Deac Rossell
The Magic Lantern and Moving Images before 1800

In early July 1672, the Parisian medical doctor and antiquarian Charles Patin visited Nuremberg and saw a magic lantern show. Patin had fled Paris in 1667 when a satirical pamphlet about the new mistress of King Louis XIV, Mme. de Montespan, was discovered by the French authorities. In a package of books he had smuggled into Paris from The Netherlands. Fleeing the country before he was sentenced in absentia in February 1668 to lifelong service in the galleys of the French Navy, Patin spent the years 1667 through 1672 travelling across Europe visiting noble courts and learned scientists, collecting medals and coins, and searching out the most interesting rarities and amusing curiosities. Before settling in Basel his travels took him from Vienna to Hungary and Bohemia, across Bavaria and down the Rhine to Mainz and Cologne, from Berlin to Jena, Leipzig, Dresden and Salzburg. His host in Nuremberg was a friend of his father's, Johann Georg Volckamer the elder, who kept up an international correspondence as president of the Leopoldina and who was a leading figure in the city's intellectual and cultural life. Patin examined his host's large collection of antique coins and medals, saw the impressive group of weapons and paintings gathered by Johann Andreas Viatis, and spent some time browsing in the library of rare medical and philosophical books owned by the apothecary Johann Leonhard Stöberlein. "There are many Learned men in this City; Antiquity, History, Politicks, Eloquence, and the Mechanical Arts are there in flourishing State," Patin wrote in Quatre Relations historiques, a series of four letters on his travels that were first published in 1673 (fig. 3). It was Volckamer who recommended the magic lantern show to Patin, a show produced by a recent addition to Nuremberg society: a former Capuchin monk who converted to the Lutheran confession and was now an optical instrument dealer and manufacturer named Johann Franz Grimmel. Patin was most impressed by Grimmel and his exhibition, calling him "absolutely Master of the most abstruse Secrets in Opticks" and saying that "there never was in the World a greater Magitian than he." Patin's description of Grimmel's magic lantern show is the most extensive surviving account of a 17th-century magic lantern presentation. "For it seem'd to me as if I had a sight of Paradise," wrote Patin, "of Hell and of wandering Spirits and Phantoms, so that altho' I know myself to be endu'd with some measure of Resoluteness, yet at that time I wold wilingly have given one half to save the other: All the Apparitions suddenly disappear'd and gave place to Shews of another nature: For in a moment I saw the Air fill'd with all sorts of Birds, almost after the same manner as they are usually painted round about Orpheus, and in the twinkling of an Eye, a Country-Wedding appear'd to my view, with so natural and lively a representation that I imagin'd myself to be one of the Guests at the Solemnity. Afterward the Horizon of my sight was taken up with a Palace so stately, that nothing like it can be produce'd, but in the Imagination; before which there were divers Personages running at the King; these Heroes seemed to be the Gods that were adored by Antiquity, and among them I was pleasant to observe Mommus mounted upon a Barbary-Horse, and making Satyrical Reflections upon Jupiter, who had made a false step amidst so jolly a company."

Patin's report of this exhibition is interesting in several respects, but perhaps the most mysterious aspect of Grimmel's show centres on whether or not he was exhibiting mechanical moving slides. Was the magic lantern a new optical instrument which not only magnified images and allowed its operator to show stately palaces or country weddings at will, to represent the Roman gods and courtly sports, but which also for the first time had found a way to imperceptibly change the image while it was being shown, and actually represent the movement of people and animals? Patin's language here is suggestive but inconclusive. He describes the game of "running at the ring", where horsemen attempted to catch a hanging leather ring on their short lances; he describes "the Air fill'd with all sorts of Birds"; he describes a country wedding in a representation both "natural and lively." But as with all new devices, whether technologically or showmanly, the appearance of something new in the world makes great strain on the capacities of language to find the vocabulary to properly describe previously unknown effects. So the automobile was at first a "horseless carriage" and the telephone a "speaking telegraph."

In the case of Grimmel's magic lantern show, the presence of moving images is supported by the precedent that the idea of moving images was proposed as soon as the optical arrangement of a projecting lantern was known. The first documented appearance of the magic lantern comes in the correspondence of the Dutch scientist Christian Huygens. His father asked him to make a lantern in spring 1662, and a French colleague wrote to him two years later ask-
ing about the arrangement of lenses in the new projecting apparatus. But the first indication of Huygens's awareness of the magic lantern is found in a remarkable series of ten small drawings of a dancing skeleton that he made in 1659. Huygens noted that these drawings were intended for "representations by convex glasses in a lantern." In the Huygens drawings, the skeleton is variously shown moving its right arm, removing its skull from its shoulders, and tossing a skull into the air. Apart from Huygens's own fascination with dancing skeletons—he had painted much enlarged figures from Hans Holbein's Dance of Death on his garden wall in 1546—his awareness of the ability of the magic lantern to reproduce movement is a recognition that he saw the lantern as much more than an instrument that could vividly illustrate the laws of optics. Although for the next hundred years the magic lantern was dutifully included in books describing experimental science, where it served as a means of demonstrating how images are formed and enlarged through the refractive power of lenses, Huygens understood from the beginning that the lantern had the parallel ability to exhibit motion and therefore to participate in the dynamic world that had been constructed by Baroque painters, architects, and musicians. For Huygens, the lantern was never an instrument of observation, like the microscope or the astronomical telescope, or an instrument of measurement, like the barometer or the pendulum clock. It was not even a demonstration instrument like the air pump. Instead, what the lantern represented to this somewhat dour scientist was an instrument of reproduction, an instrument that would show things at the will of its operator, but one that had the special ability to show painted images that moved.

Just a generation younger than Huygens, the mathematician, scientist, and diplomat Gottfried Wilhelm Leibniz saw the magic lantern in 1675 as an essential element in his proposal for an extravagant celebration of universal industry and the arts. The lantern would open his proposed entertainments, and would give particularly dynamic performances at his Baroque temple of human progress, since it could "represent quite extraordinary and grotesque movements, which men would not be capable of making." The lantern would also conclude his shows, and again it is motion and movement which particularly captivates Leibniz, as he combined the magic lantern with a new type of marionette theatre "in which there were light and small wooden moving figures, which would throw their shadow onto a transparent paper sheet, behind which there would also be light; this would cause the shadows to appear on the paper in a highly dazzling manner, and enlarged."

Moving back and forth in perspective, increasing and decreasing in size, all the lights would then be extinguished except one: "This remaining light with the aid of a magic lantern would throw against the wall admirably beautiful, and movable, figures, which would maintain the same laws of perspective. This would be accompanied by a song from behind the theatre. The small figures would be moved from below or by their feet, such that those who were moving them would not appear. Singing and music would accompany everything."

Notwithstanding the elaborately imagined entertainments of Leibniz, descriptive evidence of early moving slides for the magic lantern exists only at a more prosaic level. Indeed, Huygens's dancing skeleton and the delights of Griendel's lantern show both seem to surpass eyewitness accounts of moving slides until the middle of the 18th century. About 1697 Erhard Wiegel projec-

fig. 2: Edme-Gilles Guyot, Nouvelles Recreations Physiques et Mathematiques, Paris 1800 plate 86, Fig. 4
some moving slides made by an optician and glass grinder named Themenne whose premises were near the Zwirin Gate in Kassel. From his visit of 19 November 1709 von Uffenbach described slides of a moving carriage with rotating wheels made of brass and moved by a thread, a Cherub working at a spinning wheel, also moved by a thread, and a shooting gun, which was worked by a rapidly withdrawn paper slip that revealed the reddish firing discharge and speeding bullet. Von Uffenbach was not especially impressed with Themenne's work, calling it a mediocre invention, but before he left Kassel he spent ten florins at Themenne's shop to purchase seven of his moving slides.

Hardly more sophisticated in their imagery than the moving slides of Themenne or Wiegell, but especially intriguing because of his lifelong interest in the magic lantern and his influential family, are the moving slides illustrated in Petrus van Muschenbroek's 'Beginnings der natuurfedere... of 1736. Professor of Medicine at Dussburg, of Natural Philosophy at Utrecht, and of Physics at Leiden, van Muschenbroek came from a famous family of instrument makers, and it was his brother Jan van Muschenbroek who collaborated on the design of an extraordinary group of scientific instruments and then built them for the Dutch physicist Willem Jacob van 's Gravesande. Published in 1720-21 in 's Gravesande's book Physics Elementa Mathematica, an influential work introducing new or improved instruments for Newtonian experimental science that was published in an English edition in London the same year and was popular across Europe for the rest of the 18th century, Jan van Muschenbroek's set of instruments included an excellent magic lantern with superior lenses and a unique diaphragm, or stop, in its lens tube to block the inevitable stray rays of light reflecting from its lenses, with the result that the image reaching the screen when the lantern was in use was brighter and more finely detailed than in any previous instrument. It has long been assumed that the moving slides that Petrus illustrated in his physics textbook simply came from the family workshop, where he indicated that they could be bought. A catalogue of instruments available at the family workshop was invariably bound at the end of the book. But it now seems that these five moving slides are probably the work of Petrus himself. Until he left home in 1714 on his studies, Petrus spent much of his time in the workshop painting and making lantern slides. In early 1711, von Uffenbach also visited the Muschenbroek workshop, and had already bought a magic lantern from the family; he complained about the work of Petrus in making slides: 'We hear that the youngest brother makes the figures for it [the magic lantern]. But they are not as faultless as those the father had made.' Petrus also seems to have made his own magic lantern especially for moving slides, which was sold at auction in 1794. There would seem to be no reason why he should need to make his own lantern when his brother Jan was turning out a lantern that was unequal-

fig. 4-6: Johann Christoph Kohlhausen: description of the magic lantern, in: Neuerfundiene Mathematische und Optische Curiositaten, Coburg 1677, p. 318-320.
vocally the finest being made anywhere in Europe, a design copied by many other makers from Georg Friedrich Brandt in Augsburg to Abbé Nollet in Paris, from around 1721 onwards. Petrus himself ordered one of the 'Gravesande lanterns made by his brother for the physics cabinet at Utrecht University. The only logical reason for Petrus to have built his own lantern for moving slides is that the slides that he built were not of a proper size to be used in either of the two standard sizes of 'Gravesande's design available from the family business. And that Petrus wanted to continue to use these slides, and perhaps others, without re-building and re-painting them to fit a new model lantern. The very strong implication then remains that Petrus must have built his lantern, and made his slides, before the 'Gravesande lanterns were ready beginning around 1720. Two of the slides, the 'working mill' and the 'lady making a curtsey' are certainly included in a Musschenbroek catalogue dating before the publication of Beginnen der naturkunde.

An even earlier dating would certainly fit with his active time at the workshop before 1714, and his known involvement in painting lantern slides for the family business.

Although Petrus van Musschenbroek published detailed illustrations of a set of moving slides, he did not publish any account of their use or the context in which they were seen. So there is no way to determine whether the moving slides were linked with a series of other images and whether the motion they imparted on the screen came as the climax of a narrative, or whether they were used individually as a punctuation of movement that was separate from other projected images. In the nineteenth century with the sophisticated evolution of show-
across a panoramic background by a stout handle, and the woman making a curtsey has its glass hinged at the sides and is moved vertically up and down by a lever underneath. Abbe Jean-Antoine Nollet, physics teacher to the children of Louis XV, and an astonishingly successful public lecturer from 1735, paid a visit to the Musschenbroek workshop in 1736 and saw moving lantern slides, apart from the ubiquitous windmill, of a woman bowing her head while passing by a farmer eating cheese and moving his jaws, a horseman removing his hat and then replacing it. Himself an occasional instrument maker, Nollet also described a moving slide of a blacksmith working at an anvil. It seems fair to say that by the middle of the 18th century the depictions of motion had become a central and essential capability for the magic lantern. A pair of long panoramic slides used simultaneously also provided a way to project movement with the magic lantern, and here the central subject that became like the windmill a staple image for more than a century was the representation of ships at harbour or a seafaring scene. In 1770, Edme-Gilles Guyot suggested representing a storm at sea, with one slide containing the action of the waves "from its least movement through to the terrifying storm" and a second slide containing "ships of different aspects and sizes and at various distances, along with a few clouds." Passing the two slides through the lantern simultaneously produced the effect of a growing or diminishing storm populated with wave-tossed ships. Guyot also reminded the lanternist that "One must take care that the various representations are not sharply divided from each other, but on the contrary grow step by step and are progressive. It is easy to see that this must all be very carefully painted, since the beauty of the representation depends on this alone." Guyot's description of this moving effect circulated widely around Europe over the next score of years, not only in the German edition of his own book translated with additions by Johann Christian Thenn in 1772-77, but also in a pirated edition, again with additions, issued in English by William Hooper, who suggested the lantern could be "rendered much more amusing, and at the same time more marvellous, by preparing figures to which different natural motions may be given, which every one may perform according to his own taste." Guyot's suggestions then began to appear in a series of books on "Natural Magic" which combined elements of popular science with demonstrations of popular amusements. Less and less concerned with experimental physics, but relying on the public's intense desire to see spectacular physical effects, these later books on magical mathematics bore witness to what historian Barbara Stafford has called "the eighteenth-century culture of curiosity." Books by Johann Christian Wiegrib in 1779, Johann Samuel Halle in 1783, and Christlieb Benedict Funk in the same year began to emphasize instruction in showmen's tricks for the lantern, again following Guyot's lead and using his technique of depicting a storm at sea, but now also describing lantern projections onto smoke that could give the illusion of a figure hovering in the air. The context of these books is one further step away even from the "rational recreations" that entertained an emerging educated class during the Enlightenment; along with experiments and demonstrations of electricity, magnetism and optics, their pages were filled with card tricks, numerology, recipes for preserving sour cherries and instructions for making charm mirrors. Now moving lantern illusions were associated with the appearance of ghosts and with a long list of optical deceptions that used refraction and reflection to mystify and confuse the eyes of a viewer.

In 1789 in Vienna, the magic lantern itself began to move. A travelling science demonstrator and showman named Paul Philidor devised improvements in his exhibition intended to warn the interested public about the deceptions of the notorious "ghost-raiser", Johann Georg Schröpfer. A coffeehouse owner who had committed suicide in 1774, Schröpfer had used some of Guyot's optical tricks in his private séances converging with the spirit world; he had organized a breakaway lodge of Freemasons in Leipzig, and claimed for himself the only true knowledge of ancient mysteries. Schröp-
fer's death precipitated a vigorous public debate about his ability to raise the spirits of the dead, bringing the deceased cult leader notoriety throughout Europe. One result of the intense discussion about Schröpfer's work was the development of an optical show that repeated his methods of raising ghosts and attempted to explain his trickery. Paul Philidor was a pioneer of this exhibition that simultaneously provided both thrills and explanations, in a darkened room specially decorated with death's heads, self-extinguishing candles, a magic circle and other arcana. During his stay in Vienna he improved the techniques of his show so that the three ghosts he called up at each session "took a few steps forward towards the audience" before they again disappeared from view. Philidor produced this startling effect which set his ghosts in motion towards the audience by concealing his magic lantern behind a hidden projection screen that was lowered into the room after the hall was dark, and then moving his magic lantern away from the screen, causing its image to suddenly enlarge. Evolving in his presentation of "Schröpfer'sche Geistererscheinungen" into a rapidly moved lantern set on rails or small wheels, Philidor made his ghosts expand hugely and seem to hover directly over his audience, after which they grew infinitely small again before seeming to disappear through the floor of the room to the centre of the Earth. Fully developed by the time he transferred his show from Vienna to Paris for a five-month run beginning in December, 1792, Philidor's techniques and themes were copied by the balloonist and showman Jules-Étienne Robertson for his own Paris outings at the rue de l'Echiquier in January 1798 and then at an elaborately decorated former Capuchin cloister, Couvent des Capucines, from January 1799. Called by now a Phantasmasygar show, this elaborate exhibition of moving lantern effects and moving slides, was supplemented by the projection of opaque moveable puppets and the use of sophisticated optical trickery. The Phantasmasygar show, with its haunting decorations and memorable projections, often accompanied by the eerie sounds of the glass harmonica and the pounding of a violent thunderstorm, and sometimes even involving unannounced electrical shocks for the audience, was exhibited widely across Europe and North America early in the 19th century, and lingered on for most of the century in various guises, including that of the fairgrounds "ghost show" of the 1880's and 1890's.

With motion extended to the lantern itself in Phantasmasygar shows, a wide repertoire of moving images was now available for diverse lantern projections that ranged from scientific lectures to frightening entertainments. In the nineteenth century the simple mechanical slides of Wiegleb and Musschenbroek became finely machined works of brass gears that illustrated the movements of the planets around the sun, the moon around the earth, constellations across the skies, eclipses of the sun or moon, and many other astronomical events, in sun miniature orreries that demonstrated the most complex interrelationships of moving bodies. In the hands of manufacturers like Carpenter and Westley or Newton & Co., mechanical slides for astronomical lectures became miniature works of fine craftsmanship. Simultaneously, some of the same mechanical sophistication was applied to the making of Chromatropes, usually two counter-rotating disks painted with elaborate abstract designs that produced an illusion of depth or visual texture. A traditional end to dissolving view lantern shows, a display of Chromatropes — sometimes called "fireworks without powder" — in the hands of a skilled lanternist could be a splendid and astonishing finale of rhythmically abstract movement. Further nineteenth century experiments with projected motion in the magic lantern, particularly in the startling exhibitions of stroboscopic projection by Ludwig Leopold Döbler beginning in January 1847, led to the invention of cinematography at the end of the century; a new technology that extended a three hundred year old practise. Like the horseless carriage that became the automobile, early accounts of the cinema were couched in the language of the magic lantern; a cinematograph was nothing more than "a lantern equipped with a mechanical slide changer" and a film "for projecting a Living Picture is nothing more, after all, than a multiple lantern slide."

While a re-examination of the context of the invention of the cinema has motivated much recent research into the later nineteenth century history of moving images in the magic lantern, it has been too little recognized that the projection of moving images was an essential and constant element in magic lantern practise from the moment of its discovery in the middle of the seventeenth century. At first seen just as one of the many optical amusements that were taken up by gentlemen fascinated with recently devised instruments like the microscope, telescope, polemosecope, and portable camera obscura, the magic lantern never developed an experimental purpose that was useful for scientific investigation. The microscope, which at first was an after-dinner entertainment set piece, and the telescope, which was useful for ship's officers and a few astronomers, but which found its broadest dissemination in the form of the spyglass as a gentleman's fashion accessory, within a few decades of their discovery were being used by experimental scientists to reveal previously unseen and remarkable aspects of nature. But the magic lantern,
equally at first another device showing the power of lenses to refract light, never found any genuinely scientific purpose. Instead, as a device that at its essence was one that could reproduce motion, the magic lantern became the progenitor of the modern media of film and television.

Notes:

(2) Charles Patin, Quatre Relations historiques par Charles Patin, médecin de Paris (Basel, 1673), p. 236. The English text is taken from a translation published in London in 1696 as Travels thro’ Germany, Switzerland, Bohemia, Holland and other parts of Europe.

(3) ibid., p. 237-8.


(5) The key position of Haygains in both the early development and possibly the dissemination of the magic lantern is fully explored in Laurent Mannoni, Le grand art de la lumière et de l’ombre, archeologie du cinéma (Paris, 1994: Nathan), esp. pp. 42-60.


(7) See, for example, William Molyneux, Dioptrica Nova: A Treatise on Dioptricks, in Two Parts... (London, 1692: Benj. Tooke), Plate 38, Fig. 2; Jacques Ozanam, Recreations mathématiques et physiques... (Paris, 1696: Chez Jean Jombert), Planche 63, p. 452, Fig. 220; Christian Friedrich Wolff, Elementa mathesos universae (Magdeburg, 1713: Libraria Rergeriana), Vol. II, Tab. XI, Fig. 85; Willem Jakob de'Gravesande, Physica Elementa Mathematica (Leiden, 1721: Petrum Vandern), V. 2, Tab. XIV, Fig. 1; Pierre Polinière, Experiences de Physique (Paris, 1728: Moette/Praudhomme/Caveller), Planche 17, Figs. 15-17; Marc Mitouflet Thomin, Traite d’optique mecanique (Paris, 1749: Chez Coignet/Boudet), Planche 4, Fig. 5; others.


(10) Johann Conrad Creling, Phanomena Laternae Magicæ... (Tubingae, 1705), p. 4.


(12) ibid., p. 51.

(13) Petrus van Muschenbroeck, Beginnlen der naturkunst, Beschreiben ten dienste der Landgenoten (Leiden, 1736: Samuel Luchtmans). The often cited 1739 edition is for the French translation of this work issued by the same publisher as Essai de physique.

(14) Willem Jakob de’Gravesande, Physica Elementa Mathematica, experimentis confirmata. Sive Introductio ad Philosophiam Newtonianam. (Leiden [Lugduni Batavorum], 1720-21: Peter Vander). For most of the instruments in this book, the precise contributions of de’Gravesande and Jan van Muschenbroeck remain indeterminate: the two lived only a few houses from each other on the same canal in Amsterdam, and no correspondence or written notes between them is known. On their relationship, and the Muschenbroeck family overall, see Peter de Clercq, “At the Sign of the Oriental Lamp. The Muschenbroeck workshop...

fig. 12: Travelling showman with peep-box, in: Het groote Tarfeel der Dwaasheid, Holland 1720

Anschrift des Verfassers:
Deac Rossell, BA
Lecturer in European Studies
Goldsmiths College, University of London
74 Manor Ave. 44
London SE 41 TE, GB
e-mail: d.rossell@gold.ac.uk