Vision in motion: The complexities of Time, Space and Motion experienced in the artwork and practice of Len Lye and László Moholy-Nagy

A THESIS SUBMITTED FOR
THE DEGREE OF THE
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Declaration of Originality

I, Lisa Clunie...........hereby declare that the thesis here presented is the outcome of the research project undertaken during my candidacy, that I am the sole author unless otherwise indicated, and that I have fully documented the source of ideas, references, quotations and paraphrases attributable to other authors.
ACKNOWLEDGMENTS

Thank you to all the people who have helped me on this journey, with special thanks to my mum, dad and partner Mark for their love and support. In addition, I would like to thank my supervisors for their generosity and guidance, including Professor Roger Horrocks for his selfless dedication to ensuring knowledge about Len Lye is accessible to all.
ABSTRACT

Vision in motion: The complexities of Time, Space and Motion experienced in the artwork and practice of Len Lye and László Moholy-Nagy

This thesis examines László Moholy-Nagy's *Vision in Motion* - both a book and a theory - developed as an educational curriculum in response to an increased technological society. Considered one of Modernisms 'great' artists, Moholy-Nagy believed that it was necessary for art to become integrated with life, and that a balance be struck between man's sensory, intellectual and emotional faculties. His theory 'Vision in Motion', deconstructed here into the constituents of time, space and motion, is analysed in relation to the work of Moholy-Nagy and New Zealand artist Len Lye. Operating in similar fields at the same time, both artists were polymathic and experimental in their approach to a wide range of disciplines. Central to the practices of Moholy-Nagy and Lye were interests in light and movement respectively.

To provide a context for discussing 'Vision in Motion', this thesis initially outlines developments in Western and European understandings of time and space leading up to the 20th century. How early 20th century artists responded to this change and in particular how Moholy-Nagy and Lye subsequently developed their interests in light and motion during this epoch is discussed. Through analysis that focuses largely on Lye's films and Moholy-Nagy's photograms, it is demonstrated that both artists shared similar complexity in their work in regards to time, space and motion. This thesis proposes in conclusion that Lye can retrospectively be considered one of modernisms great artists. More so, that Lye fits the model of the interdisciplinary and 'balanced' artist that Moholy-Nagy proposed in *Vision in Motion*. 
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Introduction

Vision in Motion is a lasting theoretical proposal left by one of Modernism's great artists-László Moholy-Nagy. Operating as an account of the curriculum for The Institute of Design, which he founded in Chicago, Vision in Motion proposes a democratic vision of self-expression, one that emphasises the necessity of integrating art and life. Born of the political upheavals of the early 20th century and refined over the trajectory of his career, this all encompassing theory is as relevant today as it was in 1947 when published posthumously a year after Moholy-Nagy's death. His proposal that we learn to utilise all our sensory capacities and to see everything in relationship, emphasises simultaneity and motion through the interconnection of space and time.

This thesis will propose that another artist operating in similar fields at the same time was intuitively exploring many of Moholy-Nagy's ideas, in particular those to do with the sensory and emotional fulfilment of an individual through art. Len Lye, a New Zealander whose art practice paralleled and intersected with Moholy-Nagy's, was an experimental film maker, painter, photographer and kinetic sculptor. Where Moholy-Nagy's life-long pursuit was the expression of light, Lye's was of motion, but both artists shared similar complexities in their work in regards to the treatment of space and time, responding to the annihilation of time and space resulting from 19th century technological and scientific developments.

Yann Beauvais' essay Rapports entre Len Lye et Moholy-Nagy, 1992, is the departure point for this thesis, using the concept of ‘Vision in Motion’ to investigate further the parallels and differences between the two artists' approaches. Apart from catalogues and essays in which Lye and Moholy-Nagy are incidentally linked in the context of kinetic art, Beauvais can be credited as the first author to make direct and detailed comparisons between the two artists in regards to film, theory and life. Beauvais analyses the films and writing of Moholy-Nagy and Lye, concluding that Moholy-Nagy leaned more toward constructivism and rationalism, whereas Lye's approach was more organic, as can be seen in his writing which is incredibly poetic. Furthermore, despite the fact Moholy-Nagy's theoretical writings on film and film scripts were avant-garde, most of his films remained distanced from this. Being largely sociological and political, Moholy-Nagy's films were in contrast to

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2 Moholy-Nagy, Painting, Photography and Film, 122: See in particular Moholy-Nagy's graphic script for Dynamic of a Metropolis, 1921.
Lye’s, which showed a more innate and prolific level of experimentation. This thesis proposes to extend these comparisons into detailed analysis of their work and life through a spatio-temporal lens. Through this lens I will argue that it is in Moholy-Nagy’s photograms that he achieves what he wrote about, and that it is in Lye where we can recognise the manifestation of the experimental artist that he so eagerly advocated.

Although it is only conjecture that Lye and Moholy-Nagy would have crossed paths, it is clear that Lye was familiar with Moholy-Nagy’s work. It is most likely that the two artists would have known of each other, and may have met, when both living in London.³ Although we cannot be sure whether Lye was actually cognisant of Moholy-Nagy’s book Vision in Motion or not, Lye’s 1961 essay “Tangible Motion Sculpture” demonstrates an awareness of Moholy-Nagy’s place in the history of Kinetic art. Lye states: "Kinetic constructions date back to the twenties in the creations of Moholy-Nagy, Gabo, Leger, Man Ray, Duchamp, and others."⁴ The possibilities for their mutual recognition are interesting as we consider the ways in which they independently explored ideas of light and motion within the paradigm of Modernism.⁵

Before he moved to London, Moholy-Nagy’s film Lichtspiel Schwarz-Weiβ-Grau screened at London film society in 1932. John Grierson, the head of the GPO film unit, whom Lye would work with for several years beginning with A Colour Box in 1935, brought the rights to Moholy-Nagy’s film. In 1933 excerpts from Lichtspiel Schwarz-Weiβ-Grau were used at the beginning of Stuart Legg’s documentary The Coming of the Dial. Since Lye regularly attended film society screenings, it is highly possible that Lye would have been aware of this film. If he had not viewed Moholy-Nagy’s film at the original screening, it is likely he would have seen Legg’s documentary at some stage through the relationship he would go on to develop with the GPO.

³ The period in which both artists lived in London at the same time was 1935-37. Lye did not move to America until 1944, therefore, due to Moholy-Nagy’s death in 1946, and with both artists living in Chicago and New York respectively, it is most likely that they crossed paths in London rather than America. In 1936 Lye was an exhibiting artist in the International Surrealist Exhibition in London. It is highly likely that Moholy-Nagy would have visited this exhibition, as would have Lye visited the Moholy-Nagy retrospective exhibition at the London Gallery in 1937.


⁵ Email from Professor Horrocks, 13 October 2014.
Jack Ellitt, whom Lye collaborated with on several films, was another possible point of contact between the two artists. Like Moholy-Nagy, Ellitt had experimented with freely drawn soundtracks during the 1930s.\(^6\) During an interview with Roger Horrocks, Ellitt said that he had done sound recording for the 1935 film *Lobsters*, directed by Moholy-Nagy. As Ellitt put it, “I did some sound-recording, hauling a heavy tape-recorder round a beach!”\(^7\)

The close working relationship between Lye and Ellitt would infer Lye and Moholy-Nagy would have been aware of one another at this time. Of further interest is the similarity in sequences between the last film that Ellitt and Lye collaborated on, *N or NW*, 1937, and Moholy-Nagy’s film *Lobsters*, 1935. In the closing sequence of *Lobsters*, a lobster breaks through a page of text, a menu upon which various crustacean dishes are listed. The rupture of the written page and sense of uncanniness is echoed two years later in *N or NW* in scenes where a woman peers through a kidney shaped hole cut in a letter. The use of worms eye viewpoint and a glass table, underneath which the action of writing a letter is filmed, is reminiscent of Moholy-Nagy’s dynamic Bauhaus photographs. Through the interplay of shadowy forms, the simple process of writing a letter is rendered phantasmagoric, not dissimilar to the opening sequence of *Lichtspiel Schwarz-Weiss-Grau*.

Although this thesis will focus on the photograms and films of Moholy-Nagy and Lye, it is important to note briefly the importance of their contributions in the field of kinetic sculpture. As kinetic art became recognised as a major art movement from the 1960s onwards, there were several important survey exhibitions that included both Lye and Moholy-Nagy’s kinetic works.\(^8\) These exhibitions and subsequent catalogues could have acted as further points of contact between the two artists if Moholy-Nagy had still been alive, yet are still important to note when considering if Lye had explicit knowledge of the work of Moholy-Nagy or not. Although we cannot be sure if Lye or Moholy-Nagy owned copies of one another’s writing, *The Nature and Art of Motion*, 1965, edited by Moholy-Nagy’s colleague Gyorgy Kepes, was a book in Lye’s collection. George Rickey’s chapter ‘The Morphology of Movement - A Study of Kinetic Art’, makes mention of both Moholy-Nagy and Lye in respects to the art of motion, with photographs of their sculptures *Light Prop* and *Harmonic Curve* included.\(^9\)

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\(^7\) Email from Professor Horrocks, 13 October 2014.


Initially considered a 'maverick's maverick', Lye has become better known since his death in 1980. An increased interest in intermedia art practices and methodologies, and the development of the Len Lye centre in New Zealand, has focussed critical appraise on Lye both national and internationally. Roger Horrocks has been particularly instrumental in the publication of knowledge about Lye, and the exhibition programme at The Govett-Brewster gallery in New Plymouth mounts exhibitions of Lyes' work on an annual basis. Charles Green recently wrote: "From the perspective of canonical medium-specific modernism, Lye is an outlier, a tantalisingly peripheral yet prescient figure. But as the 20th century fades to black and its art history rewritten, Lye's name is likely to outshine that of the better-known moderns." My thesis aims to flesh out Beauvais' suggestion that Lye's films accomplished visually what Moholy-Nagy had theorised about, adding further weight to the recognition of Lye as one of the great visionaries of interdisciplinary practice and Modernism.

Chapter One will briefly examine the precepts of 'Vision in Motion' and what it developed in response to, with an analysis of the relevance of 'Vision in Motion' to our current context. Beginning with an outline of 19th and early 20th century advancements in technology and scientific and philosophic thinking, I proceed to discuss re-evaluations of space and time, from the perspective of Western and European histories. This period saw breakthroughs in the public conception of space and distance as a result of the invention of the railway, telephone, telegram, aeroplane and the birth of cinema. These in turn led to...

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12 Beauvais, *Rapports Entre Laszlo Moholy-Nagy et Len Lye*, unpaginated. Translated by Roger Horrocks: "While many things separate Moholy-Nagy and Lye, it remains the case that the film-making of one of them seems truly to have accomplished visually the hopes expressed by the other." (Si beaucoup de choses séparent Laszlo Moholy Nagy et Len Lye, il n’en demeure pas moins que le cinéma de l’un semble véritablement accomplir visuellement les attentes de l’autre).

13 The Eastern concept of space 'Ma' is discussed briefly in this chapter, however the argument in this thesis is restricted to Western and European histories.

the standardisation of public time, whilst also making it possible for the broader public to conceive of simultaneity of experience of space and time.\textsuperscript{15} In response to these 19\textsuperscript{th} century inventions the social consciousness of space and time had begun to shift, 'annihilating' previous conceptions of space and distance.\textsuperscript{16} The resonance this had and its impact on early 20\textsuperscript{th} century artists such as the Cubists, Futurists and Constructivists, including Moholy-Nagy, will be outlined.

Chapter Two will introduce time as a central element in Lye and Moholy-Nagy's works. Time will be discussed for the role it played in transforming the artists' experiences of reality, process and visual relationships. Lye had a deep understanding of evolutionary time, which went right back to the primordial. Accessing this through tribal art and 'old brain thinking,' he discovered and physically manifested the interconnections between many aspects of life, most particularly in science and art. His theoretical expression of time in 'Individual Happiness Now' is of an embodied present, with an understanding of the continuity of time. Likewise Moholy-Nagy, in looking forward to the future, also believed in the importance of understanding where one came from, as much as being aware of the potential afforded by the present; "the knowledge of historical continuity is one of man's most valuable stepping stones in his evolutionary progress."\textsuperscript{17} Fundamental to understanding 'Vision in Motion' is time, for what is motion without time and space for it to be expressed? The active interplay of different parts, 'creating new relations' advocated by Moholy-Nagy, involves the physical experience of looking, which in itself is perception constantly in motion, a time-based process. The chapter will end by analysing temporal complexities in both Moholy-Nagy's and Lye's film work and photograms.

For Moholy-Nagy and Lye space was a crucial condition for the expression of motion, and it was explored visually and physically in a myriad of ways through films, photograms and kinetic sculptures. Chapter Three will demonstrate how their explorative film-making and photographic techniques were utilised to peel apart space which, as with time, revealed its many layers. Dynamic visual relationships, created through juxtapositions and superimpositions, heightened a sense of spatial complexity, most particularly in Lye's films and Moholy-Nagy's photograms.\textsuperscript{18} Moholy-Nagy's photograms are a triumph in the

\begin{footnotesize}
\begin{enumerate}
\item The annihilation of space and time' is referred to in both Kern, \textit{The Culture of Time and Space 1880-1918} and Solnit, \textit{River of Shadows: Eadweard Muybridge and the Technological Wild West}.
\item Moholy-Nagy, \textit{Vision in Motion}, 23.
\item Due to space limitations the similarities in their kinetic sculptures will not be discussed in depth in this
\end{enumerate}
\end{footnotesize}
dematerialisation of form creating objective relationships in a vertiginous, ungrounded space, which I will argue are his most successful manifestations of 'Vision in Motion.' Moholy-Nagy’s sense of space as an active force-field of relations is different to Lye’s films and kinetic sculptures, where, instead, the articulation of Lye’s space is constantly evolving and in motion, but grounded, belly-dancing about in the audience’s bodily experience of the work.

To conclude, further intersections and differences between Moholy-Nagy and Lye will be briefly examined: from similarities in the artists’ interdisciplinary approaches to their belief that art was synonymous to life. As humanists, they committed to the ability of art to transform and better society through self-expression. They pronounced their ideas of time, space and motion prolifically and articulately in visual and written form; published as manifestos, letters, articles and poetry. In particular, Moholy-Nagy and Lye were each repeatedly drawn back to a central concern that underpinned the diverse branches of each of their practices: for Moholy-Nagy his enduring concern was with light, whereas for Lye, it was the experience of movement that inspired him to seek how to ‘compose with motion’ throughout his life. United in their encouragement of spontaneity and creativity, both Moholy-Nagy and Lye cautioned against fragmentation, favouring the overview and building of interconnections instead. Early on, Lye developed a sense of ‘direct bodily empathy’ that was central to his whole being. He tinkered with materials, getting a ‘feel of them’ which in turn energised his processes of making, often leaving a residual ‘trace’ of the artist, further strengthening the work’s effect. “In returning the hand of the artist to the film, Lye also returned a consciousness of the body to the viewer.”

It was this process of rigorous experiment, of curiosity and play, that was eagerly advocated as research by Moholy-Nagy in Vision in Motion. I will argue here that through the embodied experience of Lye’s films we see the fullest expression of ‘Vision in Motion’, with its “grasp of new imagery and its new rhythmic structure.” As Beauvais posits, it is through his experimentation that Lye “seemed to accomplish within the cinematic field what the other had championed theoretically.”

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19 Lye stated: “If there was such a thing as composing music, there could be such a thing as composing motion” Tyler Cann and Wystan Curnow, eds., Len Lye (New Plymouth: Govett-Brewster Art Gallery, 2009), 43.


21 Moholy-Nagy, Vision in Motion, 25.

22 Beauvais, Rapports Entre Laszlo Moholy-Nagy et Len Lye, (Geneva: Fonction:Cinema, May 1992), unpaginated. Translated by Professor Horrocks: "While many things separate Moholy-Nagy and Lye, it remains the case that the film-making of one of them seems truly to have accomplished visually the hopes
Chapter 1

Introduction

To locate Moholy-Nagy’s *Vision in Motion* in a broader context of early to mid 20th century art practice, shifts in thinking about the nature of time and space will be outlined as separate, although intertwined, concerns. Finally, *Vision in Motion*, both a publication and a theory, will be briefly examined for its underlying proposal to integrate art and life, to see and think in relationships. The theory ‘Vision in Motion’ provides a lens through which similarities in Lye and Moholy-Nagy’s practices can be considered.

László Moholy-Nagy was geographically situated in the midst of such change, in Hungary then Germany, gaining first-hand experience of the philosophical and artistic responses to this *zeitgeist*. Len Lye, located in New Zealand, Australia and Samoa prior to his arrival in the UK in 1926, was aware of such shifts; this knowledge was mostly intuitive or second-hand, filtered through publications that reached him. Therefore, as the history of the changes in time and space consciousness are outlined in this chapter, Moholy-Nagy features more than Lye in regards to their deliberate theoretical contributions to the dialogue about space and time.

Space

Prior to the 19th century, a Euclidian concept of space prevailed, whereby space was considered absolute, homogeneous, measurable, and static. Depicted from the stasis of a singular viewpoint, pictorial space was considered objective: fixed and disembodied. Geoffreys Batchen writes that prior to the 19th century “Subject and world were understood to be pre-given, separate and distinct entities. As a consequence the act of seeing was regarded as both passive and transparent to the world being seen, and was in that sense an act sundered from the physical body of the observer.”

expressed by the other." (Si beaucoup de choses séparent Laszlo Moholy Nagy et Len Lye, il n’en demeure pas moins que le cinéma de l’un semble véritablement accomplir visuellement les attentes de l’autre)

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23 The fervency behind the artistic responses of such shifts in thinking were most keenly felt in the modernist art groups operating out of Europe at this time.


implicit in this statement was later overturned by scientists and philosophers during the 19th century. In particular, Phenomenology, a philosophical method in which hierarchies between body and mind are levelled, and the subjective experience legitimised, gained popularity with artists and writers by the turn of the 20th C.26 Although Lye and Moholy-Nagy do not appear to reference phenomenology directly as an influence, Horrocks suggests that Lye's approach was "a kind of phenomenology." 27 Lye's knowledge of the world was mediated through what Lye called a "feeling of bodily being," "an awareness of the experience of experience." 28 It is useful to consider how these earlier shifts in the understanding of perception, manifested itself in Moholy-Nagy and Lyes' treatment of space decades later.30

Contributing to this shift in concepts of space were developments made by scientist Ernst Mach who proposed a model of space that was no longer fixed and singular but experienced through the continual motion of the body.31 Mach, highly critical of Newton's geometric model of space and idea that space or time were absolute, proposed that they should be considered in relative motion. Mach also differentiated between geometric space and perceptual space, with fellow scientist and mathematician Poincare explaining in 1901 that perceptual space included other different kinds of spaces that could be physically experienced: tactile, audio, and visual.32 Poincare believed that our experience

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26 The philosophy of phenomenology is best defined as an approach or a set of methods. It is an inquiry into the essence of anything of which we are conscious, its purpose to facilitate understanding of the world and our relation to it. Although phenomenology has different strands, fundamentally phenomenologists subscribe to the idea of a 'natural attitude' where there is a focus on the lived experience of the world. Key phenomenologists are: Hegel, Husserl, Heidegger, Merleau-Ponty and Bergson.


29 Horrocks, Art That Moves: The Work of Len Lye, 74: Horrocks quotes Lye in his footnotes from an unpublished essay on 'Empathy (Concerning Coloured Hearing)'

30 In particular Lye's method of perceiving the world, was not only embodied but demonstrates an empathetic inter-connection between self and world. Lye writes: "When you look at the linear direction and timing of the interstices described by the lines of flight made by a flock of gulls soaring around in some updraught, you try to feel their flight by imagining it seeping into your bones by some kinetic kind of osmosis." Wystan Curnow and Roger Horrocks eds., Figures of Motion: Len Lye Selected Writings, (Auckland: Auckland University Press, 1984), 82: The Art that Moves, 1964.


of space was not only based on our relative position within space but also on the
correlation of muscular sensations and thought processes occurring within us, establishing
spatial perception as a subjective experience, reliant on the interconnection of bodily and
thought processes. Mach and Poincare therefore reinstated the body back into the
experience of space, the understanding of which had been ocular-centric to this point.33
This fluid and phenomenological model of space was an idea seized upon by artists
operating in the early 20th century, and was central to the birth of Cubism. As Lye writes in
his essay 'Is Film Art?' this shift toward a more embodied perception was also explored by
literary figures such as Beckett, Rimbaud and Joyce, who: "added their weight to the break
from the Cartesian dictum" of "I think therefore I am." To which Lye goes on to add: "In the
Arts we seem to have altered this to read, "I feel therefore I am."34 In addition to
questioning the shape and fabric of space, scientists as well as philosophers were arguing
for the heterogeneity of spatial experience and perspective to be recognised as well.

Predating Mach's proposal of space in motion were visual technologies developed during
the 19th century that re-articulated space as different from the Euclidian idea. The
elaborate phantasmagoric effects of magic lantern shows, fragmentary effects of the
kaleidoscope and the stereoscope all challenged the stasis and two-dimensionality of
pictorial space, and can be read as precedents for the kinds of experimentation Lye and
Moholy-Nagy later realised in their works.35 Following on from earlier optical devices, the
Cinematographie was invented in the early 1890s, presenting the public with the moving
image.36 People flocked to the cinemas and were initially startled, even terrified, by its
realism. Cinema challenged the notion of homogenous space, as through its filming and
editing, the same scene could be shown from different viewpoints; a technique that Lye
and Moholy-Nagy both mastered in their respective films Rhythm and Lichtspiel schwarz
weiss grau (Lightplay black white grey).37

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33 Kern, The Culture of Time and Space 1880-1918, 134: Kern refers to the fact that some of our terminology of
measurement such as 'foot and pace' demonstrates that our "notions of space are rooted in our physiological
organism."

34 Cirnow and Horrocks eds., Figures of Motion : Len Lye Selected Writings, 52-53,'Is Film Art?' 1959: By
recognising and critiquing the Cartesian method of privileging the intellect over the body demonstrates that
Lye had, at some level, an awareness of phenomenological ideas. In addition was his life long interest in
'kinesthesia,' which he refers to as move perception in this essay.

35 The embodied act of refocussing on different planes within the stereoscopic spatial field can also be
experienced in many of Lye’s films and Moholy-Nagy’s film Lightplay Black-White-Gray.

36 For example the phenakistoscope and zootrope: see Crary, Techniques of the Observer - on Vision and
Modernity in the Nineteenth Century.

37 In the early 20th century experimental jump cut editing, which made small, dislocated jumps in the
footage, further challenged the homogenous nature of space.
Walter Benjamin wrote about film’s ability to challenge the homogeneous nature of space: film “bursts open the restriction of being in one place and time, and thereby extends our perception of life, space and time.”\(^{38}\) Like the magic lantern, the act of projecting an image further transformed “the physical parameters of space.”\(^{39}\) The telephone enabled simultaneous experiences of space, allowing people to talk and respond to one another as though in two places at once.\(^{40}\) Siegfried Giedion, a friend of Moholy-Nagy’s, provides a summary of the new ideas about space, writing that “in most intellectual centres new movements began to emerge, all of which recognised ... that the old conceptions of the 3-dimensionality of space (perspective) and the naturalistic reproduction of objects that had held undisputed sway since the Renaissance were inadequate for our new projection of the visible world.”\(^{41}\)

Of particular influence to the thinking of artists was the discovery of x-ray photography by Wilhelm Röntgen in 1895. The dissolution of boundaries between, and the simultaneous rendering of interior and exterior spaces made possible by the x-ray, gripped the creative imagination and became a signature motif for discussing notions of the fourth dimension; a concept of space which included time as a coordinate, postulated by scientists’ Poincare, then Minkowski. X-ray photography fascinated Moholy-Nagy, who considered it to be one of the most marvellous inventions of the modern age, and whose visual effects he would liken to his photograms. Herbert Molderings writes of its influence: “Looking into the interior of an opaque body had the fascination of a mechanical eye that nothing could escape, an eye of god-like supremacy that revealed, in a process of mutual penetration, both the outer forms of things and their inner structures.”\(^{42}\) Like the x-ray, glass was also crucial to Moholy-Nagy. Transparent with interpenetration between interior and exterior spaces, it created a sense of visual ambiguity in figure-ground or positive-negative space relationships.\(^{43}\)


\(^{39}\) Ibid., 33: 20th century installation practice used projection to create all-enveloping spatial fields. Moholy-Nagy’s *Licht-Raum-Modulator* (*Light-Space Modulator*) of 1930 de-centered the frontal viewing position and placed the viewer inside the work itself.

\(^{40}\) Kern, *The Culture of Time and Space 1880-1918*, 69-70.


\(^{43}\) The visual ambiguity of interpenetrating planes of light and tone that had provided the impetus for his photogram production, were also explored by Moholy-Nagy through painting and plastic sculpture.
Einstein's 'On the Electrodynamics of Moving Bodies', published in 1905, further challenged Euclidean space. Einstein adjusted his theory in 1916 with the publication of his 'General Theory of Relativity' in which he established the curvature of space-time through gravity, thus acknowledging the effect of bodies upon one another. This theory of space-time demonstrated that space and time were intertwined with one another and relative to the viewer. Leonard Shlain writes on its influence:

If space and time were relative, then within this malleable grid the objective world assumed a certain plasticity too. The simultaneity or sequence of events, the colours of objects, and the shapes of forms did not solely belong to a world outside human affairs; instead they were also dependent on the speed of the mind hurling through space that was doing the observing.45

The non-deformability of solids in motion, which was taken as a given in Euclidean space, was revoked by Einstein and further challenged by the Cubists in their exploration of new forms revealed through motion and viewpoint. Gleizes and Metzinger argue in ‘Du Cubisme’ that after 1911 in a Cubist painting the form “is tempered or augmented by contact with another form, it is destroyed or it flowers, it is multiplied or it disappears. An ellipse may change its circumference because it is inscribed in a polygon.”46 The Cubists explored new forms revealed through motion and viewpoint, describing space and form in a process of symbiotic evolution. These receding and advancing volumes merged with the surrounding space, creating what Merleau-Ponty called “the impression of an emerging order, of an object in the art of appearing, organising itself before our eyes.”47 The terminology space-time gripped the public imagination and was subject to different literary, artistic and philosophical interpretations.48 In Vision in Motion Moholy-Nagy describes the contribution of Cubists, especially Braque, to the contemporary dialogue about space-time.49 He focussed on the various 'planes' of cubist paintings and collage, upon which different views of subject matter and textures are painted; playing 'hide and seek', slipping behind one another to create visual juxtapositions and interpenetrations to

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44 Also known as 'Einstein's Special Theory of Relativity.


46 ‘Du Cubisme’ was originally published in 1912, this excerpt was republished in: Linda Dalrymple Henderson, The Fourth Dimension and Non-Euclidean Geometry in Modern Art (New Jersey: Princeton University Press, 1983), 94.

47 Kern, The Culture of Time and Space 1880-1918, 142: Merleau-Ponty is quoted here talking about Cezanne.

48 Minkowski first proposed the term space-time in 1907. By the 1920s Einstein's theory of relativity and the idea of space-time was widely accepted among the public.

49 Particularly Braque, who he attributed as the father of Suprematism and Constructivism.
stirring effect. Moholy-Nagy writes, “Whether we use the term ‘space-time’, ‘motion and speed’, or ‘vision in motion’, rightly or wrongly, they designate a new dynamic and kinetic existence freed from the static, fixed framework of the past.”

Theories that described space as malleable, relative and dynamic had finally undermined the Euclidian idea of space as inert and without influence. The concept of an active or a 'positive-negative' space shifted people’s consciousness of space and influenced artists, musicians and poets to use it as a palpable part of their compositions. Lye’s film’s *Colour Cry* and *Trade Tattoo* and Moholy-Nagy’s photograms clearly demonstrate the treatment of space as an active force field; space is endowed with continual motion and energy, no longer ‘nothingness’ nor without purpose.

**Time and Motion**

At the end of the 19th century the camera was being used by various photographers as a means for dissecting space and time. Initially Eadweard Muybridge (an American-based photographer) followed by Étienne-Jules Marey (French, of scientific background) were interdependently engaged in conducting scientific experiments of movement; creating photographic contraptions and photographs, both of which have contributed to the advent of cinema. Muybridge’s sequences portrayed time as a series of points, which together made up a temporal line – each separated from the other and divorced from a temporal continuum. In contrast, Marey’s depictions of motion remained situated within time by utilising multiple exposures on the one photographic plate. Marey believed instead in using

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50 Moholy-Nagy, *Vision in Motion*, 128.

51 Ibid., 266: Writing about its utopian purpose, Moholy-Nagy goes on to comment on the ability of space-time to modify “the character of social ends, even beyond the sense that pure science may lead to a better application of our own resources.”

52 Kern, *The Culture of Time and Space 1880-1918*, 154: In 1898 philosopher Hiram M Stanley identified the common view among physicists that everything was a different state of energy and that space was “a struggle for existence among the opposing forces that might displace it.”

53 William James, an American philosopher and psychologist, believed that the perception of sound depended upon the experience of silence, as with form and space. He called this reciprocity a positive-negative relationship.

54 Shlain, *Art & Physics: Parallel Visions in Space, Time, and Light*, 160: The predominant Western conception of space became more closely aligned to an Eastern understanding. Zen philosophy viewed empty space as the Void, which was, the antithesis of nothingness and contained the “pregnant possibility of everything. From this invisible cornucopia issued forth all that was substance.”

55 This was a time when the camera was still widely seen to be ‘truthful’ and used as a Positivist tool because of its mechanical nature, and its apparent objectivity.
the camera as a mechanical means for making up for the shortfall of human vision. By seeking "not to represent nature but to discover the laws that governed it," he thus foregrounded how technology and artists would interpret and represent reality in the 20th century. Akin to philosophical theories about the nature of time developed in the late 19th century by Henri Bergson, Marey's photographs of dematerialised forms in motion were hugely influential on early 20th century artists, predating early Modernist concerns with the dematerialisation of form, celebrated by artists such as Moholy-Nagy.

The understanding of temporality as a necessary part of observation was utilised in early 19th century optical devices, dependent upon the persistence of the observer's vision to complete the visual effect of an image in motion. Philosophers such as Schelling and Hegel were equally interested in the temporality of perception, which they envisioned as a dynamic model where past and present overlapped. In the early 19th century Schelling wrote of perception as "a series of processes following one another, in which the later always involves the earlier." The term 'concretion' was used by physicist Andre-Marie to describe perception as infused with the memory of what had preceded the present moment. These philosophical approaches foregrounded Bergsonian theories of duration, which saw time as 'flux', without artificial stoppages. "Pure time has no separate or distinct moments; its parts do not begin and end, strictly speaking, but each of them prolongs and continues itself in all the others." Furthermore, Bergson believed that matter should be considered as a form of energy, which like time, was in a constant state of becoming.

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57 Marey's images of Time were seen to be a more truthful expression of our experience of time and perception in contrast to Muybridge's fragments of time. As Gueroult explains this is because human vision can "only see a confused image whose form participates in the preceding and following positions at the same time" (Ibid., 275).

58 Muybridge's locomotion studies influenced artists to rethink the realism of their depictions of movement. Marey's photographs were especially influential to modernist art movements such as Cubism and Futurism, but whose subsequent interpretations of his work were at odds with his original intent. As were the popular 19th century philosophical theories of Henri Bergson, namely 'duration' and subjective experiences of time. Most notably was the parallel made between his theories and Marey's chronophotographs, who he thought was guilty of spatialising time and therefore not true to an intuited 'real' sense of subjective time.

59 Optical devices such as the Thaumatrope and the Phenakistiscope were originally developed for scientific purposes but absorbed into popular culture as forms of entertainment. Joseph Plateau conducted experiments to analyse the length of retinal afterimages. Refer to Crary, *Techniques of the Observer - on Vision and Modernity in the Nineteenth Century*.


62 Forms in a state of 'becoming' would be realised visually in the early 20th century by the futurists and cubists. "Thus the shapes of material objects are not properties of those objects but are snapshots taken by the mind of the continuity of becoming: the misleading data provided by ordinary and inadequate
Marta Braun writes: “By the century’s close, time was no longer just the container within which the transformation of nature and humanity occurred. Time itself had become one of the primary objects of both scientific and artistic investigation.”

The concept of a fourth dimension, later called hyperspace philosophy by Linda Dalrymple Henderson, had arisen initially in the 19th century in science, higher mathematics and in literature. There was no commonly held understanding of the fourth dimension, with artists developing their own nuanced views. However, time, and therefore motion, were both considered to be important aspects of hyperspace philosophy and became key artistic concerns in the search for new modes of representation. Linda Dalrymple Henderson writes: “Whether overtly subversive or an idyllic vision of higher truth, “the fourth dimension” as a rationale for exploring new kinds of language in art, literature, and music justified some of the more advanced experimentation of the era.”

Aligned with Futurism, from 1911 to 1913 the Bragaglia brothers used the camera in the attempt to express energy itself, calling this photo-dynamism. Although, Bragaglia was quick to distinguish their attempts from other forms of photography, stating: “we are not interested in the precise reconstruction of movement, which has already been broken up and analysed. We are involved only in the area of movement which produces sensation, the memory of which still palpitates in our awareness.” Rather than break time up into separate moments the Futurists considered time to be in constant flux like a stream with an interest in representing “the intermovemental fractions exiting in the passages between seconds.” Boccioni described this as producing “the impression of simultaneity between proximity and distance, between perception and recollection, between what is seen and what remains impressed in the mind.”

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65 Ibid., 341.
67 Ibid., 26.
Vision in Motion

Formulated over the years in response to these changes in the perception of space and time and the invention of new technologies, Moholy-Nagy's ideas culminated in Vision in Motion, 1947. Precedented by earlier publications Malerie, Photographie, Film, 1925 and The New Vision, 1930, Vision in Motion explores further Moholy-Nagy's ideas on art and education, with particular emphasis on the interrelatedness of art and life, and the need to develop a balance between man's sensory, intellectual and emotional faculties.69

As a progressive educator for 15 years Moholy-Nagy had contemplated the role of art in life and the effects of technology and the modern age. Born from the preliminary course at the Bauhaus that he presided over from 1923-28 Vision in Motion is an account of the curriculum for The Institute of Design, which he founded in Chicago 14 years later. Despite celebrating the machine for its ability to provide new perceptual experiences and opportunities for social change Moholy-Nagy was also cognisant of the need for people to humanise technology and use it to their advantage as “an arsenal of ever new playful possibilities for self-realization.”70 He emphasised the necessity of experiment, of intuition and analysis and of learning to utilise all our sensory capacities. In particular, influenced by new viewpoints offered by the camera, aeroplane and x-ray and dynamism created through experiences of speed, Vision in Motion emphasises the possibilities of simultaneity and motion through the connection of space and time as “a means to comprehend the new dimension.”71 The ultimate goal expressed in Vision in Motion is learning to see and think ‘in relationships,’ and through this awareness, to live a life integrated with art. The emotional, physical, psychological and intellectual components of an individual are considered as interdependent, with sensory and creative fulfilment playing an important part of the health of the individual and society as a whole.

To arrive at an integrated life in which he would function to the fullest of his capacities through a synthesis of the intellectual and the emotional, through the coordination of penetrative thinking and profound feeling. To reach this goal - to feel what we know and to know what we feel- is one of the tasks of our generation.72

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70 Rainer K. Wick, Teaching at the Bauhaus (Ostfildern-Ruit: Hatje Cantz, 2000), 144: As early as 1925 Moholy-Nagy wrote: “we, the creators of our own time, should go to work with up-to-date means.” László Moholy-Nagy, Painting, Photography and Film (London: Lund Humphries, 1969), 141 -144.

71 Moholy-Nagy, Vision in Motion, 12: Expressions of speed facilitated by the train, aeroplanes and car.

72 Ibid.,10.
During the 67 years that have passed since *Vision in Motion* was published there have been huge advancements in technology that have led to the current information age. Through increased use of technology in our everyday lives, access to knowledge has become more democratic and tailored to our individual interests. However, is our reliance on digital technologies to mediate our experience of the world at the detriment of our senses, and ability to engage directly with human emotions? It is in answering these questions that we find the ongoing relevance of *Vision in Motion* to our present context. Although only speculative, it can be assumed that Moholy-Nagy would approve of the Internet and technologies that have enabled us to print three dimensionally, to proliferate information and facilitate increased communication and collaboration with others. However it can also be assumed that he would caution us against the potential for isolation and specialisation at the expense of the emotional health of the individual, the community, and the supplantation of primary experiences by secondary ones. When considering the relevance of *Vision in Motion* to today it is worth noting that he leaves us with a proposal for the future. In his final chapter Moholy-Nagy outlines a blueprint to ensure that future societies will be underscored by collaboration and integration between regions and communities. He insists that man needs to be equipped with the tools and opportunities necessary to lead stimulated lives, to "restore the basic unity of all human experiences." Whether Moholy-Nagy would have significantly adapted his theory in response to the many changes that have occurred we can only speculate, however what he cautions against and what he proposes are still as dynamic and fitting as a response to our current age as they were 67 years ago.

Summary

The rapidly changing technological environment of the 19th century irrevocably changed commonly held perceptions of time and space, with the new notion of space-time informing much of modernist art practice. Hungary and New Zealand did not share a

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73 Moholy-Nagy identifies the need to create "group consciousness of communal issues," which we currently see realised through the proliferation media and Internet forums.

74 Moholy-Nagy's blueprint is an activity plan for adult education and an International cultural working assembly of scientists, sociologists, artists, writers, musicians, technicians and craftsmen, who together would "investigate the roots of our intellectual and emotional heritage," and would tackle issues of concern both to the individual and the community: Moholy-Nagy, László, *Vision in Motion* (Chicago: Paul Theobald & Co, 1947), 360.

75 Moholy-Nagy, *Vision in Motion*, 360.

76 Due to the visionary nature of *Vision in Motion* regarding the health of the individual and community, we can assume that if Moholy-Nagy was alive in our present context he would not need to change this theory significantly, but would rather keep revisiting and rewording it to ensure his message was widely disseminated and understood.
similar political climate in the early 20\textsuperscript{th} century, therefore it was for different reasons Lye and Moholy-Nagy found it necessary to leave their homelands: Lye by choice, for cultural fulfilment elsewhere, whilst Moholy-Nagy was compelled to do so due to political necessity. Initially Lye moved to London and Moholy-Nagy to Germany. Both artists finally relocated to America; the trajectory of their careers informed by these developments in thinking about time and space.

The key areas of conjecture between Lye and Moholy-Nagy that arise when contemplating \textit{Vision and Motion} are: energy, dynamism, motion, simultaneity, seeing and thinking in relationships, experimentation with technologies and an emphasis on sensory development. In the following chapters on the complexities of time and space I will focus on how these artists specifically explored aspects of space, time and motion in their artwork and theoretical writing.
Chapter 2

Introduction

If time is like a river, then it has many tributaries flowing into it. This understanding of the multiplicity of time is key to László Moholy-Nagy and Len Lye’s work. Moholy-Nagy and Lye’s own theories of art and life: ‘Vision in Motion’ (1947) and ‘Individual Happiness Now’ (1940), which in addition to the belief in the creativity of mankind, share a desire to take hold of the ‘now’. Time will be examined as a constituent part of motion; integral to Moholy-Nagy’s interpretation of space-time which culminated in his theory ‘Vision in Motion’, also to Lye’s idea of perpetual motion and direct bodily empathy which underpinned his entire oeuvre. Further nuances of the temporal dimension, such as: simultaneity, dynamism, space-time, flux, becoming, and the ‘thickened present’ are discussed in relation to their work. Moholy-Nagy’s use of light as a medium of expression in his photograms Untitled and Diagram of Forces is used similarly for maximum effect in Lye’s scratch films Free Radicals and Particles in Space. The chapter will end with a brief discussion of how this fundamental interest in motion and the temporal dimension of space-time became manifest in kinetic sculpture as well as how time can be read into aspects of each artist’s practice and methodology.

In the arts the 20th century was marked by the desire for change, manifested through experimentation with new techniques and processes, and breaking with traditions of the past. In 1922 Moholy-Nagy co-wrote a proposal to incorporate actual movement into art. Lye believed that everything is in motion on a molecular level, even a framed photograph, a building, or a mountain. See Curnow and Horrocks eds., Figures of Motion : Len Lye Selected Writings (Auckland: Auckland University Press, 1984), 80.

Throughout this thesis the term ‘thickened present’ is used to explain that an experience of the present moment is not a single isolated event. Stephen Kern phrased this term when referring to William James in The Culture of Time and Space 1880-1918, 82. Although there is no reference to James using this actual term, James does refers to the present moment as having breadth and spatiality: "The practically cognized present is no knife-edge, but a saddleback, with a certain breadth of its own on which we sit perched, and from which we look in two directions into time. The unit of composition of our perception of time is a duration, with a bow and a stern, as it were — a rearward- and forward-looking end.... We do not first feel one end and then feel the other after it, and from the perception of the succession infer an interval of time between, but we seem to feel the interval of time as a whole, with its two ends embedded in it." William James, The Principles of Psychology, (Chicago/ London/ Toronoto/ Geneva: William Benton/ Encyclopaedia Britannica, 1952),399.

Particles in Space is not discussed here due to space limitations.

This was predated by Naum Gabo's kinetic sculpture and Gabo's Realist Manifesto co-authored with his brother Anton Pevsner. Moholy-Nagy gave full credit to Gabo and Pevsner for their discussion of the principles of movement in art.81 Gabo and Pevsner hailed “kinetic rhythms as the basic forms of our perception of real time”, thus creating what Roger Horrocks calls the “theoretical basis for kinetic art”.82 1922 was also the year that Moholy-Nagy first encountered the photogram process, which he later named as such in 1925 in his book Malerie, Photographie, Film.83 The term 'photogram' was an attempt to align the process with the telegram (for its sense of immediacy and its ability to collapse time and space).84 In the years to follow there was much debate over who had first 'invented' the photogram. Although Moholy-Nagy's first encounter, which was the result of collaboration with his then wife Lucia85 was in 1922, Christian Schad's early attempts can be dated back to 1918 and Man Ray's to 1921.86 Moholy-Nagy wrote to Beaumont Newhall in 1937, in which he indicated that he was not initially aware of the photograms of Henry Fox Talbot or Man Ray when he first used the photogram process. Furthermore, as is indicated in an earlier letter to Erich Buchholz of 1928, it is clear that Moholy-Nagy was not interested in who was credited with the 'invention' of the photogram.87 In contrast to schadographs and rayographs, which primarily recorded literal silhouettes of shapes or accurate records of form, Moholy-Nagy saw the photogram as a means for visualising a new concept of space. Moholy-Nagy's photograms were first published in Broom publication in 1923, along with his essay “Light: A medium of Plastic expression”. This followed on from his essay “Production-Reproduction” published a year earlier, in which


83 A photogram is a photographic process that forms an image when an object is placed directly on top of light sensitive paper and is exposed to light. Not mediated by a camera, the process is characterised by directness and indexicality, which retain a sense of the immediate and a trace of the object.

84 See: Heyne, Neusüss and Moholy-Nagy eds., Moholy-Nagy: The Photograms : Catalogue Raisonné, 40. Moholy-Nagy also referred to the process as: 'photodesign without a camera', 'cameraless photography' and 'photogrammetry'. Despite all of these different titles, it is largely as 'photograms' that the process is referred to today.

85 Lucia Moholy was a photographer and it was initially together that Laszlo and Lucia explored the photogram process. Lucia writes: "During a stroll in the Rhön Mountains in the summer of 1922 we discussed the problems arising from the antithesis Production versus Reproduction. This gradually led us to implement our conclusions by making photograms" Das Bauhaus-Bild' (Werk 6/1968).

86 However as Lucia Moholy illuminates the earliest form of camera-less photography was in the eighteenth century, albeit the image was unable to be fixed until the nineteenth century: Moholy, Marginalien zu Moholy-Nagy/Moholy-Nagy Marginal Notes, 59.

87 Lucia Moholy writes of this letter, from which it can be gathered that Moholy-Nagy believed that each artist had "found, or discovered, the technique of photography without a camera on his own, by means of a different approach." Ibid.
we first see Moholy-Nagy questioning the medium of photography and its creative possibilities beyond reproductive services. 88

Initially Moholy-Nagy’s experiments with photograms were on printing out paper (POP). 89 These were characterised by the brown colour of POP photographs and a constructivist approach with more formal rectilinear compositions, often created by masking with strips of paper. POP photographs required light for longer periods than silver gelatin prints, therefore enabling him to control the subtleties of the tonal renditions by shifting templates and objects around. Because sunlight was the light source for his POP photograms, the light quality was uniform, its primary function being to illuminate the forms and textures of the objects being printed. However when Moholy-Nagy ventured into the darkroom to work with silver gelatin printing paper he was able to play with more controlled sources of light; providing room for experiment with modulated light, and light from multiple sources and angles. 90 By moving his photogram production into the darkroom he took the photogram from a simple contact printing method into what Herbert Molderings calls a “complex projection process,” 91 where light became an active and primary force and three-dimensional forms were predominately used. Moholy-Nagy’s desire to work purely with light culminated during the Dessau period of his photogram production. Molderings explains: “By steering the light source, he was now able to distort the shadow projections of the objects beyond recognition and evoke pure spaces of light.” 92

Film was also subject to experimentation, and time became an element to be explored in its own right. As Walther Ruttman suggests, there was a desire “To produce art that differed from painting 'in that it has a temporal dimension (like music), in the temporal unfolding of its form.'” 93 However Moholy-Nagy was critical of how this was done, challenging filmmakers to develop their own visual language and approach that was separate from the concerns of painting. 94 The understanding that every media had its own

88 Laszlo Moholy-Nagy to Beaumont Newhall, April 7, 1937 (rpt. in Kostelanetz, Moholy-Nagy, p.57)
89 This is seen in the Weimar photograms 1923-25.
90 Initially he used gaslight paper in the darkroom but then changed to silver gelatin paper.
92 Ibid.
93 Horrocks, Art That Moves: The Work of Len Lye, 32: In 1919, in his 'Film as an Independent art form' manifesto, Walter Ruttman acknowledged that film had its own speed.
94 Henderson, The Fourth Dimension and Non-Euclidean Geometry in Modern Art, 332: Like Moholy-Nagy Van Doesburg wrote: "What has been offered up to us now as abstract film was based on the erroneous idea that
intrinsic properties and processes that needed to be understood underpinned all of Moholy-Nagy's experimentations. Through his photograms Moholy-Nagy envisioned further their potential in producing what he called 'absolute filmic art'; whereby varying intensities of light are recorded as it is transmitted through adjustable slits onto the film.

Moholy-Nagy and Ruttman believed that the 'manipulation of motion' was the primary concern of film. These challenges are addressed by Lye through his desire to create real kinaesthetic experiences in the audience. Lye claimed: “Film is the Cinderella of the fine arts. Her beauty lies in her 'kinaesthesia'. This is the basic element of abstract expression prevalent in 20th century art. 'Kinesthesia' is from the Greek kinein move–aisthesis perception.” As Tyler Cann writes: “For Lye the abstraction of his films has everything to do with his, and the viewer's, own corporeal existence. His direct films moved toward the presentation, projection and cinematic translation of sensation itself.” In 1925 there was a screening of abstract film making in Berlin titled 'The Absolute Film' involving Eggling, Ruttman, Richter and Fischinger with whom Lye later developed connections. Despite similarities in the idea of non-objectivity in the absolute filmmaking of Eggling, Ruttman, and Richter, their work was produced through animation by photographing separate frames that had been drawn. For Moholy-Nagy these films gave too strong a sense of the artist consciously developing the forms which “thereby defeating the non-objective goals he claimed for the modern artist,” preferring instead the kineticism found in the recording of light projections on various surfaces.

Theories of art and life

Moholy-Nagy's active involvement in the publication of various manifestos in the early 20th century attests his intent on communicating his revolutionary ideas about art and life. These were formed through his involvement with similarly minded artists and writers after
his return from active service in World War One. Having moved to Germany, where he suffered the censorship imposed on artists by the Nazis whilst teaching at the Bauhaus in Dessau, he developed a vision of a future where all humankind could express themselves freely.

Lye arrived in the United Kingdom seven years after the end of World War One. A fully developed artist, it was as though he had emerged suddenly from a trap door in a manner that Horrocks likens to John Berger’s notion of the ‘vertical invader’. Confident in his own style and determined to shake off the shackles of 'literal' representation he soon began exhibiting with leading London artists. Lye had been a teenager during the First World War, and, owing to New Zealand’s geographical distance from Europe, he had quietly formulated his own approach. Driven by curiosity and the desire to represent motion, his work was in a constant state of evolution, and like Moholy-Nagy, involved continually questioning and experimenting with materials. Lye was in the UK when the Second World War broke out. It affected him deeply. He was aware of the censorship being executed by the Nazis and was devastated by the inhumanity of the war, as much as the subsequent impact on mankind’s freedom to express. Where Moholy-Nagy had been actively engaged in theoretical writing between the two wars, it was only in 1940 that Lye first formulated his own theoretical ideas about art and mankind. Over many rewrites, Lye's 'Individual Happiness Now!' was born. In 'Individual happiness Now' Lye advocated the importance of self-expression and an awareness of the experience of the present. He believed that free and creative expression and an awareness of self, experiencing in the present moment, would ensure individual happiness. Lye believed that this was integral to enriching one’s relations to others, to thus bring about a better world. Similarities can be drawn between Lye and Moholy-Nagy here in regards to their desire for a more fulfilled society using creative expression as a means to this end. Lye in particular, lived his life by his philosophy, and modelled the integration of sensory, intellectual and emotional faculties that Moholy-Nagy would call for in *Vision in Motion*. Despite his dogged belief and determination to share his theory of ‘Individual Happiness Now’, Horrocks points out that Lye had no actual desire to impose his own disposition on others. Although both artists advocated for freedom of expression, Moholy-Nagy was more strident in pushing his agenda, while Lye was stridently opposed to being 'pigeonholed' as belonging to one movement or another.

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101 Ibid.

Lye’s awareness of time expressed through his theoretical response to the epoch marked by the Second World War is also a key aspect of his artwork. Historian Fernand Braudel’s theory of a multiplicity of times, provide a model with which to consider the elasticity of time in Lye’s art making. Braudel’s theory of time extended the distinction between private and public time first encountered in the 19th century. Building upon Bergson’s notion of time he suggested that a dialectic of duration was “the only language binding history to the present, creating one indivisible whole.” Braudel asserted that seeing time as duration was necessary to situate our ‘present’ in an historical context, rather than time being seen as a series of separate events. He also proposed that a true understanding of history should reflect the existence of multiple levels of times, which exist in synchronicity at any one moment. Braudel’s theory of the time of history was stratified. He identified three different speeds that occurred simultaneously within this layering of time. The base was geographical time, which moved so slowly that its change was not discernible. Above this was social time, which he suggested was rhythmic and its change gradual. The final and uppermost layer was biological time, which he considered to be “based on the time-scale of the individual life...a time of surface disturbances.”

Lye, who spent his childhood in New Zealand, lived for several years in the shadow of a lighthouse, by the ocean with its endless ebb and flow. Influenced by Freud’s psychoanalytic theory and his interest in indigenous cultures, Lye believed that humankind has a collective body-consciousness and genetic knowledge that permeates our experience of the present subconsciously:

Our body houses inherited archives of genetic information about our life-span values of survival, and, for good measure, about all evolution....The old brain browses through these various sorts of information and sometimes transposes its findings into one or another of our new brain's acquired modes of expression

Lye believed that by using the left side of the brain through doodling, or through music and body movement the reptilian "old brain" could be accessed, effectively creating a bridge between the present and a collective ancestral past. Finding links between his artwork and scientific discoveries after the fact, qualified these ideas – the proof of which Lye called 'Gene-myth.' Duration, which is a way of understanding the present moment, can be

105 Curnow and Horrocks eds., Figures of Motion : Len Lye Selected Writings, 90: Considering a Temple, 1975
likened to a melody, where many different events are occurring at the same time. Like a range of melodies, the present is 'thickened' with the memory of the past and the protention or anticipation of the future. The concurrence of the past layered with the present in Lye's work is evident in the subject matter and titles of his paintings, which were often revisited and changed throughout his career. Lye's fluid understanding of past, present and future can also be read in an excerpt from one of his poems:

Such living candescent signs
We ignite now to show
Some luminous version of the future
From ourselves long ago

Lye's correlation between his Gene-Myth theories and kinaesthetic experience as a way of accessing this knowledge find a precedent in Bergson, who wrote a century earlier that “every moment leaves traces that continue to affect all subsequent physical or mental processes. The past collects in the fibres of the body as it does in the mind and determines the way we walk and dance as well as the way we think.” Evident throughout Lye’s oeuvre was his phenomenological understanding of time and the present moment. Moholy-Nagy also valued the immediacy of sensation. He recognised that primary experiences were being “supplemented or even replaced by secondary experience from an expanding media reality,” and Vision in Motion places emphasis on an active engagement with the world. Tyler Cann writes: “Lye's interest in the “perception of real-time” was kinaesthetic. That is, Lye wanted to involve the body in motion and space, and to address its different sensory modes at once, forcefully.” Cann comments on the way in which Lye's films “bombard the sensorium with this confusion [of sensory modes]...to create a kinaesthetic experience in the viewer that occurs at the very cusp of the present

107 Following on from Husserl, Maurice Merleau-Ponty considered the past to be retention and the future to be a protention and these all co-incided in the present moment creating a layered or thickened present. Also see Husserl, William James and Jossiah Royce who, argued for a “thickened present” against Hume's concept of the construction of time from discrete parts: Kern, The Culture of Time and Space 1880-1918, 82. William James writes: "All the notes of a bar of a song seem to the listener to be contained in the present." William James, The Principles of Psychology, (Chicago/ London/ Toronto/ Geneva: William Benton/ Encyclopaedia Britannica, 1952), 398.


110 Wick, Teaching at the Bauhaus, 149.

The phenomenological experience in Lye's films and sculptures is heightened because of the active engagement with one's senses. The subsequent awareness by the audience of itself experiencing situates the experience of Lye's work in the 'now'.

The past and future were only relevant to Lye if experienced in the present moment. In Lye's words: “I soak in now. NOW IS NOT A SECOND. Now is the constant ideal of the self in all human life since it’s beginning. The ever recurring moment NOW is the only human facet of the past and the future. More important than the past or future of happiness is the 'now' aspect of it." Lye's theory of living in the 'now' is akin to Moholy-Nagy's 'Vision in Motion'. The importance of the present and the concept of change were declared by Moholy-Nagy as early as 1921 in 'The Manifesto of Elemental Art':

We love bold invention, innovation in the Arts. Art is actually the consequence of all of the forces of an era. We live in the present, and therefore we postulate the consequence of an era, in an art that cannot derive but from ourselves, one that did not exist before us and shall not be when we are gone - not as some changing fashion but out of the recognition that art is eternally new and does not stop at the consequences of the past.

Contrary to the utopian idea of the 'whole man', which the Constructivists had subscribed to, was the belief that all matter was in the process of change. Matter as well as time was in flux: the universe was unfolding and nothing would ever be entirely constituted. Phenomenologist Maurice Merleau-Ponty believed that we are never fully developed but that instead our lives are imbued with time, in a process of constant change. Moholy-Nagy, who initially identified as a Constructivist, also considered change to be one of the most important aspects of life. It was an integral part of his theory 'Vision in Motion', where he placed an emphasis on motion, constructive forces and dynamic relationships. This can be seen most clearly articulated in his photograms, where Moholy-Nagy was attempting to work directly with the subtle qualities of light moving across light sensitive paper. Likewise Lye considered movement to be the “language of life,” and recognised that: “everything

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112 Cann and Curnow, eds., *Len Lye*, 81: Tyler Cann.

113 From primary research at the Len Lye Archive: a folder named: 'Individual Happiness Now' Dated 1 April 1941.

114 Passuth, *Moholy-Nagy*, 286: Originally published in *De Stijl*, No.10, (Berlin 1921) This manifesto was co-signed by Moholy-Nagy, Raoul Haussmann, Hans Arp, and Ivan Puni.

115 Ibid.,288: From ‘Manifesto’, 1923: “To a non functional but dynamic (kinetic) constructive system of forces which organises space by moving through it.”

of us, everything related to us, and everything about us is in a process of continual change, right down to the atoms that make up everything in existence.”

Image analyses

Synopsis For an Abstract Film (triptych of photograms)

Weimar period 1923-1924 (possibly 1922), silver gelatin prints

László Moholy-Nagy

For Moholy-Nagy the photogram was a recording of flowing light, it was 'vision in motion' because “as a diagram of the motion of light, it created the space-time continuum.” In Synopsis For an Abstract Film a sequence of three photograms are arranged vertically, one above the other, each landscape in format. In Vision in Motion, Moholy-Nagy introduces this triptych of images as:

A synopsis of another motion picture where a new dramaturgy grows out of pure filmic elements. The film demonstrates the refined values of the black-white-gray graduations of the photogram (the camera-less photography) in continuous motion.

At the same time it uses all possible means of the film technique such as superimpositions - at places seven times - prisms, mirrorings, and moving light. Through systematic use of light and shadow in motion as it tries to conquer the peculiar dimension of the film, the dimension of space-time.

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117 From primary research at the Len Lye Archive: Len Lye, Footnotes ' on time and the 'present' From folder ' Hypothesis (on individuality) 1946, IHNI 17/1.


120 Moholy-Nagy, Vision in Motion, 288.
Synopsis For an Abstract Film was published in Vision in Motion alongside his film script for Light display, black, white and gray. Six parts in length in its conception, it was only the sixth and final part of the film script that was filmed and completed. This much shorter version of the original script was subsequently titled Ein Lightspiel Schwarz-Weiss-Grau (LightPlay Black-White-Gray) – the film of his sculpture Light Prop - produced in 1930. This dating of the triptych of photograms suggests that they were an influence on the development of Moholy-Nagy’s subsequent film script and film. Reading Moholy-Nagy’s shopping list-like script of ideas it is evident that this would have been a film that demonstrated both movement-images and the penultimate complex time-images referred to by film theorist Deleuze.\textsuperscript{121} Part two of the script in particular reads like something that Lye accomplished in his film Trade Tattoo and in the harmonics of his various kinetic sculptures, in particular:

Smelting mill. Glowing molten steel.

Casting, rain of sparks...

Virtual volumes. Luminous sticks in different colour moving and rotating on various planes, producing glowing arabesques.\textsuperscript{122}

The list-like script demonstrates Moholy-Nagy’s belief that photographs in series were “the most logical culmination of photography” where “the single image loses its separate identity and becomes a part of the assembly; it becomes a structural element of the


\textsuperscript{122} The full script for Light Play is almost 500 words in length, describing approximately 112 separate motions or camera takes and angles in a list-like form.
related whole which is the thing itself,"\textsuperscript{123} indeed the full six parts of the film could have been produced as a series of still images, as per Chris Marker's film \textit{La Jetee}.  

In the accompanying note beneath \textit{Synopsis for an Abstract Film} (triptych of photograms) Moholy-Nagy's indicates his intention for each photogram in the triptych to be read as its own sequence. This suggests that he may have seen his other photograms as scenes with their own temporal dimensions rather than as static images, as: "direct light diagrams recording the actions of light over a period of time, that is, the motion of light in space."\textsuperscript{124}

The three photograms are minimal in terms of their content and composition. Predominately black in tone, they share oval, circular, ring and linear forms. The central photogram in the sequence is the simplest in the triptych. In it an inky black negative space is punctuated by a small white ring and the suggestion of an oval form, which overlap one another about two thirds of the way down the image. The two forms cling together, rendered delicate by the immense volume of negative space around them. Collectively they appear to make a hollow cylindrical shape, whereas in other reproductions of this photogram this illusion is disrupted by the presence of subtle charcoal tones of the oval form underneath. The two forms appear to be falling, acted upon by the weight of the negative space around them. Despite its apparent simplicity, this image effectively conveys Moholy-Nagy's interest in creating an 'active play of forces'. The predecessor and successor in the triptych have more complex forms and areas of tonal variance in their compositions. When the three photograms are read together the sequence suggests that the depicted forms are not simply falling but possibly rising and falling or tumbling. The motion implicit is underpinned by the interplay of light and shadow, of luminous forms moving through the darkness. In 1929 Moholy-Nagy wrote:

The materialization of light, hitherto secondary, becomes more direct. Light is captured as it fluctuates and oscillates in its own radiation almost without any transmission. And although some material effects do remain, as light is translated through the photosensitive layer of the photogram into an almost immaterial substance, the way of the future to a more subliminated visual mode of expression may already be observed.\textsuperscript{125}

\textsuperscript{123} Moholy-Nagy, \textit{Vision in Motion}, 208.

\textsuperscript{124} Moholy-Nagy, \textit{Vision in Motion}, \textit{Another photogram Untitled (Photogram) Weimar period 1923-1924} is strikingly similar to sequences described in part 6 of Moholy-Nagy's written script for \textit{Light Play}. Produced two years before he wrote the script, this photogram could also have provided the impetus or been considered a synopsis for his later film, as with the triptych of photograms discussed here.

\textsuperscript{125} Passuth, \textit{Moholy-Nagy}, 306: From 'i 10', 1929.
Although these images are static they are nonetheless intended to be read as a synopsis of a film. One can only imagine the qualities of motion and "undreamt-of optical experiences"\(^ {126} \) that would have been achieved if these photograms had been translated into moving image.

*Diagram of Forces*

Chicago period 1938-43, silver gelatin print\(^ {127} \)

Lásló Moholy-Nagy

*Diagram of Forces* is unique to Moholy-Nagy's oeuvre in terms of his approach to making. It is his most stripped back and one of his most powerful photograms. Although initially appearing deceptively simple, this image is complex on a metaphysical level; questioning notions of time and space, whilst establishing a strong physical sense of presence and a direct relationship with the viewer. *Diagram of Forces* is an excellent example of 'concrete' photography since the photogram utilises only the material means for making a photograph: light, paper, and chemicals.\(^ {128} \) To create *Diagram of Forces* Moholy-Nagy crumpled up a piece of photographic paper whilst wet and then exposed it to light, achieving his life long goal of working solely with light as material. On the reverse Moholy-Nagy has written in pencil 'A light sensitive paper / was made wet, squashed / and exposed to light / the result is a 'diagram / of forces' projected on / the flat sheet.'\(^ {129} \) It would appear that the photograph was then 'revaluated' since the areas of the image that are the most condensed are the darkest, whereas the broader areas, which would have been more easily exposed to light, are the lightest. This suggests that Moholy-Nagy used the original print as a paper negative to print through on another piece of paper, reversing the tones in doing so. Renate Heyne discusses how under close inspection Moholy-Nagy's 'revaluated' photographs show a fine structure over the image, due to the paper quality itself being projected as a part of the printing process, and becoming ingrained in the image as a result. In these Moholy-Nagy observed that there was a rich variety and subtlety of blacks in the original paper negative which at first simply appeared as black, but when reversed,

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\(^ {128} \) Concrete photography is a term similar to non-objective. First used by Theo van Doesburg to describe art that depicts nothing but 'itself.' Gottfried Jäger published a book on concrete photography in 2005.

\(^ {129} \) These ruptures can be seen literally as Barthes's 'punctum'.
a range of different shade of whites and subtle gray tones were revealed: "resulting from several intersecting incidences of light during exposure of the original photogram."\textsuperscript{130}

![László Moholy-Nagy, Diagram of Forces](image)

Again the image is immersive. Predominantly white and lighter grey tones, it looks like crumpled paper, yet it retains the effect of motion and includes the viewer in its unfolding. It appears as though the image is actually crumpling around the viewer and expanding again, like the effect of breathing in and out of a paper bag. Poised on the brink of collapse, the image is active, suspended in time, weighty in its potential force and motion. Reminiscent of Braudel's theory of the layering of different times, the force of an ancient geological time is inscribed here along with a more immediate and active play of forces; the inhale and exhale of wet paper barely holding its structure together. The title \textit{Diagram of Forces} demonstrates that he saw this photogram as a spatio-temporal record of forces at play. Moholy-Nagy considered various phenomena as spatio-temporal diagrams where forces acting on the phenomena were represented along with the "resistance of the

\textsuperscript{130} Heyne, Neusüss and Moholy-Nagy, eds., \textit{Moholy-Nagy: The Photograms : Catalogue Raisonné}, 30: Light displays: Relations so far unknown.
materials to the impact of these forces.” \(^{131}\) Inscribing a sense of space-time Diagram of Forces utilises light an active force, and the image is alive with potential motion.

Motion was a common denominator between Moholy-Nagy and Lye. Whereas Moholy-Nagy's palette was restricted in the aforementioned photograms to tones from black to white, Lye utilised colour to inscribe a sense of motion and time in his work. We can only wonder what effects Moholy-Nagy would have similarly been able to achieve if he had pursued colour photography more actively, and explored the dematerialised effects of the photogram with colour.

**Rainbow Dance**

1936, 35mm Gasparcolour \(^{132}\)

Len Lye

![Rainbow Dance](image)

In 'The Art that Moves' Roger Horrocks refers to Bergson's belief that "life in general is mobility itself" and "an infinite multiplicity of becomings variously coloured." \(^{133}\) This quote

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\(^{131}\) Moholy-Nagy, *Vision in Motion*, 36: Examples that he gives here challenge the normal use of the term diagram, such as: "The sea rolls against a sandy beach; the waves subtly corrugate the sand. A painted wall cracks; the surface becomes a web of fine lines."

\(^{132}\) Len Lye, *Rhythms* (Paris: Re:Voir Video, 2009), DVD.

is most apt in describing Lye's masterpiece of colour and motion seen in his film *Rainbow Dance*. In contrast to the black and white photograms of Moholy-Nagy and Lye's scratch films, here motion is inscribed in colour.

Acting like the gnomon on a sundial, the hand drawn text of the title sequence casts a shadow, implying the course of the sun's daily trajectory. As the text changes the shadows shift, and the rainbow which is behind the text ripples in colours, then band by band dismantles itself and rebuilds itself anew. The film begins with the visual texture of rain falling down in long diagonal lines – blue, yellow and hot pink - the promise of a chromatic wonderland to come. A landscape is outlined then a silhouetted figure holding an umbrella appears, set amongst buildings like a stage set. In the distance a building with a clock tower sets the tone for the temporal elements of the film to unfold.

The rain clears and on cue a rainbow fills the horizon. The silhouetted figure closes his umbrella and in conjunction with the funky music begins to get a wiggle on, the interior space of his form flashing from deep blue to vermillion to pink; anticipating the words of Merleau-Ponty: "It is of the essence of time to be in the process of self-production."\(^\text{134}\)

Like tumbleweeds, two asterisks roll onto the screen and the figure evaporates, signified now by the rolling asterisk. In the production of this film Lye wished to closely control the colour and used Gasparcolour, a three-colour separation process. To ensure the colours were pure, he painted the entirety of the stage set where *Rainbow Dance* was filmed in differing shades of grey: so no conflicting colour could muddy the overall effect during the printing out process.

The figure reappears, this time playing guitar, whilst in characteristic fashion Lye's hand painted squiggles, lines and use of stencils fill the silhouetted form with vibrant colour or pattern. The background changes in counterpoint - both changing at different speeds, implying the differences posited by Braudel existing between our private time, social time and geological time, or simultaneity of experience lauded by the Futurists. Everything is in motion, with each component operating at its own rhythm.

\(^{134}\) Silke von Berswordt-Wallrabe, *Lee Ufan: Encounters with the Other* (Göttingen: Steidl, 2007), 105.
Due to a blip as the man moves toward the right hand side of the screen, a pink fuzzy haze appears behind him reminiscent of a speed blur, or the photo dynamism of the Futurists. The sky is filled with an aerial view of a map that on first appearance looks like the lines caused by crazed glaze in an old piece of china. This sequence creates a fragmentary spatial effect by combining an aerial view with normal perspective in the one frame. In the following sequence, using over-dramatised gesture like that of a mime artist, the figure appears to be searching and looking outwards, whilst his silhouetted form shifts internally from one colour to the next. The question 'where am I?' implied by his gestures could be accompanied equally by the question 'when am I?'

The figure moves deliberately and theatrically; after a sequence of gestures from walking, hiking, and searching, he suddenly leaps through the air and his silhouette peels apart to leave behind an arc of various traces of itself: first in cyan blue, then yellow, indigo and hot pink. This flutter of colour effectively demonstrates Lye's ability to make palpable the temporal dimension of movement through space. Like a futurist sculpture this representation of 'élan vital'\textsuperscript{135} pauses awhile and then accordion-like folds back in on itself following the order in which it was expanded; this 'rewind' of the figure is like watching time eat itself. Jae Emerling's statement about the temporal sensation in a John Beasley Greene photograph could be similarly applied to this scene from \textit{Rainbow Dance}:

\begin{quote}
Rather than a descriptive photograph he gives us an experience of dislocation in space and time; a temporal sensation traverses space... He creates an aesthetic
\end{quote}

\textsuperscript{135} Élan Vital is terminology first used by Henri Bergson in reference to the flux of experience and continuous state of becoming, which he associated with intuition. Élan vital was particularly influential to the Futurists.
experience, an image capable of being an opening in time rather than a representation of the past. There is an enigmatic form of life within this image that is simultaneously a play of forms and a play of forces (temporality as a force).\(^ {136}\)

Due to the constant shifts in colour and the interrelationship between drawn/stencilled imagery and filmed imagery, *Rainbow Dance* is “simultaneously a play of forms and a play of forces.” Working together to communicate Lye’s belief in perpetual motion, different components of the film operate at their own temporal flow.

Looking further into the distance, we are presented with another map upon which rolls a red stencilled locomotive. The silhouetted figure, in blue, leaps like a ballet dancer across the background. Hand painted onto the film, green waveforms give way to filmed footage of waves, a lurid pea-green colour that, as intended by Lye, emphasises the movement of the waves rather than their pictorial value through use of non-representational colour. Further on in the film the figure stops its leaping and settles down for a game of tennis, pirouetting a tennis racquet, whilst brilliant colours change within the figure; mostly in contrast to the background which also flashes through a different sequence of colour. Lye includes a sequence of filmed footage of a person moving their head from side to side, however this sequence is printed as a negative image, reminiscent of Moholy-Nagy’s deliberate use of negative images to ensure the audience engaged with the image beyond its representational value. The close of *Rainbow Dance* sees the figure lay down to rest on his bed after five minutes worth of a myriad of colour and motion. A voice over message reminds the audience of the pot of gold at the end of the rainbow and to bank their money, thus fulfilling Lye’s obligation to the GPO to advertise its services.

In contrast to Lye’s elaborate use of the three-colour process, later in his life Lye produced several black and white stripped-back films. Using reductive rather than additive techniques these films initially appear deceptively simple in comparison to his earlier colour work. However these ‘scratch’ films have their own complexity, and sense of being alive in the present with strong phenomenological effect.

Free Radicals

1958 (re-edited 1979), 16mm Black and White film

Len Lye

Free Radicals, Lye's first scratch film, utilises the simplest and most primal methods of mark making. In it Lye was primarily concerned with depicting lines pirouetting and waggling about in space. In his scratch films (of which there were three, Tal Farlow was completed posthumously in 1980) the ‘figures of motion’ or the images projected upon the screen are brought about as an effect of pure light shining through marks, tears or scratches created by the artist (and his assistants) into the opaque black film leader. The characters we see are therefore painted with light, and only revealed through a process of reduction, an image enabled by ‘a taking away’, which would require a more obvious negotiation with the ‘negative space’ than his films employing additive processes. Lye describes his body-centric process of mark making in his scratch films:

I took a graver, various kinds of needle. My range included Indian arrowheads, for Romanticism. You spit or dampen the celluloid with a sponge. You stick down the sides with scotch tape...You’ve got sprocket holes to guide you...You hold your hand at the right height and act as if you were making your signature...I worked myself into a kind of hypnotic trance and did this kind of... spastic gesture.

137 Len Lye, Rhythms (Paris: Re:Voir Video, 2009), DVD.

138 Refer to Moholy-Nagy who called himself Lichtner (he who paints with Light). Moholy-Nagy wished to paint with light instead of pigment.

Tyler Cann talks about Lye’s gesture as being 'calligraphic and self-referential', which locates his films in the present moment.  

Yann Beauvais also writes of Lye’s mark making in *Free Radicals*: “These lines do not represent anything recognisable. They are hints, indications, rough sketches in a state of suspension, in a continual state of becoming. They are the signature of movement itself. They are like the trails of shooting stars: abysses of energy. These are lines of force, and not lines of figuration.” This celebration of rhythm and energy through line, where line is expressed as a vector of movement, is underpinned by Lye’s belief that all life was in constant change, and that this was a fundamental aspect of one’s 'life-principle', necessary for understanding the temporal condition of the 'present'. Beauvais suggests that *Free Radicals* should be interpreted as a 'celebration of energy', explaining: “This surface, which is not a surface of recording but of paradoxical inscription - since it is by suppression that the veins and lines appear, and, treated in various ways, meet in the blank spaces - allows energy to beget volume.” The manner in which Beauvais describes the effects of Lye’s scratch film could equally apply to many of Moholy-Nagy's photograms and the effect of the light tracks therein.

Summary

Time as a constituent part of motion was explored both indirectly and directly in the work of Moholy-Nagy and Lye. The expression of motion was Lye's lifelong goal, while Moholy-Nagy’s theory ‘Vision in Motion’ gave primacy to motion and simultaneity as a way of 'comprehending the new dimension' which he saw as a 'yet-chaotic world': a world in flux and full of potential. The artworks by both artists analysed in this chapter have temporal qualities to them; the 'thickened present', 'becoming' of form, flux, simultaneity, motion, time-images and the 'now'. Moholy-Nagy and Lye share temporal similarities in regards to the actual time involved in the experimental nature of their respective practices and their belief that everything is in a state of change and motion. Moholy-Nagy's photograms and Lye's scratch films convey a weighty sense of the present through the indexicality of their nature and the 'becoming' of their form. Both artists communicate an immediacy of sensation, in particular Moholy-Nagy's photogram *Diagram of Forces*, however it is in Lye's films that we sense a more corporeal understanding of time.

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140 Ibid.,82: Tyler Cann ‘Surreal Sight Seer? Len Lye, Mind, Self and Time.’


142 Refer to Lye’s theory ‘Individual Happiness Now’, written 17 years earlier.


144 Kern, *The Culture of Time and Space 1880-1918*, 82.
Chapter 3

Introduction

In this chapter I will be considering how Len Lye and László Moholy-Nagy engage with the complexities of space. This involves an examination of Moholy-Nagy’s theoretical writing, and analysis of his works where the interpenetrating play of light and shadow, and dissolution of form were used for their spatial effect: the kinetic sculpture *Light Prop*, the film *LightPlay Black-White-Gray*, and an earlier photogram, *Untitled*. Lye’s film’s *Trade Tattoo* and *Colour Cry* are discussed in depth and their key features of motion, superimposition of pattern and colour, visual tension and spatial elasticity are identified. Throughout the chapter I consider the crossovers between the artists’ practices, the similarities and the differences. The works discussed articulate a sense of space that is multilayered, ambiguous, subjective, and complex. Lye’s understanding of space was highly developed in its proprioceptiveness, infused with the continual motion of the body. Likewise Moholy-Nagy drew upon motion in his theoretical interpretation of concepts of space-time, and applied them in his work. The chapter concludes by examining photogram works by both artists: the photogram *Untitled* and film *Colour Cry*, which demonstrate how a process can be similarly explored but for different ends. I argue that the two artists create spatial complexity and a subjective sense of space for the audience in their works, with Lye achieving this consistently through an intuitive understanding of the body moving in space, whereas Moholy-Nagy’s static photogram *Untitled* is the instance where he most effectively achieves the articulation of space that he actively theorised.

Space

The importance of Gabo and Pevsner's Realist Manifesto of 1920 to Moholy-Nagy is evident in the similarities of language in their manifesto and his theoretical book *Vision in Motion*, published 26 years later. Further influence can be seen in the spatial articulation of his artwork, most clearly in his kinetic sculpture *Licht-Raum-Modulator (Light-Space Modulator)*, where the boundaries between viewer and sculpture are dissolved. Moholy-Nagy also sought to express active fields of tensions as in his film *Ein Lightspiel Schwarz-Weiss-Grau (LightPlay Black-White-Gray)* and in the black and white compositions of dematerialised form throughout the 21-year oeuvre of his photogram production. In 1922 Moholy-Nagy co-authored a manifesto with Alfred Kemeny expressing his views on the activation of space and dynamic principle of life:

Vital constructivity is the embodiment of life and the principle of all human and cosmic development. Translated into art, today this means the activation of space by means of dynamic-constructive systems of forces, that is, construction of forces
within one another that are actually at tension in physical space and their construction within space, also active as force (tensions)...we must therefore replace the static principle of classical art with the dynamic principle of universal life. Stated practically: instead of static material construction (material and form relations), dynamic construction (vital construction and force relations) must be evolved in which the material is employed only as the carrier of forces, Carrying further the unit of construction, a DYNAMIC-CONSTRUCTIVE SYSTEM OF FORCES is attained whereby man, hitherto merely receptive in his observation of works of art, experiences a heightening of his own faculties, and becomes himself an active partner with the forces unfolding themselves.\footnote{Passuth, \textit{Moholy-Nagy}, 290: From ‘Dynamic-Constructive System of Forces’ published in der Sturm.}

Lye was cognisant of the trends, politics and concerns underpinning the desire of numerous early 20th century artists to express something of the new age. Although we can only speculate whether Moholy-Nagy was one of the artists that Lye knew about before arriving in London, it is highly likely that this awareness did subsequently develop during the time that both artists lived in London. Initially inspired by photographs of a kinetic stage set that paralleled his own interest in composing motion, Lye originally planned to travel to Russia to design stage sets for Vsevelod Meyerhold's theatre company.\footnote{Horrocks and Bouhours eds., \textit{Len Lye}, 181: Roger Horrocks ‘ Len Lye - Origins of his Art.’} He was also familiar with psychoanalytic theories from reading Freud's 'Totem and Taboo', and his understanding of modern art was gleaned from whatever British art magazines or reviews in newspapers he found in libraries. Of particular significance was Ezra Pound's book \textit{Gaudier-Breska} for the way in which it linked modern art with the primitive, and which he felt validated his approach to making art. From his interest in Maori and Aboriginal culture and time spent living in a Samoan village, he had first-hand experience of what other Modernist artists were theorising about. Lye, who had developed his own modernist aesthetic initially from afar in the Antipodes, had not been embroiled in the modernist debates found in European centres, as had Moholy-Nagy. True to these formative years, and the subsequent advice he would give his students to 'shape their own shoe' (as only they knew where it fitted best),\footnote{Lye taught at New York University in a 'Master Artist' capacity from 1966 to 1969. See: Horrocks, \textit{Len Lye: A Biography}, 319.} Lye resisted being categorised, and worked outside of 'isms'.\footnote{Lye was however engaged with various groups including the Surrealists, GPO, the Seven and Five Society and Film Society in London.} Despite being intensely focussed on developing his own unique visual language and 'take' on the world, his enthusiasm to experiment with new techniques and processes, and purposeful avoidance of any sense of predictability creeping into his work, meant he was aware of broader artistic, social and scientific contexts. Through this awareness he
would have come to know Moholy-Nagy’s work – initially through film – but later in the fields of photograms and kinetic sculpture. Moholy-Nagy, interested in the role of art in society, and advancements in methods of representation, was a critically engaged artist. Therefore it can be supposed that Moholy-Nagy would have become mutually aware of Lye whilst living in London.149

Both artists explored space in a manner that is multilayered and complex. Moholy-Nagy’s treatment of space developed from a theoretical and utopian base. His sense of space was honed through practical experiment with materials and light. Lye too would ‘doodle’ with materials to develop a sense of its properties in space, but Lye’s spatiality was more embodied, formed intuitively through his spatial awareness of the body in motion. Lye seldom wrote about his ideas on the articulation of space, focussing his writing on the nuances of motion instead, but his treatment of space as an active force is evident in his artwork.150

Image analyses

Trade Tattoo

1937, 5 minutes length, 35mm Technicolour Film151

Music: Lecuona Cuban Band

Len Lye

Commissioned by the British GPO in 1937, Trade Tattoo was constructed in Technicolour; created from three black and white negatives printed together through filters to create a composite colour film. Using three separate negatives meant Lye could maximise the manipulation. Through an intuitive understanding of the creative possibilities of this technique, he developed intricate composite matrices, with a degree of control and complexity that even surprised the Technicolour experts.152 Methodically planned frame by

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149 In 1936 Lye was an exhibiting artist in the International Surrealist Exhibition in London. It is highly likely that Moholy-Nagy would have visited this exhibition, as would have Lye visited the Moholy-Nagy retrospective exhibition at the London Gallery in 1937.

150 Lye experimented with moving pieces of metal, he appropriated found film footage and painted, scratched and photogrammed onto film, creating intense spatial complexity in his works.

151 Len Lye, Rhythms (Paris: Re:Voir Video, 2009), DVD.

152 Horrocks, Art That Moves: The Work of Len Lye, 156: “Lye brushed off the amazement of Bernard Happe and Leslie Oliver of Technicolour in regards to his creative control and intricacy in the Technicolour process-stating that it was “simply a matter of knitting- two pearls, one plain, etc.”
frame, *Trade Tattoo* made the most of the vibrant colour process to create new and unexpected colours and patterns that became structural elements of the film. Rather than filming the footage for *Trade Tattoo* himself, Lye utilised the out-takes of other films previously commissioned for the GPO. In response to the brief to create a film encouraging people to 'post early', the visual material he incorporated into the five minute long montage was an attempt to convey a sense of a unified working rhythm of Britain; what Roger Horrocks describes as a "overall figure of motion for society as a whole." Horrocks goes on to describe the footage chosen, and its subsequent treatment: " Black and white shots of mail-sorting, welding, cargo loading, steel milling and other types of work.... he used the colour separation process as a kind of cubist machine that swallowed naturalistic footage and converted it into brilliant, multi-coloured fragments." The footage Lye selected was then printed in high contrast or had the tones reversed, creating a positive-negative effect as seen in Moholy-Nagy's photograms and his film *Light Play*. The effects of these treatments are made evident in the predominance of silhouettes and strong simple forms, which work well to counterbalance the busy myriad of pattern. Like the cubists who fragmented space and rearranged the planes of reality, Lye pulled the background to the fore and pushed the foreground back; interweaving found footage with a constantly shifting network of patterns, simultaneously opening and closing the sense of space achieved.

The film begins: horizontal movements (that Horrocks likens to 'optical wipes') sweep across the screen like a curtain opening, and despite the predominately sideways motion, the flicker/jitter of the image also makes us aware of the film's vertical movement as it travels down and through the projector. Reminding us further of the film's materiality, the title sequence uses film leader, recognisable by its sprocket holes, to slide across the screen and back again. In addition, Horrocks considers the 'dot stipple patterns' used throughout as another reference to film, because of their similarity to the inherent grain structure of the medium. A diagonal movement of screens of dots and other textures begins, subsets appear – new forms momentarily created when they overlap with one another. Shapes suddenly break rank, they enlarge and emerge out of the screen toward the viewer, like individual characters stepping forward. These shapes retract and enlarge again, pulsing back and forth for a short while before being assimilated back into the field,


154 Ibid.,156.


creating a deep sense of space whilst the patterns in the background continue their movement across the screen in an otherwise contradictory fashion.

Fig. 6. Len Lye, *Trade Tattoo*

Enter text: *The rhythm of work-a-day Britain, The furnaces are fired.*

Out of the darkness a furnace is burning, we know it as such because of the text and hand-painted flames that preceded it, but otherwise its context has been eradicated through the high contrast in which the negative was printed. Fittingly, the furnace sequence and its placement at the beginning of the film can be read as semi-autobiographical. Lye had made his way to London working on a ship from Sydney, sweating for 2 months in its hot, dark belly. No stranger to physical hard work, as a coal trimmer Lye was responsible for delivering barrow loads of coal to those stoking the furnaces to power the ship. Given the importance Lye placed on being able to establish direct bodily empathy in his work, there is no doubt that the strong physical memory of this experience would have helped him set the energetic tempo for the working rhythm he was trying to achieve in the film.

Initially in the furnace sequence there is no ground besides a velvety black space in which the brightest elements of the furnace and the forms of white-hot steel float, giving an uneasy feeling of vertigo. Momentarily we witness form being born, illustrating Merleau-
Ponty’s concept of continual change and reminding us that we are all in the process of becoming. Rapidly the space becomes patterned with a succession of dots, lozenge shapes, stripes, triangles, and diamonds that seem to be behind these floating forms, and then in front. As the film proceeds there are moments when the space seems to eat into the form itself, creating a feeling of space engulfing and swallowing its content. Hans Hofmann’s ‘push/pull’ theory, where visual tension is created between forces and counter-forces also comes to mind when we watch Trade Tattoo. Here space is not inert but malleable. The tension of forces is akin to the notion of ‘tensegrity’: tension and integrity first written about by Moholy-Nagy and used by architect Buckminster Fuller to describe structural support systems as: “islands of compression inside a sea of tension.” This patterned space is an active field of forces, a complex battle between figure and ground vying for supremacy over representational logic, dismantling the boundaries existing between space and form in its wake.

Lye talked about creating 2D, 2½ D, 3D & 3½ D effects in his films. One way of creating spatial effects was through subverting spatial assumptions in his use of colour. In 1936 in 'Voice and Colour' he outlines ways of doing this: “Some theorists say that Red is a ‘near’ or ‘approaching’ colour, [and] that Blue is a ‘distant’ or ‘receding’ colour...[but] Blue...could be turned into an approaching colour with all the more significance, by making it approach.” Throughout Trade Tattoo the use of warm and cool colours trade places back and forth with one another as positive and negative space. Changes in the tempo of the music are closely aligned with shifts in colour, and the jump-cut edits of the film. Lye wanted the colour movement to act as counterpoint to the actual movement of the footage, and in contrast again to the movement of the patterns. Jump cuts from one piece of footage to another, which on first appearance seem unrelated, add to the punchy tempo and are tied together through the soundtrack and colour and pattern. Drawing from five different pieces of music all recorded by the Lecuona Cuban Band, the soundtrack produced for Trade Tattoo places Jack Elliot as one of the earliest DJs.

As Trade Tattoo plays we are taken on an upbeat tour of working Britain. We swing from the steel mill to being aboard a ship, then we are wharf side where cargo is being loaded. We see people trading in the markets, and crossing city streets, we see their rural counterparts working in the fields, and people welding, marching, and sorting mail. The wharf sequence recalls Moholy-Nagy’s film Marseille the Old Port and the men on boats

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157 Olga P. Larsen and Andy Tyas, Conceptual Structural Design: Bridging the Gap between Architects and Engineers (London: Thomas Telford, 2003), 68: Tensegrity is a concept that was first written about (in relation to Russian Constructivist experiments) by Moholy-Nagy in his book From Material to Architecture, published 1929.

There are viewpoints from up high looking down, and from low looking up to the cranes above, both of which recall the use of extreme viewpoints in Moholy-Nagy's photographs. Similar to Moholy-Nagy's idea that looking through a window in a street gives a sense of simultaneity of experience; the predominant use of silhouettes, populated by pattern, both obscure and create frames to look through. The sense of looking through these to another dimension is created – one where multiple times and spaces intersect. The juxtaposition of these different activities and movements is cleverly unified into a whole by Lye. Footage of trains moving through the landscape and a ship's prow sliding through the water complete the picture of a modern society where time and space have been annihilated for the common good of speedy communication.

Trade Tattoo's spatial complexity can be found in the film's interplay of figurative and non-figurative elements. Notably it is through his use of screens and patterns that parts of the footage are isolated and abstracted from their initial context, so that we are left with shapes floating or swimming in soups of rapidly moving textures. Here we experience space emerging and dissolving; a world reconfigured as oscillating fields of colour and pattern. Mostly hand-painted or stencilled, text vibrates and shivers its way on and off the screen without dominating or halting the visual rhythm. As the film unfolds, the rest of the text interwoven into the film emphasises that the rhythm of trade, from the markets to the port, is maintained by the mail service. A clear message is given to “keep in rhythm by posting early.”

Moholy-Nagy wrote about his own use of colour to create spatial effects: “Colour, which I had so far considered mainly for its illustrative possibilities, was transformed into a force loaded with potential space articulation and full of emotional qualities. I started out to clarify how different colours behave when organised in relation to one another.” However despite this statement and unlike Lye, Moholy-Nagy's photographic work was mainly realised in black and white, his use of colour restricted to his paintings and his sculpture Light Prop for an Electric Stage. Despite the promise of colour and its application in photography, expense and technical difficulties thwarted Moholy-Nagy. Although influenced by Malevich's use of colour and pure form to represent 'the movement of colour as energy,' Moholy-Nagy's sculpture Light Prop for an Electric Stage only performed with coloured lights for its first 2 years.

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159 Moholy-Nagy's film 'Lobsters' was realised whilst living in the UK. Because of Moholy-Nagy's relationship with John Grierson from the GPO, it would be an excellent undertaking in research to find out exactly what films these out takes used by Lye came from.

160 Passuth, *Moholy-Nagy*, 362: Lye had also written similarly about this in 'Voice and colour' in 1936.

In shaping his vision of a utopian future, Moholy-Nagy envisioned light as a new material capable of transforming and integrating art with life in line with his concept of the gesamtkunstwerk, and the sensory expansion fundamental to this transformation. With this in mind I consider the development of his kinetic sculpture during this period (1922-1930). Later renamed Light-Space Modulator, Light Prop represents the culmination of his ideas during this time. Most notably it summarises his preoccupation with the transformative effects of light, and the emphasis on light as the most fitting medium for expressing the spirit of the age.

Two years after departing from the Bauhaus, but in a manner true to the Bauhaus tenets of the marriage of art, technology and industry, Moholy-Nagy’s experiments with the kinetic sculpture were brought to fruition thanks to the AEG (Allgemeine Elektrizitäts-Gesellschaft). The AEG sponsored a stage workshop in Berlin, which made workshop space and tools accessible to Moholy-Nagy, including the help of engineer Stefan Sebok. With these resources Moholy-Nagy was able to complete Light Prop, which he had already been working on for several years. Initially the apparatus responsible for the light play was just as its title states – a prop for the purpose of the projection of over one hundred coloured light bulbs – yellow, green, blue, red and white – reminiscent of Bauhaus colleague Ludwig Hirshfeld-Mack’s Farbenlichtspiele (colour-light plays), circa 1921-23.

The sculpture had three platforms upon which various bits of metal and glass moved, each rotating at different speeds so that their alignment of positions was not repeated. Moholy-Nagy used a rotating glass spiral in the sculpture, which he saw as the penultimate form for representing the fourth dimension, since the spiral revealed at once both its exterior and interior structure. Light Prop has precedents in Tatlin’s Monument for the Third International, 1919, as well as Naum Gabo’s Kinetic Statue: Standing Wave, 1919-20.163 According to Nikolai Punin, writing in 1920, the spiral form was to the constructivist artist “full of movement, aspiration and speed: they are taut like the creative will and like a

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163 Passuth, Moholy-Nagy, 53-54.
muscle tensed with a hammer,"\(^{164}\) and it was this sense of tension and dynamism that Moholy-Nagy was intending to create in his sculpture. When first exhibited at the 'Exposition de la societe des artistes decorateurs' in Paris in 1930, the mechanisms and light sources of the light prop were enclosed inside a housing with circular openings. This focused attention on the effects of the lights and reflective surfaces being projected outwards onto a piece of scrim, which acted as a projection screen. Moholy-Nagy had initially intended the work to be used as a piece of lighting design in a domestic setting – one that could respond to different lighting sequences, transforming the lived space through projected light and colour – or as a theatrical piece of stage design.\(^{165}\) He also considered \textit{Light Prop} as "an experimental apparatus for 'painting with light," and a 'space kaleidoscope' which could "synthesize simple elements by a constant superimposition of their movements."\(^{166}\) The effects of light created by the work so pleased him that he is said to have exclaimed that he almost believed in magic when he first saw it functioning.\(^{167}\)

Through subsequent development the \textit{Light Prop} had its outer housing and projection screen removed, drawing attention to both the sculpture's internal play of reflective surfaces, light sources and movements, as well as its outward projections. However, it is in the actual performance of the \textit{Light-Space modulator} where Moholy-Nagy's vision of the future becomes alive. The multiple projection planes of the rooms in which it is exhibited, and the moving surfaces of the audience as they move through the room, become involved as partakers in the performance of the work, further integrating life with art. Together they add many layers of light play, kineticism, visual complexity and tension to the work; having the effect that he had earlier proposed about kinetic, projected compositions.\(^{168}\)

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\(^{165}\) With the added accompaniment to music Moholy-Nagy envisioned the light prop being able to receive transmitted lighting sequences over the radiogram, which it would play in accompaniment to the music also played over the airwaves.

\(^{166}\) Passuth, and Senter, \textit{L. Moholy-Nagy}, 38.

\(^{167}\) Ibid.

\(^{168}\) Moholy-Nagy, \textit{Painting, Photography and Film} (London: Lund Humphries, 1969), 24: These ideas were first published in 1925 in the original version of \textit{Painting, Photography and Film}. 45
From 1946 onwards the *Light Prop For An Electric Stage* became known as the *Light-Space Modulator*, thereby placing an emphasis on the modulation of space. In the same year that he renamed his sculpture he explained what he meant by the term modulation - comparing a flat surface which can only reflect light to an object which “with combined concave-convex or wrinkled surface may be considered a light modulator since it reflects light with varied intensity depending on its substance and the way its surfaces are turned toward the light source.”\(^{169}\) Furthermore he added that whereas a light modulator facilitated “the discovery of the genuinely photographic elements”\(^ {170}\) a plastic modulator can lead to the discovery of sculptural elements. He described the various stages of plastic modulation as a history of sculptural development throughout the ages:

1. Blocked-out
2. Modelled (hollowed-out)
3. Perforated (bored-through)
4. Equipoised (suspended)
5. Kinetic (moving)\(^ {171}\)

It was mostly the last three stages that interested Moholy-Nagy for their ability to communicate volume relationships instead of mass, with the fifth stage adding the temporal dimension to the spatial. He utilised the perforated and kinetic stages in this sculpture, realising that the modulation of light and reflective qualities of the sculpture, of itself, upon and within itself, had the ability to render 'opaque metals transparent,'\(^ {172}\) thus

\(^{169}\) Moholy-Nagy, *Vision in Motion*, 198.

\(^{170}\) Ibid., 218.

\(^{171}\) Ibid., 219.

\(^{172}\) Passuth, and Senter, *L. Moholy-Nagy*, 38.
achieving the dissolution of material that preoccupied him in his photograms. By removing the outer housing, the sculpture was able to engage more actively with the space around it, dissolving the barrier between the audience and the work, shifting the viewing position to inside the projective play of light. Through the added dimension of time, the motion of the sculpture's light play and its interpenetrating areas of shadow and highlight alluded to the spatial complexity that was already highly developed in his photograms. Creating this kinetic sculpture was the logical next step in his exploration of light and space-time articulation, as he stated later:

The photogram understood as a diagrammatic record of the motion of light translated into black and white and grey values can lead to a grasp of new types of spatial relationships and spatial rendering. The receding and advancing values of the graduations, which are projections of the 'light tracks', can be used for space - that is, space-time-articulation.173

Moholy-Nagy credits this sculpture with immense and lasting influence on his future developments in painting, film, design and photography.174 The significance of this sculpture in understanding Moholy-Nagy's ideas and beliefs, is further extrapolated by Renate Heyne:

This sculpture may be regarded both as an autonomous work of art in its own right and as an exhibit for the practical demonstration of Moholy-Nagy's theory of a multidimensional projection screen that receives light impressions and re-projects them in a changed form. In the final analysis, it is also a model of Moholy-Nagy's notion of the ideal artist of the twentieth century, who absorbs and transforms all the influences and forces that act upon him. 175

173 Moholy-Nagy, Vision in Motion, 189-190.
174 Passuth, and Senter, L. Moholy-Nagy, 38.
Ein Lightspiel Schwarz-Weiss-Grau (Lightplay Black-White-Gray)

1930, 6 minutes length, Black and White film

László Moholy-Nagy

The shadow of the rotating Light Prop.

The superimposition of metal details with the shadows. The shadow revolving; slowly the shadow of a ball surrounded by strong light, moving up and down over the original shadow.

The light prop turns; it is seen from above, below, frontwards, backwards; in normal, accelerated, retarded, reversed motion.

Close-up of details.

A big black shiny ball rolls from left to right. From right to left. Over again.

Positive, negative pictures, fades, prisms; dissolving.

 Movements, queerly shifting grills.

“Drunken” screens, lattices.

Views through small openings; through automatically changing diaphragms.

Distortion of reflections. Pendulum.

Blinding moving light flashes. Revolving spiral, reappearing, again and again. Rotation increases; all concrete shapes dissolve in light.

Evident in the script notes Moholy-Nagy published in 1931 in the magazine Kronuk and again in Vision in Motion 1947, Lightplay Black-White-Gray was always intended to be a small part of a larger film about the effects of light. The filming of Light Prop in action would have been part six in a six-part film, if the rest of the film had been realised. Moholy-Nagy's intention is clear in his later description of the script as “a synopsis of


177 Moholy-Nagy, Vision in Motion, 289.

178 Ibid: However it is worth noting that the script notes published earlier in magazine Kronuk in 1931 would have placed the sequence of the Light Prop as part five. The quote from the film script used here is taken from the 1947 version in which he has slightly elaborated in the description of the film script.
another motion picture where a new dramaturgy grows out of pure filmic elements...
[where]... through systematic use of light and shadow in motion it tries to conquer the
peculiar dimension of the film, the dimension of space-time."\(^{179}\) Although he talks about
demonstrating "the refined values of the black-white-gray gradations of the
photogram,"\(^ {180}\) he had been undertaking experiments in colour photography for Kodak at
the time, and the film was originally conceived of in colour. However, disappointed in the
results, colour was abandoned in favour of the more subtle tonal graduations he was so
familiar with through his extensive exploration of the photogram. *Lightplay Black-White-
Gray* was ultimately realised as a black and white silent film, six minutes in length.

![Fig.9. László Moholy-Nagy, Lightplay Black-White-Gray](image)

Moholy-Nagy's films, mostly documentary in style, utilised many different camera angles
and viewpoints from worms-eye to birds-eye. In *Lightplay* Moholy-Nagy favours camera
positions where the picture plane is fragmented by screens and grills. Diagonal camera
angles create strong, dynamic and disorientating compositions. Here the camera
communicates a sense of ambiguity and intrigue about the subject, creating tension and
revealing new relationships between different parts, rather than being a tool to clarify and

\(^{179}\) Moholy-Nagy, *Vision in Motion*, 88.

\(^{180}\) Ibid, 288.
document. However, besides the opening title sequence, the rest of the film is more limited in its light play than its title first suggests. For the majority of the film the camera focuses on recording the motion and reflective surfaces of the actual sculpture, albeit it with its specular highlights and rippling shadows, rather than on the more ethereal 'light play' of its projections.\textsuperscript{181} Despite missing the opportunity to utilise the sculpture's projective environment and fully immerse the viewer in more spatial expressions of light, the film effectively captures us through its playful complexity. Bright flashes of light reflect off the sculpture's mirrored surfaces, requiring the audience to actively 'stop their eyes down' or to squint, demanding a direct bodily response to the film. Complex patterns of obscurcation are created through the footage, and the film creates a further sense of density through experimental technique: multiple-exposure, montage, solarisation and the intermittent use of negative images rather than positives. Together it all works to create a sense of optical confusion and multiplicity; demonstrating effectively the concept of simultaneity of experience that both Moholy-Nagy and the Futurists subscribed to, with a strong dose of what Moholy-Nagy coined as 'ocular gymnastics'.

Alena Williams questions whether Moholy-Nagy was able to achieve the 'mobilisation of vision' that he had set out to accomplish in this film, despite film having a "flattened opticality" in contrast to the "haptic intervention of the rotating sculpture."\textsuperscript{182} At the expense of more tangible spatial articulation, the fragmentary effect of continuous shifting through different camera angles and viewpoints do create 'Vision in Motion'. But the visual complexity of this film, its field of tensions, and the overall effect of the experimental filming, processing and editing keeps the motion and spatial articulation at the surface level. Through the superimpositions of images and their reflections, the film is successful in creating a topsy-turvy world with a strong sense of spatial disorientation and fragmentation. Flat in terms of its spatial depth however, the film fails to draw you in deeper beyond what acts as a barrier of constant motion and visual confusion. Any attempt to focus on aspects of the film where rotational motion is depicted, which at first promise to articulate a deeper sense of space, is thwarted by the fragmentation, dissolution of form and otherwise predominately pendulous motion back and forth across the screen. Despite recording the 'light play' across the sculpture's highly polished surfaces, the film does not completely dissolve into the projective play of light and shadow, as throughout we are reminded of the sculpture's mechanical and awkward, slightly jerky rotations. Contributing to this stuttering sense of motion is the constant change from one

\textsuperscript{181} The title sequence has an interesting moment where a transparent ball painted with the title of the film then with Moholy-Nagy's name rotates. Due to its transparency we can simultaneously see the words on either side of the ball. This is followed by the projection of a shadow of someone's twisting film.

camera angle to another. We are presented with motion and 'ocular gymnastics' abound, but no sense of rhythm is able to develop that might abet this. What the film loses on one hand - the tangible articulation of space, it gains on the other - the complexities of space. It could be argued that through its complexity of space, as in Cubism where 'multiple profiles' of an object are described showing the object being organised in space, that experiential space here becomes constituted through its form flowering and multiplying. Einstein believed in an infinite number of spaces, which he thought to be in constant motion in relation to one another.\textsuperscript{183} The motion in \textit{Lightplay} teases us with the promise of an infinite number of spaces, which in the process of becoming, articulate a complex vision of space that is in constant motion and manifold.

Although this film is the most experimental of his surviving films, and is most closely aligned to his ideas about the use of light and creating 'productive' instead of 'reproductive' effects,\textsuperscript{184} it still seems that his theories about the creative possibilities of film fall short in realisation. This film fulfils Moholy-Nagy's intention to use light to express a 'new spatial awareness'. But in terms of its spatial complexity it is worth noting that in comparison to its sculptural counterpart and his theories of a poly-cinema, the performance of light in it remains neatly encapsulated in the one projection; its spatial complexity ultimately restrained by the one-dimensional surface intercepting the projection. Despite the promise of the moving image to extend further the motion implied in his photograms, and the conclusion he reached in 1945 that "motion pictures, more than anything else, fulfil requirements of a space-time visual art,"\textsuperscript{185} it is ultimately in Moholy-Nagy's photograms that his most effective articulation of space-time is created.

\begin{center}
\textit{Untitled Photogram}
\end{center}

1925-38, Silver Gelatin Print, 23.9 x17.9 cm\textsuperscript{186}

László Moholy-Nagy

"Design with light: not in the sense of surface embellishment but rather in the creation, using a camera less process, of an illusionary and intangible picture space in which light itself generates forms in dynamic, spatial relationships."\textsuperscript{187}

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\textsuperscript{184} Passuth, \textit{Moholy-Nagy}, 290.
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\textsuperscript{185} Passuth, and Senter, \textit{L. Moholy-Nagy}, 35.
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\textsuperscript{186} Published in Heyne, Neusüss and Moholy-Nagy, eds., \textit{Moholy-Nagy: The Photograms : Catalogue Raisonné}, 183.
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**Fig.10. László Moholy-Nagy, *Untitled Photogram***

*Untitled* photogram dated 1925-1928 from his Dessau period, effectively demonstrates a sense of Moholy-Nagy's spatio-temporal concerns and the use of light and shadow in manifesting theme. Portrait in format, the photogram is 23.9 x 17.9 cm. Produced in the darkroom, unlike his earlier experiments with POP (printing out paper) in the sunlight, this photogram is reasonably high in contrast between whites and blacks, yet also retains the subtlety of its mid-tones. A circular area of light grey tone is demarcated from the all-surrounding inky black by a fine white line. Moholy-Nagy believed that abstraction “creates new types of spatial relationships, new inventions of forms, new visual laws- basic and simple- as the visual counterpoint to a more purposeful, cooperative society.”\(^{188}\) In keeping with his non-objective paintings and other photograms, this photogram uses non-representational forms to create dynamic relationships, with their utopian theoretical underpinnings. Like a spotlight on a stage this circle is situated slightly lower than the centre of the paper. The line that circumscribes the circle is like a chalk line on the pavement, with a variance in its thickness like the shifting weight and quality of line in a Cezanne painting. The circle appears suspended, or floating precariously like an isolated

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\(^{188}\) Passuth, and Senter, *L. Moholy-Nagy*, 12.
platform out in space. However, reassuringly, through its act of linear definition, there is no falling off from the circle into a shadowy penumbra, nor the bottomlessness of the cosmos. From inside the circle, right side, a beam of light appears to project outwards, toward the left, like a searchlight in the night sky, ever-straining upwards. It appears that we have interrupted its scanning across the sky. Contrary to physics, what appears to be the source of the light – the base of the beam of light – dissolves away into indistinctness. Instead it is the apex of the projected beam that has its edges most clearly defined. Upon re-evaluation it seems that the source of this diagonal beam of light could originate from an invisible trapdoor high above, looking down at the circle, but whichever way it is read, its' constitution and orientation defies any sort of logic. The circle has a fine granular texture across it like silver particles within the substrate of film, residual dust resting on a mirror, or the pebbly warmth of the pavement beneath our feet. Like other artists who used shadows, mirrors and glass as a means to depict notions of the fourth dimension, it could be that Moholy-Nagy intended the circle to be read as a disc of transparent perspex, beneath which cascade endlessly, and timelessly, away the stars of the milky way.

Inherent in the making of photograms in a darkroom is the sense of floating. In the minimal light radiating from a red light source and the intermittent flashes of the enlarger, form is indistinct and ambiguous; orientation is dependent on spatial relationships felt and memorised- it can be hard to tell where the darkness ends. Likewise there is a strong sense of vertigo and spatial disorientation in this photogram. The negative space in the print could be immense or tightly enclosed, and the darkness surrounding the circle teases the viewer with this ambiguity. Similar to Moholy-Nagy's paintings, where circles are interpenetrated by strip-like forms, within the larger circle of this photogram is a smaller one, divided into two segments across which the beam of light diagonally projects. Cast upon the circle are shadows, like those of window frames, implying the presence of structures outside of the physical limits of the photogram. It is unclear whether we are looking through something, at something, or whether the structure has had its interior revealed. To Moholy-Nagy the photogram was the artistic equivalent of the scientific x-ray photograph; this is particularly evident in how he juxtaposed his photograms with examples of x-ray photography in his book 'Malerei Photographie Film'. Herbert Molderings explains why these two forms of photography were read as parallel to one another, in that “the dematerialisation of objects into pure light and shadow, transparency and translucency, was an aesthetic characteristic common to both processes.” Like his sculpture Light Prop that can be read as a mobile painting, one that paints with light

189 Marcel Duchamp saw the mirror as a symbol of the 4th dimension.


191 Passuth, Moholy-Nagy, 54.
instead of pigment, this photogram seems to defy traditional modes of material definition. Two dimensional in its nature it also expresses itself as a free floating construction, like the fourth dimensional plastic sculptures that Moholy-Nagy would focus on creating later in his career.

The photograms of Moholy-Nagy, which marry dematerialised form with ambiguity of time and space, are reminiscent of Lye's explorations of the photogram process in colour years later. Although Lye created still photograms, largely a portrait series in the 1940s, his most successful manifestations of time and space using the photogram process is in his film *Colour Cry*.

*Colour Cry*

1953, 3min length, 16mm Kodachrome Film

Music: ‘Fox Chase’ by Sonny Terry

Len Lye

In response to the stifling environment in which Lye's creative ideas for colour television and advertising were misunderstood or deemed as too radical, he funded *Colour Cry* himself. It was constructed from many of the experimental test strips that he had already produced in his plugs for experimental television work, is three minutes in length and has no advertising slogans. The film was shown by Lye to friends at home and amongst film circles.

*Colour Cry* was realised on Kodachrome 16mm film stock, which was a subtractive and integral process. Earlier experiments with Gasparcolour and Technicolour had required three separate negatives to be filmed and printed together in order to create colour. The colour generated by Kodachrome only required the one negative to be filmed (Kodachrome film stock had three separate layers within it, each with a different sensitivity to the colour of light). Coloured dyes also within the film stock then created a full colour effect when processed. This greatly simplified process was the precursor of modern colour photography and Lye utilised it because it did away with the need for employing specialist printing technicians: the 16mm format was also smaller and cheaper than 35mm.

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True to Lye's voracious appetite for experimentation, the majority of this film was produced utilising the photogram method. Following in the footsteps of Man Ray and Moholy-Nagy, he was able to create abstract patterns and shapes by laying objects and stencils directly on the film itself and exposing it to light. Lye used coloured gels in front of the light source, which enabled him to create more complex spatial effects by shifting the objects and stencils whilst creating multiple exposures with different colours. Through the process of multiple exposure the stencils would both block areas that had been previously exposed, and then reveal previously unexposed areas. This allowed him to construct patterns with different colour shifts without overexposing the film. Working a bit like a magician in the dark, the process was extremely time-consuming (apparently the experimentation took months), and physically engaging. Spending hours, let alone months, in the midnight dark would have been a meditative and internalized process. Any photographer knows that working in a darkened room for a period of time requires a heightened spatial awareness and is a deeply phenomenological experience; there is much 'looking' with your hands and a reliance on bodily memory over vision. If any photographic technique would make you aware of the palpable qualities of light (and darkness) and a knitting of the body to the physiology of vision, then this would be it. In turn, Lye successfully transformed the all-enveloping blackness of the darkroom into a projected blanket of colour, a veritable technicoloured dream coat.

Fig.11. Len Lye, *Colour Cry*

In *The Art that Moves* Horrocks refers to Lye's "fluid sense of space" in his films and *Colour Cry* is no exception. It makes use of complex overlaying of stencils, creating multiple
planes of focus that slide across one another at different speeds. Without the constraints of any narrative signified by figurative imagery, or the need to advertise any message for a sponsor, Lye shuffles the abstract forms like a deck of cards, moving them behind then in front seamlessly. Adding to this complexity is the depth of field created in the film, where upon each layer the shapes have a different quality of outline from the other. Circles appearing to be in the background have fuzzier contours than those in the foreground. Perceptually this helps us to read the composition as having a depth to it and is the result of a deliberate spatial separation that occurs in the darkroom. To create shapes that appear to have ‘harder’ contours, objects (or a stencil) need to have been placed in direct contact with the photographic film/paper. To create ‘softer’ shapes the objects/stencil are separated from it, usually physically held further away by the artist or another means of support. Through colour and motion these shapes are visually adjoined yet remain spatially separated. The use of blur in the background creates a sense of depth and focuses our attention on the foreground instead. However, Lye suddenly usurps this law of perspective and makes the patterns on the visual plane closest to the viewer blurry and the farthest away sharp, so that we have to look through a fuzzy grid to focus on the background instead. As an artist who understands the visual possibilities of his medium, Lye is playing with the visual effects of depth of field. Normally synchronous, the physiological mechanisms of our vision and the process of focussing on something remain hidden, however in Colour Cry this shift becomes revealed in the rapidity that Lye makes us jump from one plane of focus to the other. The viewer becomes physically aware of their eyes changing focus, thus bringing a more embodied experience of the film.

Colour Cry begins with colourful circles floating across the surface in that fluid-like-way in which ‘floaters’ cross our vision from time to time, or as clouds travel when caught in high winds. Lye artfully structures the composition so that these circles are repeated on two different layers. The circles in the foreground appear to be throwing shadows behind or below them, giving the definite effect of a spatial separation between the two. However, there is a certain temporal disjunction that disrupts the illusion; the shadows follow their owners about the screen at a slightly slower pace, somewhat lazily, in contrast to the rapidity of the shapes darting about in the foreground. One is reminded of an aerial view from a plane, looking down to observe the plane’s shadow trailing behind- tripped up by the landscape. Throughout the film the sense of looking down gives way to looking across and then back again. Horrocks attributes the film’s incredible sense of spatial complexity to these apparent shifts in viewpoint.193 Another sophisticated rendition of space is established through motion. In one sequence Lye twists a ribbon whilst it is being recorded as a photogram onto the film stock. The twisting, wriggling motion of the ribbon transcribes a space that lies cocooned within its motion, as is found within a whirlwind

193 Refer to ‘Vision in Motion’ where Moholy-Nagy writes about the importance of the aeroplane for extending our spatial perception.
spinning along its axis. This twisting motion acts as a counterpoint to the predominance of rectilinear movements in the film.

The background texture of the film acts as positive-negative space; alive with the grain, speckles and scratches that create an underlying visual noise that can be read as microorganisms trapped within the gelatin. In addition to this a sequence of painted vertical stripes sashaying across the film and back again look like magnified cross-sections of hair, or could it be the inner core of the earth? Further still the flashing of light and darks and biomorphic shapes throughout the film can be read like an x-ray - shadowy impressions of internal organs and bodily structure, with its interpenetration of exterior and interior spaces. Initially Lye likened this film, with its haunting soundtrack of Sonny Terry's wailing harmonica, to the racial tensions in Southern America. He considered that its intense combination of sound, abstract imagery and flashing of lights and darks created a sense of tension, confinement and escape, like that of a slave fleeing captivity. Retrospectively Lye found another level of signification in the work, reading the biomorphic shapes and dark shadows in Colour Cry as of the body: “Blood cells, nerves, bone and marrow, rib-cage, sinews.”

The end of the film, bathed in blood-red, is signalled by a singular resonant chime of a clock, signalling the end of an hour and the beginning of the next.

Throughout the film the viewer is transported from the external world of aeroplanes, magma, shadows and railway tracks into that of the body as if seen through a microscope or an x-ray. Moving between macro and micro, by switching the focal planes over, and the shift between looking down to looking across at, viewers of the film become aware of their vision in motion. Because the film is constructed from many short segments, the colours change dramatically throughout. The movement of different colour relationships within the film adds further emphasis to its elasticity of space. Drawn deeper into the spatial field constructed by open network of grids and patterns moving over one another in different directions, Colour Cry engulfs the viewer until they are in the belly of the work. Any semblance of order that arises is absorbed rapidly back again into the wildly oscillating river of colour and pattern. There is no escape from the soundtrack and the rich interplay of colour and shape, which are at times visceral and full of tension. Addictive, but at times uncomfortable, the rapid pace and continual motion commands you to wriggle along in your seat until the film’s close.

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Summary

In conclusion, Moholy-Nagy's work communicates a sense of dynamism, visual complexity and tension. In particular it was the relations between different parts, and the spatial networks that these generated that interested him. Although Moholy-Nagy was not preoccupied with the idea of the fourth dimension as other artists had become; in response to the modern age he had formulated his own relativist theory of 'Vision in Motion' and posited it as another interpretation of 'space-time'. Walter Gropius summarises Moholy-Nagy's fascination with light, space and motion:

His genius ventured into all realms of science and art to unriddle the phenomena of space and light. In painting, sculpture and architecture, in theater and industrial design, in photography and film, advertising and typography, he incessantly strove to interpret space in its relation to time, that is, motion in space.\textsuperscript{195}

Drawing upon the multiplicity of camera angles, as well as the superimposition of forms, pattern, light and shadow, his film \textit{LightPlay Black-White-Gray} generates spatial complexity, but falls short in delivering the space-time articulation he envisioned. It is instead in his static photograms that Moholy-Nagy was most successful in articulating a sense of 'space-time'. In comparison, Lye, who did not set out intentionally to create a new consciousness of space did so through an intuitive understanding of 'Vision in Motion', his use of experimental technique, and the creation of tensions and interrelations between forms and colours. He created films that offer us the space-time experiences that Moholy-Nagy had written about.

Conclusion

László Moholy-Nagy long-considered at the forefront of modernism proposed ideas prolifically throughout his trajectory as an artist and an educator, the culmination of which were published in *Vision in Motion*. Moving in similar circles to Moholy-Nagy was Len Lye, a lesser-known artist whose oeuvre, once examined, bears striking similarities to those of Moholy-Nagy, in particular the level of experiment which both artists engaged in, their interdisciplinary practices, and the incredible complexities of time, space and motion in their work.

Underlying these similarities in their work were shared beliefs and approaches to making and thinking that the two artists held. Lye and Moholy-Nagy believed in the ability of art to enable self-fulfilment through individual creative expression, transforming life and society actively as a result. Polymathic in terms of their interests and skills, they worked and thought relationally, making active connections to produce new and dynamic outcomes. Conversant with a range of materials they created multi-faceted relationships between and across different media. Their artwork stemmed from a constant questioning and experimentation both of, and with, their materials and processes.

Throughout their careers Lye and Moholy-Nagy were prolific in exploring life-long preoccupations with light and movement. The nature of their practice was an antithesis to the idea of specialisation in one discipline; transgressing the traditionally regimented boundaries between media instead; from painting to photography, to film and kinetic sculpture.

Modernism was defined by a common drive in artists to break with traditions of the past and a relentless search to find a new means of expression befitting the modern age. The treatment of space and time was a common preoccupation for early modernists. Therefore chapter one has outlined some of the 19th and 20th century developments they were responding to, providing context within which Lye and Moholy-Nagy’s own articulations of space and time can be considered.

196 Due to space limitations these have not been discussed earlier, however are important to consider.

197 Both artists worked in other disciplines besides these. Moholy-Nagy also worked in industrial, stage, lighting and graphic design. Lye also created batiks and assemblages.
Chapters two and three discussed the exploration of time and space in modernist art practice, focussing in particular on the complexities of time and space evident in Moholy-Nagy and Lye's work as they celebrated elements of light, movement, vision and bodily sensation.

In this thesis 'Vision in Motion' has been used as a framework within which to analyse Lye and Moholy-Nagy's work and practice, illuminating parallels between these artists in relation to their integration of art with life and democratic vision of self-expression. Both artists engaged in relational thinking and had recursive practices. Lye’s thinking was circular and can be seen in his many re-workings of ‘Individual Happiness Now’, which, despite having grand ideological aspirations, did not culminate in a logical progression toward a finite summary. Lye revisited some of his paintings decades after their date of original conception, reconsidering and retitling them in the light of new knowledge that surfaced in the evolutionary scientific context of the late 1960s. Lye felt saw this as ‘proof’ of the intuitive ‘old brain’ knowledge that he had. Lye and Moholy-Nagy remained committed throughout their careers to the pursuit of the expression of motion and light respectively, whilst moving fluidly across media boundaries.

Upon analysis of these two artists' works it is clear that Lye's approach to experimentation was intuitive, his films free and explorative. Moholy-Nagy believed that the experiences of intuition, perception “seeing, feeling and thinking” should be in constant relationship with one another, rather than existing “as a series of isolated phenomena.”\(^{198}\) Lye demonstrated such a relational and embodied self-awareness: his art and writing celebrating the senses, most particularly through movement. Intimately tied to life, Lye's oeuvre is full of idiosyncratic examples of the active and productive relationships that Moholy-Nagy theorised about.

The art, writing and practice of Lye and Moholy-Nagy have many similarities, defined by the complexities of time, space and motion. Trailblazers in the fields of kinetic sculpture, photography, painting and film,\(^{199}\) I have argued that Lye and Moholy-Nagy’s strengths were their films and photograms respectively. Thinking, seeing and feeling in relationships they modelled Moholy-Nagy’s concept of ‘Vision in Motion’.

\(^{198}\) Wick, *Teaching at the Bauhaus*, 360.

\(^{199}\) I acknowledge similar levels of experiment in both Lye and Moholy-Nagy’s Painting and kinetic sculpture practice. However this has not been the object of this inquiry.
Recently there has been increased interest in Lye generated through several major exhibitions and the construction of a Len Lye centre in New Zealand.\textsuperscript{200} Considering this, and the former disparity of recognition between the two artists, I return to Charles Green’s speculation that Lye will come to “outshine that of the better-known moderns,”\textsuperscript{201} and propose that it will only be a matter of time before this occurs.

\begin{figure}[h]
\centering
\includegraphics[width=0.4\textwidth]{Fig12.png}
\caption{Len Lye, \textit{Free Radicals}}
\end{figure}

\begin{figure}[h]
\centering
\includegraphics[width=0.4\textwidth]{Fig13.png}
\caption{László Moholy-Nagy, \textit{Untitled}}
\end{figure}

\textsuperscript{200} Selected major solo exhibitions include: \textit{Len Lye: Motion Sketch}, The Drawing Centre, New York, 2014. \\

\textit{Len Lye: Kaleidoscope}, The City Gallery Wellington, 2013. \\


\textit{Len Lye}, Hordaland Art Centre, Bergen, Norway, 2011. \\


\textit{Len Lye}, ACMI, Melbourne, 2009. \\


Lye’s work has been shown in several important survey Kinetic art exhibitions: \textit{Bewogen Beweging, Moving Movement}, Amsterdam, 1961; \textit{Territorium Artis: 'The 100 most influential artworks of the twentieth century'}, German National Museum, Nuremberg, 1992 and \textit{Force Fields}, Hayward Gallery, London, 2000. In addition his films have featured in the exhibition: \textit{Abstract Expressionist New York}, MOMA, New York, 2011. \textit{A Colour Box} screened as part of its collection display at The Tate Modern, London, 2007. Lye’s films have also been shown at the Bienal de Sao Paolo, Brazil, 2006 and in \textit{Le Mouvement des images}, Centre Pompidou, Paris, 2006.

\textsuperscript{201} Green, "Len Lye," \textit{International Art Forum}, 251.
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