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Title	Art and its others 1: the aesthetics of technology
Authors(s)	Daly, Nicholas
Publication date	2017-03
Publication information	Daly, Nicholas. "Art and Its Others 1: The Aesthetics of Technology." Cambridge University Press, 2017.
Publisher	Cambridge University Press
Item record/more information	http://hdl.handle.net/10197/6490

Downloaded 2024-04-19 01:02:29

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Modernism and Technology

Nicholas Daly, University College Dublin

Modernism first emerges during the transformations of time and space wrought by the age of steam, and it comes to dominance against the background of the 'second industrial revolution'. This revolution, which was really more of an intensification of earlier processes, was driven by, inter alia, the exploitation of electricity and the internal combustion engine, use of early plastics (celluloid, and later bakelite), the oneiric power of the cinematograph, the sound-reproduction technology of the phonograph, and the communications technologies of the telephone and later the radio. In theoretical terms one could argue that there is no space, no "and" between modernism and these technological shifts: they are bound together in a common culture. But for practical purposes we can describe a set of relations between the two: Modernism incorporates technological change as historical content; it appropriates new representational means for its own artistic practices; and at times it self-consciously draws on the machine world for aesthetic models. The flurry of innovation in mechanical reproduction brought the materiality of older media into sharp focus.¹ For some, of course, the era of mechanical reproduction appeared to undermine lingering conceptions of the artist as Romantic creator, or as bohemian rebel. Further, Modernism enters its mature phase during the industrialized slaughter of the First World War, and it is imbued with an awareness of the lethal potential of modern technology, and of the fragility of the human body. Keeping such factors in mind, in this chapter I will consider, among other things, the new cultural forms that were directly made possible by technology; the way in which human/machine relations are imagined in these years; and the development of "machine" aesthetics.

Modalities of the Visible

In the visual field the potential of reproductive technologies emerges in commercial art before fine art, and some of the most powerful images of the late nineteenth and early twentieth century are the chromolithographic advertising posters of Henri de Toulouse-Lautrec, Pierre Bonnard, Théophile Steinlen, and Leonetto Capiello. Color lithography had, in fact, been around for quite some time, but it is only at the end of the century that its potential for advertising was realized, and bold, eye-catching ads were part of the transformation of the visual culture of everyday urban life² Among the most iconic of these images are Steinlen's poster for the Chat Noir cabaret, and Toulouse-Lautrec's for the Moulin Rouge and Les Ambassadeurs. The artists exploit chromolithography's

effectiveness in reproducing blocks of two or three vivid colors, while also deploying the flattened perspective learned from Japanese prints. Subsequent post-impressionist art would draw on both of these techniques, while the fledgling science of advertising learnt lessons about how to engineer attention, and how to make a lasting impression on the consumer.

Arriving at roughly the same time as the modern poster boom, the cinematograph was to have an even more powerful effect on the visual field.³ The development of motion-picture technologies by the Lumières, R.W. Paul, Thomas Edison and others depended on advances in camera technology, but also on the exploitation of the first real plastic polymer, celluloid. Invented in 1862, it was only in the 1880s that celluloid was used to replace glass plates in photography, and in the 1890s it provided the flexible film stock for the first moving pictures. Unlike other second industrial-revolution machines the cinema could produce self-conscious narratives about its own impact: R.W. Paul's *The Countryman's First Sight of the Animated Pictures* (1901) is a well-known example, dramatizing the consternation of a naïve viewer who takes the moving image for reality. While some pioneers used cinema to defamiliarize everyday space, George Méliès, a former magician, showed that the cinema had its own magic, and that it could be used to produce wholly imaginary landscapes and fantastic voyages. Both approaches are captured in Walter Benjamin's account of the cinema as bursting asunder the "prison-world" of space with "the dynamite of the tenth of a second".⁴ As cinema developed in the 1910s through the Italian "super-films" (e.g. Giovanni Pastrone's *Cabiria* [1914]), and D.W. Griffith's epic features, a filmic grammar developed around such features as the use of close-ups, medium and long shots, tracking shots, point of view, and continuity montage. The unique role of montage in particular was seized upon by the pioneers of modernist film-making, including Fritz Lang, Sergei Eisenstein, Lev Kuleshov, Dziga Vertov, Luis Bunuel and Man Ray. Not only could a new imaginary space be constructed by cutting from one shot to another, but a whole range of emotional and intellectual effects could be created in the mind of the viewer. Eisenstein theorized that cutting could be "dialectic", that complex ideas could be evoked by cutting from one shot to something very different to suggest their metaphorical linkage. (T.S. Eliot's idea of the "objective correlative" is not so very different.) Bunuel, collaborating with Salvador Dali, harnessed these techniques for surrealism, creating startling juxtapositions and shocking close-ups: the intercutting of clouds passing across the moon with the apparent slitting of a woman's eyeball in the opening sequence of *Un Chien Andalou* (1929) is an infamous example.

Motion pictures helped artists to understand the specificity of photography as a practice, as we see in the work of Alfred Stieglitz, Man Ray, and others, just as photography gave fine art painters a new sense of the materiality of their work. As it emerged from the daguerrotypes and calotypes of the 1830s and 1840s photography became a sophisticated art-form in the work of such pioneers as Oscar Rejlander and Julia Cameron. The Victorian pioneers tended to rely on the compositional practices of fine-art painting (allegory, for example, in the elaborate photomontages of Rejlander), and this orientation towards easel painting lingers even in Stieglitz's work, though he began to take photography in a new direction in his stylized close-ups of Georgia O'Keeffe, and in the cloud photographs he first published as *Songs of the Sky* (1923). Stieglitz also came to

champion the avant garde in the journal *Camera Work*, and at his “291” gallery, at 291, Fifth Avenue, one regular visitor to which was Man Ray (Emmanuel Radnitsky), a young painter and creator of Dada-esque “assemblages”.⁵ His *Portrait of Alfred Stieglitz* was painted the year of the Armory Show, and is one of the better-known instances of his work in this period; a broadly cubist painting in oils, its intersecting planes present a stylized Stieglitz, an urban landscape, and the number “291”. Man Ray began by photographing his own work in other media, but his exposure to Surrealism and Dada in New York and later Paris helped to make him one of the most innovative photographers of this period. Among his most arresting images are those that spotlight resonances between the human and the non-human, as with his *Violon d’Ingres* (1924), which shows the back of his model, Kiki de Montparnasse, seemingly endowed with the f-holes of a violin; and his primitivist *Noir et Blanche* (1926), which juxtaposes the heavily-made up face of the same model and an African ceremonial mask. Elsewhere he seems to gesture towards a visual realm beyond the quotidian. His ‘Rayographs’, for example, were created without the use of a camera by placing objects directly onto photo-sensitive paper (Schwartz 236-8). The resulting images have an other-worldly aspect, though they also recall the history of the medium: among the earliest photo-images are the ghostly traces of lace and leaves captured by William Henry Fox Talbot through a similar process, which he named photogenic drawing. Bauhaus artist László Moholy-Nagy also experimented with this technique, calling his object-pictures photograms.

Artists in other media were scarcely immune to what was happening in photography and film. Nineteenth-century painters had early realized the usefulness of the camera for their realist canvases: W.P. Frith used photographs by his friend Robert Howlett to create the complex sub-groups of his panoramic *Derby Day* (1858); James Tissot, whose work had been denounced by John Ruskin as “mere colored photographs of vulgar society”, increasingly used photographs after 1875 as the basis of his works.⁶ But we have also come to realize that photography influenced the more “painterly” styles that began to evolve from mid-century, including the impressionism of James Abbott McNeill Whistler and his French peers: the capturing of a specific moment, the pre-eminent role of light, and the focus on the everyday present are all aspects of impressionism that were also facets of the evolving art of photography. Similarly, the break that cubism represents coincides with the appearance of motion pictures. As Gerald Noxon noted many years ago, cubism has in common with the cinema a technique of “fragmentation and re-synthesis”: the cubist canvas rejects traditional perspectival space, replacing it with a synthetic perspective. One could also argue that the cinema’s extension of the viewed subject in time inspires cubism, which compresses a sequence of perspectives into a multi-perspectival moment.⁷ In other respects, of course, the post-impressionist turn in the fine arts seems more like an embrace of the specifically painterly (color, composition, distinct brush-strokes), a reaction against rather than an adoption of the regime of the camera.

Writers also drew on photography and cinema for models or metaphors for their own practices. The “Camera-Eye” sequences in John Dos Passos’s monumental *USA* trilogy (1930-36) are a familiar instance of the direct influence of the new medium on prose fiction.⁸ But critics have also made claims for the centrality of cinema to an understanding of texts in which it is less of an

announced presence. For instance, Sarah Danius argues that in *Ulysses* Joyce – himself a one-time cinema entrepreneur -- reproduces the techniques of the film camera just as he incorporates other visual media into his encyclopaedic text, from telegrams and newspapers to mutoscopes.⁹ Other writers too saw the potential of the new form, and hoped to rescue it from commercialism: H.D., Bryher (sc. Annie Winifred Ellerman, who supported the venture financially), and Kenneth Macpherson co-edited the monthly film journal *Close Up*, which promised on its cover wrappers to be the first review to “approach films from the angles of art, experiment, and possibility”, and promised “Theory and Analysis – No Gossip”.¹⁰ Published between 1927 and 1933, by the POOL collective (Macpherson and Bryher), *Close Up* brought the work of Eisenstein to the attention of a wider audience, pioneered psychoanalytic approaches to spectatorship, and was largely hostile to Hollywood and other mainstream commercial film; contributors included the editors themselves, Dorothy Richardson, Gertrude Stein, and Marianne Moore.¹¹ The editorial trio also made films, the most famous of which is the avant-garde *Borderline* (1930), which featured H.D., Bryher, and Paul and Eslanda Robeson among its cast, with McPherson directing.

Sound

Among the first of the new sound technologies of the modernist years were the phonograph and the telephone, which both appeared while Queen Victoria still had some 20 years left of her reign. While we now largely think of it as a medium for interpersonal communications, the telephone might also be thought of as the first broadcast medium. Invented in 1876, its potential as part of a telecommunications network was not fully grasped for some time, and its first commercial uses included the broadcasting of concerts and plays to the private homes of the wealthy. Budapest had telephone concerts from 1893; in London the Electrophone Company promised to offer a similar service, and it broadcast the national anthem from Her Majesty’s Theatre in the Haymarket in 1899 -- Queen Victoria, listening at Windsor, was ‘amused’.¹² Fiction was slow to recognize the new distance-annihilating technology, with Henry James, for instance, more interested in the symbolic and affective role of the electric telegraph and the Parisian pneumatic post, even in his later fiction, as Pamela Thurschwell and Mark Goble have shown in different ways.¹³ Proust and Joyce, however, were drawn to the new medium. Danius argues that the perceptual framework of Proust’s *Remembrance of Things Past* is shaped by the telephone, among other technologies: for example, in describing a telephone conversation with his grandmother in *The Guermentes Way* Proust’s narrator discusses how the telephone reifies her embodied voice as abstract sound, but also makes him think of a time in the future when she will be further reified, separated from him by the long-distance line of death.¹⁴ Along with other new technologies, the phone makes a number of cameo appearance in Joyce’s *Ulysses* – we hear half a telephone conversation in the busy newspaper office of the Aeolus episode, and such things are clearly taken for granted as part of everyday communication. For Danius, such technologies also allow Joyce to imagine the representation of the world in terms of autonomized sounds and sights (156-57). Mark Goble suggests, by contrast, that the telephone’s role in Gertrude Stein’s *Autobiography of Alice B. Toklas* (1933) is less to do with questions of pure sound, and more

about a vision of modern America as integrated by the circulation of celebrity, money, and communication as an end in itself (85-150). Arguably, it is in the “popular modernism” of the cinema that the telephone achieves its greatest recognition as an index of the modernity of the networked city: from Fritz Lang’s *Dr Mabuse, the Gambler* (1922) and *Spies* (1928) to the film noir of the 1940s and beyond, the telephone is both symbolic presence and narrative device, allowing us to imagine different locations sutured into a network of surveillance, or crime, or community, as well as romantic intimacy mediated by machines.¹⁵

Patented just after the telephone, the phonograph likewise allowed the separation of voice from the speaking (or singing) subject, but it also enabled that voice to cross time as well as space: for the first time sound could be archived. Echoes of the new technology ring through, for example, Joseph Conrad’s *Heart of Darkness* (1899), in which the voice of Kurtz is a powerful presence even after death, as well as in the intelligent and elegant Shakespearean Rag of T.S. Eliot’s *Wasteland* (1922), which echoes the actual *Shakespearean Rag* of 1912.¹⁶ We might speculate that the Dadaist nonsense poem also learns from the abstracted voice of the phonograph (or its successor, the gramophone). Recorded sound effects soon became a part of theatre and later radio performances, but the key example of a stage play that takes recording as its structural principle is, of course, Samuel Beckett’s *Krapp’s Last Tape* (1958). As the title indicates, Beckett deploys a tape-recorder rather than a phonograph in this one-act play, in which the elderly protagonist is making a sort of aural diary entry, and listening to and commenting on a recording made by his younger self: the relations of selfhood and time is one theme here, but so is the homology between recording and death: soon there will be no Krapp, and only tape.

Radio arrived quite a bit later than the sound technologies I have mentioned, but by the 1930s it already enjoyed a powerful media position: broadcasting directly into the intimate sphere of the home, and moulding national imagined communities, it is radio, not cinema, that anticipates television. Many modernists wrote for the radio, or made broadcasts, including Gertrude Stein, Virginia Woolf, T.S. Eliot, Bertolt Brecht, Samuel Beckett, and – infamously – Ezra Pound. Yeats, for example, gave a reading for Radio Athlone in Ireland, made nine broadcasts for the BBC, and wrote a number of poems specifically for his radio readings; Eliot made some 80 broadcasts between 1929 and 1963.¹⁷ If the cultivation of small, coterie readerships through “little magazines”, and small, independent presses show one facet of modernism’s relationship to the public, this enthusiasm for the radio’s mass reach displays a rather different one. However, as Debra Rae Cohen points out, the modernist will to experiment was often in tension with state and broadcasting-elite efforts to control the new medium, and some of the more innovative work produced for the radio by, for example, F.T. Marinetti and Antonin Artaud was never broadcast.¹⁸

In the field of music, emergent sound technologies made available wholly new musical instruments, as opposed to enhancements to existing ones such as the electric piano, and electric guitar. The first of the new “electronic” instruments was the Theremin, patented by Léon Theremin in 1928, which worked by frequency modulation. The eerie sound of the Theremin has mostly given it a place in radio, film and television scores as an index of mental

agitation, or the supernatural. Its more high-profile appearances have included Dmitri Shostakovich's score for *Alone* (1931), and Miklos Rozsa scores for Hitchcock's *Spellbound* (1945), and Billy Wilder's *The Lost Weekend* (1945).¹⁹ A similar instrument, the ondes Martenot was taken up by composer Olivier Messiaen, among others. The possibilities of making new kinds of purely electronically-generated music attracted such late-modernist figures as Karlheinz Stockhausen, who also experimented with splicing together sections of recorded sound.

Industrial Death

New technologies gave new tools to creative artists, or offered inspiration for new ways of using established media, but as I noted in my introduction modernism came to maturity at a very particular moment, that of the industrial carnage of the First World War. Critics have argued that this is not just a question of the war as historical context. For some, the war crystallized out of a modernist worldview; for others the war's fracturing of the language of liberal modernity directly informs modernism.²⁰ More literally, of course, modernist practices were part of the war effort. C.R.W. Nevinson and Paul Nash worked as official war artists; the camouflage devised in France by Guirand de Scévola acknowledged its debt to cubism; the Vorticist artist Edward Wadsworth supervised the painting of many British vessels in "dazzle" camouflage during the war, and after the war drew on this work in his fine-art painting.²¹ One might also argue that propaganda posters in both world wars learned from modernist techniques for engineering attention.

However we conceive of the relations of the war and modernism, it is undeniable that the war darkened views of the more general machine culture. Tanks, planes, zeppelins, long-distance rifles and artillery, machine guns, and gas: the catastrophic effects of modern warfare could not but affect the way in which industrial culture more generally was interpreted. Echoes, sometimes faint, sometimes loud, of the war can be heard in most of the major modernist artifacts of the 1920s: *The Wasteland*; *Mrs Dalloway* (1925); *Women in Love* (1920); Hemingway's short stories and early novels are all "about" the war at some level. The dead that haunt the *Wasteland* are not simply the literary dead, fragments of whose works echo through the poem, but the recent war dead. *Mrs Dalloway* likewise is a novel about the war's reverberations: Septimus Smith, whose consciousness has been irrevocably damaged by the war, is one index of the recent conflict, and the effects of "shell shock"; the off-stage Lady Bexborough has lost her favorite son, John; Doris Kilman has been embittered by the wave of anti-German feeling. More importantly, though, Woolf's depiction of shell shock models consciousness more generally in the novel: Septimus's scattered mind, in thrall to the horrors of the war, is only an extreme version of Clarissa's, in which the past is a forceful presence; and like him she experiences a sense of connection to others that at times annihilates the harder edges of the self.

By contrast, in the work of Lawrence and Hemingway memories of the war underwrite a variety of modern primitivism. In *Women in Love* (1920) the mine-owner, Gerald Crich, is a lover of mechanical efficiency, and life-denying forms of modern thought; his death in the snow of the Alps symbolizes the logical end of his investment in icy abstraction. Birkin, by contrast, believes that

there is a way out of modernity through the embrace of the senses, a modern primitivism. A similar polarity structures *Lady Chatterley's Lover* (1928), in which Sir Clifford Chatterley returns crippled from the war; that he gets about in a motorized wheelchair further marks him as a product of the bad mechanical modernity that Lawrence rejects. His wife, Constance, is drawn to the earthy masculinity of the gamekeeper, Mellors, and their passionate sexual encounters represent the novel's alternative to the life mechanical. Sensuality in these novels has become a last refuge from the deathly world-view that produced the war.

Hemingway's war-tinged modernism resembles Lawrence's primitivism in that the natural world is similarly seen to represent an escape from a hostile, mechanized modernity. But in his case this leads to a radical limiting of his canvas: modern, urban America rarely appears, and instead his characters move through a series of alternative landscapes: the backwoods of America, Africa, rural Spain, the sea. Urban Spain features in *The Sun Also Rises* (1926), but it is a place in which the primitive survives in the form of the *corrida*. Hunting and fishing likewise allow for a kind of symbolic remasculinization of men who have been damaged by industrial warfare.

Bodies, Machines, Creation

The post-war primitivism that locates the human body as a last nature reserve, a sort of anti-machine, is of course only one strain within modernism. There is a long tradition of seeing the human body itself as a machine, or as a body electric rather than as an organic entity.²² At times this idea has been expressed in terms of Gothic: the nameless monster of Mary Shelley's *Frankenstein* (1818) is the classic instance of the assembled body as nightmare, and the early twentieth century reactivated that mythic text in countless film versions, more or less faithful to the original, from the robotic false Maria (Brigitte Helm) of Thea von Harbou and Fritz Lang's *Metropolis* (1927), to Boris Karloff's lurching Frankenstein monster (1931, 1935). The narrative of hypnotic control, borrowed from, inter alia, George Du Maurier's popular fin-de-siècle success, *Trilby* (1894), represents another version of this body-as-machine theme. Such human automata include the somnambulist Cesare (Conrad Veidt) in Robert Wiene's expressionist *The Cabinet of Dr Caligari* (1920), and the mesmerized victims of Fritz Lang's Dr Mabuse in *Dr Mabuse: The Gambler* (1922), and *The Testament of Dr Mabuse* (1933).

The idea of the body as a conduit for other forces appears in a different guise in automatic writing. This practice becomes particularly important in the work of the Surrealists, who rejected ideas of individual craftsmanship and genius in favor of collective creativity and the power of the unconscious mind. (Automatic drawing was also developed by the Surrealists, in particular by André Masson.) However, it should not be assumed that the emphasis on the automatic was always a rejection of craft. André Breton carefully revised what came by letting the writing flow through him. By contrast, the non-Surrealist William Carlos Williams believed in preserving the raw flow of his thoughts, publishing some of this material as *Kora in Hell: Improvisations* (1920).²³ Not all automatic writing derived from the idea of the unconscious: for W.B. Yeats and his wife, Georgie Hyde Lees, the power that drove such writing was the spirit world. It is tempting, though, to see all forms of automatic writing as a

negotiation of what it meant to be creative in an industrial world, as residual Romantic conceptions of the artist were reimagined.

That the artist is a Romantic figure who creates the artwork, *ex nihilo*, as it were, from the fiery crucible of the imagination was problematized also in the practice of modernist collage, which turned the *disjecta membra* of industrial culture into art. Picasso and Braque are usually seen as the earliest proponents of the use of this technique. For example, in Picasso's *The Letter* (1912, now lost), an actual postage stamp is affixed to a painted letter. As Clement Greenberg noted, from the point of view of form such inclusions complicate the pictorial space by drawing attention to the difference between the flattened cubist perspective of the canvas, and the flattened space of the printed page – this is quite a different use of print to that which we see in nineteenth-century *trompe l'oeil* pictures.²⁴ In Dada, the use of cut-out pictures, newspaper headlines, and other “found” material takes on a less painterly aspect, as we see in the Merzbilder of Kurt Schwitters, in which the flotsam and jetsam of post-war Germany are turned into art. This is even more true of the work of Richard Huelsenback and George Grosz, in which direct political commentary is intended.

But perhaps the most radical use of found objects in these years was not within collage, but in what one might term found sculpture or installation: Marcel Duchamp's *Fountain* (1917), which turned a porcelain urinal into an art exhibit by signing it (R. Mutt) and displaying it in a gallery. It is a piece whose assessment of art as a cultural institution still resonates: that it is the art institution rather than the artist who consecrates something as art.

Embracing the Machine

In the early years of the twentieth century we see the fetishization of the machine itself as a subject of art in Futurism, Vorticism, and other manifesto-driven movements. Sometime this mechanical turn is at the level of content, but in places it becomes something more fundamental, a belated recognition that the machine offers a model for the artwork itself: efficient, shorn of anything that does not contribute to function.

In what we might consider the first phase, there is a coming to terms with modern mechanical culture as theme. This involved a rejection of nineteenth-century pastoral, and its underlying assumption that humanity's fundamental affinity is with the natural world. Futurism's great propagandist, Marinetti, celebrated the mechanical turn in 1909: “A racing car whose hood is adorned with great pipes that seems to ride on grapeshot is more beautiful than the Victory of Samothrace” (Kern 119). Consonant with this machine aesthetic was Futurism's investment in movement and the urban, as we see in such paintings as Umberto Boccioni's *The City Rises* (1910). Such ideas spread quickly, not least because the newspaper industry was in a phase of expansion, and “a symbiosis prevailed between modernist groups hungering for publicity and newspapers eager to report their most outrageous acts to a readership that thrived on scandal”.²⁵ In London, where Marinetti, was invited to give readings by C.R.W. Nevinson, Wyndham Lewis wanted to distinguish his own Vorticism from Futurism, but it is difficult not to see the similarities of the two movements. Lewis came to consider that “the world of the machine [was] as real to us, or more so, as nature's forms ... and that machine forms had an equal right to appear on our canvases”.²⁶ Jacob Epstein's *Rock Drill* (1913) is a landmark piece

in this embrace of machine culture. At times, the mechanical turn in Futurism and Vorticism coincided with fantasies of thrusting masculinity, in part, perhaps, a deliberate eschewal of the popular image of the previous generation of artists as effete.²⁷ But there were women Vorticists too, such as Jessica Mismorr and Helen Saunders, whose work also shows an affinity with the abstract and the geometric, and impatience with natural forms. Elsewhere machine-art took different forms, appearing in the United States, for example, in the work of the Precisionists (e.g. Joseph Stella, Charles Demuth, and Elsie Driggs), which also drew on the geometric shapes and clean lines of machine culture, but was less marked by abstraction. Other exponents of machine art saw its humorous possibilities, as with Francis Picabia's witty *portraits mécaniques*, *Ici, c'est ici Stieglitz* (1915) and *Portrait D'une Jeune Fille Américaine Dans L'état De Nudité* (1915). Neither of these pieces was deferential to mechanical culture; rather, they pointed fun at the way in which the mechanical had come to saturate everyday life.

This same saturation might be considered the subject of the film that Fernand Léger made with Dudley Murphy and Man Ray, *Ballet Mécanique* (1924). Léger regarded the technology of the cinema as transforming our perception by making us see things we had previously only half noticed: "the beautiful is everywhere", he pronounced (cited in Danisus 168). In the film repetitive montage and other techniques are deployed to make everyday objects (whisks, saucepans, among other things), close-ups of a human mouth and eyes, printed words, and geometric shapes all "dance" and flash before the eye. In this heady mixture of Futurism and Surrealism, the more anthropocentric sequences show a woman seeming to climb the same section of stairs over and over again; people in a mechanical fairground ride; and an abstracted Charlie Chaplin figure. Intercut with these is footage from a factory, showing the balletic movements performed by machines themselves, presumably the inspiration for the film's title. Just as striking is the score for the film composed by George Antheil, which uses a mechanical piano and a police siren, as well as orchestral instruments, to produce a heavily percussive and repetitive score. If a machine could compose, Antheil seems to suggest, this is what it would sound like. More arguably, perhaps, one can see Arnold Schoenberg's adoption of twelve-tone serialism, in place of composition around keys, as partaking of this same analytic and machine-inspired tendency, though permutation and variation have, of course, long been part of orchestral composition.

A later wave of machine-inspired visual art appears in the linocuts of Walter Claude Flight, a member of the Seven and Five Society, and the work of his pupils, including Lili Tschudi, Cyril Power, and Sybil Andrews.²⁸ Their colorful geometric images of such subjects as the London Underground, speedway racing, and electricity pylons are celebratory, and lack the sinister aspect of the earlier work of Epstein and Nevinson. With their work we come closer to the design aesthetic of Art Deco, in which the clean lines of machines – planes, ships, racing cars – promise a brightly-lit world of pleasure, speed, and adventure. Cassandre's posters promoting transatlantic travel, images of the Normandie and the Atlantique, are among the most frequently reproduced of this strain of what one might consider popular futurism.

The delight in the geometric was not simply a question of absorbing mechanical content: it involved a basic transformation at the level of form. Its

nearest equivalent in literature is probably Imagism, which grew up alongside Vorticism, with Pound and Lewis uneasy colleagues. Where the Imagists rarely take the machine as subject matter, they follow the geometric turn in adopting the machine as aesthetic model. Paring down, removing “decorative” features from poetry, reducing the role of the feeling “I” of lyric poetry: in these ways the imagist poem imitates the action of the efficient machine. Here are Ezra Pound’s precepts from *Poetry*, March 1913, reprinted in *Pavannes and Divisions* (1918):

Use no superfluous word, no adjective which does not reveal something...
Go in fear of abstractions.²⁹

The first Imagist collection, *Des Imagistes: An Anthology* (1914), had shown the potential power of such a poetry, particularly in H.D.’s work:

The hard sand breaks,
And the grains of it
Are clear as wine.³⁰

The tumblers of Imagist theory and practice were never entirely in alignment, and the ethos of machine-efficiency by no means suffused the first anthology. It is not there, for example, in James Joyce’s one poem in the same anthology, “I Hear An Army”, which is more redolent of 1890s neo-Romanticism than a poetry of the concrete: “My love, my love, why have you left me alone?” (40). Nonetheless, as Hugh Kenner points out, Imagism’s functionalist program shows a modernist sensibility thoroughly infused by machine culture. No longer did the cultural artefact have to represent machines: henceforth, it could go one step further, and *be* a machine.³¹

Nicholas Daly is Professor of Modern English and American Literature at University College Dublin. His publications include *Modernism, Romance, and the Fin de Siècle* (1999), *Literature, Technology, and Modernity, 1860-2000* (2004), and *Sensation and Modernity in the 1860s* (2009). He is currently working on a study of the transatlantic circulation of urban narratives and images in the nineteenth century.

¹ See, for example, Michael North, *Camera Works: Photography and the Twentieth-Century Word* (Oxford: Oxford UP, 2005), and Julian Murphet *Multimedia Modernism: Literature and the Anglo-American Avant Garde* (Cambridge: Cambridge UP, 2009).

² See, for example, John Hewitt, "The Poster and the Poster in England in the 1890s", *Victorian Periodicals Review* 35.1 (Spring 2002): 37-62.

³ Standard works on the early period include Rachael Low's 7-volume *The History of British Film* (1949-1985; London: Routledge, 1997); Charles Musser's *The Emergence of Cinema: The American Screen to 1907* (Berkeley: U. California P., 1994) and subsequent volumes in the *History of the American Cinema* series.

⁴ Walter Benjamin, "The Work of Art in the Age of Mechanical Reproduction", in Hannah Arendt, ed., *Illuminations*, trans. Harry Zohn (New York: Schocken Books, 1969) 217-51 (236).

⁵ William Innes Homer, *Alfred Stieglitz and the American Avant Garde* (London: Secker and Warburg, 1977); on Man Ray's career see, Arturo Schwartz, *Man Ray: The Rigour of Imagination* (London: Thames and Hudson, 1977). On the complicated interrelations of avant garde painting, photography and the written word in *Camera Work* see Murphet, *Multimedia Modernism* 39-79.

⁶ Anne Labourdette, "James Tissot et la photographie", in Cyrille Sciamma, ed., *James Tissot et ses Maitres* (Nantes: Musee des Beaux-Arts de Nantes, 2005) 93-107 [93].

⁷ Gerald Noxon, "Cinema and Cubism (1900-1915)", *The Journal of the Society of Cinematologists*, Vol. 2, (1962): 23-33.

⁸ For a discussion on the way in which writers aspired to a camera-like "impersonal" vision, see David Trotter, *Cinema and Modernism* (Oxford: Blackwell, 2007).

⁹ Sarah Danius, *The Senses of Modernism: Technology, Perception, and Aesthetics* (Durham, Duke UP, 2002) 147-88. On Joyce and the mutoscope see Katherine Mullin, *James Joyce, Sexuality and Social Purity* (Cambridge: Cambridge UP, 2003).

¹⁰ James Donald, Laura Marcus and Anne Friedberg, eds., *Cinema and Modernism* (London: Cassell, 1998) 2, 8.

¹¹ Donald, Marcus and Friedberg, eds., *Cinema and Modernism* 7.

¹² Asa Briggs, *Victorian Things* (Harmondsworth, Penguin, 1988), 384.

¹³ Pamela Thurschwell, *Literature, Technology and Magical Thinking, 1880-1920* (Cambridge: Cambridge UP, 2001) 86-114; Mark Goble, *Beautiful Circuits: Modernism and the Mediated Life* (New York: Columbia UP, 2010) 29-84.

¹⁴ Danius, *The Senses of Modernism* 12-13.

¹⁵ See, for example, Tom Gunning, *The Films of Fritz Lang: Allegories of Vision and Modernity* (London: BFI, 2000).

¹⁶ On Conrad and the phonograph see Ivan Kreilkamp, *Voice and the Victorian Storyteller* (Cambridge: Cambridge UP, 2005) 179-204.

¹⁷ Emily C. Bloom, "Yeats's Radiogenic Poetry: Oral Traditions and Auditory Publics", *Éire-Ireland* 46.3 and 4 (Winter 2011): 227-251 (227, 229); Todd Avery, *Radio Modernism: Literature, Ethics, and the BBC, 1922-1938* (Farnham: Ashgate, 2006) 113.

¹⁸ Debra Rae Cohen, "Modernism on Radio", in Peter Brooker, Andrzej Gasiorek, Deborah Longworth, Andrew Thacker, eds., *The Oxford Handbook of Modernisms* (Oxford: Oxford UP, 2010) 582-98.

¹⁹ Albert Glinsky, *Theremin: Ether Music and Espionage* (Urbana: University of Illinois Press, 2000) 253-54.

²⁰ See Modris Eksteins, *Rites of Spring: The Great War and the Birth of the Modern Age* (Boston: Houghton Mifflin, 1989); Vincent Sherry, *The Great War and the Language of Modernism* (Oxford: Oxford UP, 1993). For a good summary of the arguments on this issue see Marina Mackay, "Violence, Art, and War" in Brooker et al. eds., *The Oxford Handbook of Modernisms* 461-76.

²¹ Kern, *Culture of Time and Space* 303-4.

²² Among the most influential studies of the body in relation to nineteenth- and twentieth-century machine culture are Mark Seltzer's *Bodies and Machines* (New York: Routledge, 1992), and Tim Armstrong, *Modernism, Technology, and the Body: A Cultural Study* (Cambridge: Cambridge UP, 1998).

²³ Ernesto Suárez-Toste, 'Spontaneous, not Automatic: William Carlos Williams versus Surrealist Poetics in Viorica Patea and Paul Scott Derrick, eds., *Modernism Revisited: Transgressing Boundaries and Strategies of Renewal in American Poetry* (Amsterdam: Rodopi, 2007) 161-74 (165-6)

²⁴ Greenberg, "Collage", *Art and Culture* (Boston: Beacon Press, 1961) 70-83.

²⁵ Milton A. Cohen, *Movement, Manifesto, Melee: The Modernist Group, 1910-1914* (Lanham: Lexington Books, 2004) 157.

²⁶ Walter Michel, *Wyndham Lewis, Paintings and Drawings* (Berkeley: U. of California P., 1971) 443-44.

²⁷ Peter Brooker, *Bohemia in London: The Social Scene of Early Modernism* (Houndmills: Palgrave Macmillan, 2007) 99.

²⁸ See, for example, Clifford S. Ackley, ed., *British Prints from the Machine Age* (London: Thames and Hudson, 2008).

²⁹ "A Retrospect", in T.S. Eliot, ed., *Literary Essays of Ezra Pound* (London: New Directions, 1968) 3-14 (4-5):

³⁰ "Hermes of the Ways", *Des Imagistes: An Anthology* (New York: Albert and Charles Boni, 1914) 21-23 (21).

³¹ Hugh Kenner, *The Mechanic Muse* (New York and Oxford: Oxford University Press, 1987) 37-59. See also Cecelia Tichi, *Shifting Gears: Technology, Literature, Culture in Modernist America* (Chapel Hill: U. North Carolina P., 1987).