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Media as modern magic:

Early x-ray imaging and cinematography in Sweden

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This article examines different forms of intermedial relations between x-ray imaging and cinematography in the media culture around 1900, mainly in a Swedish context. With the Stockholm Exhibition of 1897 as one of the focal points, the author argues that these two media were linked in their production, distribution and exhibition as well as in the envisioned audience reception. More specifically, the aim is to show how collaboration and competition between these new media can be understood in relation to nineteenth-century discourses on ‘modern magic’. Through the marketing in other media – illustrated books, articles, caricatures and advertising in the press – an expectation was fostered that the x-ray apparatus and the *Cinématographe* could perform operations that once had been thought of as impossible or magical. In a similar manner, the media industries, scientific performers and entrepreneurial showmen launched x-ray imaging and cinematography as something new, strange and even exotic. In the end it was the cinema that proved to be more successful in inventing new ‘magical’ tricks, and x-rays were appropriated for other, medical services, but through innovative uses, the moving x-ray pictures could once again become new and fascinating.

Keywords: history of cinema; history of x-rays; history of new media; intermediality; magic

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The Scandinavian Art and Industry Exhibition of 1897 in Stockholm was a celebration of modern science and technology. Among the media presented as spectacular technological novelties were x-ray imaging and cinematography. Both attractions had been placed in a replica of medieval Stockholm. In one of the towers of the town wall, the physician Thor Stenbeck arranged demonstrations of moving x-ray pictures. The screening of films took place in a modest room on the ground floor in a house in the same area. They were operated by Numa Peterson's Handels- och Fabriksaktiebolag: a pharmaceutical and photographic company that had recently begun to market film equipment as well as x-ray apparatus. Several of the spectators at the demonstrations described x-ray imaging and cinematography as 'modern magic'. The Lumière *Cinématographe* was characterized as magical in its nature, and Stenbeck was compared to a magician that kept guard over the x-rays in his tower. At the same time that these 'wonders' were associated with a 'primitive', mysterious world of belief, visitors at the exhibition also reflected that the produced effects were the result of modern science and technology (Hasselgren 1897, 563–567). The Stockholm Exhibition of 1897 was only one of many arenas of media culture where x-ray imaging and cinematography were joined and compared to each other. Several other examples from this period suggest an intricate exchange and interaction between these two new media that took place on a technological and industrial as well as cultural level.

Both x-ray imaging and cinematography were invented in 1895 – the year that Conrad Wilhelm Roentgen discovered x-rays and the Lumière brothers staged their first public exhibition of the *Cinématographe*. This historical coincidence, however, has not received much scholarly attention. For a long time the paths along which these two media developed were considered to be isolated from each other. Historians of science and medicine depicted the progress of x-ray pictures from 'primitive' diagnostic experiments to full-fledged medical specialization. Film historians, on the other hand, concentrated on descriptions of the evolution of the cinema as popular entertainment and as an art form. Recently, however, a few studies have begun to explore the overlapping between the histories of x-ray imaging and cinematography (see Cartwright 1995; Crangle 1998; Jülich 2002, 2006).

This article investigates different forms of intermedial relations between x-ray images and cinematography in the media culture around 1900, mainly in a Swedish context. With the Stockholm Exhibition of 1897 as one of the focal points, I will argue that these two media were linked in their production, distribution and exhibition as well as in the envisioned audience reception. More specifically, the aim is to show how collaboration and competition

between these new media can be understood in relation to nineteenth-century discourses on ‘modern magic’. To begin with I will point to literature on stage magic as a telling instance of the ways in which the x-ray apparatus and the *Cinématographe* were associated with each other. Through this kind of writing there arose an expectation that these technologies would be able to do something that earlier had been thought of as impossible or magical. In a similar manner, the media industries, scientific performers and entrepreneurial showmen marketed x-ray imaging and film as something new, strange and even exotic. I will also analyze how the press portrayed the audiences of the new media as naïve natives without habit or competence to manage the gifts of civilization. Finally, I discuss one of the factors contributing to public displays of moving x-ray pictures never becoming established as popular entertainment in contrast to film.

Media, magic, science

In his *Letters on Natural Magic* the Scottish physicist David Brewster (1832) juxtaposed the history of magic with the traditions of scientific demonstrations. Here ‘natural magic’ becomes a term that is used to separate the practices of illusions coupled to popular science from those connected to the supernatural. As Michele Pierson (2002, 19–20) has pointed out, Brewster intended his book to be a critique in the name of science against deceivers who profited from mystifying the techniques of illusions. According to him, popular and entertainment media could realize the democratic potential of natural magic. At the same time, Brewster is clearly fascinated by the mystery of optical illusions – something that is obvious in his description of the phantasmagoria.

In the same spirit Albert A. Hopkins compiled material from *Scientific American* and *La Nature* into the book *Magic: Stage Illusions and Scientific Diversions, Including Trick Photography* (1898). Characteristic of conjurers of the tricks described in the book, at least according to the introduction, is that they do not make a claim of secret knowledge, but ascribe them to manual dexterity or technical and scientific principles. Unlike the magicians of the Middle Ages these ‘modern professors of the *art magique*’ do not lay claim to occult powers (Hopkins 1898, 16). Their astonishing ‘marvels’ are in fact no real wonders; they are the products of science and technology. Hopkins’s *Magic* presents a whole repertoire of magical numbers and acts and gives them a rational, matter-of-fact explanation. Traditional magic and automata are gathered together with the late nineteenth century’s new tricks and

applications based on the development in electricity, mechanics and optics. Among all these apparently disparate skills and tricks, the x-ray apparatus and the *Cinématographe* make their appearance (Figures 1 and 2). This example proves that early x-ray technology and cinematography can be related to a wider tradition of producing spectacular, magical effects.

It is in this larger context that the ‘modern magic’ of x-ray imaging and cinematography should be considered, but the threads also lead in different and other directions. In a disenchanted world, new media technologies could be experienced as a return of the magical (Moore 2000). Similar to early anthropology’s fascination for the relation between magic and primitive conceptions and practices, there was around 1900 a tendency to portray film and x-ray technology as magical tools with the power to bring life to inanimate objects or images. Not unlike the African objects shown at ethnographic missionary exhibitions around 1900, these media were charged with meaning by placing them in the tension between the modern and the primitive (Coombes 1994). As I will show, the ‘primitivism’ at the Stockholm Exhibition of 1897 and in a larger media culture was expressed in many different ways.

Intermedial industry

It is hardly a coincidence that cinematograph innovators and industrialists were also pioneers in the emerging field of x-ray technology. The Lumière brothers not only invented the *Cinématographe*, but also experimented with x-ray-sensitive emulsions (Lumière and Lumière 1896, 382). Another leading inventor, Thomas Edison, also showed an early interest in x-rays (Anon 1896k). Already in March 1896, his portable fluoroscope could be purchased easily on the open market (Figure 3). It consisted of a wooden box (that had the shape of the familiar stereoscope) with a fluorescent screen at one end and an opening for the eyes at the other. If a person placed his or her hand between a vacuum tube emitting x-rays and the fluoroscope, the bones of the hand appeared as a dark, moving shadow on the glowing screen. Edison’s laboratory also improved the stationary fluoroscope: a piece of cardboard coated with fluorescent material and placed in a wooden stand. Edison arranged a demonstration of his devices at the annual display of the National Electrical Exposition in New York in 1896 (Anon 1896l) (Figure 4). Huge crowds lined up to examine their own hands through the new fluoroscopic equipment. Edison’s assistants were reported having had to cope with shock, skepticism and joking as the visitors moved through darkened chambers heavily draped in

black to increase the visitors' visual sensitivity. These examples show that the entertainment industry considered both the *Cinématographe* and the x-ray apparatus as potentially profitable technologies for producing moving pictures.

One of the cornerstones in the Lumière business was to sell concessions to local suppliers all over the world. In Sweden it was Numa Peterson's Handels- och Fabriksaktiebolag – a pharmaceutical and photographic company based in Stockholm – that had the exclusive rights to the Lumière films.¹ The director Numa Peterson was originally a pharmacist, but abandoned his profession to run a firm of his own. His son Mortimer was trained as an engineer. In accordance with many international media entrepreneurs at the time, they introduced and marketed a whole range of technical novelties within different areas.

Peterson's store in Stockholm housed scientific instruments and medical articles as well as photographic and film equipment, phonographs, telephones and typewriters (Anon 1900a). Numa Peterson's company also sold x-ray apparatus and equipment. After Roentgen's discovery, a number of manufacturers competed on the growing market. There were a lot of brands and models from which to choose. Many buyers traveled to Germany to purchase the desired goods, and some of the emigrants to North America that returned home brought an Edison fluoroscope with them. Others turned to Numa Peterson.

In the early years, suppliers like Peterson could not be certain who might be the potential buyers. Both the larger public and diverse professional groups had shown an interest in the technology. Advertising in the daily press played an important role in the marketing of the new product (see, e.g., Anon 1896h).

With his intermedial intuition, Numa Peterson became a central media industrial actor in Sweden in the decades around 1900. As a producer of feature films on a national level as well as supplier of cinematographs and x-ray apparatus, his firm was almost without competition for a number of years. He offered equipment, accessories and images for traveling exhibitors. There were also other actors – and the showmen themselves – that provided the Swedish market with products from foreign companies.

Traveling media attractions

At the end of the nineteenth century, traveling exhibitors in Sweden were provided with new machines and images. The phonograph was introduced as a new kind of technological marvel,

electric light became an attraction in itself, and film and x-ray imagery made their entrances. Intermedial couplings were the norm. It was not unusual for the same exhibitor to launch a number of different attractions throughout his career; often more than one machine was exhibited at a time. Exhibitors visiting the same town or village could also sometimes join and offer audiences a combination of image and sound presentations.²

One of the exhibitors touring the northern part of Sweden was Johan Eneqvist. He began his career as a tradesman traveling from town to town with a cartload of crinolines. After that he tried to launch the Christmas tree and also introduced coke stoves, but with little success. In the late 1890s he got hold on one of Edison's phonographs as well as an x-ray apparatus. It is not known which route his northern tour followed, but as late as 1900 there are traces of his activities in Örnköldsvik, a town located on the east coast. In the assembly room, Eneqvist demonstrated 'the greatest innovation in the scientific area': 'Röntgen's x-rays!' The great lure was the possibility to 'look through parts of oneself' (Anon 1900b). Eneqvist soon felt the time was ripe for exploiting another new medium: cinematography. He purchased an Edison-projector and started to exhibit moving pictures in the district courthouse of the small village of Mo. His business was later left to his son, Carl Eneqvist.³

It was the Danish showman Ole Olsen that reached the largest audiences for public demonstrations of x-rays. He was one of three brothers each traveling with an amusement park in the 1890s. Christian Olsen exhibited waxworks figures with mechanical motions. The audience could, for instance, watch Charles XII of Sweden and Frederick II of Prussia playing chess with Napoleon and Frederick VI of Denmark as spectators. He also had a '*Kaiserpanorama*': a mechanical viewing apparatus devised for the public display of stereoscopic photographs (Idestam-Almquist 1959, 17–18). In his memoirs *Filmens eventyr og mit eget* (Olsen 1940), Ole Olsen tells how he started off in small-scale exhibiting peepshows at markets and fairs. As time went by, the company grew and for a while it consisted of several railway-carriages filled with mechanical apparatus, wild animals, a pelican and members of the Kru-tribe. The last-mentioned seem to have been unemployed sailors from Nigeria and West India that Olsen dressed in animal skins with feathers in their hair. Part of the attraction was a collection of 300 'original' objects from Congo that were exhibited together with the members of the Kru-tribe and accompanied by African music. Olsen himself often appeared in a Lapp costume. 'The Caravan', as it was called, toured in Scandinavia and in Germany for several years. When Olsen heard the news of Roentgen's discovery, he traveled to Berlin and bought an x-ray apparatus (Olsen 1940). In the summer of 1896 he brought all his machines to

the fairground at the industry exhibition in Malmö, a major town located in the South of Sweden.

As has been well documented by film historians, when the first motion picture screening took place in Sweden it was at the industry exhibition in Malmö (Waldekranz 1969). During the summer of that year, Harald Limkilde from Copenhagen projected his series of films in a theater that was temporarily constructed at the fairground. Less known, however, is that the newly discovered x-rays were also an attraction at the exhibition. In ‘Colloseum’ – a large tent housing Olsen’s exhibition – one compartment had been draped in dark textiles and made into a ‘black chamber’. Elevated at one side of the room was the x-ray machine. The first day the press was invited to view the spectacular show. When Olsen turned on the current, the vacuum tube began to shine in a color resembling ‘the one when absinthe mixes with water’ and after a short while the tube radiated ‘an intense and magnificent pale green light’. He then held up a fluorescent screen in front of the x-ray source and ‘the interesting sights’ started. A frog struggling in a wooden box performed ‘a rather strange skeleton dance’. The coins in a purse ‘presented themselves unmercifully clear’. Also, the bones in the hand were outlined in sharp detail. Yet when one of the journalists placed his chest before the screen, the rest of the audience could only faintly discern the shadow of his spine. And the attempt to ‘look through the head’ of another person was without success. The demonstrations continued for a week and the apparatus was later transported to Copenhagen.⁴

The x-rays seem to have been a parenthesis in Olsen’s career as showman. He left his itinerant life and in 1898 became the director of the newly opened Malmö Tivoli Gardens. After a rather dubious start, Olsen then chose to concentrate on moving pictures. In time he became a film producer and the founder of Nordisk Films Kompagni, one of the leading film companies in Europe with stars like Asta Nielsen (Olsen 1940).

The magic of Old Stockholm

The Stockholm Exhibition of 1897 was another event when x-ray imaging and film competed for the audience’s attention. Both attractions had been placed in the ‘theme park’ Old Stockholm (Figure 5). This was an interpretive reconstruction of the sixteenth-century capital, the town of the Vasa Kings, with the castle of Three Crowns as the major sight. The buildings had imitated stone and brick facings consisting of wooden frames covered by plaster. Actors

in medieval costumes crowded the narrowed alleys of the town (Ekström 1994, 171–172). Voices in the contemporary press praised Old Stockholm for its immediate transparency. Resembling an anthropologist traveling in exotic cultures, the visitor could enter the town and begin to explore another place, but also another time: ‘One walks in there just as if one was in a country with a foreign culture with medieval customs, a country that you had traveled to for the express purpose of studying it’ (Anon 1897c).

It may seem like a contradiction that *new* media like x-rays and film were displayed in *Old* Stockholm, but this was hardly a coincidence. Through this arrangement, the organizers of the exhibition hoped to create an expectation that the visitors would experience something ‘primitive’ and mystical in the encounter with the new technologies. The old-fashioned setting established a striking contrast to the scientific and technical novelties. At the same time, the references to the medieval world emphasized that the x-ray apparatus and the *Cinématographe* were strange phenomena with which to be amazed and fascinated. These associations between modern inventions and medieval magic were reinforced by the ways the attractions were presented.

The *Cinématographe* was located in a room for sixty visitors at a time that had been built by Numa Peterson’s trading company and inaugurated by the Lumière operator Alexandre Promio. At the opening of the exhibition, the program offered films from the Lumière catalogue, but from July there were also ‘Swedish pictures’. Several of these were shots from the exhibition area produced by Promio, assisted by Peterson’s employee Ernest Florman. Two of the films are especially interesting for their self-reflexive character: they show scenes from Old Stockholm. However, the subject of the films was only one part of the attraction. Through advertisements in the press, it was emphasized that the *Cinématographe* in itself was as much an appeal as the individual films. The screening’s highlight was no doubt the medium’s capacity to visualize and perform tricks by the use of movement.⁵

The x-ray demonstrations took place in a tower room in Old Stockholm. The letter ‘X’ surrounded by thunderbolts had been put up on the dome. During the summer, the physician Thor Stenbeck and an assistant displayed moving x-ray pictures to crowds of visitors. Similar to the *Cinématographe*, the x-ray apparatus was launched as an attraction in itself. This was underlined by the way Stenbeck used to start the demonstrations by holding up and explaining the induction coil and vacuum tubes. It was apparent that the strength of the medium was not mainly in what the pictures showed. Often it was difficult to perceive the shadows on the

screen at all. Instead the events were more about exhibiting the medium's potential: the capacity to penetrate and visualize the inside of opaque objects (see, e.g., Hasselgren 1897, 563–566; Anon 1897b).

Stenbeck had an explicit educational aim with his demonstrations, but this did not stop him from arranging them as spectacular shows. The showings drew upon aesthetics of display that can be related to other medial contexts. Similar to a magician, he addressed himself directly to the audience and in focusing their attention on the transformations he performed, Stenbeck took the role of mediator between the audience and the unique event. In parallel with contemporary film lectures he commented on the pictures and continually reminded the spectators about the novelty of their visual experience. He also stimulated the audience to engage and interact with the media. They were encouraged not only to investigate purses, umbrellas, small boxes and other objects they had with them, but also to put their hands, arms and even heads behind the fluorescent screen (Anon 1897d). This form of aesthetics of display that built upon the audience's active involvement in the media had much in common with both magic theater shows and popular science exhibitions at the time.⁶

The journalists who covered the exhibition commonly described the display of film and x-rays in terms of modern magic. The innovations were described as mystical, strange and exotic, but no secret was made of the fact that they were the result of science and technology. This tension is apparent in the articles of the journalist Andreas Hasselgren. At the same time as he presents the *Cinématographe* in Old Stockholm as a 'wonder of the present day', he also gives a rather matter-of-fact explanation of how the shooting and projection of pictures work. It is significant how he comments upon the reaction of the audience when the projectionist shows people diving in the Strömbadet open-air swimming baths in Stockholm backward:

The audience choked with laughter, and that is not so strange, for this scene – which is contrary to all reason and laws of gravity – looks tremendously funny. The whole secret consists in a repetition of the just projected bath-scene in reverse order, starting with the end and ending with the beginning. Such strange 'optical illusions' may appear close to magic, but are in fact the most natural thing in the world. (Hasselgren 1897, 565)

Under the heading of "'Wonders" at the exhibition', a series of articles were published in *Stockholms-Tidningen* with the purpose of explaining some of the sights that were assumed to be difficult for the visitors to comprehend. The x-ray apparatus was one of the innovations considered. Also in this article, the journalist vacillates between giving a scientific explanation to the effects that were produced, and depicting their origin in a mystical way. In one moment the x-rays are presented as a natural phenomenon, and in the next as 'magic

light'. Even Roentgen himself was portrayed as a magician, and the x-ray tube was associated with the *laterna magica* (Anon 1897e).

This way of describing film and x-ray exhibitions can be seen in the light of the tradition of natural magic. Here science and technology are understood to produce their own marvels, but journalists and other commentators also related the *Cinématographe* and the x-ray apparatus to primitive magic. This tendency was manifested in many types of representations of the audiences of films and x-ray imagery. Around 1900, uncivilized audiences becoming fascinated and terrified in the encounter with new media technologies was a recurrent motif in books, magazines and newspapers. Natives, women, children, country bumpkins as well as animals could in this context represent the primitive. Miriam Hansen (1991, 60–89), among others, has shown how the spectators of early cinema were portrayed as louts, unable to grasp the difference between illusion and reality. In a similar way, the audiences of x-ray pictures were depicted as too unsophisticated to be able to understand or handle the functions of the machinery. For instance, in the same year as the Stockholm Exhibition, *Allers Familj-Journal* (Anon 1897a) published a comic strip entitled 'The rescuing x-rays or a scientist's adventure in the desert', which tells the story of how 'Doctor Himmerland' is saved from cannibals (Figure 6). The genre motif in itself had been used several times before. Natives encounter for the first time Western colonizers' advanced technology and flee in terror at the sight of a machine's power (see, e.g., Anon 1896b).

Yet the stories and images that visualized the first encounter with the *Cinématographe*, the x-ray apparatus and other new media not only permitted their readers and viewers to take a superior and elevated position as observers, but could also contribute to the development of a specific way of experiencing scientific and technical novelties. Natives and country bumpkins became a sort of guide that could direct modern people in the ways of conceiving of and handling foreign and unknown technology. In this perspective, as Tom Gunning (2003) has pointed out, modernity is a matter of learning to be surprised and to wonder at the newness of some media technologies. It might appear as if this learning process proceeded in a certain order. When a new medium is introduced there is a certain moment of enchantment and amazement over what the machines can perform. Concurrently with a process in which a technology becomes more familiar and ordinary, the original fascination yields to curiosity and examination, maybe also to rational explanation. Yet at the same time it is important to emphasize that the introduction of new media does not always follow this pattern. Through

innovative uses or in the meetings with new audiences, a technology that once lost its fascination value can be charged again.

The dangers of overexposure

There were thus several points of contact between the early histories of x-ray imaging and cinematography. Also in the beginning some attempts were made to combine x-ray technology with film technology, creating a new medium (Jülich 2002, 140–141, 289–293) (Figure 7). However, x-ray cinematography was not an instant success.

During the early years of the twentieth century the close relationship between the two media seemed to have been transformed in a decisive way. Demonstrations of x-rays at fairgrounds and exhibitions came to an end. Audiences searched for and let themselves be fascinated by other, newer attractions. Instead, x-ray imagery became a specialized medical technology. In contrast, film gained a durable status as a popular entertainment medium. The dominant explanation among historians is that physicians and engineers discovered the dangerous effect that x-rays had on people and that this knowledge put an end to the uncontrolled use of the new technology.⁷

Some early alarming reports seem to confirm this assertion. For instance, only a couple of days after Ole Olsen's exhibitions in Malmö, the official journal of the exhibition published a notice on a 'victim of the x-rays' (Anon 1896d). This was a translation of an article in German press that reported on a young man that 'had been used at experiments with the x-rays'. The consequences of the experiments were described in detail: intense red spots had appeared on exposed body parts, his hair had fallen out and some skin had come loose. Similar stories about the dangers of x-ray exposure circulated in the press during the autumn of 1896. Thor Stenbeck concluded a public demonstration of x-rays in the lecture hall of the Royal Swedish Academy of Sciences with some remarks on these reports, but according to him, there was no evidence whatsoever for the loss of hair or other damage due to x-rays. Rather, it was the ultraviolet rays produced at the same time as the x-rays that could have these unpleasant effects.⁸

After the ending of the Stockholm Exhibition of 1897 Stenbeck was alerted to the fact that a person that had assisted as an 'experimental object' at the display of x-rays in Old Stockholm was suffering from changes in their skin. During the autumn, this assistant – now 'a patient' –

was shown at a meeting of the Swedish Society of Medicine. The individual had severe inflammations on the hands; especially the fingernails were badly affected. When Stenbeck (1899, 568–575) reported on the case two years later, the nails of the index fingers were not yet cured. Despite this fact, the physician still was of the same opinion. It was not, he argued, the x-rays that had this strong effect, but the ultraviolet rays that were generated at the same time as the x-rays. He therefore recommended that at medical examinations with x-rays, the body part that was exposed to the light should be covered with black cardboard. This did not hinder the x-rays, but the ultraviolet rays would be ‘strained off’ (Anon 1898, 141).

The awareness of the dangerous effects of x-rays on both patients and physicians would not become a matter of consensus for several years. The circulation of some alarming reports was not the only reason for the loss of popularity of x-ray demonstrations. Another important factor appears to have been overexposure in the news media from the summer of 1896. Almost every day new chatty articles, chronicles and caricatures were published that speculated about the consequences of x-rays on society and everyday life. The audiences became weary of the rays. In the Malmö Exhibition’s official paper, the following self-reflexive humoresque appeared:

Author: I have written a humoresque that I wish to hand over for reading.

Editor at the comic paper: I am sorry, but at the moment I am absolutely overburdened by contributions.

Author: My humoresque is not about Roentgen’s x-rays.

Editor (delighted): Wonderful! What is your fee, young man? (Anon 1896a)

A couple of weeks later the paper reflected upon how blasé the public had become of all the new inventions and discoveries. During the last fifty years the conditions on Earth had changed so much that humanity had almost lost its capacity of being surprised. Before it was considered a proof of ignorance to be astonished, but nowadays it was only the engineer or the scientist that had retained their ability to be amazed:

The non-expert however, that only sees the outside of the great achievements, but does not understand their inner value, is no more amazed when he hears of something new; yes, there are even persons that when they are told about for instance such a great discovery as the x-rays, quite blasé say: ‘Oh, well it was a good thing that they got on to that’. (Anon 1896m)

Against this background, the writer thought he was justified to inculcate in all people living at the end of this century ‘that they had reason to and were duty bound to salute every new invention that carries humanity forward with amazement and admiration’ (Anon 1896m).

The most telling sign of weariness was the failing public support of x-ray demonstrations. Johan Enequist and Ole Olsen's abandonment of x-rays in favor of film can be understood as a calculation that one of the two media was expected to become more profitable than the other. It is true that the cinema in Sweden and elsewhere also lived through a couple of hard years around 1900 (Waldekranz 1969, 107, 144). For a while audiences' interest in moving pictures seemed to weaken. It was no longer enough to exhibit and play with the dynamic property of the film medium; something new was demanded. And gradually the narrative elements became more important and the dramatic or comical scenes expanded into stories. The feature film made its entrance. The x-ray medium did not go through a similar process. The novelty faded. To hold up an umbrella and to see how it was transformed into a metallic skeleton in the x-ray light, or to experience the bones in one's hand on the glowing screen in the dark appears no longer to have been enough for an audience that had become discriminating about visual delights.

Instead x-rays were appropriated and loaded with new energy by film. As Yuri Tsivian (1996) has described, filmmakers exploited the fact that x-rays were well known to create tricks. One of the first fiction films that simulated or alluded to x-ray effects was George Smith's *X-ray Fiend* (1897): a comedy around the popular subject of a couple in love that were transformed into skeletons while embracing. Shortly thereafter, Georges Méliès produced another 'magical comedy': *Les rayons X* (1897–1898). He made at least nine films with x-rays as motif before 1904. *Le monstre*, from 1903, showed an Egyptian pharaoh that performed magical transformations with his wife's skeleton. Usually that kind of film ended with the skeleton delivering a grotesque dance – a variation of the old theme of *dance macabre*. The association between x-rays and thought reading was picked up in several trick films. In Emile Cohl's *Les lunettes féeriques* (1909), a family was gathered and each member put on their x-ray glasses. Everything that passed through the consciousness of the bearer was projected onto the glasses. With feature films such as James Whale's *The Invisible Man* (1933), and of course *Superman*, released in 1948 and directed by Spencer Gordon Bennet and Thomas Carr, x-ray effects were embedded in a more elaborated narrative frame.

Yet even if public demonstrations of moving x-ray pictures dwindled, they never completely disappeared. One example is Urania, an institute for popular science in Stockholm inaugurated in the late 1920s. In one of its rooms young visitors could switch on an x-ray apparatus, and on a screen that glowed with 'magical green-yellow light' examine their hand skeletons or count the coins in a purse without opening it (Larsson Karlowitch 1931, 3). Another trace of

early x-ray demonstrations is the shoe fitting fluoroscopes that were placed in ‘Sko-Konsum’ and other shoe shops from the early 1930s and for several decades thereafter (Figure 8). This ‘scientific’ technique for trying out shoes was very popular in the Western world. By placing the shoe in an x-ray apparatus, the bearer could see if the model and size were right. In advertising for the shoe shops, these fluoroscopes were used to attract the interest especially of young buyers. Maybe it was no coincidence that it was in the encounter with children that the moving x-ray medium was brought to life again. By this time x-ray images were used more routinely at hospitals, and may in this process have lost something of their original force of attraction. Yet inserted into a different context and in the encounter with an inexperienced audience, the moving x-ray pictures could be made magic again.

Conclusion

In Sweden around 1900, early x-ray imaging and cinematography were associated and combined with each other in many respects. One determining context was that of ‘modern magic’. First, as most evident with the example of the Stockholm Exhibition of 1897, the launching of x-rays and the *Cinématographe* were permeated by a common rhetoric that stressed the power of new technologies to surprise audiences by performing something that earlier had been considered impossible or magic. Second, as indicated by the careers of the entrepreneurial showmen Johan Eneqvist and Ole Olsen, the employment of these two media in the area of entertainment was marked by both collaboration and rivalry. In the end, it was the cinema that proved to be more successful in inventing new ‘magical’ tricks, and x-rays were appropriated for other, medical services. Yet through innovative uses, the moving x-ray pictures could once again become new and fascinating.

Notes

1. This account of Numa Peterson and his firm is based on Jülich (2002, 157, 188, 220).
2. See Waldekranz’s (1969) pioneering study on nineteenth-century visual culture in Sweden.
3. A short description of the career of Eneqvist can be found in Idestam-Almquist (1959, 14, 55).

4. This account builds upon several articles in the press, see Anon (1896c, 1896g, 1896f, 1896j).
5. For an account, see Ekström (1994, 175–176).
6. For a comparison between the exhibition aesthetics of stage magic and early cinema, see Gunning (1989).
7. E.g., Lisa Cartwright (1995, 109–110) claims that it was the insight of the hazards of radiation that put a stop to the use of x-rays for entertainment.
8. For accounts in the daily press, see Anon (1896i, 1896e).

Captions

- 1-2. The x-ray apparatus as part of a magical stage trick. D. S. Hector, *Magiens värld*, translation of A. Hopkins' *Magic*, 1898 (1898-99).
3. Edison's fluoroscope. *Electrical World*, vol. 27, 1896.
4. Edison's exhibition of x-rays at the 1896 Electrical Exposition in New York. *The Electrical Engineer* vol. 21, 1896.
5. Overview of 'Old Stockholm' where the demonstrations of x-ray imaging and film took place (Stockholm City Museum).
6. The 'primitive' audience. *Allers Familj-Journal*, vol. 21, 1897.
7. Five views of the motion of a frog's leg. X-ray cinematography by the Scottish physician John Macintyre, 1896 (National Library of Scotland, Scottish Screen Archive).
8. Advertisement for the shoe fitting fluoroscope. Oscar Karlowitch Larsson, *Kompletterande beskrivning och vägledning genom institutet samt strövtåg på vår forsknings vidsträckta fält i anslutning till vad som förevisas å institutet Urania* (1931).

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