LEIBNIZ AND THE LANTERN

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Gottfried Wilhelm Leibniz, 1646–1716

IN SEPTEMBER 1675, in Paris, the mathematician and philosopher Gottfried Wilhelm Leibniz (1646–1716) saw a demonstration on the banks of the Seine of 'a Machine which served to walk on the water'. Leibniz was 29 years old at the time and in the service of the Elector of Mainz, for whom he spent the years 1673–6 in Paris on a diplomatic mission. This was Leibniz's first close contact with some of the leading scientists and scientific societies of his time: in this period he met both Christiaan Huygens and Robert Boyle, amongst many others, and began work on his new mathematical method for determining 'The Greatest and The Least' – the calculus – which was published in 1684.

The experience of seeing the new machine inspired Leibniz to make some handwritten notes on 'a new sort of Entertainment' that would bring together scientists, mechanics, showmen, investors, mathematicians, publishers, musicians, poets, booksellers and architects – nothing less than the most prominent thinkers and entrepreneurs of the day – for a new kind of exhibition of modern inventions and industry. He titled these notes *Drôle de Pensée*, which translates loosely as 'a fantastic idea' or 'an amusing thought'.[1] In the full possession of his extraordinary faculties, and in the gilded capital city of Europe for the first time, Leibniz produced an idealistic proposal that considered the financing, organisation, presentation, content and effect of his exhibition.

Leibniz wrote his notes without inhibition, from the heart. He suggested that the exhibition could open with projections from a magic lantern:

> *The entertainments would be for example Magic Lanterns; (one could commence with that) flights, imitation meteors, every sort of optical marvel; a representation of the sky and its stars.*

Items on view would include

> *a Globe [model of the Earth] like that of Gottorp or Jena; fireworks, fountains, vessels of strange shapes; Mandrakes and other rare plants. Extraordinary and rare animals.*

There would be miniature sea battles in a canal, grand concerts and demonstrations of rare musical instruments, anatomical displays, botanical gardens and laboratories. Alongside these grand public entertainments Leibniz also proposed scientific displays of more specialised interest, to include calculating machines, coins, pictures, a library, experiments with water and air, and demonstrations of a vacuum. Leibniz thought that perhaps Otto von Guericke's experiment with his so-called 'Magdeburg Sphere'[2] could be recreated, and 'From England could be brought the man who eats fire etc., if he is still living.' Optics appeared again as an instructional entertainment: 'In the evening the moon, as well as the other stars, could be viewed through a telescope.' Throughout, Leibniz showed a fascination with optical illusions and transformations, such as:

> *Display of camera obscuras. Paintings which from one side appear in a certain way, and from the other in quite a different one.*

For public festivities he specified:

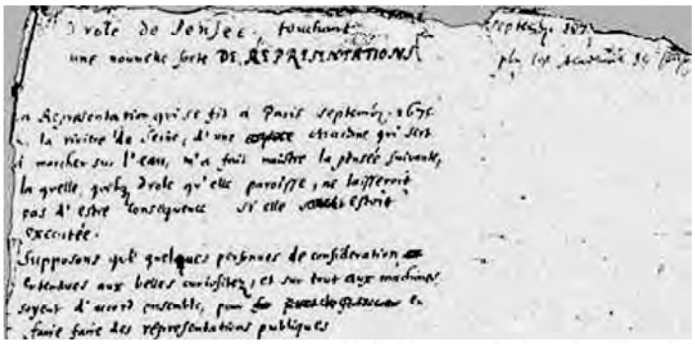
> *Grotesque images painted on oiled paper with lamps inside. There could be figures which would move, illuminated from within to show what might be on the paper. For the magic lanterns, there could be not only simple subjects painted on transparent material, but [also] ones which can be dismembered, to represent quite extraordinary and grotesque movements, which men would not be capable of making.*

Discussions and colloquia were also part of Leibniz's plan, along with the potential for the founding of a new international college and the teaching of young persons. For the wider public, displays of automata, glockenspiels, small cavalry and infantry soldiers in mock battles, demonstrations of conjuring and tricks with cards, and various pranksters and 'French clowns' would provide entertaining diversions. Finally, the entirety of the various representations and staged events could be integrated with an opera. For this spectacle,

> *To draw the curtain would not be a bad thing, since during the interval one might show something in the darkness. And magic lanterns would be appropriate for that. One might show the actions made by those transparent puppets represented by some speech or song. One might make one representation of the antiquities of Rome and others of illustrious men. In fact of all sorts of things.*

NOTES

1. Gottfried Wilhelm Leibniz, 'Drôle de Pensée, touchant une nouvelle sorte de Representations', handwritten document (in French), Eigenhändige Aufzeichnungen A, Leibniz Archiv, Niedersächsische Landesbibliothek, Hannover. I am indebted to Richard Crangle for a new English translation of this text, which was written by Leibniz with an imaginative enthusiasm that is not at all simple to parse. All quotations are from this translation. An excellent full critical text of the original French document, with many annotations and an Italian translation, can be found at http://www.znort.it/suiseth/drole/drole.html (address correct at time of going to press).
2. Otto von Guericke (1602–86) was the inventor of the vacuum pump and did much early research on the properties of vacuum. The 'Magdeburg sphere' consisted of two copper hemispheres placed together, with the air inside pumped out to form a vacuum. Air pressure on the outside of the sphere meant that the hemispheres could not be pulled apart even by two teams of horses.



First page of Leibniz's manuscript (reproduced from the Drôle de Pensée website, address in Note 1)

Leibniz was equally energetic and far-reaching in his thoughts on how such an exhibition would be financed. Royal privileges and patents would cover some of the costs, while bringing inventors together with entrepreneurs, who would pay a portion of their receipts to the exhibition, would cover others. Some events would be ticketed; public lotteries and a gambling casino (which Leibniz preferred to call an 'Academy of Games') would also contribute to the expense.

But even though Leibniz was thorough in his suggestions about his exhibition's financing and organisation, his irrepressible fascination with the new, the extraordinary, and the inventive continually breaks into his text, disrupting any logic that would separate practical considerations from his evident sense of wonder and exuberance at all of the things that could be shown to the public. His plan was no didactic venture along the lines of Diderot's Encyclopedia, even if it attempted to include all possible new and remarkable ventures of the Enlightenment. For Leibniz, the scholarly and scientific materials exhibited would be seamlessly interwoven with spectacle and pleasure, creating a project whose usefulness 'would be greater than can be imagined'. Throughout the text of *Drôle de Pensée*, Leibniz is fascinated most essentially with light and its effects, and with projection and its possibilities. In the last paragraph, he returns again to this subject, suggesting the construction of a special marionette theatre like the *Théâtre des Pygmées* in the Quartier Marais in Paris, and a shadow 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.*

As the figures moved back and forth in perspective, increasing and decreasing in size, 'which would be easy and simple', all the lights would suddenly 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.*

Leibniz's amusing text is very powerful and suggestive. In one important sense it relates to the question I raised in the last issue of the *NMLJ*: if Christiaan Huygens was the inventor of the magic lantern, why could he not define the use of his new instrument and why did he feel so strongly that people would make fun of the lantern? Should we ascribe Huygens' reluctance to be associated with the lantern only to a dour and rigid personality? Certainly Leibniz takes a very different attitude to the magic lantern, which is a central element of his proposed exhibition. Is this, too, only to be ascribed to his more flexible and fun-loving personality? In *Drôle de Pensée*, Leibniz wants the lantern both to amuse and educate, to make a grand display as well as to provide information. Where Huygens is supposed to have been embarrassed to be associated with the lantern, just a decade later Leibniz is clearly not, and furthermore has some well-established suggestions for using the lantern for visual education. So, if he was its inventor and first builder, why did Huygens get the idea that the lantern was a triviality which had to be an embarrassment to him?

Leaving this unanswerable question aside, perhaps the most intriguing passages of this text for the modern lantern community are Leibniz's comments on using the magic lantern to represent motion. He envisages that the lantern will 'represent quite extraordinary and grotesque movements, which men would not be capable of making'. Was this a stroke of pure imagination on the part of Leibniz, or had he seen moving figures for the magic lantern already? Hauke Lange-Fuchs' detailed article 'On the Origin of Moving Slides'[3] offers some intriguing clues. The earliest suggestion for moving slides in the lantern, says Lange-Fuchs, may have come from the German physicist Erhard Weigel of Jena. According to his son-in-law Georg Albrecht Hamberger, Weigel had projected slides of goats butting, and a bear rising and attacking a man in a Swiss costume with his paws, sometime around 1697.[4] Leibniz wrote his text in 1675, but he had spent the summer of 1663 at the University in Jena, where he was taught by Erhard Weigel and came to admire his work greatly (the 'inventions of Mons. Weigel' are included among the lists of attractions in *Drôle de Pensée*). The two stayed in touch until Weigel's death in 1699. So could Weigel's moving slides be from an even earlier period, and could Leibniz be expanding on his memories of them in this text?

Or had Leibniz seen moving slides elsewhere? There are some possible references to movement in Charles Patin's description of a lantern show given by Johann Franz Griendel in Nuremberg in July 1671. 'I saw the Air fill'd with all sorts of Birds, almost after the same manner as they are usually painted round about Orpheus,' says Patin, and he later describes 'divers Personages running at the Ring'.[5] While the language of these descriptions *implies* movement, it is wholly uncertain that a moving slide was in use: the language could equally imply sudden surprise and delight, or simply a very 'busy' image. The second passage refers to a common game of skill performed by horsemen with short lances, and again there is no indication that movement was shown on the screen; it may have just been represented in a still image. It is, however, interesting that Leibniz mentions the same game, immediately after describing the magic lantern's ability to produce movements that men 'are not capable of making'. Leibniz continues, in his freely associative text, with the words: 'Dancing horses. Running at the ring and at the Turk's head. Experiments with burning mirrors, fireworks.' Is this a chance reference, a subconscious recollection, or a deliberate citation on Leibniz's part? It is, of course, impossible to say. But it is certain from this text that Leibniz was very familiar with the magic lantern by 1675, that he had creative suggestions for its use in both educational and entertainment contexts, and that he thought the lantern could be a central instrument for his new kind of exhibition. His plan, unfortunately, seems never to have been realised – at least not until the great public international expositions of the nineteenth century.

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3. Hauke Lange-Fuchs, 'On the origin of moving slides,' *New Magic Lantern Journal*, Vol. 7 No. 3 (November 1995), pp. 10–14.
4. Lange-Fuchs, p. 14. Franz Paul Liesegang suggests an earlier date of 1692 for Hamberger's recollections of his father-in-law's moving slides. See Franz Paul Liesegang (ed. Hermann Hecht), *Dates and Sources: a Contribution to the History of the Art of Projection and to Cinematography* (London: Magic Lantern Society, 1986), p. 14.
5. Charles Patin, *Travels thro' Germany, Swisserland, Bohemia, Holland and Other Parts of Europe* (London: A. Swall & T. Child, 1696), p. 235. This passage is reprinted in Laurent Mannoni, *The Great Art of Light and Shadow: Archaeology of the Cinema* (Exeter: University of Exeter Press, 2000), pp. 59–60. The original French text, which Leibniz could have seen, is Charles Patin, *Quatre relations historiques* (Basle, 1673), pp. 238–9. A further edition, also possibly available to Leibniz, was published at Lyons in 1674.