THE TOOLBOX OF TECHNOLOGY AND TECHNIQUE

ANIMATION IN 100 OBJECTS

PAUL WELLS

As photographer Richard Nicholson has recently remarked, 'Even a few years ago every profession had its own machinery, its tools; now we all have computers.'[1] The digital shift has fundamentally revolutionized all production processes; for many creative practices, this has seen the analogue become a marker of some past era of technologies and techniques. There is some irony, then, that animation has benefited from such progress, with the digital era bringing its definition into question but, as a consequence, reclaiming it from the margins of arts practice, and placing its significance right back at the heart of debates and discourses about moving-image production and cinema itself.

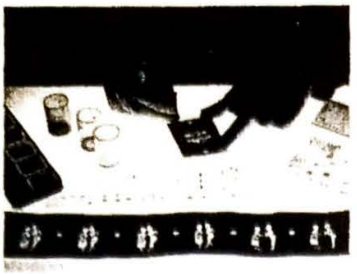
In *The Language of New Media*, Lev Manovich makes the following observation:

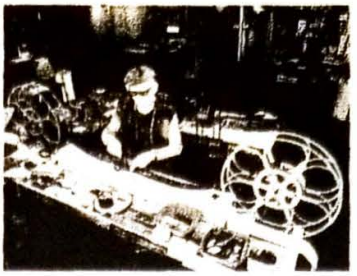
> Once the cinema was stabilized as a technology, it cut all references to its origins in artifice. Everything that characterized moving pictures before the twentieth century – the manual construction of images, loop actions, the discrete nature of space and movement – was delegated to cinema's bastard relative, its supplement and shadow – animation. Twentieth-century animation became a depository for nineteenth-century moving image techniques left behind by cinema.[2]

These same moving-image techniques have become what animator Don Hertzfeldt has called the 'toolbox', to which animation (despite the crisis at the Walt Disney Company when it temporarily closed its 2D classical animation division in response to what appeared to be the hegemony of CGI) constantly refers, and uses.[3] In turn, this toolbox of techniques and approaches maintains animation's status as the most progressive and experimental of the various forms of moving image, both at the margins and in the mainstream.

It is pertinent, then, to look at animation through one hundred objects, tools and technologies, many of which are present in the *Watch Me Move* exhibition – and are indicated throughout the following text in ***BOLD***. As the world is increasingly mediated through screens and keyboards, and as virtual environments prevail, the seemingly lost world of the material past takes on an increasing fascination, especially in the ways in which the physical elements of previous processes and practices have been re-mediated in the contemporary era. Essentially, the history and definition of animation have been rewritten through the objects, applications and mechanisms that it employs, and these are traced here.

Object number one is Charles-Émile Reynaud's ***THÉÂTRE OPTIQUE*** of 1888. The first device capable of presenting moving images to an audience, it made its public debut in 1892 during a show given by Reynaud in Paris. Preceding the public premiere of the Lumière brothers' first film by three years, Reynaud's show, billed as *Pantomime lumineuses*, featured three early ***CARTOONS***, *Pauvre Pierrot*, *Un bon bock* and *Le Clown et ses chiens*, displayed using a device that was a sophisticated development of Reynaud's own praxinoscope. The Théâtr Optique projected more than 500 individually painted sequential imag embedded within a leather band; each narrative was accompanied by a piano piece. Reynaud's use of technology demonstrates the preoccupation of the cinema pioneers with self-consciously presenting both the mechanism and its creative outcomes simultaneously, a condition that has existed in animated film throughout its history. Wh Georges Méliès developed optical tricks in his early cinematic work, a





Restoration of Charles-Émile Reynaud's *Pauvre Pierrot* (pages 54–55) by animator Julien Pappé. It took Pappé ten years, from 1986 to 1996, to restore the original reel and to transfer the animation to film.

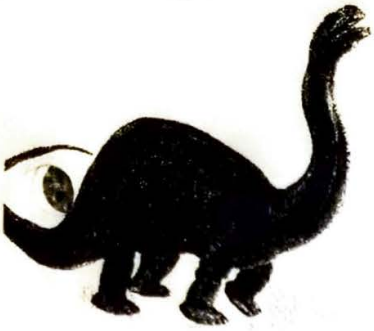
sometimes employed stop-motion animation, animation as a form in its own right developed in other hands.

In 1899, using **MATCHES**, Briton Arthur Melbourne-Cooper created stick-figure stop-motion puppets for such films as *Matches Appeal*, *Animated Matches Playing Volleyball* and *Animated Matches Playing Cricket*.[4] Melbourne-Cooper's experience as a newsreel cameraman and particular interest in sport inspired him to engage with movement for its own sake. He rejected the moving corporeal body, already the key fascination of the early cinema, replacing it with a more [illegible]polic representation of the body as it played out deliberately choreographed motion. The Spaniard Segundo de Chomón took this to its logical and often surreal extreme in a body of work made between 1905 and 1912 in Paris, which partly echoes the approach of Méliès, and also anticipates the playfulness of such film-makers as Charles Bowers.

This playfulness also featured on Anglo-American J. Stuart Blackton's **CHALKBOARD**, common to many live performances given by **LIGHTNING SKETCH** artists across Europe and the United States at the turn of the century. In theatrical settings, artists would rapidly draw amusing and topical caricatures on a blackboard or large paper pad. In the context of early film, this process was recorded and made yet quicker through frame-by-frame editorial intervention: figures and forms would magically emerge on screen as animations, the blank background suddenly revealing its graphic images. Blackton's *The Enchanted Drawing* (1900) and *Humorous Phases of Funny Faces* (1906) both included stop-motion chalk-drawn illusions, and prompted him to use more extensive stop-motion effects in *The Haunted House* (1907). This was the film that essentially convinced US film culture that animation might be a further verification of both early cinema's possibilities and its popularity.

In St Petersburg, however, the development of Hollywood cinema was the least of the concerns of Alexander Shiryaev, Deputy Ballet Master of the Mariinsky Theatre. Shiryaev's early interest in cinematography, as well as his desire to preserve the fast-disappearing national folk dances of Russia, led him to draw and animate on rolls of **PAPER** in 1905, and to make 3D stop-motion **PUPPET** versions of character choreography in 1906.[5] In France, Émile Cohl – protégé of political caricaturist André Gill and member of the 'Incoherent' movement – drew the first acknowledged cartoons on paper for Gaumont. *Fantasmagorie* (1908), a surreal sequence of transforming images, illustrated the narrative potential in metamorphosis, and cited the ephemeral image-making of the 'fantasmograph' of the 1850s.[6] Like Blackton's *Humorous Phases of Funny Faces*, Cohl's film featured a clown, and presented the figure of the animator as the creator of the work. The very illusionism of animation always suggests the presence of such an author, even if not literally in the frame, and equally points up the degrees of constructed-ness in the image. Thus every animation, even from its earliest conception, also plays formally with time and space.[7]

This was of major concern to American illustrator and comic-strip artist Winsor McCay, whose observation of a **DINOSAUR SKELETON** led to the creation of *Gertie the Dinosaur* (1914). Gertie was a playful character who hurled mammoths into the far distance and 'interacted' with McCay in his vaudeville-style shows and lectures. As well as anticipating both gaming interaction and tensions between 2D and 3D space in later cartoons, Gertie also prefigured and



RAY HARRYHAUSEN

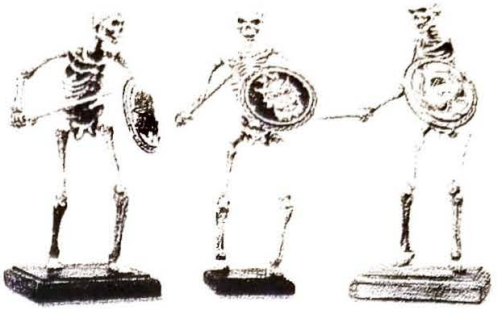
Original model brontosaurus from *One Million Years B.C.*, 1966

Latex body with internal metal armature

incomplete technology, invest in it, and market it as the ***CINEPHONE SYSTEM***. Powers was able to persuade Walt Disney to use the system on his first sound cartoon, *Steamboat Willie* (1928), featuring the later-iconic Mickey Mouse. This promoted the ***SYNCHRONICITY*** of Carl Stalling's soundtrack, and led to the use of fragments of sound, song and music to add a distinctive narrative, emotional and comic dimension to a cartoon. The Fleischer brothers' later *Talkartoons* shorts (1929–32) embraced full ***SCRIPTED DIALOGUE***, and made Betty Boop a flirtatious, innuendo-inflected star. Their key innovations, however, proved to be the ***ROTOSCOPE*** (1914) and the ***STEREOPTICAL PROCESS AND APPARATUS*** (1933). The rotoscope allowed animators to trace over live-action figure motion, and was used, for example, for the dance-walking, ghost-styled figure of orchestra leader and singer Cab Calloway in the Fleischers' *Snow White* (1933). It was later adapted by Bob Sabiston for his ***ROTOSHOP*** software, and used in Richard Linklater's *Waking Life* (2001). The stereoptical apparatus, essentially a large turntable, was designed to create depth in the environment of a 2D cartoon, and, like the rotoscope – surprisingly, perhaps, given the Fleischers' surreal story constructions and the full animation of many aspects of their *mise en scène* – sought to respect the theatrical proscenium and codes of realist representation.

Ironically, the Fleischers had already challenged the material fixity of the real world in the animated figure of Koko the Clown, who, in the *Out of the Inkwell* series (1918–29), leaves his animated world to cause havoc in the studio environment, a perspective Disney reversed by placing a live-action ***ALICE*** in an animated 'wonderland' (1924–27). Disney recognized, however, that such graphic freedoms and comic vignettes – epitomized by Otto Messmer's extremely popular and Chaplin-influenced *Felix the Cat* cartoons (1919–28) – could service the cartoon form only to a limited extent. They did not facilitate animation in an extended narrative or, indeed, as art. Disney thus used its technological innovations to move towards a hyperrealism, one that authenticated the conviction and believability of the cartoon environment itself. This also enhanced the appeal and authority of the characters, even in the light of their over-determined theatricality and the prominence of slapstick and physical comedy. To this end, Disney was more successful than the Fleischers, creating a 'reality' in the cartoon, which allowed for both broad humour and more emotive, sentimental expression.

The Disney studios embraced ***LIFE-DRAWING*** and developed the use of ***STORYBOARDS*** in order to advance visual storytelling, and to prepare what needed to be animated and shot. It invested in the ***TECHNICOLOR*** process for *Flowers and Trees* (1932), even though part of the film had already been made in black and white, and it deployed (William) ***GARRITY AND*** (Roger) ***BROGGIE'S MULTIPLANE CAMERA*** for *The Old Mill* (1937). Consisting of a camera positioned above five separate planes of glass, each one holding a different element of the animated scene, this device allowed animators to create a greater sense of depth by 'moving' the camera between each plane. The first and second were used for animation in the foreground, the third and fourth for backgrounds, and the fifth mainly for sky and distant landscape; four of the planes could also be moved laterally. Ub Iwerks, the extraordinary draughtsman responsible for the style of early Disney cartoons, was the technical genius behind the ***XEROGRAPHIC FUSING/DEVELOPING APPARATUS*** for inking cels, later used in

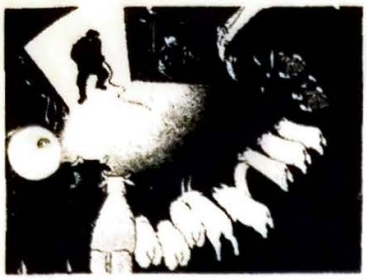


RAY HARRYHAUSEN
Three of the seven skeleton warriors from *Jason and the Argonauts*, 1963
Internal metal armature covered with cotton wool and dipped in latex
© The Ray & Diana Harryhausen Foundation

the making of *One Hundred and One Dalmatians* (1961). He also developed the ***SODIUM TRAVELLING-MATTE PROCESS***, which helped to fuse live action and animation more effectively, but his early experiments were with the multiplane camera.[8] However, it was the sophistication of Garrity and Broggie's version of the camera, together with its ability to represent shifting depth perspective and figures apparently moving through receding and foregrounded space, that was crucial in persuading Disney that an animated film could be made at feature length and echo live-action narratives. The milestone of *Snow White and the Seven Dwarfs* followed in 1937, ensuring animation's recognition as both a headlining and a mainstream form of entertainment.

Inevitably, the success of Disney, even in the contemporary era, tends to obscure the achievements in animation elsewhere. The studio's *Silly Symphonies* of the 1930s were essentially a set of experimental films leading to the creation of *Snow White*, similar in nature to the Pixar shorts of the 1980s and 1990s that led to *Toy Story* (1995). However, the *Silly Symphonies* ran parallel to a different kind of experimental tradition in Europe, one that has left behind its own Proustian objects: Lotte Reiniger's exquisite ***CUT-OUTS*** from her silhouette film *The Adventures of Prince Achmed* (1926), which is preceded as the world's first known animated feature only by Quirino Cristiani's *El apóstol* (1917); Alexandre Alexeieff and Claire Parker's ***PINSCREEN***, which rendered engraving-like images through the shifting tones of layered pins set at different heights in such films as *Night on Bald Mountain* (1933); and Oskar Fischinger's stop-motion ***MARCHING CIGARETTES*** from the advertisement *Muratti Marches On* (1934). Inspired by German film director Walter Ruttmann, as well as by his own desire to create 'visual music', Fischinger developed a ***WAX-SLICING MACHINE***, which synchronized the slicing of a cylinder composed of melted and hardened multicoloured wax with the shutter on a camera; the resulting frame-by-frame record of the randomly swirling colours and forms present in the cylinder could then be turned into an animated sequence. Fischinger continued to experiment with colour, shape and form, creating an abstract masterpiece, *Composition in Blue* (1935). His formalist preoccupations were echoed by Norman McLaren, who noted in a series of ***VISUAL SCRIPTS*** the technical and aesthetic considerations of his approach. McLaren employed a number of optical effects, including ***PIXILATION***, the frame-by-frame recording of staged physical actions, which he used to particular effect in his brutal anti-war parable, *Neighbours* (1952). He also used an ***OPTICAL PRINTER*** – a device for re-photographing strips of film – to achieve an almost stroboscopic effect in *Pas de deux* (1968), a study of ballet dancers Margaret Mercier and Vincent Warren played out in stark lighting with lyrical precision.

Since its early days, animation has been characterized by the simultaneous development and consolidation of the 'cartoon' and a more 'experimental' tradition, essentially preoccupied with the manipulation of materials, space and time in the communication of emotion. However, at the heart of many creative solutions remain technical solutions. In the early 1930s Hungarian-born George Pal used ***REPLACEMENT HEADS*** for his 3D characters in order to address the labour-intensive aspect of the animation process; as early as 1912, in the dark, fairy-tale world of *The Cameraman's Revenge*, Polish-Lithuanian animator Ladislas Starewitch used ***INSECTS*** as 3D characters; and in 1916, in Japan, Oten Shimokawa, failing to animate



HALAS & BATCHELOR
Animal Farm, 1954
35mm, colour, sound, 74 min.
Courtesy of the Halas & Batchelor Collection

chalk drawings, drew directly on to film using ink. Shimokawa's ***INKPOT*** anticipated not only the Fleischers' inkwell but also, more importantly, Len Lye's use of a ***PAINTBRUSH*** and ***FILM STOCK*** as he worked in a more self-consciously personal style on such vibrant abstract films as *A Colour Box* (1935). This more direct, 'under the camera' style was extended by Caroline Leaf in her under-lit ***SAND-ON-GLASS*** film *The Owl Who Married a Goose: An Eskimo Legend* (1974); her ***PAINT-ON-GLASS*** film *The Street* (1976); and her ***SCRATCHED-ON-FILM*** drama *Two Sisters* (1990), in which the means to make the film are reflected in its themes of light and dark, hidden and revealed, controlled and controlling – and, arguably, the generic qualities and conditions of the animator.

So often, then, the talent emerges through its tools and processes: the ***PENCILS*** of Joanna Quinn, Bill Plympton and Frédéric Back; the ***POSTCARDS*** decorated by Robert Breer; the ***SCRATCHED PLASTER*** of Piotr Dumała; the myriad ***OBJECTS*** that have had their voices and histories revealed by Jan Švankmajer; the ***DETRITUS*** reanimated by the Brothers Quay; Jiří Trnka's puppets, esteemed as ***ACTORS***, rather than merely material things; Nick Park's mute but gesture-rich ***CLAY*** dog, Gromit; Karel Zeman's assorted ***MINIATURE AIRSHIPS***; Terry Gilliam's ***STOLEN FOOT*** from Agnolo Bronzino's *Venus, Cupid, Folly and Time*; Yuri Norstein's and Andrey Khrzhanovsky's challenging personal, religious and political ***ICONS***; Bob Godfrey's ***FELT-TIP PENS***; Vera Neubauer's ***KNITTING WOOL*** figures; Viking Eggeling's ***SCROLLS***; Zbigniew Rybczyński's ***MULTIPLE MATTE MANIPULATIONS*** (a matte being a mask used to obscure one part of an image so that another can be put in its place) in *Tango* (1980); or Berthold Bartosch's diffusive ***LIGHT SOURCES*** in the never-released *L'Idée* (1934). But what are these but a means to draw on and represent memory; the 'muscles and bones' of physical expression; the fantasy, dream and solipsistic preoccupation of interior states recalled?

Animation is effectively one long expression of recollection and response, a re-interrogation and representation of alternative realities and preferred worlds. For example, even as Disney had lyricized animation and perfected its enclosed pastoral idyll with quasi-gothic undercurrents – a radical perspective and approach in the eyes of Soviet film-maker Sergei Eisenstein[9] – the emergent auteurs of ***TERMITE TERRACE*** (the Warner Bros. studio), Tex Avery, Chuck Jones, Bob Clampett and Frank Tashlin, were reinventing the cartoon, constantly breaking the cherished ***FOURTH WALL***, sharing the illusion with the audience. This spirit of reinvention and acknowledgement of the audience have been characterized by a persistent interrogation of the language of expression animation permits. From the use of ***GRAPHIC DESIGN*** idioms by United Productions of America (UPA) and Halas & Batchelor's use of ***MODERN ART*** codes and conventions, as well as ***TENSION SHEETS*** planning the emotional development of the story in relation to its aesthetic shifts, to the Wan brothers' ***CALLIGRAPHIC*** approach and Priit Pärn's profoundly influential ***CARICATURES***, conventional notions of the cartoon have always been challenged.

In Zagreb, between 1956 and 1970, the artists of the former Yugoslavia deployed ***LIMITED ANIMATION***. In the made-for-television era in the United States, largely defined by Hanna-Barbera, this was known as ***REDUCED ANIMATION***; in Japan, it was pejoratively called 'overexpressionism' by Hayao Miyazaki.[10] Each approach used less full animation, focused on many rapidly cut single shots and ***REPEATED MOVEMENT CYCLES***, and privileged minimum

Toys based on the character of Astro Boy (originally known as Tetsuwan Atomu) from the animated television series by Osamu Tezuka
First three from left: Takara, Japan, 1980, plastic; right: Popy, Japan, 1976, die-cast metal and plastic
Courtesy of Fabrizio Modina

sound and imagery to gain maximum symbolic suggestion. In Zagreb this achieved a model of political metaphor resistant to authoritarian oppression; in the United States it foregrounded the work of such talented ***VOICE ARTISTS*** as Daws Butler and June Foray; and in Japan it prompted Studio Ghibli to maintain its powerful model of emotive storytelling in the face of ***MERCHANDISE*** and such ***GAMING***-related phenomena as *Pokémon* (1997–present). The relationship between animation and the commercial marketplace is a well-established one, of course, producing a myriad of artefacts, among them the ***3D MOVING ADVERTISEMENT*** in London's Piccadilly Circus featuring George Studdy's Bonzo the dog (1925); ***MICKEY MOUSE DOLLS***; Popeye's ***SPINACH***; and the Transformers ***TOYS***. Cels, storyboards, ***LAYOUTS***, ***MODEL SHEETS*** (on which a single character is depicted from a range of angles and perspectives), ***DEVELOPMENT SKETCHES*** and even ***SETS*** have in themselves become animation art and, like the spin-off products, highly collectable – a facet of animation culture explored to brilliant effect in the narrative of *Toy Story 2* (1999).

Perhaps one of the most important collectables from the history of animation, however, is Ed Catmull's ***SIGGRAPH PAPERS***, academic discourses that were instrumental in the development of computer animation. In 1986, together with Alvy Ray Smith from Industrial Light and Magic (ILM), ex-Disney animator John Lasseter and Apple's Steve Jobs, Catmull formed Pixar Animation Studios, a company committed to making fully computer-generated animated films. George Lucas did not want to invest in this possibility, focusing instead on animated digital effects for his *Star Wars* series (1977–2005).[11] Thereafter, Hollywood increasingly prioritized the use of animation in its post-production suites, creating ***DIGITAL DOUBLES***, ***CROWD SIMULATIONS***, ***SCENE EXTENSIONS*** and ***3D ENVIRONMENTS***, while also using ***MOTION CAPTURE*** to deploy physical performances by actors, dancers and martial-arts experts in the service of animated characters. If Roger Rabbit shared a ***2½D*** space with human characters in *Who Framed Roger Rabbit* (1988), and the eponymous hero of *Tarzan* (1999) swung through a jungle created using ***DEEP CANVAS*** (a means of rendering 3D environments for 2D animation), then Gollum fully shared 3D space in *Lord of the Rings: The Two Towers* (2002). The development of the Na'vi for James Cameron's *Avatar* (2009) was informed by the use of ***REAL-TIME MOTION CAPTURE*** technology, and proved the most advanced use of immersive ***POLARIZED 3D***. Such worlds are our worlds.

So all we have now are computers. The ***LIGHT CYCLES*** from *Tron* (1982), the ***STAINED-GLASS KNIGHT*** from *Young Sherlock Holmes* (1985), *Toy Story*'s ***VIRTUAL PULL-STRING COWBOY AND ASTRONAUT***, the ***DIGITAL HAIR AND CLOTH*** from *The Incredibles* (2004) – all gathering dust in a ***DATABASE***, the new museum space, the store for exhibition.

But animation has always insisted that when it has nothing left, it has something more. As Canadian Rose Bond projects moving images on to town-hall windows, or Italian artist Blu moves subjects on walls, or American film director and animator PES reinvents old objects to exhibit on the Internet, the world is refreshed and re-imagined. Animation always bellows, 'Watch me move!'

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OSKAR FISCHINGER

Radio Dynamics, 1942

35mm, colour, silent, 4 min.

© Fischinger Trust, courtesy of Center for Visual Music

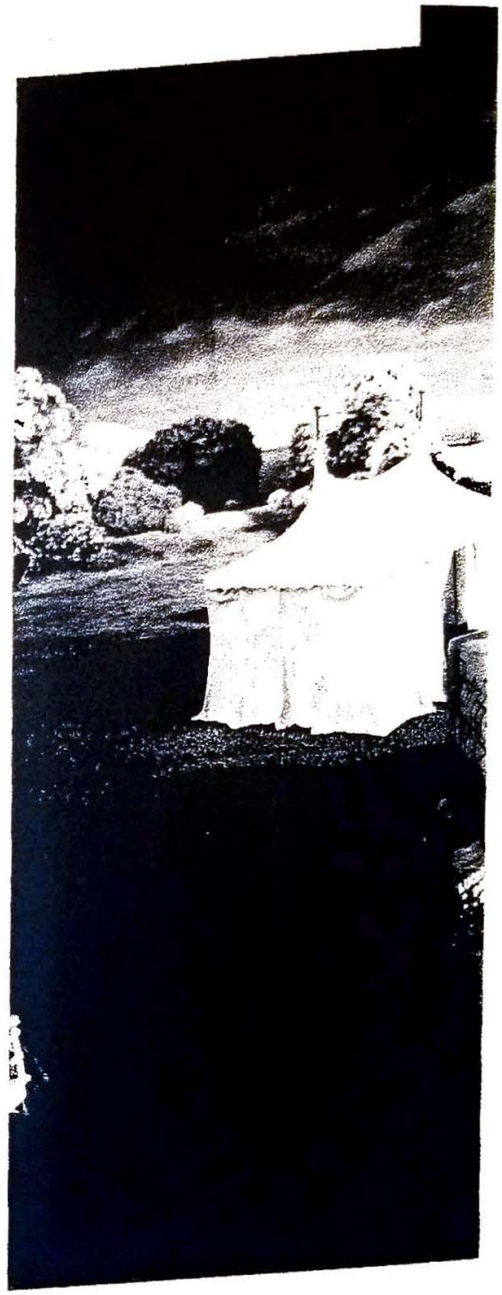
RIGHT

NICK PARK AND STEVE BOX

Set from the film *Wallace & Gromit in The Curse of the Were-Rabbit*, 2005

Wallace & Gromit Curse of the Were-Rabbit

© 2005 Aardman Animations Ltd



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[1] Richard Nicholson, quoted in Sean O'Hagen, 'Elegy to the Ghost in the Machine', *The Observer*, 26 December 2010, p. 31.

[2] Lev Manovich, *The Language of New Media*, Cambridge, Mass., and London (MIT Press) 2001, p. 298.

[3] Paul Wells and Johnny Hardstaff, *Re-imagining Animation: The Changing Face of the Moving Image*, Lausanne (AVA Academia) 2008, p. 60.

[4] See Tjitte De Vries and Ati Mul, *'They Thought It Was a Marvel': Arthur Melbourne-Cooper (1874–1961) – Pioneer of Puppet Animation*, Amsterdam (Pallas) 2009.

[5] See Birgit Beumers *et al.*, eds, *Alexander Shiryaev: Master of Movement*, Gemona (Le Giornate del Cinema Muto) 2009.

[6] See Donald Crafton, *Émile Cohl, Caricature and Film*, Princeton, NJ (Princeton University Press), 1990.

[7] See J.P. Telotte, *Animating Space: From Mickey to WALL-E*, Lexington, Ky. (The University Press of Kentucky) 2010.

[8] See Leslie Iwerks and John Kenworthy, *The Hand Behind the Mouse*, New York (Disney Editions) 2001.

[9] See Jay Leyda, ed., *Eisenstein on Disney*, London (Methuen) 1988.

[10] Hayao Miyazaki, *Starting Point: 1979–1996*, tr. Frederick L. Schodt and Beth Cary, San Francisco (Viz Media) 2009.

[11] See Michael Rubin, *Droidmaker: George Lucas and the Digital Revolution*, Gainesville, Fla. (Triad) 2006.