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The Invisible Made Visible:

X-Rays as Attraction and Visual Medium at the End of the Nineteenth Century

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Abstract

This article focuses on the early history of X-rays. It argues that, during the first years after their discovery in 1895 by German physicist Wilhelm Conrad Röntgen, they were regarded as a technological attraction and a visual medium. While their application in medical practice was not yet fully established, the possibility of seeing into the realm of the invisible encouraged pioneers of this technology to actively exploit their visual powers. By using a media-history framework, and relying on primary and secondary sources in English, German, French, and Italian, the article takes into account three aspects of the rays' early display: its character of technological attraction; its association with photography; and its connection to beliefs in the supernatural and the occult.

Keywords

Radiography; Medicine; X-rays; Photography; Early Cinema; Visual Media.

Text

“Is the invisible visible?” was the first question that the journalist H.J.W Dam asked Wilhelm Conrad Röntgen, in the only interview that the German physicist granted after his 1895 discovery of X-radiation (Dam 411). The discovery of this phenomenon was seen by its contemporaries as a groundbreaking event that, as the Austrian newspaper *Die Wiener Presse* put it, allowed for speculation “in the style of a Jules Verne” (qtd. in Dommann 77). The new rays, allowing to see and to take a picture of the interior of a living human body, promised to become a new, popular visual medium that challenged previous boundaries of visibility and invisibility.

While the history of X-rays had been previously confined to the history of medicine and science, recent scholarship questioned its relationship to turn-of-the-century media culture (Knight; Henderson; Tsivian; Crangle; Pamboukian; Bernard; Jülich; Cartwright; Cappellini). These studies have shown that X-rays were displayed, in the last years of the nineteenth century, as an attraction and a visual medium, and that foreseen applications of X-ray technology were much broader than medical diagnostics alone. Relying on a wide array of literature in English, German, French, and Italian, this article aims to frame the discovery and early development of X-ray technologies within media history. By using theories developed within media history as a framework, it takes into account three aspects of early X-ray display: its technological attraction; its association with photography; and its connection to beliefs in the supernatural and the occult.

1. X-rays of Attraction: Technology and Visual Display

In April 1896, just four months after Röntgen’s discovery, an article in the British journal *The Quarterly Review* referred to the popularity of the X-ray in compelling ways: “Never has a scientific discovery so completely and irresistibly taken the world by storm. ... The performance of Röntgen's rays are obvious to the 'man in the street'; they are repeated in every

lecture room; they are caricatured in comic prints; hits are manufactured out of them at the theaters” (Anon. Invisible 496). Interacting with the popular press and profiting from a growing public interest for technological change, X-rays stimulated what film scholar Tom Gunning called a “primal fascination with the act of display” (Gunning Trick 9).

This section relies on a discourse undertaken in film studies to frame the new technology’s early culture of visual display. Gunning’s influential theory on the “cinema of attraction,” in fact, provides some helpful clues for studying the early history of a visual technology, the X-ray image, that appealed to a large audience at the end of the nineteenth century, promising new, previously unpredictable possibilities for human vision. Although Gunning’s theory refers to film technique and form, and cannot be applied, as such, to different media, it may offer useful insights into a historical analysis of X-rays as a visual medium.

In recent years, early cinema scholarship has been looking beyond the boundaries of its discipline to question cinema’s relations with optical devices, entertaining practices, visual media, and technology in general. In this context, attempts to understand the origins of cinema from a media history perspective have appeared. A particularly relevant example is Deac Rossell’s book *Living Pictures: The Origins of the Movies*, in which the author adopted a social constructionist viewpoint, intensively relying on Wiebe E. Bijker’s work (Rossell 5). Nevertheless, while film studies scholars are increasingly borrowing from media history, less attention has been given to the converse possibility: to employ frameworks developed in film studies as a key to understand media change. As I will demonstrate, however, a perspective such as Gunning’s theory on the “cinema of attraction” may contribute to the understanding of X-ray technology’s earliest steps.

Tom Gunning’s article “The Cinema of Attraction: Early Film, Its Spectator, and the Avant-Garde,” appearing for the first time in 1986, is one of those works that has come to be

regarded by students of film studies as symptomatic of a paradigm shift. The article reflected broader changes in the field: a growing interest in early film history and in the technologies of so-called “pre-cinema”; the refusal to understand early cinema as “primitive,” a term that implied a deterministic trajectory toward cinema's “classical” form; and a focus on the connections between cinema and other media (Elsaesser). Working in collaboration with André Gaudreault, Gunning addressed these issues, questioning the qualitative difference between early and later cinema and suggesting that taking their heterogeneity into account might open the way to a new conception of film history. In fact, Gunning explained the history of early cinema had been previously written “under the hegemony of narrative films” (Gunning *Attraction* 229), and the works of early filmmakers such as Méliès and Porter had been regarded for their contribution to the development of film as a narrative form. Such an approach was oblivious to the fact that early cinema did not rely on narration as its primary spectacular strategy. The role played by actuality films, which outnumbered fictional films during these years, as well as the focus on illusory effects rather than on storytelling among fictional films, suggested to Gunning that a different conception dominated cinema until about 1906-07. This conception, to which he refers as “the cinema of attraction,” focused on the act of exhibition, on cinema's “ability to *show* something”: “from comedians smirking at the camera, to the constant bowing and gesturing of the conjurors in magic films, this is a cinema that displays its visibility, willing to rupture a self-enclosed fictional world for a chance to solicit the attention of the spectator” (230).

According to Gunning, early film audiences' viewing experience bore more resemblance to fairground attractions than to the theatrical tradition, and therefore should be considered in relation to popular entertainment practices of that time, such as amusement parks. Gunning explicitly mentions X-rays as taking part in a similar culture of display:

Nor should we ever forget that in the earliest years of exhibition the cinema

itself was an attraction. Early cinema audiences went to exhibitions to see machines demonstrated (the newest technological wonder, following in the wake of such widely exhibited machines and marvels as X-rays or, earlier, the phonograph) rather than to view films. It was the Cinématographe, the Biograph, or the Vitascope that were advertised on the variety bills in which they premiered, not *The Baby's Breakfast* or *The Black Diamond Express*.

(231)

Similar to cinema, at the turn of the century, the new rays became part of the culture of technological display. As Yuri Tsivian pointed out, “cultural expectations aroused by the X-ray exceeded anything that could be observed in connection with other scientific discoveries of the time” (82). Otto Glasser, the most influential among Röntgen's biographers, estimated that, in 1896, as many as 49 essays and 1044 articles about the new rays were published. These frequently-mentioned figures probably underestimate the number of actual responses to X-rays in the press. In 1896, in fact, nearly every paper in Europe and North America extensively reported about the new discovery. The journal *Science* alone published somewhere near twenty-three articles whose primary subjects were the new kind of rays. As an article in the *British Medical Journal* noted, the reason for such interest and popular attention was not difficult to find, “for the application of the discovery to the photography of hidden structure is a feat sensational enough and likely to stimulate even the uneducated imagination” (Anon. New 289).

The medium's potential to visually penetrate opaque objects was presented as a technological attraction to visitors of the most important scientific and technological exhibitions, as well as those at fairgrounds, public conferences, curiosity museums, and magic theaters (Tsivian 89; Jülich 24). Also, X-rays were promoted as an attraction for private demonstrations, alongside amateur magic tricks and other visual attractions (Van Tiggelen and

Pringot). As *Il Corriere della Sera* reported, in the first article published in Italy on Röntgen's discovery, it was in fact relatively easy for anyone who was familiar with photographic equipment and techniques to apply his knowledge to the new photography. The equipment of the amateur photographer could be complete “with some inexpensive and easy-to-handle devices” (Anon. Meravigliosa).

The X-ray technology was made widely available to the public. An advertisement published in the magazine *Fortune* on August 20, 1896, shows how early producers of X-ray devices did not target only the medical field, but also the profession of public lecturers: “time occupied in adjustments or readjustments that would be tolerated in the Laboratory might be fatal to success at a public Lecture. Every Lecturer knows this” (qtd. in Busch 50).

Conferences and public demonstrations displaying the new technology were paramount in North America as well as in Europe, and the X-rays were often shown alongside another new medium, the moving picture (Jülich 26; Tsivian 91). Being X-rayed could be as easy as going to the movies. A medical journal, *The Lancet*, reported that in October 1896 Londoners had the opportunity to see inside their bodies for just two pence: a machine had been arranged for screenings in Hyde Park (qtd. in Busch 49). An article from the *Electrical Engineer* reports the spectacular way Edison displayed his X-ray fluoroscope at the 1896 New York Electrical Exhibition:

The visitor entering circuitously, after reading sundry signs instructing him or her to slip a coin or key in the glove, etc., was ushered into the Egyptian darkness, lit only by two blood-red incandescent lamps, the rays of which were intercepted from the fluoroscope by pendant walls of black. Immediately along the edge of the platform ran a stout wooden rail, and outside this was a massive iron rail with stanchions forming an alley through which the endless line of people passed. On coming to the fluoroscope, the visitor was quietly told to slip

his hand underneath the support and press it against the screen, palm side toward the eyes, and fingers close together. The hand was thus between the Crookes tube and the screen, and the structure of the hand was immediately visible. (Anon. Edison 600-01).

The relevance of public display in the early development of X-ray technologies suggests that a discourse similar to Gunning's theory of early cinema can be applied. In fact, while the use of X-rays in medical practice was still sporadic, its role being rather symbolic than practical until about the First World War (Hessenbruch 397; Howell 7), a significant part of their use and experimentation was initially geared toward public exhibition. More than a diagnostic means, X-rays were at the end of the nineteenth century a visual attraction.

Although moving from the distinction between "early" and "classical" cinema, Gunning allows for elements of continuity, too. In his above-mentioned article, he pursued the idea that "cinema of attraction does not disappear with the dominance of narrative, but rather goes underground, both into certain avant-garde practices and as a component of narrative films" (230). A similar discourse can be applied to the developments of the X-ray technology. Although the association with photography and its public display were largely lost in later years, traces of this early display culture can be found in the medium's later history. In the artistic domain, the consequence of X-ray visibility was persistent. Its heritage can be found, as Linda Dalrymple Henderson has argued, in the "Technical Manifesto of Futurist Painting," which mentioned the link between X-rays and human vision, as well as in the art of Kupka, Duchamp, and the Cubists (Henderson). The influence of the X-ray image has been relevant in artistic photography, too, stimulating original modes of expression such as Man Ray's "Rayographs" or Heartfield's montage "Das ist das Heil, das sie bringen," where the bones of a human hand blur in the trail of two airplanes, dominating a landscape of war and destruction.

Returns of aspects that characterized early X-rays are not limited to the boundaries of the artistic field. As Solvig Jülich observed, “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” (Jülich 31).

2. New and Old Media: X-Rays, Photography, Cinema

Notably since the publication of Carolyn Marvin's *When Old Technologies Were New* (1988), a growing literature on the interrelations between “old” and “new” media has flourished. As many have noted, new media, when they first emerge, pass through a phase of “identity crisis” (Gitelman and Pingree xii), a stage that is frequently overcome by adapting the medium and its uses to existing categories of public understanding. Throughout their quest for identity, one of the ways new media develop their forms and meanings is by reacting to other communication technologies. New media, in fact, often emulate and adopt some of the characteristics of older media (Balbi). This is, for example, the case of television, which in its early stages inherited several aspects from radio, including organizational structure, economic configuration, and modes of reception. In a similar way, as I argue in this section, X-ray imaging developed, during its early history, mainly in connection to an older visual medium, photography.

The most evident difference between photography and radiography is that the latter, unlike traditional photography, does not involve light. However, the fact that both shared the use of the photographic plate allowed the new technology to be presented, as cited in an 1896 Italian newspaper column, as “a wonderful discovery in photography” (Anon. Meravigliosa

1). The X-ray's pervasive presence in 1896 photographic culture is striking if we recall that during the same year the invention of the Lumière brothers' cinematograph was scarcely reported by the photographic press. An examination of the principal Italian journals in the photographic field published during this year confirms that the relevance given to the discovery of X-rays exceeded by far the space accorded to every other contemporary innovation related to the photographic field, including cinema. The *Bullettino della Società Fotografica Italiana*, perhaps the most authoritative photographic journal in Italy at that time (Zannier and Beltramini), had by January dedicated a long article to the "photography of the invisible" (Pizzighelli 3-13). In contrast, its readers had to wait until November for Lumière's invention to be reported (Volkmer 303). In England, the *British Journal of Photography* printed as many as 31 articles on X-rays in 1896 (Pamboukian 61). Richard Crangle, relying on British popular press and photographic journals such as *The Photogram*, that ran a special issue on X-rays in February 1896 and a monthly "Radiography" column from April until August, noted that at the end of the nineteenth century, X-rays were usually promoted as a kind of "New Photography" (Crangle 138).

The X-ray's relevance in the photographic field did not go unnoticed by Röntgen himself, who feared that this could hinder the public's understanding of his discovery. In a letter to a close friend and colleague, he lamented that the popular press had been reporting more on X-ray photography than on the phenomenon itself: "I can not recognize my own work. For me, photography has been a mere instrument to reach my ends, but now it is depicted as the most important thing" (Röntgen 19). His concerns were justified, as the publisher of his article "A New Kind of Rays," which saw five editions in the first months of 1896, advertised the selling of an "X-ray picture of the hand of Geheimrat von Kölliker. Price 50 Pfennig. The picture is of special interest since it was made by Professor Röntgen himself at that memorable meeting on January 23, 1896, in which he presented his discovery and also

since this is the hand of the famous anatomist von Kölliker” (qtd. in Glasser 80).

The story of the X-ray’s discovery was also sometimes connected to the power of photography. Röntgen reported to have first noticed the phenomenon thanks to a fluorescent screen on which a trace of the new rays appeared during a laboratory experiment. Nevertheless, the story of his discovery was frequently retold by assigning a decisive role to the photographic medium. Still in 1945, a German biography recounted that the “revelation” of the rays had reached him in the middle of the night, in a Faustian manner, when he discovered that some mysterious traces had been accidentally recorded on a photographic plate (Dessauer).

X-ray photographic images circulated widely. The radiograph of his wife’s hand bones with the ring she was wearing (fig. 1), which Röntgen took before his invention was made public in December 1895, is one of the most famous and reproduced photographic images of the late nineteenth century. Viewing the woman’s bare bones, with the shadow of the ring, would have been an uncanny experience for her contemporaries. As Otto Glasser suggested, “to Mrs Röntgen, as to many others later, this experience gave a vague premonition of death” (75). Subsequently, advancements in X-ray photography, such as the picture of a baby first published on the *British Medical Journal* and the composite image of an entire human body made in Germany in 1896, kept arousing the interest of the photographic and the popular press alike (Grove 162).

The focus on photography in early X-ray history went so far, that several accounts pointed to a technologically impossible “X-ray camera.” A normal photographic camera, similar to the human retina, captures the light that is refracted by objects, leaving trace of their image on the photographic plate or film that is located inside the camera. Because X-rays do not share with light the same quality of refraction, in order to perform a radiograph the object or human part to be x-rayed is located *between* the X-ray generator and the

photographic plate. In this process, the plate is exposed directly, without the intermediation of a camera. Nevertheless, the possibility of developing an “X-ray camera” was repeatedly evoked during the medium's early years. In the January 1896 edition of the *Rivista Scientifico-Artistica di Fotografia*, for instance, an article reporting some X-ray pioneering experiences in Italy explained that “prof. Röntgen claims that these rays do not reflect, but apparently prof. Battellini from Pisa succeeded in obtaining their reflection, and it would be an important fact, because in this case photography could be made with means similar to the ordinary ones” (Carissimo 197). A similar tendency toward the convergence of X-rays and photography can be observed in the experiments undertaken by P. Germak at the University of Graz in Switzerland. Germak successfully attempted to apply one of the most popular kinds of nineteenth-century photography, the stereoscopic picture, to X-rays (Germak Prove 64). The publication of a sample of his work resulted in a fascinating, truly unique image: the stereoscopic radiography of two mice (fig. 2). One year later, Germak proposed another technique of X-ray photography, that had to be performed through the use of “the oldest and simplest photographic device” (Germak Visione 3), a pin-hole camera. Pin-hole cameras did not employ an optical lens, allowing the passage of light through a small hole. As Germak put it, if a similar device, consisting of a plumb box with a very small hole on the side, is exposed to the X-rays, “we will have a photograph of the tube, corresponding to what an eye sensitive to the X-rays would see” (Germak Visione 3).

The fantasy of the X-ray camera was not restricted to scientific experiments. Such an imaginary device was evoked, for instance, in a cartoon published in *Life* in February 1896 with the title “The New Röntgen Photography” (Anon. Roentgen). In this image, the taking of an X-ray picture was accomplished using a traditional camera. The resulting photograph reveals a spectral surprise: the skeleton of the peasant who had posed for the photographer looks like the incarnation of death.

X-rays' pervasive presence in the photographic field was not supposed to last. Soon after the beginning of the twentieth century, articles on X-rays nearly disappeared from the photographic press. Most histories of photography published after World War II dedicate just a short mention to Röntgen's discovery. The association between X-rays and photography, however, did not totally disappear. Alessandro Vallebona, the Italian radiologist who introduced stratigraphy, a forerunner of the diagnostic method of computer tomography, suggested in 1930 that "if we could use lenses and mirror for Röntgen rays in the same way that we do for light rays the problem [of producing a diagnostic image that gives account of the three dimensions] would be resolved, for as in microscopy or photography we could focus on only one definitive plane" (qtd. in Cartwright and Goldfarb 197). More recently, an article in the *Canadian Medical Association Journal* noted:

The term 'x-ray' is often used by physicians and patients alike to mean the films or radiographs produced by an x-ray exposure. It is usual to refer to a 'chest x-ray' but most unusual to hear the term 'chest radiograph,' which is the correct description. A patient may thus have an ambiguous relationship with his or her radiograph and may ask 'What is the matter with the x-ray?' or 'What does the x-ray show?' instead of 'What is the matter with me?' (Lentle)

Pointing to this "ambiguous relationship," that equated the physical phenomenon to the resulting photographic image, the author of this article seems to recall the early concerns of Röntgen, who at the beginning of the X-ray era lamented that photography had been a mere instrument to reach his ends, but had now become "the most important thing."

3. Haunted Rays: Interior Vision and Supernatural Beliefs

As the authors of a recent collection of essays underlined, a new technology is frequently "the object of fascination, hyperbole, and concern. It is almost inevitably a field onto which a

broad array of hopes and fears is projected and envisioned as a potential solution to, or possible problem for, the world at large” (Sturken, Thomas and Ball-Rokeach 1). Among the most recurring fantasies to be connected to media technologies, occult beliefs such as telepathy and spirit communication have acquired the attention of media historians. In particular, Jeffrey Sconce’s *Haunted Media: Electronic Presence from Telegraphy to Television* laid out a fascinating network of correlations between media technologies and the supernatural, documenting how telegraph, telephone, radio, television, and computers have all been subject to occult beliefs, serving as “either uncanny electronic agents or as gateways to electronic otherworlds” (Sconce 4).

In the second half of the nineteenth and at the beginning of the twentieth century, occultists and psychic researchers in Britain, United States, France, and Germany followed attentively the progresses of science and technology. New discoveries and inventions were often regarded, by the members of the Society for Psychical Research in Britain and its analogues in other countries, as evidence of a common argument of end-of-the-century occultism: that what was presently deemed as ‘supernatural’ was destined to be the scientific discovery of tomorrow. Probably no other scientific and technological advancement of the late nineteenth century, however, received attention comparable to that of the X-ray. Many spiritualists and psychical researchers immediately regarded Röntgen’s discovery as an event that opened the way to a new phase in their investigations into the supernatural.

Mystifications about the new technology insisted on the medium’s extraordinary power in the visual realm, equating X-rays to a kind of clairvoyancy or “second sight” (Henderson 326). The possibility of seeing through women’s clothes was another frequent fantasy about the medium, and many contemporaries feared the X-ray’s potential indecency (Cartwright 143-70). Reportedly, a London firm advertised in February 1896 the sale of X-ray-proof underclothing, and in the United States an assemblyman of

Somerset County, New Jersey, introduced a bill into the state legislature prohibiting the use of X-rays in theater opera glasses (Glasser 82). As a medical journal realized, “in spite of the attention which has from the first been given to the subject of the new photography, it seems difficult to get the general public to take a rational view of what the new process can and cannot achieve” (Anon. New). Popular fantasies about the new phenomenon included the X-rays being visible to blind people (Knight 18), the possible use of them to correct blindness (22), the possibility of transforming metal into gold (Nitske 121), and their application to mind reading (Gitelman 88).

The discovery of X-rays was immediately connected to beliefs about an invisible substance, the ether, which was believed throughout the nineteenth century to be the medium through which forces as different as heat, light, electricity, and magnetism move. References to the ether were common to many influential scientists of the time, including Heinrich Hertz, Wilhelm Wundt and James Clerk Maxwell, and continued to appear well after the 1910s, when its existence was almost unanimously ruled out by the scientific establishment (Douglas 37). In occultism and psychical research, the concept of ether was often used in relationship with mesmerism, a tradition originated in the theories of Austrian physician Franz Anton Mesmer at the end of the eighteenth century. As Robert Darnton aptly documented, Mesmer rooted the effectiveness of its therapeutic practices in an all-embracing substance, the magnetic fluid (Darnton), which was described in terms similar to those employed by theories on the ether (Milutis).

The discovery of X-rays was probably the main reason why, in *fin-de-siècle* France, a revival of mesmerist theories succeeded in gaining the coverage of the press. Although such theories were soon dismissed, the debate about what the *Bulletin de la Société Française de Photographie* described as “the impressions produced on the sensitive plate by some invisible fluids emanated from the fingers of the experimenter” (Anon. Procès 542) became quite

extensive. As French historian of photography Clément Chéroux (117) pointed out, without Röntgen's discovery, the new fluidic photographs would probably have remained obscure laboratory experiments, but in 1896-97 they benefited from the media buzz generated by the publication of the first radiographs.

Since these experiments addressed the status of the photographic plate as a scientific means, the photographic establishment reacted conspicuously to this challenge. Referring to these experiences, the French photographic magazine *Photo-Gazette* ironically announced in 1898 that, after Röntgen's discovery, a special illness had been revealed in the world of science, the "actinic fever." Like in the case of gold fever, this new obsession created a situation of disorder in which "everybody wishes to have discovered some obscure rays, and several effects that can be explained much easier in another way are ascribed to the unknown rays" (Gaedicke 83). Scientists such as René Colson, a contributor of the *Bulletin de la Société Française de Photographie*, who had also been among the first to study X-ray photography in France (Colson Plaque), published a number of articles in the photographic press that were aimed at debunking the so-called "photographs of fluids." Colson underlined how the strange impressions were most probably due to misleading manipulations of the photographic plates. As he pointed out, the "exaggerated sensitivity" of the plate to heat, contact and chemical action presented the inconvenience of stimulating the outcome of occult theories (Colson Développement 112).

After 1895, theories about invisible fluids became quite common in spiritualism, too. The French psychologist Théodore Flournoy, for instance, recalled how "in the course of the years 1898-99 M. Eug. Demole and myself often tried to collect instances of unknown forces, of emanations issuing from different mediums, who were supposed to move tables, etc., at a distance." Flournoy also reported how, during several spiritualist séances in which he took part, a photographic plate was held near the body of the medium, Madame Saxo. These plates

that were kept inside wooden frames, once developed, “were found to be more or less cloudy; that is to say, they gave the impression of having received a luminous impression not directed by an object” (Flournoy 297-98).

As Allen W. Grove argued, the images presented in X-ray photographs might have stimulated the public to think of ghosts and gave credibility to the claims about the presence of an invisible world of spirits among us (Grove). This seems to be confirmed by several sources from the spiritualist movement. A few years after the introduction of X-rays, for instance, a spiritualist noted that Röntgen's discovery encouraged a renewed curiosity toward spirit photography, a spiritualist practice based on the claim that images of ghosts could be captured on the photographic plate (Finst). If it is possible to record invisible rays, the argument reasoned, why should we deem unconceivable the photography of spirits? As the author of a sympathetic history of spirit photography reasoned, “to say that the invisible cannot be photographed, even on the material plane, would be to confess ignorance of facts which are commonplace – as, for instance, to mention the application of X-ray photography to the exploration of the muscles, of fractures and bone, and the internal organs” (Coates 2).

The fact that X-ray photography was performed on the plate without the aid of a camera also elicited speculations about new spiritualist phenomena such as the “psychographs,” portraits of departed persons “similar to what are termed spirit photographs, but which come on the plate without the use of camera and light, necessary in photographic reproductions” (Coates 56). The connection between spirit photography and X-ray did not pass unnoticed among the opponents of spiritualism, too. In a 1887 publication that exposed the practice of spirit photography as a photographic trick, the author suggested that spirit photographs could be artfully produced “by means of Professor Röntgen’s newly discovered process of impressing an image upon a photographic dry-plate without uncovering the shutter” (Hopkins 438).

The X-ray's association to beliefs in the supernatural is particularly evident in the first years after Röntgen's discovery. However, some later examples of the connection between X-rays and the occult exist. One of the most famous chapters of Thomas Mann's *The Magic Mountain*, for instance, described a radiological cabinet in mystical ways, when the protagonist, Hans Castorp, receives from a screening an uncanny premonition of death. Similar fantasies can be found in the products of popular culture, too: think, for instance, of Superman's X-ray vision, which recalls some of the most common mystifications of the medium to be found in early accounts.

Conclusion

As Lisa Gitelman put it, "looking into the novelty years, transitional states, and identity crises of different media stands to tell us much, both about the course of media history and about the broad condition by which media and communications are and have been shaped" (Gitelman 1). Looking at the early development of X-ray imaging allows us to further develop this claim and, at the same time, to shed light on the frequently undervalued significance of Röntgen's discovery for visual culture of the late nineteenth and the beginning of the twentieth century. Before being fully embraced by the medical field, X-rays were seen as a powerful new medium. Their visual powers encouraged pioneers of this technology to use it as a technological attraction, to present it as an innovation in the field of photography, and even to depict it as a possible gateway for speculations about the supernatural and the occult. Literature in media history can help us to better understand these processes. Moreover, as I have suggested in each of the three sections of this article, traces of the initial reception of the X-ray can be found in later developments of this technology, too. In this sense, an historical account of the medium's initial years allows us to go far beyond the "transitional states" to which Gitelman refers.

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Caption: The radiograph of the hand of Bertha Röntgen, wife of the discoverer of the X-ray, made in December 1895 before the discovery was made public.

Fig. 2: fig2.jpg

Caption: "Stereoscopic photograph of two mice, taken with the Roentgen rays by Prof. Dr. P. Czermak, University of Graz." From GERMAK, P. "Prove stereoscopiche coi raggi di Röntgen." *Bullettino della Società Fotografica Italiana* 8 (1896): 64-67. Courtesy of the Archivio Fotografico Toscano, Prato, Italy.

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