuously.252 Other studies contain similar textural combinations of regularity and irregularity, sameness and variety; for example, in Study No. 3 an ostinato is pitted against increasingly complex layers of rhythm.253 In Studies 27 and 28, Nancarrow uses a steady beat as a 'perceptual yardstick' for changing tempos.254

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252 Ibid., 81.
253 Ibid., 76.
254 Ibid., 4.
Example 7.9 - Page 33 from Nancarrow, *Player Piano Study No. 5*

Reproduced by permission of Schott Music, Mainz. All rights reserved.
Influenced by these ideas, I have sought to apply a similar technique to the music-picture relationship in *Mechanical Principles*. I planned for the musical rhythms to 'wrap' themselves around the metronomic regularity of the visual patterns, which they would duplicate yet also contradict, or challenge. Composing the single line was a fairly straightforward process. However, when I began to add surrounding layers and flesh out the piece, I encountered serious problems. A framework of similarity was prevented from establishing itself; the musical elements and the visual elements would not 'mesh.' The film images resisted my music too much for a polyphony of musical perspectives to have any real meaning. Unlike the German films, even the more austere ones, there is a total lack of visual artifice or technologically induced polyphony in *Mechanical Principles*. The images are perhaps too raw, realistic and 'closed' to accommodate multiple musical perspectives embedded in fluid, complex musical textures.

I was convinced that the piece was a failure, and the only way to save it might be to re-edit or even remove the film. However, after some experimentation on Final Cut Pro, I realised that applying the 'Mirror' split screen effect partially solved this problem. As discussed earlier, the images have a certain beauty and fascination. However, they are very raw and repetitive, and rather static. The Mirror effect causes many of them to dissolve into one another as they move, filtering them through an illusionistic, morphological effect which makes them more dynamic, and seem closer to animation. Some of the single movements reciprocate one another, becoming double or multiple movements, creating a more explicit and dynamic form of contrary motion and subdividing the screen.
This increased complexity or 'polyphony' also aligns the visuals slightly more with the aesthetic of Eggeling and Richter, although there is still little sense of global evolutionary growth or tightness of structure. The fundamental character of the film has not been changed; the tempo and structure remain basically the same, the forms and movements have simply been enriched and enlivened in a fairly uniform manner. The film text is treated as raw material, not as a finished, 'closed' historical artefact. I had no real 'ethical' qualms about altering the images in this way, because I discovered during my research that Steiner himself had disparaged his early films in later years, calling them 'primitive and inept'. That said, the alteration would have to be clearly pointed out in a programme note if the work was presented in a public concert.

However, I am a composer, not a film-maker. I accept that this solution is relatively basic and imperfect; I would welcome the opportunity to work with a film-maker in order to solve the problem more professionally and elegantly. A few of the shot compositions are weakened by

255 Ralph Steiner, *Ralph Steiner: A Point of View* (Middleton, Conn.: Wesleyan University Press, 1978), 12.
the 'Mirror' effect, their composition becoming squashed and unbalanced, with movements partially contained outside the frame. But the overall effect is strong.

Example 7.11 - *Mechanical Principles*, Mirror effect (2)

Like the earlier pieces in the project, the music punctuates or exaggerates many visual gestures and superimposes additional rhythmic complexity, with one musical line recreating the visual gestures and 'pulse', while another embellishes or clashes with them.

e.g.
Bar 14/24.5"
Bar 66/2'08.0" - Close up - very intense music
Bar 81/2'38.0" - Upward motion
Bar 95/3'06.0" - Softer, slower
Bar 112/3'42.0" - Downward, then upward motion
Bar 125/4'13.0"
Bar 133/4'29.0" - Shadowing, punctuation
Bar 144/4'50.5"
Bar 157/5'17.0" - MIDI keyboard punctuates cogs hitting one another
Bar 171/5'47.5"
Bar 182/6'12.0" - Gtr/piccolo melody punctuates cogs
Bars 240-43/8'13.0" - 8'19.0"
Bar 264/9'01.5"

The intermittently repeating note flurries in the MIDI keyboard part, while moving extremely quickly and at a different tempo to the surrounding parts, are often spaced widely apart. This actually creates the sensation of slower movement, or a 'counter-pulse'.

e.g. The opening bars
Bar 21/38.5"
Bar 66/2'08.0"
Bar 73/2'22.0"
Bar 103/3'24.0"
Bar 148/4'59.5"
Bar 237/8'07.0"

I was influenced by an Andriessen piece, De Snelheid (1982), in which the composer explores 'contradictory factors that guide our perception of velocity256 - perceptual paradoxes, in which the listener 'experiences a simultaneous sensation of having sped up and slowed down'.257 This temporal ambiguity projects itself onto the visual patterns.

The visual movements are steady and uniform throughout, almost metronomic. The music wraps itself around this rhythmic regularity in different ways, as there is a productive tension between dotted, syncopated dance rhythms and more abstract, layered pulses. This contrast is also reflected in the instrumentation; the MIDI parts move at different speeds and are extremely agile, while the instrumental parts tend to be more direct and buoyant in their effect, with traces of jazz and rock. This is an extension of the type of ensemble writing first explored in Lichtspiel Opus 3. There is a clear differentiation between the instrumental parts and the electronic lines; a tension between 'funky' rhythmic patterns and unplayable bursts of

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257 Ibid., 112.
MIDI. This occasionally creates a representational tension in the visuals; are they cogs, or dancing humanoid figures?

Most of the Sibelius timbres on the recording are satisfactory. There is some dynamic contrast and separation between parts, although not as much as I would like - occasionally some of the detail is lost. The contrast between the note flurries in the MIDI part and the surrounding layers would be more apparent in a polished MIDI recording or live performance.

Although there are many repeating figures in the piece, their function is mostly rhythmic and textural, not harmonic. The inner re-shaping of melodic patterns remains paramount. The pattern introduced in bar 4 is the most structurally significant, and permeates the entire piece. It is contained within a major third.

The material which begins the quieter middle section at bar 95 is built around an inner re-shaping of this melodic pattern.

Another important motive is first introduced at bar 31, and subsequently varied and fragmented, re-appearing as a repeating figure at bar 66.
There are also some important rhythmic figures, for example at bar 39 and bar 157.

From bar 193/6'39.0" to 235/8'03.0" the music is not very obviously connected to the visuals (except for the unrelenting pulse). This is because the overall structure of the film remains static and somewhat lacking in differentiation, despite the alterations I have made by adding the Mirror effect. Therefore, some large-scale temporal partitioning was necessary in order to sustain momentum over this longer time stretch (the earlier film pieces in the project typically last only 3-7 mins). A break from the unremitting textural complexity also seemed musically appropriate at this point in the piece. The main melodic pattern in the unison passages is first introduced in bars 134 and 136, in the background of the musical texture.

Overall, then Mechanical Principles is the application of compositional principles first developed in Symphonie Diagonale and Lichtspiel Opus 3 to a much broader canvas, with some necessary modifications in order to account for the different film aesthetic.
CONCLUSION

Reading early abstract film texts as musical scores reveals their unique aesthetic position.

While the German artist film-makers made opaque and self-referential abstraction the main content of their films (and their work in other media), the French-American practitioners are more focussed on a cinematic modernism as the term has been conventionally understood - as an aestheticisation of everyday objects. For example, Man Ray's first film, Le Retour a la Raison (1923) is an extremely rapid, breathless montage of seemingly unrelated commonplace items and more abstract textures. The items include clocks, pins, lampshades and scrolls of paper, which are intercut with non-representational, grainy textures and images of a fairground. It has a wildness and a spontaneity that few other film-makers of the time were able - or willing - to capture. Some of the objects are related through their slow rotating motions and resemble films of sculptures. However, Man Ray's own account of his procedures when creating the abstract textures makes clear the role of chance and spontaneity in the work: 'On some strips I sprinkled salt and pepper, like a cook preparing a roast, on other strips I threw pins and thumbtacks at random; then I turned on the white light for a second or two, as I had done for my still Rayographs.'

Example 8.1 - Film stills from Man Ray, Le Retour a la Raison (1923) – Redacted

https://www.youtube.com/watch?v=Ebz2AARJUwI

Léger and Murphy's *Ballet Mécanique* (1924) is a more substantial work. As with Man Ray, but even more noticeably, a hallmark of Léger's visual style is the juxtaposition of abstract and figurative elements.\textsuperscript{261} Futurism,\textsuperscript{262} Cubism and Dada mingle in this rich, enticing piece of experimental montage-animation, in which machine movements, innocuous household objects and film looping are provocatively aestheticised. The 'precisely controlled rhythms' and 'calculated, changing tempos'\textsuperscript{263} of these 'non-narrative mechanical movements'\textsuperscript{264} attest to the film's machine aesthetic and quasi-musical conception. Eisenstein defines 'metric montage' as pieces of differing lengths joined together, whereas 'rhythmic montage' implies contrasting rates of movement within the frames as well.\textsuperscript{265} Both types are equally prevalent in *Ballet*. Many of the images pulsate; quickly pulsating machines are juxtaposed with slowly pulsating ones. While the screen is partitioned on occasion, particularly during the earlier sections of the film, simultaneous occurrences are apparently prioritised below 'horizontal' and additive concerns, i.e. the juxtaposition of shots in quick succession. Towards the end of the film, quick alternations of still shots become more central in any case.

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Example 8.2 - Film stills from Léger and Murphy's *Ballet Mécanique* (1924) – Redacted (copyright) [https://www.youtube.com/watch?v=FMZxu910E3E](https://www.youtube.com/watch?v=FMZxu910E3E)

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\textsuperscript{264} Ibid., 5.

It can be seen from these examples that the French-American aesthetic was more pictorial and less self-consciously motivated by an analogy with traditional music forms.\textsuperscript{266} The German animations are, for the most part, much more uncompromisingly abstract, stylistically unified and, to borrow another musical term, 'long-breathed'. The French films have an utterly futuristic quality, strongly apparent whether or not they are read 'musically'. Some of their processes seem reminiscent, in hindsight, of the procedures used by contemporary electroacoustic composers and free improvisers. For example, the application of artificial, technological effects to mechanically captured real world phenomena, and the recording of 'improvisations'. There is an obvious, almost banal link between cinematic montage and the intercutting and irregularities used by Stravinsky. For Malcolm Le Grice, the famous looped sequence of the washerwoman climbing the stairs in \textit{Ballet Mécanique} prefigures what would later become 'almost a genre in itself' - the entirely looped film.\textsuperscript{267} But, in spite of all this, there is little to relate the French-American films to Western classical music concepts from the Common Practice era, such as counterpoint, motivic growth or sonata form. \textit{Le Retour a la Raison} is a quintessentially Dada product, a very long way from Eggeling's dialectical graphic notations, in spite of their common allegiance to non-narrative cinematic principles and the 1920s avant-garde more generally.

The German abstract animations look backwards and forwards at the same time, retrospectively embodying a tension between tradition and modernity. Their time character is evolutionary and organic, yet also repetitive and irregular at times. They reject montage, in favour of spatial subdivisions and a polyphony of visual elements. Yet the visual elements are frequently geometric, and move at an uneven pace. A device such as counterpoint is a thoroughly institutionalised element within music; yet its deployment in an analogous way within abstract moving images is deemed 'avant-garde'. There is an oblique cultural paradox at the heart of this body of work; only a 'musical' reading or analysis makes it explicit.

However, my musical/compositional responses to the German films also show how flickering, echoing, inwardly transforming visual patterns and distinctive visual rhythms, which run the whole gamut from fluid to spasmodic, metronomic to irregular, might be


\textsuperscript{267} Malcolm Le Grice, \textit{Abstract Film and Beyond} (London: Cassell & Collier Macmillan Publishers Ltd, 1977), 40.
creatively re-interpreted, in the light of later twentieth century musical styles. This aesthetic parallel strikes me as more than just a coincidence. The unique intermingling of influences from different media and different historical periods places the German works a very long way from the filmic mainstream, but affords them a timeless quality; they are not constrained by conventional distinctions between media. They have certainly helped me to look at many musical processes, such as counterpoint, afresh.

'AUDIO-VISUAL HETEROPHONY AND DIFFERENT TYPES OF MUSICAL MOMENTUM

Surveying the entire project, consistent principles reveal themselves, at least in the later pieces. My method for interrogating the films musically has involved treating the visual patterns as a set of instructions, or 'score', which I ‘perform’ by composing a fragmentary single line of music. This very close, imitative reading then becomes the structural bedrock and material basis for a multifaceted, polyphonic musical response. The finished pieces seek to illuminate detail and articulate structure, for example through shadowing, punctuation and temporal partitioning. However, there are also layers which exaggerate visual gestures, superimpose additional rhythmic complexity and move at their own pace.

I have sought to demonstrate that precisely synchronised musical gestures and relatively self-governing musical textures are not mutually exclusive. Superimposed layers of activity make it possible to create a polyphony of musical perspectives. However, I have not sought to create a ‘universal’ theory or technique of film music. I imagine that the strictly formalist methods I have developed would not work so well in the context of a mainstream, narrative silent film. Yet, in bringing the insights and methods of later musical thought to bear retrospectively on the German abstract films, my compositions have explored new modes of mediation between historical moving images and contemporary classical music. The internal relationships of both media interact and overlap, resulting in a set of dynamic interrelations across different sensory categories.

I am tempted to refer to my approach as 'audio-visual counterpoint.' However, this is not strictly accurate. Musical counterpoint, whether unified by tonal harmonies or separated into strata by superimpositions and dissonance, is 'the combination of two or more independent
In my later PhD pieces, the music and picture are not, strictly speaking, completely independent of one another. Rather, they represent different versions of one another, played at the same time. Heterophony is defined as the 'simultaneous performance of a melody and a variant of the same melody'. Therefore, 'audio-visual heterophony' would, perhaps be a more precise description of the multimedia texture captured in pieces such as *Symphonie Diagonale, Lichtspiel Opus 3* and *Mechanical Principles*. This relates back to Nicholas Cook's theory of multimedia, which I originally cited at the start of Chapter 3; similarity is the *starting point* for a 'transfer of attributes' between two media (especially music and film). Meaning is created from a 'limited intersection of attributes', not 'complete overlap or total divergence'.

It is possible to superimpose pulses or rhythmic activity across different sensory categories - an unheard visual 'pulse' and a musical pulse might synchronise or interact. However, as previously discussed in Chapter 3, visual patterns lack the 'transient bite' of aural attacks, so a combination of musical and visual pulses moving at different rates might often be too subtle to have a really visceral impact. The collision becomes much more noticeable and beautiful if the visual pulse or rhythmic activity is first 'recreated' aurally, or 'punctuated', before additional, perhaps contrasting layers of sound are added. This is the advantage that audio-visual 'heterophony' has over audio-visual 'counterpoint', in my view.

In Chapter 4, I hypothesised that rhythmic superimpositions and layers of pulses have a more expressively 'neutral' quality than melodic or harmonic devices. Surveying the whole project, there has been a noticeable shift in my music away from compositional strategies which afford harmony and harmonic dissonance the highest priority. My later pieces derive more of their musical momentum from rhythmic layering and rhythmic/temporal dissonance. Harmony and pitch functions might well be the most medium-specific aspects of music; it is difficult to imagine an abstract visual pattern systematically modelled after a perfect cadence, for example. The limited success of colour organs, briefly discussed in Chapter 1, attests to this problem. However, films like *Symphonie Diagonale* show how it is possible to have a polyphony of visual elements, to present graphic patterns 'pulsating' at different speeds or to

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269 Ibid., 78.
271 Ibid., 82.
explore aspects of divisive and additive rhythm visually. Perhaps by foregrounding types of momentum and texture which are intrinsically musical yet less exclusive to music, it becomes easier to create an overlapping, multimedia framework between music and abstract moving images.

If, as Russell Lack argues, the music for a silent film is an 'assertion' or 'declaration' of values about the cinematic events,272 then perhaps my music also analyses or 'reveals' the films in a more general sense. The distinct layers of rhythmic activity and splitting of melodic patterns are clearly audible as such, and call attention to the spatial subdivisions and polyphony of visual elements in the films. The organisation of the musical textures is perhaps analogous to a split-screen effect. The connection between melodic fragmentation and layered pulses results in a form of audio-visual divisive rhythm on a higher level.

Overall, then, my original contribution to knowledge can be summarised as follows. Through close analysis, I have demonstrated that the spatio-temporal characteristics of many early abstract films are systematically modelled after musical processes and forms; the appropriation of musical terminology is, for the most part not merely decorative or status-seeking. Also, a musical perspective brings the blend of influences from different media and historical periods into sharper focus. I have developed methods for interrogating and 'performing' the abstract film texts through my own compositional practice, creatively reinterpreting these 'scores' in the light of later musical styles and generating unique audio-visual textures in the process.

As the project unfolded, my music became increasingly influenced by the structural and behavioural aspects of abstract cinema and began to foreground elements which, while intrinsically musical, are less exclusive to music. In addition, the juxtaposition of human and machine gestures in the later pieces is a commentary on the mechanical nature of the film medium. It might also be interpreted as an extension or projection of the habitual 'forced marriage' between live and pre-recorded media, which occurs in silent film concerts.

The Hammer Revisited: Further evidence of a rethinking and reinvention of my compositional language, pointing towards future collaborations with contemporary film-makers

In order to lend further support to my conclusions and round off the thesis, I will end by discussing the final piece in the portfolio, *The Hammer Revisited*, a short, single movement piece for quintet. It is not an apotheosis or culmination as such. However, it does further demonstrate how close engagement with the film texts and being 'instructed' by them has stimulated a rethinking and reinvention of my compositional language.

Most of the pitch material is derived from the first three bars of *Avant L'Artisanat Furieux* (‘Before the Furious Craftsmanship’), from *Le Marteau sans Maître* (‘The Hammer Unleashed’, 1954) by Pierre Boulez.

Example 8.3 - *Le Marteau sans Maître* (1954), bars 1-3


The piece was commissioned as part of a concert in Brighton celebrating Boulez' 90th birthday, in 2015. The idea of writing a relatively tonal or modal piece based on a snippet of Boulez was intended as a playful, rather than polemical gesture, which might inject some lightness into the uncompromising programme.
As with the film pieces, I began by composing a fragmentary, skeletal line. I then layered the other parts around it, amplifying and commenting on the material and superimposing additional rhythmic and melodic complexity. The parts in the first two bars were all composed simultaneously, however; this area is effectively a quotation.

Example 8.4 - *The Hammer Revisited*, bars 1-2

The pitch material is divided into motivic fragments; their textural and linear placement are constantly changing. Sequences originally concealed by wide melodic gaps in a thick texture emerge to form distinctive patterns, for example at bar 73. Elsewhere, fragments are reordered, fusing together to create new instrumental lines, for example at bar 77.
Example 8.5 - The Hammer Revisited, bar 73

Example 8.6 - The Hammer Revisited, bar 77

The fragments themselves are also subject to small-scale, inward re-shaping, for example at bar 23.

Example 8.7 - The Hammer Revisited, bar 23

The harmonic connections between the fragments are kept fixed most of the time, in order to strengthen unity. Pitch centres (often the bass note) are not always audible as such, but tend to bind together all the melodic patterns in a fixed harmonic relationship. There are
exceptions to this rule, for example at Figure C, when inversions are used. However, it is a significant feature of the piece.

The pitch centres in the piece are as follows:

Bars 1-3: E
Bars 3-7: F sharp
Bars 7-10: E
Bars 10-12: D
Bar 12: E
Bar 13: D
Bar 14: C
Bars 15-19: B
Bars 19-23: C
Bars 23-33: D
Bars 33-40: C
Bar 40: E
Bars 41-3: A
Bars 43-7: B
Bars 47-50: F sharp
Bars 50-57: C
Bars 57-68: F sharp
Bars 68-73: G
Bars 73-80: C sharp
Bars 80-83: E
Bars 83-88: G/C sharp
Bars 88-100: D
Bar 100-end: E

Many of the rhythmic ideas in The Hammer were conceived independently from the pitch material, with syncopated gestures and dotted dance rhythms especially prominent. On the whole, it uses a very similar rhythmic vocabulary to the film pieces in the Portfolio. Like in Lichtspiel Opus 3 and Mechanical Principles, but perhaps less overtly due to the lack of electronic instrumentation, there is a productive tension between the buoyant, dotted dance
rhythms and the comparatively impersonal, mechanical, pulsating elements. For example, at Figures B, C and K. This was influenced by the tension between different types of movement and between rounded and geometric shapes in Walter Ruttmann's *Lichtspiel Opus 3*.

I worked out many of the rhythms before I filled in the pitches. The rhythmic cell at the end of bar 2 functions independently of the melodic patterns. For example, in bars 75-77:

![Example 8.8 - The Hammer Revisited, bars 75-77](image)

Another important rhythmic cell is unveiled for the first time at Figure D.

![Example 8.9 - The Hammer Revisited, Fig. D](image)

In the middle section (Fig. E to H), two long, pulsating melodic patterns emerge. One is 'improvisatory' and in dotted quavers, the other more 'premeditated', methodically worked out and in straight quavers. The two lines unfold at conflicting speeds. The slow pedal bass implies a third tempo, creating further disruption.
Example 8.10 - *The Hammer Revisited*, bars 49-53

The improvisatory melody takes the three-note piano figure from bar 1, transposed a perfect fifth lower in relation to the overall pitch centre, as its starting point. It also elaborates freely on the whole tone cello figure and Locrian flute figure from bar 1, with irregular phrasing and a fluid unpredictability, as material is inwardly re-shaped, and turned inside out. It reaches a climax at Figure G. Despite its superficially wayward qualities, it shares scalar and intervalllic characteristics with earlier materials.

The premeditated melody is a linear expression of all the pitches in the first two bars, zig-zagging and 'stretched' out to create a 30-note series. The first 12 notes are played by the violin in bars 47-50. The full pattern is not revealed until bars 57-64 in the flute part. (Although it is derived methodically from the opening bars, it sounds like new material because its scalar and intervalllic properties are somewhat different, and there are more leaping intervals.)
Example 8.11 - *The Hammer Revisited*, 30-note series

It can be observed that virtually all of the tension and momentum during this passage comes from the interaction of the two melodic sequences and the rhythmic/temporal dissonance, not chord progressions or harmonic contrasts/dissonance. The pitch centre alternates between F sharp and C, but the harmony is relatively static within these fields. The percussive, staccato articulation means that individual sonorities are too fleeting to fully register; they are like splashes of colour. However, the pedal note provides a point of repose, an unchanging musical backdrop.

The *Hammer's* 30-note series is integrated with earlier melodic and rhythmic materials at Figure K. This is also the moment when the two contrasting rhythmic styles in the piece, dotted dance rhythms and pulsating figures confront one another very directly in an intense climax which shares aesthetic similarities with the ending of Ruttmann's *Lichtspiel Opus 3*. Some of the improvisatory melody is recalled at 100-103.

Because *The Hammer Revisited* foregrounds types of momentum and texture which are intrinsically musical yet less exclusive to music, it is quite possible to imagine a contemporary abstract film being choreographed to it in a 'heterophonic' way. The rhythmic layers provide multiple points of emphasis for polyphonic visual patterns, especially during the middle section, when the two melodies unfold at conflicting speeds. One might imagine a collection of wheels and cogs turning at different rates. Or, a visual sequence could be coordinated with one of these melodies and presented in a split-screen format, alongside more independent visual activity.
These ideas point towards a new research project, which builds on and extends the discoveries made in this one. I am not sure whether it can be truly said that I have achieved a 'liberation from psychological time'\textsuperscript{273} in *The Hammer Revisited*, or in the later film pieces like *Lichtspiel Opus 3*. However, inhabiting and 'performing' abstract film texts has helped me to become more disciplined and flexible as a composer. I am keen for this process to continue.

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PhD Dissertations


APPENDIX 1

Hans Richter's *Rhythmus 21* - Shot analysis.
Identification of musical processes & forms. Spatio-temporal transformations.
Continuities, symmetries and sectional breaks.

0:01- Title sequence.

0:07 - Motive x - two white squares, the same height as the camera shot meet in the middle of the screen, then move outwards again, forming a 'wiping' gesture. This spatio-temporal motive is stated once, then rapidly repeated twice in reverse. 2[+2+2] seconds

'Flat' movement: left-right. Contrary motion.

[Alternative perceptual reading: a black vertical line in the centre of a white background, which widens to become a black vertical rectangle.]

0:13 - Motive y - Large white square, in centre of shot, over black background, shrinking or rushing backwards. This motive is looped once at the same speed, without being reversed and has its ending slightly cut off. 4[+2.5] seconds.

'Three-dimensional' movement: backwards-forwards.
Additive-subtractive 'looping' principle becoming established.
0:19 - Motive x again, but movement occurs horizontally this time: inversion of original. It is looped three times. $2[+2+2+2]$. ‘Flat’ movement: up-down.

0:27 - First appearance of multiple surfaces/objects. Three white, vertical rectangles perform Motive y, in ‘parallel’ motion, shrinking/moving away.

0:30 - A huge white square slides in from the right of the screen over the black background and engulfs the shot, 'wiping' the image; this leads very briefly to a white background before the process happens again, with the colours in reverse. $2+2$ (Still for half a second in the middle.)

This is a variation on Motive x - flat movement: left-right.
0:34 - Shot has similar composition to 0:27, but movement is 'flat'. Two vertical rectangles slide up and then down at the same time, in exact 'parallel' motion. 2+2.

0:38 - The variation on Motive x from 0:30 begins again, just as the previous gesture is finishing. This time, however, the white square only travels halfway across, before the black side of the screen, which now resembles a tall, vertical rectangle, suddenly recedes and disappears. Motives x ('wiping') and y (growing, shrinking square) are combined in a single, sweeping gesture. 2+2

0:42 - Motive y begins to be explored 'contrapuntally'. Rectangular shapes grow and shrink at roughly the same speed - 'imitative' textures (reverse 'canons') and contrary motion.
First Motive y (the shrinking/backwards-moving white square) returns, this time accompanied by a growing, narrow, vertical white rectangle on the right side of the screen. After this rectangle reaches full size, it shrinks abruptly; and Motive y replays while a similar (but slightly wider) rectangle, positioned horizontally, expands and then contracts in the lower portion of the screen.

0:51 - First juxtaposition of still images/stop motion/still motion. A still image of a huge, centrally placed white square appears for 3 seconds - this marks the end of the brief, exploratory 'polyphonic' section. It is then alternated several times with another still shot of an identical white square approximately one quarter its size, creating a very clearly articulated musical rhythm, six 'beats' at crotchet 60, with a slight deceleration occurring. 3+1+1+1+1+1+3. The rhythmic sequence ends with the still shot of the larger white square, again held for 3 seconds. This sequence might be considered another variation of Motive y.

There is a sharp contrast between this jerky succession of stills and the polyphonic interplay and smooth motion which immediately precedes and succeeds it. It functions like an interlude, or perhaps a 'compressed' restatement of earlier materials.
1:00 - Now the polyphonic, 'imitative' exploration of Motive y begins again. There is 'oblique' motion for the first time, as motionless rectangles co-exist with moving 'three-dimensional' shapes.
(In musical counterpoint, oblique motion is when one part remains on the same note, while the other moves towards or away from it.)
The inclusion of motionless elements within the polyphonic interplay also provides some continuity with the previous sequence.

There are two shapes in each shot.
First there is a small, still grey square on the lower right, with a small, expanding horizontal white rectangle underneath it. The two shapes are in 'oblique' motion here, since one is moving or changing size; the other is fixed and stationary.
This sequence then repeats with the image turned upside down and the movement reversed.

Then, a large white-grey rectangle appears lower right, with a smaller, white square contracting behind/above it. That square expands, then becomes still and turns dark grey as a small, white rectangle appears underneath it and begins to enlarge.
The two shapes remain in position and alternate between contrary and oblique motion.

2+2+2+1+2+2+1 - Diminution.
1:13 - Shot composition similar to 0:27 and 0:34. There is a tall, motionless, white vertical rectangle on the left side of the shot, and the still, horizontally placed white-grey rectangle from the previous sequence remains on the right side. The two are arranged in a broken L shape, forming a right-angle.

After about 2 seconds, two tiny rectangles, forming a virtual mirror image of the larger formation, appear top left in a steady rhythm, then vanish.

Connection between small-scale and large-scale patterning here.
Following this, there is a polyphonic transition, as the broken L shape recedes and is gradually replaced by a virtual mirror image of itself, enlarging to fill the screen.

A similar, but not identical series of movements occurs - the shot is still for 2 seconds, before two small, grey rectangles forming another broken L shape, upside down this time, fleetingly appear on the upper left in a regular rhythm, and a tiny, syncopated white square 'punctuates' the screen just below them.

Then, a small white square emerges on the upper right. As this happens, the large rectangle on the right shrinks, and the two rectangles shrink and grow for 5 seconds while the square above them remains motionless - combined contrary and ‘oblique’ motion for the first time.

2+2+2+2
1+1+1+1+1+1
At 1:27 there is another quick polyphonic transition. The sequence from 1:28-35 is exactly the same as 1:13-20, but each formation has been replaced by a mirror image of itself.

1:35 - Motive y returns in its simple, original form (large, single white square shrinking) for the first time since 0:13. Link with sequence of still shots/stop motion at 0:51. Brief interlude from the polyphonic interplay, but motion is still smooth. This time, the square shrinks for 4 seconds, (slower than previously) then grows for 3 (reversed, normal tempo). It doesn't have time to shrink to nothing, like at 0:13.

1:41-46: Square abruptly vanishes and a tiny, horizontal white rectangle appears centre left and enlarges very slowly.

1:46-54: Exact repeat of 1:27-35.

1:54: 'Imitative' textures or 'canons', in combined contrary and oblique motion, begin again. Similar to 1:00-13, but this time the rhythms are more irregular, causing an acceleration-deceleration effect. (This has only been hinted at during previous polyphonic episodes.) The variations are sometimes looped and 'jump' back abruptly to start again, contributing further to this sense of 'rubato', which slightly recalls the stop motion/still shots from 0:51 again. Less smooth, more abrupt and erratic pulsation.

The 27 seconds from 1:54 to 2:21:

Organisation of shapes:
1:54: Small, motionless square top left; two pulsating rectangles placed far apart, forming a right-angle across the centre of the screen.
2:00: Medium-sized, motionless square centre right.
2:05: Large, motionless square in centre.

2:09: Motive y returns in prime form again. Large square shrinks very slowly this time. 6+6
Meanwhile, rapid, pulsating polyphonic activity all around it. Flashing, flickering shapes. Sped up growing and shrinking gestures, recalling earlier sequences.
2:15: Square begins to enlarge again. (Loop reversed.)

Meanwhile, the polyphonic interplay of smaller rectangles from 2:10-21 is organised into two very similar sequences. The second plays with the image turned upside down and many movements from the first reversed.

3+2+2+3

The white square appears in the centre of the shot for 3 seconds again. It is alternated rhythmically with shots of the quarter size square, then a third square appears which is about half size.
3+1+1+0.5+1.5

2:28-29: Film negative is reversed for the first time. First the background whitens, then the square darkens.
2:30-42: Some patterns from the middle section of the film are briefly recalled, with the colours reversed.

2:38: First and only appearance of diagonal lines and an upside down, broken V shape (or tilted T shape), top left.

2:42: The end of this section is marked by the 'recapitulation' of Motive x in its original form.
The white background splits down the middle and the image becomes two white squares, moving apart once then sliding back together. Their original movements from the beginning have been reversed. 2[+2]
The original colour scheme is restored in the process.

2:46: One horizontal and two vertical white lines appear at the edges of the (once again black) screen and grow inwards.
2:48: As soon as the first three lines stop growing, a second line formation appears and superimposes itself on top, prominently intersecting the first group of lines in two places. The result is a grid of orthogonal lines. This sequence is 'flat' and can be understood as a distant relative of Motive x.

2:49 - The image appears abruptly enlarged, as the process slowly reverses.

2:53 - Blank screen. (Pause for breath.)

2:54: Previous variations and spatial compositions are recalled, summarised very quickly, compressed and super-imposed as three screen shots dissolve into one another, ending with the ‘Mondrian-like grid.’ (Richard Suchenski).
2:57: Negative is quickly reversed again. Shot of black square, motionless for 3 seconds.

3:00-03 - The black square shrinks/rushes backward very quickly, and this final statement of Motive y is looped once.

2+1

3:04: 'Fin'. 
Appendix 2: Scores by other composers, for films used in the Portfolio

Rhythmus 21 (Hans Richter, 1921/24)
Bernd Thewes (2008, ARTE TV)
Berlin Soundpainting Orchestra (2013) https://www.youtube.com/watch?v=5Nf7atah-4s

Symphonie Diagonale (Viking Eggeling, 1924)
Sue Harshe (2005, Kino Video) https://www.youtube.com/watch?v=nJuIDPp6raw
Olga Neuwirth (2006, ARTE TV) https://www.youtube.com/watch?v=MtBjFv46XlQ
Markus Robam, 'Angle to Angle' (2012) https://www.youtube.com/watch?v=Zm2qtoPYv_Q

Lichtspiel Opus 3 (Walter Ruttmann, 1924)
Hanns Eisler, 'Prelude in the form of a Passacaglia' (1927)
https://www.youtube.com/watch?v=SDxcfDNFrIA
Louis Andriessen, with Orkest de Volharding (2003)

Mechanical Principles (Ralph Steiner, 1931/33)
Colin McFee (1931)
Philip Glass, piano improvisation (2000, Anthology Film Archives)
Appendix 3: Experiments, alternative versions

Alongside the 'definite' recordings and video synchronisations of the musical scores in the Portfolio, there are also a number of experiments and alternative versions of pieces, which are occasionally referred to in the Commentary. These media files are prefixed with the label 'TR_Appendix 3'.

Unlisted links on Vimeo

TR_Appendix 3_Rhythmus 21a & 21b layered.mov
https://vimeo.com/579568442/795210957e

TR_Appendix 3_Symphonie Diagonale - version with dynamics.mov
https://vimeo.com/579570136/5a26ce61ac

TR_Appendix 3_Lichtspiel Opus 3 - live workshop recording.mov
https://vimeo.com/579574117/052776ba0b

TR_Appendix 3_Mechanical Principles - no effect on film.mov
https://vimeo.com/579692822/122f397140
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In loving memory - Madeline Lee Pulsford (1925-2017), Magdalena Reid (1948-2014) and Alex Reid (1943-2009).