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RESEARCH ARTICLE / ARAŞTIRMA MAKALESİ

Representation of space in pre-cinema moving image devices

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Abstract

The aim of this research is to establish a dialogue between moving image devices, considered as precursors of cinema, and the representation of space in order to evaluate the physical orientations of inventors who transformed their spatial searches into cinematic organisation. This study examines the experimental environment created by cinema art for space through moving image devices. It is focused on two research questions: 'The integration of space representation in pre-cinema moving image devices' and 'The effect of space representation on visual narrative in pre-cinema moving image devices'. The study employed a qualitative research design and the literature review method to answer the research questions. The research data was analysed using descriptive content analysis. Based on the analysis, it can be inferred that pre-cinema moving image devices invented between 1558-1834 utilised figurative representations in visual narratives. The representation of space was first introduced in the visual narratives of the Stereoscope, invented by Wheatstone in 1838. Moving image devices invented between 1880-1895 established a strong relationship with the representation of space. However, the fact that the research was collected from fourteen different moving image devices invented in 1558 and later is considered to be one of the major methodological limitations of this study. The limited sample size weakens the possibility of generalising the findings and negatively affects the external validity of the research. In order to overcome the problem of low external validity and to ensure that the data obtained from the study can represent the study population, it is recommended that new studies be planned that include different pre-cinema moving image devices.

Keywords: Pre-cinema, Moving image devices, Space, Representation.

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1. INTRODUCTION

Before the advent of cinema, moving images were produced through devices. Pre-cinema shares a common visual concern and narrative style with this period, providing many references for the production of space.

In this context, pre-cinema, which is universally considered a method of representation, shapes fictional experiences and controls the conditions of experimental space representations that refer to the future world. In the intersection of cinema and space, human communication with people and objects occurs through devices produced by human hands. Therefore, cinema, which relies on spatial possibilities to convey its own reality, must make use of various disciplines in the development process. The concept of space has given new identities to pre-cinema and enabled the reinterpretation of cinematic ideologies in a mimetic sense.

Throughout the history of cinema, social demands and scientific research have influenced each other. The invention of pre-cinema moving image devices was not a linear process, but rather an accumulation of knowledge from various fields such as physics, physiology, anatomy, and chemistry over centuries (Abisel, 2003, p. 13). Cinema, named after the Cinématographe invented by the Lumière Brothers, has become one of the most influential and popular mass arts of the past and current century due to its universal visual language. The debate over who actually invented cinema as a technological invention has persisted for years.

These devices were invented for both entertainment and the study of human vision. Many inventors have contributed to the development of this long standing lineage of optical illusions, including Michael Faraday and Joseph Plateau (Veras et al., 2017, pp. 1-2). In this context, the focus of research is on the physical rather than fictional use of space in pre-cinema moving image devices.

1.1. Problem of the Research

The main problem of this research is to study the representation of space in moving image devices that were used in the pre-cinema period and are considered as precursors to the art of cinema. The study analyses the relationship between spatial representation and moving image devices, as well as their aesthetic values, using specific examples.

1.2. Purpose of the Research

The objective of this research is to establish a dialogue between moving image devices, which are considered precursors to the art of cinema, and the representation of space. The analysis of the effect of space usage on visual narrative in the historical development of cinema is approached through interdisciplinary relations. Additionally, this study comparatively examines the physical orientations of inventors who transformed their spatial searches into a cinematic organization using moving image devices.

1.3. Research Questions

The study aimed to address two research questions, RQ1 and RQ2, based on the identified problems:

RQ1: At what point did the representation of space become integrated into pre-cinema moving image devices?

RQ2: How did the representation of space in pre- cinema moving image devices have an impact on visual narrative?

1.4. Importance of the Research

This research, which discusses the experimental environment established by the art of cinema for space through moving image devices, is important in terms of making the place and applicability of spatial representation approaches in pre-cinema devices traceable, drawing conclusions about the interaction between the pre-cinema period and spatial representation, and synthesising the wealth of research information currently available to contribute to the existing literature.

1.5. Limitations of the Research

The study's limitations are discussed in terms of theoretical and methodological aspects, as well as the internal and external validity of the research. Although an extensive literature review was conducted on the research topic, the limited number of scholarly studies aiming to establish a dialogue between moving image devices, which are considered precursors to the art of cinema, and the representation of space is considered a theoretical limitation of this research.

The study assessed the impact of factors that were known. However, it had methodological limitations. The data were collected from fourteen different moving image devices, which are considered precursors to the art of cinema, invented in 1558 and after, which limits the generalisability of the findings. The external validity of the study was negatively affected by the limited sample area.

2. THEORETICAL FRAMEWORK

Before discussing the pre-cinema moving image devices, it is important to recognise that cinema is based on the concept of illusion. This illusion results from the fact that the brain tends to perceive the image on the retinal surface as moving for a short time following its disappearance. The history of cinema is largely based on this principle.

The earliest examples of attempting to depict phenomenon of movement in a static drawing can be traced back to Palaeolithic cave paintings, where animals are depicted in arrays in different positions. These paintings often depict animals in various positions, sometimes with eight legs instead of four to convey the impression of movement. Thus, it is intended to indicate that the animal does not stand still, but walks, "moves". According to Teksoy (2005, p. 15), these paintings can be regarded as the earliest examples of animation cinema and comics in the history of civilisation.

The wall depicting running animals in the Chauvet-cave in the Ardèche province of southern France is recognised as one of the most qualified examples of prehistoric art. Dating back to 30,000 BC, the cave dwellers, who were able to create images of faith with primitive reflexes, have succeeded in depicting the sense of movement in a very clear way (Figure 1).

Figure 1. Chauvet Cave Paintings (Little, 2021)

These paintings often show animals stacked on top of each other. According to some sources, these stacked images were deliberately constructed so that a moving light source, such as a torch, could gradually reveal the images (Zorich, 2014). In this context, we can conclude that cinema began thousands of years ago with mankind's desire to communicate what is in motion.

A vessel dating back to 3000 BC was discovered in Shahr-e Sookhteh, Iran. The vessel features a scene of a goat and a tree, which is positioned to repeat five times around the vessel (Muzdakis, 2023). When these scenes are juxtaposed, it can be observed that the goat jumps on the tree and eats its leaves (Figure 2).

Figure 2. The Vessel's Decorations (Muzdakis, 2023)

This 5000-year-old vessel is recognised as one of the oldest recorded ideas of animation in history. It is described as an animation idea rather than an animation because its main purpose is to convey the phenomenon of motion as the vessel rotates.

Cinematic elements are not only present in visual media but also in literary works. For instance, in *De Rerum Natura (On the Nature of Things)* a poem by Titus Lucretius Carus, a Roman philosopher from the 1st century BC, there are lines that refer to the fundamental principles of animation. Carus attempts to explain the basic logic of the transition between two images by referring to the principle of the impression of the retina, which is the basis of cinema (Teksoy, 2005, p. 16).

The Bayeux Tapestry, also known as *Tapisserie de la Reine Mathilde*, is a seventy-metre-long and fifty centimetre wide tapestry from the 11th century.

It is on display at the *Musée de la Tapisserie de Bayeux* in Bayeux, France. The tapestry depicts the Norman invasion of England in a comic book style (Teksoy, 2005, p. 15) (Figure 3).

Figure 3. Tapisserie de Bayeux (Bessin, 2018)

During the 11th century, lanterns with rotating figures were developed in civilian areas of China (Ruirui & Xiao, 2012, p. 1304). The figures often depicted warriors with spears and arrows, reflecting the survival concerns and warfare of the time (Figure 4). Trotting Horse Lamp rotates automatically as hot air rises from the candle in the centre, casting shadows of the figures on the surrounding permeable surfaces with the light emitted by the candle. The lamp is named after the horse figures commonly used in its design.

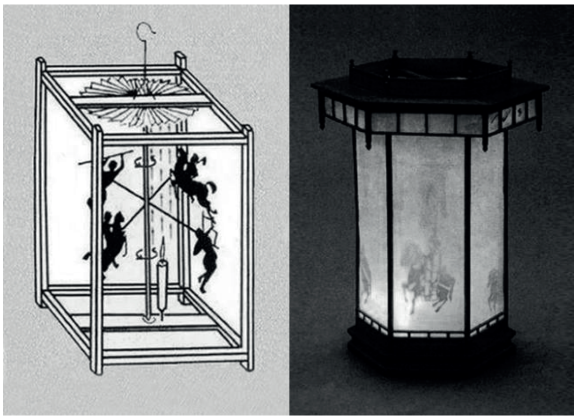


Figure 4. Trotting Horse Lamp (Liu, 2021)

In 1558, about 500 years after the Trotting Horse Lamp appeared, the book Sigenot was written. It's considered an epic knight's tale and contains an illustration on every page, which are related to each other both in plot and in moving fiction. Leafing through the pages of the manuscript produces a certain illusion of motion, although there is no evidence that this was the original intention (Pikkov, 2010, p. 30) (Figure 5).

Figure 5. Sigenot (Werner, 2013)

As can be seen from the literature, no devices is needed to produce the phenomena of shadow and movement. However, it is necessary to consider the pre-cinema period together with shadows and reflections. In this context, the main issue to be highlighted in the research is the importance of the devices in the process of image creation (Kılıç, 2011, p. 110). In the following part of the study, the development process from the camera obscura, where man began to represent moving images on the surface, to the point where the of cinema began will be presented.

2.1. Camera Obscura (1558)

In 500 BC, the philosopher Mozi mentioned for the first time that if a hole is made in a dark box, the light entering through this hole creates an inverted image on the opposite surface (Kılıç, 2011, p. 105). This principle led to the invention of the Camera Obscura (Dark Chamber), which was a crucial step towards the creation of photography and thus cinema. The Camera Obscura is a device that has been studied by various researchers, throughout history. It works on the principle that light outside the box passes through a hole drilled on one surface of a rectangular box and reflects the opposite of the image on the opposite side. This phenomenon is based on the principle of transmitting light through a dark medium and has been known since ancient times. It was first analysed by the Italian Leon Battista Alberti, and he conveyed his results to Leonardo da Vinci. Da Vinci observed the event and described it in detail in one of his manuscripts (Teksoy, 2005, p. 17).

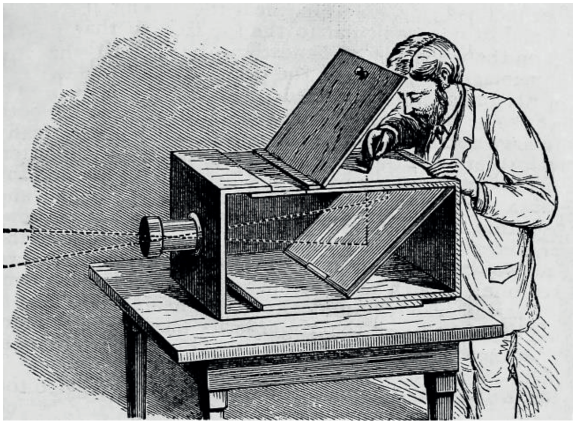


Figure 6. Camera Obscura (Lardner, 1855, p. 203)

The book Magia Naturalis, written by Giambattista della Porta in 1558, was the first to explain in detail that the image would be much clearer and sharper if a convex lens was placed in front of the hole in the camera obscura (Kılıç, 2011, p. 109). According to Porta, the Camera Obscura was enlarged from a box to a room. In a dark room, noble people were able to view hunting, feasting, and war scenes on a white sheet, which appeared to come to life before their eyes (Teksoy, 2005, p. 17).

2.2. Magic Lantern (1659)

The Magic Lantern, believed to have originated in China during the 2nd century BC, was officially described by Athanasius Kircher in 1645 in a work entitled Ars Magna Lucis et Umbrae (Teksoy, 2005, p. 17). It is estimated that Kircher depicted an already existing device rather than introducing a new invention in this book. The Magic Lantern was first produced by Dutch physicist Christiaan Huygens in 1659 (Kılıç, 2011, p. 110). It projects images drawn on glass plates onto a wall surface using a light source (usually a gas lamp) and a lens. Therefore, it can be considered the ancestor of the modern slide machine (Figure 7).

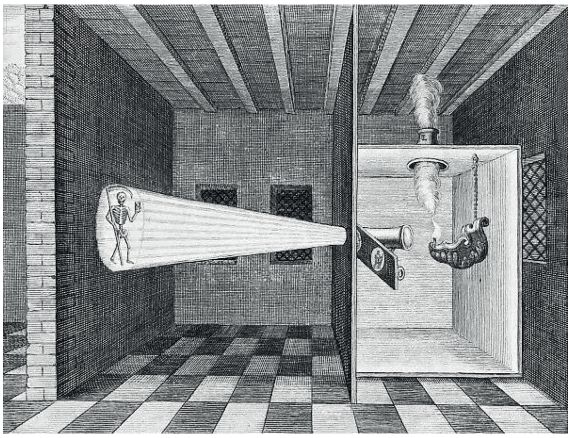


Figure 7. Magic Lantern (Kircher, 1671, p. 769)

The Magic Lantern follows the tradition of the dark box in terms of its structure. But unlike the camera obscura, which used light from outside to produce a reduced image of a landscape, the magic lantern used light from inside to enlarge and project a small image (Kılıç, 2011, p. 110).

In contrast to Catholics who used the printing press for missionary activities, Protestants are known to have used the Magic Lantern. They often displayed eerie figures, such as the devil, to the public. Similarly, in 19th century England, people travelled with Magic Lanterns and showed many slides one after the other to the public. The Rat-swallower is widely regarded as the most famous show of that period. It depicts rats entering the mouth of a sleeping man.

2.3. Thaumatrope (1825)

The Thaumatrope (Magic Circle) was invented in 1825 by British Doctor John Ayrton Paris. It is considered to be the first invention to use the phenomenon of retinal persistence (persistence of vision) (Faden, 2019). The product consists of a cardboard circle with a diameter of 2.5 inches and two strings attached, one at opposite points of the diameter. When spun, the images on either side of the circle merge, providing the illusion of continuous movement. This illusion is created because the images remain on the retina for some time after they are seen. On the cardboard disc there are two pictures, one on each side, with the positions of the pictures reversed. Although the selected images are different, they are related to each other and can be combined into a single coherent image. When the strings attached to the disc are quickly pulled and rotated, the disc rotates around its axis, creating the illusion that the images on both sides are merged. The thaumatrope was a popular Victorian toy. The most common pair of images is a bird and a birdcage (Figure 8). Due to their reliance on the phenonmenon of persistence of vision, it can be argued that any moving image device up to and including cinema of today is derived from the thaumatrope (Faden, 2019).

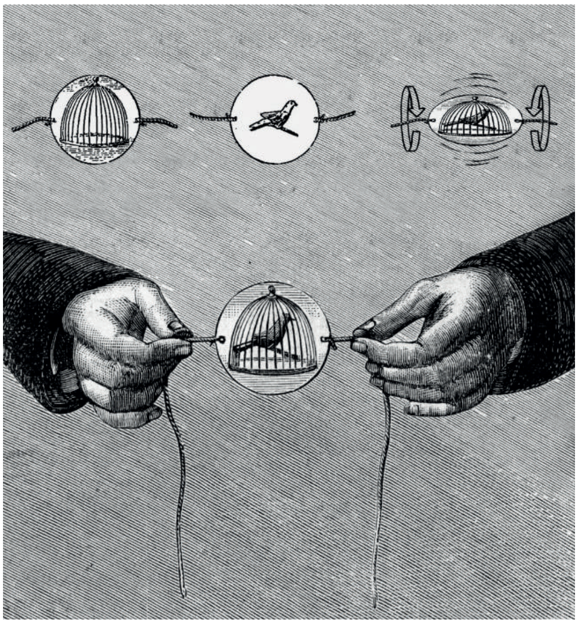


Figure 8. Thaumatrope (Traisnel, 2020)

2.5. Phenakistoscope (1833)

The Phenakistoscope was invented in 1833 by the Belgian Physicist Joseph Plateau. It consists of a disc with drawings of objects or people in motion. This disc, which is on a shaft, has openings at the edges through which you can have a look. The device also requires a mirror. The user turns the disc while looking into the mirror and seeing the reflection of the Phenakistoscope. The closed sections of the disc block part of the image, so that what is seen through the restricted space is perceived as moving (Leskosky, 1993, p. 178).

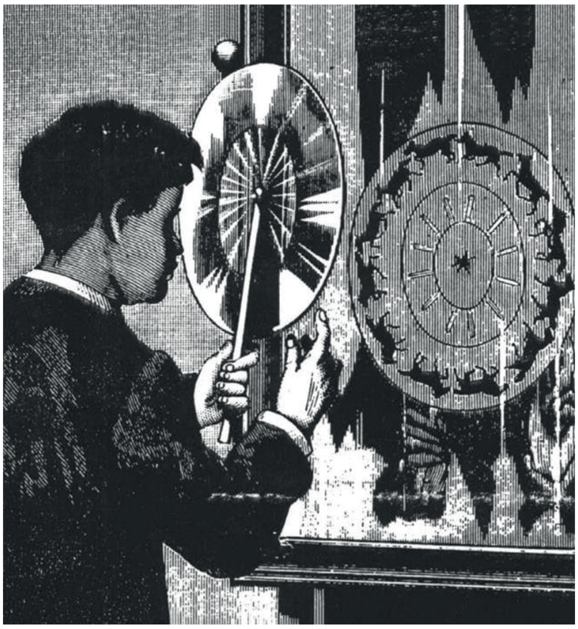


Figure 9. Phenakistoscope (Bak, 2016)

The Phenakistoscope was influenced by Peter Mark Roget's observations on the 'persistence of vision' (Ramsaye, 1926, p. 358). The principle behind this illusion is simple: if objects of different sizes and positions pass in front of our eyes at very short intervals and close proximity, the impressions created by these objects on the retina combine, resulting in a single object that changes in form and position (Teksoy, 2005, p. 19).

In the 19th century, the Phakistoscope, also known as the 'philosophical toy' due to the perception that optical inventions were merely playthings, was the first pre-cinema device capable of creating the illusion of 'full animation' (Leskosky, 1993, p. 176).

2.6. Zoetrope (1834)

The zoetrope was invented in 1834 by the British Mathematician William George Horner (Veras, 2022, p. 28). Known as the 'Daedaleum' when it was first produced and introduced with the slogan 'Wheel of Life', the zoetrope consisted of a wooden platform that acted as a stabiliser, a wooden or metal pole that raised the viewing cylinder, an empty cylinder with equally spaced vertical slits, and a paper strip with painted or drawn sequential images (Art of Play, 2016).

Figure 10. Zoetrope (Art of Play, 2016)

The paper strip containing the sequential images is placed inside the cylinder. Vertical rectangular slits on the side of the cylinder prevent the images from interfering with each other as they rotate. When the cylinder structure is rotated, an observer looking through the slits from the outside can see a silhouette moving inside the cylinder. Despite its seemingly simple mechanism and function, the zoetrope creates a remarkable array of illusions (Veras et al., 2017, p. 2).

2.7. Stereoscope (1838)

The stereoscope was invented in 1838 by the British Physicist Charles Wheatstone (Hoffmann, 2002, p. 8). In general terms, the stereoscope works by combining the binocular image seen by both eyes at the same point but from different angles, with the help of the brain's correction mechanism, either through a mirror or a lens. Two mirrors are positioned at right angles to view the two different images presented. Each eye sees only the intended image through identical monocular tubes. Binocular vision causes the two images to superimpose, creating the illusion of depth and solidity (Hankins & Silverman, 1999, p. 148) (Figure 11).

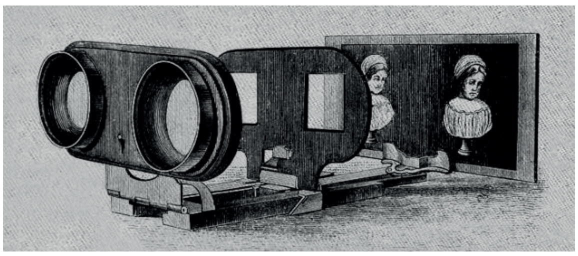


Figure 11. Stereoscope (Reynolds, 2020)

The stereoscope's moving image extension consists of a reel that holds a series of stereographic cards, creating a moving picture when rotated by a crank. The cards are stretched by a small metal part and brought into the viewing position. As they rotate, they create the illusion of a moving image.

2.8. Choreutoscope (1866)

The choreutoscope was developed in 1866 by Dr. Lionel Smith Beale. The choreutoscope has a very simple system; it uses a glass plate with successive images on a black surface. This plate is mounted on a manual Geneva wheel mechanism that allows the image to move forward rapidly. The most widely used image is known as the 'Dancing Skeleton' series, in which six different images of a skeleton are animated (Figure 12).

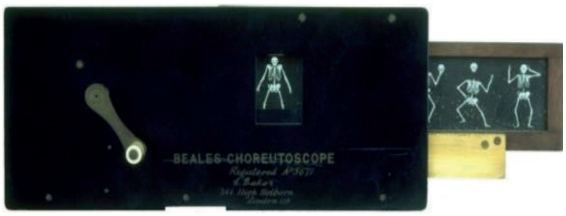


Figure 12. Choreutoscope (Burns, 1999)

L. S. Beale designed the Choreutoscope for use in presentations while working at the Polytechnic University (now the University of Westminster), but never patented the design (Ruffles, 2004, p. 23). The first patent application for a larger version of Beale's invention, the Giant Choreutoscope, was made in 1884 by the British optician William Charles Hughes (Liesegang, 1926, p. 55).

2.9. Kineograph (1868)

The kineograph was developed by the British Inventor John Barnes Linnett in 1868 (Sfetcu, 2021, p. 58). Also known as a 'flip book', 'moving picture' or 'pocket cinema', the kineograph is described as a small book with a series of animated images on the unbound edge (Bullen et al., 2018, p. 77) (Figure 13).

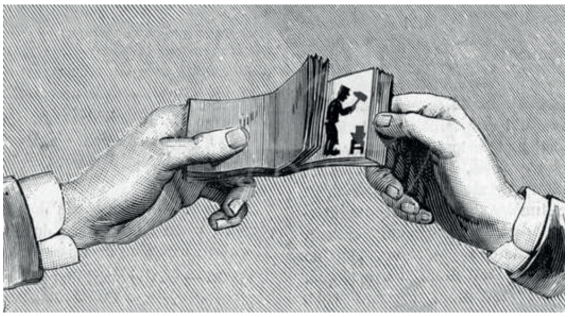


Figure 13. Kineograph (Folioscopio, 2021)

Leskosky (1988, p. 460) explains that the illusion of movement is created by overlapping each drawing in the series with the next scene. The user can achieve this effect by bending all the pages backwards with their right hand while holding the bound edge of the book with their left hand and then releasing the pages one by one with their right thumb.

The Kineograph's popularity has increased due to its unique features. It requires no additional tools besides the user's hand, is highly portable, and is more cost-effective than similar products.

2.10. Praxinoscope (1879)

Praxinoscope was invented in 1879 by the French Science Teacher Charles-Émile Reynaud (Butler, 2008, p. 17). The figures were placed on a fixed scene depicted on an image tape consisting of 12 frames superimposed on a black background.

The image tape is positioned along the inner surface of a cylindrical drum. A 12-sided mirror arrangement surrounding the axis of the drum intermittently reflects successive images. A light source, usually a candle, is positioned above the axis to provide illumination. The rotation of the cylindrical drum platform produces a moving figure's image that is visible in the array of mirrors rotating in the device's centre. Each mirror reflects a different movement of the figure. This device is a remarkable demonstration of optical illusion. As the device rotates, the figures move rapidly, and all twelve separate images merge into a single moving scene. In this context, the Praxinoscope combines the Zoetrope's cylindrical shape with the Phenakistoscope's mirror (Faden, 2019).

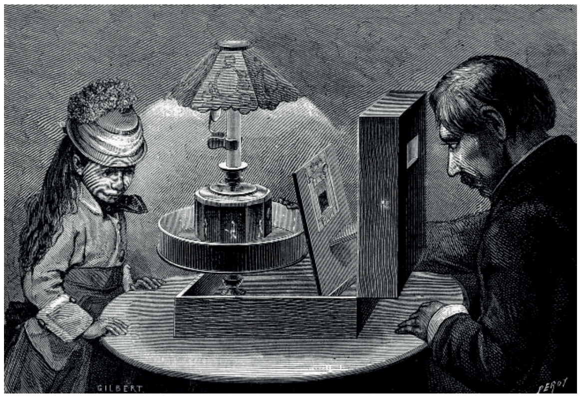


Figure 14. Praxinoscope (Gunning, 2014)

Reynaud then developed a mechanism called the Théâtre Optique (Optical Theatre), which was a further development of the projection version of the Praksinoscope, to make it more accessible to a wider public (Pandya, 2019, p. 4). The shows Reynaud performed with this optic mechanism, which he patented in 1888, were called Pantomimes Lumineuses and between 1892-1900 he organised more than 12,800 performances for more than 500,000 visitors at the Grévin Museum in Paris (Myrent, 1989, p. 191).

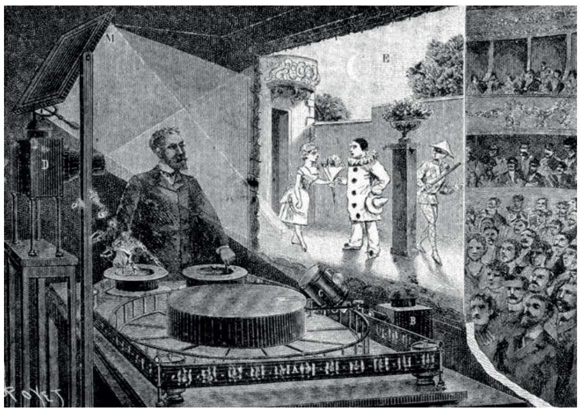


Figure 15. Theatre Optique (Conreur, 2016)

2.11. Zoopraxiscope (1879)

The Zoopraxiscope was the invention of British Photographer Eadweard James Muybridge in 1879 (Andersen, 2018, p. 14). Commissioned by the then Governor of California, Leland Stanford, who also owned many racehorses, to find the answer to the question 'Whether all four legs of a horse are cut off from the ground at the same time while galloping', Muybridge, in 1972 with the help of Railway Engineer John Dove Isaacs, developed a contraption consisting of 24 cameras (Robbins, 2013, p. 78) (Figure 16).

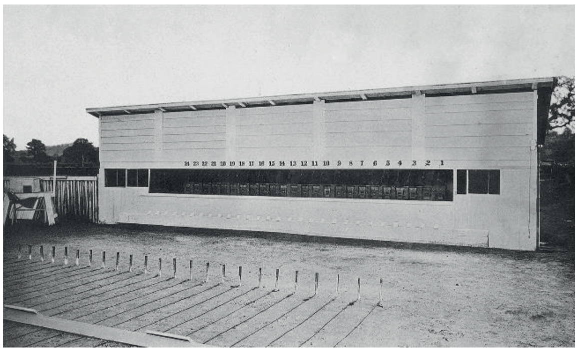


Figure 16. Camera Shutters (Braun, 2010, p. 140)

Twenty-four cameras were placed side by side at equal distances inside a wooden shed. Twenty- four ropes were stretched across the floor of the road in front of the shed, and the ends of each rope were connected to the electronic shutter of a camera. A black race horse was then made to run along the prepared set in front of a white wall, and each rope that the horse touched while moving triggered the camera (Teksoy, 2005, p. 22). In this way, different postures of the horse in motion were photographed instantly (Özön, 1964, p. 6; as cited in Gökçearslan, 2016, p. 95) (Figure 17).

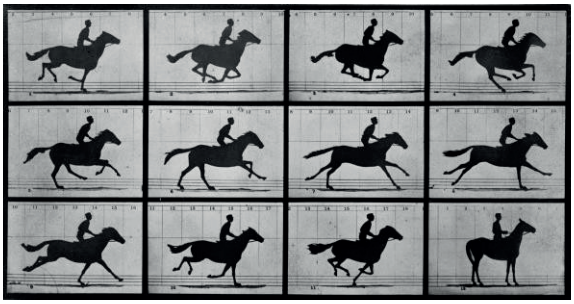


Figure 17. The Horse in Motion (Braun, 2010, p. 145)

Muybridge published the results of his study, which began as a simple assignment, in an article titled 'Animal Locomotion'. This study became one of the most popular academic works of the 19th century. Even in the most famous paintings of the period, horses were depicted with their forelegs forward and hind legs backwards while running. During this period, there were many discussions about the horse's posture, but they could not be finalised due to technical limitations. Muybridge was the name that put an end to this debate. The photographs demonstrate that the moment when all four of the horse's feet are off the ground is when they are closest together. This contrasts with the paintings of the same period, which convey the opposite.

Muybridge arranged the photographs he captured in a sequence on a glass disc and projected them onto a surface using a magic lantern (Demirbilek, 1994, p. 7). Muybridge's named Zoopraxiscope is considered one of the first early film projectors (Régnier, 2013, p. 237) (Figure 18).

Figure 18. Zoopraxiscope (Myers, 2018)

Muybridge documented the movements of animals and humans using multiple cameras, making him an iconic figure in the history of motion capture. Muybridge's gradual photography of animal of human movement by breaking it into fragments provided a rich source for the scientists and artists of his time. Furthermore, these studies have made a significant contribution to the development of the product known as the film strip.

2.12. Kaiserpanorama (1880)

The Kaiserpanorama was invented in 1880 by the German Physicist August Fuhrmann (Engelen, 2021, p. 134). The Kaiserpanorama, which means 'panorama of the emperor' in German, was one of the most popular entertainment devices in late 19th century Europe, especially in the German Empire. The popularity of the device lay in its ability to create the illusion of three-dimensional images by projecting stereoscopic photographs that moved between the viewer's gaze (Peselmann, 2016, p. 70).

The Kaiserpanorama, first opened in Breslau in 1880 and capable of seating twenty-five people at a time, is a cylindrical structure approximately fifteen feet in diameter developed to display a series of fifty illuminated colour stereoscopic photographs (Duttlinger, 2006, p. 424) (Figure 19).

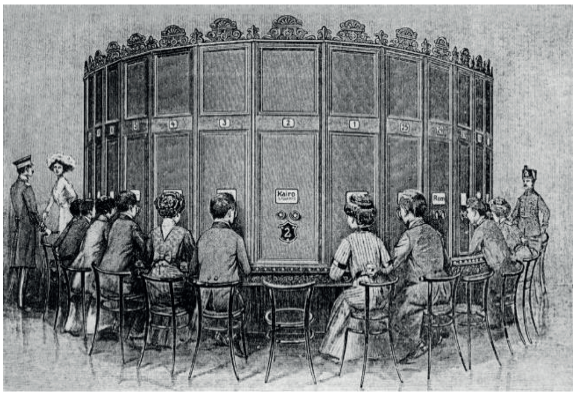


Figure 19. Kaiserpanorama (Lee, 2013, p. 36)

The content of the shows was chosen to give the audience a sense of travelling to different places and exploring different parts of the world, enabling them to discover different cultures and places, as people's opportunities to travel were limited at the time. For this reason, Kaiserpanorama shows often included a variety of themes such as tourist sites, works of art and scenes from popular culture.

Kaiserpanorama, which creates a hybrid spatial experience by combining microscope and telescope components in its structure, is considered by some scholars to be a forerunner of cinema, as it uses mechanical technology to move the images (Peselmann, 2016, p. 71).

2.13. Kinetoscope (1891)

In 1891, Thomas Alva Edison and his assistant W. K. Laurie Dickson developed the Kinetograph and the Kinetoscope. The Kinetograph records movement serially with still photographic frames, while the Kinetoscope allows the resulting moving image to be viewed. The Kinetoscope is a personal device for a single user (Kılıç, 2008, p.199). The image obtained from a 15 metre long 35 mm film could only be viewed by one person through an eyepiece (Özuyar, 2017, p. 16). The lens captured forty images per second, resulting in a twenty- second one-person cinema show (Teksoy, 2005, p. 29) (Figure 20).

Figure 20. Kinetoscope (Akman, 2019)

In 1892, Edison established a film studio on his land in West Orange, NJ, adjacent to his research laboratories (Robb, 2013, p. 22). This studio, known as 'Black Maria', was the first film studio in history. The Studio nicknamed Black Maria because of its similarity in texture, colour and form to the wagon cell vehicles used by the American police at the time (Jacobson, 2011, p. 233).

According to Rossell (1998, p. 86), the Kinetoscope was an improved version of Joseph Plateau's Phenakistoscope or George Horner's Zootrope. Although it provided the illusion of movement, it could not project it onto the screen. Thomas Alva Edison did not feel the need to develop a device that projected films on the screen because he believed that films were a passing fad (Bordwell & Thompson, 2012, p. 423).

2.14. Mutoscope (1894)

The mutoscope was invented by the American inventor Herman Casler in 1894 (Pikkov, 2010, p. 182). Inspired by the kineograph developed by Linnett, the mutoscope emerged to compete with Edison's kinetoscope and soon surpassed it in popularity in the entertainment industry (Fernett, 1988, p. 8). By the late 1890s, it had become one of the most sought-after 'adult' materials (Streible, 2003, p. 91) (Figure 21).

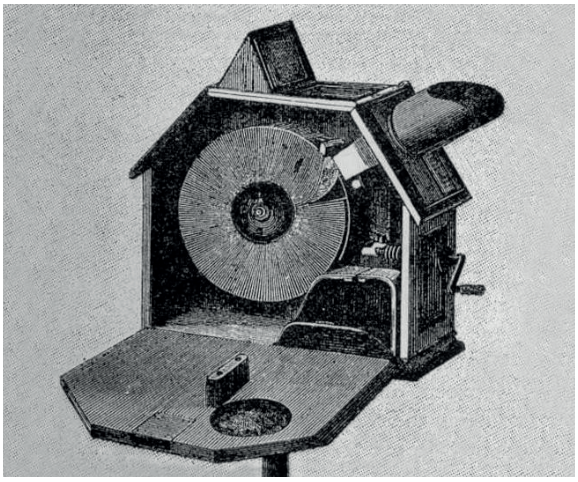


Figure 21. Mutoscope (Hendricks, 1964, p. 78)

The mutoscope consists of hundreds of small 7x5 cm cards with images printed on them, attached to a circular spool about 25 cm in diameter. This spool is similar to a Rolodex and is connected to an external crank that is turned by the tracker. When the crank is turned, the spool rotates and the cards are stretched by a small metal part and brought into viewing position. As the cards rotate, they create the illusion of a moving image (Rossell, 1998, p. 96). A typical mutoscope roll holds an average of 850 cards and provides approximately one minute of imaging time.

2.15. Cinématographe (1895)

The Cinématographe was developed in 1895 by Auguste Lumière and Louis Lumière, also known as the Lumière Brothers (Özuyar, 2017, p. 17). According to Teksoy (2005, p. 30), it was Louis Lumière who invented the cinématograph and his brother Auguste helped him.

The Cinématographe recorded moving images on 35 mm wide celluloid film (a type of film with holes on both sides of the frame) at a rate of sixteen frames per second. It could also project images using a lantern as a light source and create film copies (Teksoy, 2005, p. 31) (Figure 22).

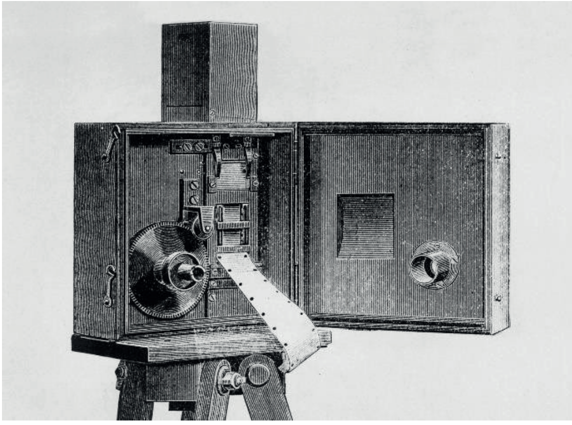


Figure 22. Cinématographe (Lumiére, 1897)

In December 1895, the first commercial film screening in history took place in the exotically decorated Indian Hall of the famous Grand Café on the Boulevard des Capucines in Paris (Ceram, 2007, p. 121). The screening consisted of 10 different films. This experience, which was recorded as the first film screening in history, did not turn out as expected. When the film titled 'The Arrival of a Train at La Ciotat Station', known as 'La Ciotat', started, the audience saw a train coming towards them and started to run away in panic and took shelter under the seats, causing a short-lived stampede (Bergan, 2011, p. 12). Among this audience was Georges Méliès, the director of the Théatre Robert-Houdin, who would soon become one of the creators of cinema (Robb, 2013, p. 24). The same reaction was given a year later at the screenings at Sponeck Brewery in Galatasaray, where the first cinematograph screenings were held in Istanbul (Özuyar, 2017, p. 19).

The Cinématographe, developed by the Lumière Brothers and after which the art of cinema is named, conveyed sections of daily life without any design considerations. The film camera was used purely as a means of recreating reality.

3. METHOD

3.1. Model

This research is based on a general inductive approach. In this context, a qualitative research design was preferred. Qualitative research seeks to understand the form of the problem in its natural environment and aims to describe phenomena by producing unique information rather than testing hypotheses.

3.2. Sample

The research sample consists of fourteen moving image devices: Camera Obscura, Magic Lantern (Laterna Magica), Thaumatrope (Magic Circle), Phenakistoscope, Zoetrope (Daedaleum/Wheel of Life), Stereoscope, Choreutoscope, Kineograph Praxinoscope, Zoopraxiscope, Kaiser-panorama, Kinetoscope, Mutoscope, and Cinematographe. These pre-cinema devices were invented in 1558 and beyond. In order to collect data from the main mass in a simple and quick way, the homogeneous sampling method, one of the purposeful sampling types, was preferred.

3.3. Data Collection Tools

A literature review was conducted to gain a new perspective on the theoretical limitations of this research. The aim is to establish a dialogue between moving image devices and space representation. The process encompasses scanning, analysing, segmenting, summarising and synthesising sources published on a particular research topic. In this context, various scientific resources were scanned, including reports, papers, theses, dissertations, articles and books, accessible through national (ULAKBIM TR, Sobiad, etc.) and international (ERIC, ScienceDirect, Google Scholar, ProQuest, etc.) databases.

3.4. Data Analysis

In order to elucidate the research problem and develop theoretical and practical solutions, the data obtained must be analysed and interpreted.

Analysis describes the process of determining and differentiating the basic elements of the data. In this context, the 'descriptive content analysis method' was preferred to analyse the data obtained in the research and the data was analysed in two stages. In the first stage, descriptive analysis was carried out and the general trend was determined by examining the qualitative studies that could answer the research questions. In the second stage, content analysis was carried out and the data obtained were organised and interpreted according to the parameters set by the researcher.

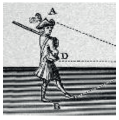
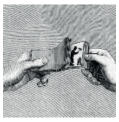
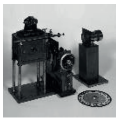
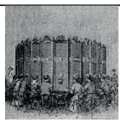
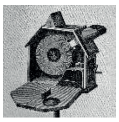
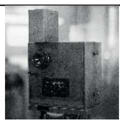
4. RESULTS

In the context of research aimed at establishing a dialogue between the pre-cinema moving image devices and the space representation, the literature review method was preferred to answer the research questions. The data obtained from the research was subjected to descriptive content analysis.

The analysis infers that pre-cinema moving image devices invented between 1558-1834 used figural representations in visual narratives. Representation of space was first introduced in the visual narratives of the Stereoscope invented by Wheatstone in 1838. The Praxinoscope, invented by Reynaud in 1879, made the representation of space a prominent factor of visual narrative. In 1880, the Kaiserpanorama, invented by Fuhrmann, included urban interior representations in the visual narrative for the first time. The invention of the Kinetoscope by Edison in 1891 and the Mutoscope by Casler in 1894 made spatial representation an integral part of visual narrative. The cinématographe, developed by the Lumière brothers in 1895, was used as a technical means of reproducing reality, and parts of daily life were transferred without any fictional concerns. In this context, it is possible to conclude that with the cinématographe, the representation of space was completely integrated into pre-cinema moving image devices and had a very strong influence on visual narratives (Table 1).

However, all pre-cinema moving image devices included in this analysis have been evaluated solely on the basis of scientific documents published by the developers regarding the designs. Of course, it is possible that all the devices presented here serve different purposes in different contexts and can therefore be evaluated on the basis of different parameters (figural, spatial, etc.). Therefore, this analysis must be regarded as rudimentary and in need of improvement.

Table 1. Impact of Spatial Representation on Visual Narrative

Sample	Device	Visual	Figural	Spatial	Impact of spatial representation
MID_01 Camera Obscura (1558) Leon Battista Alberti			●	○	no impact on visual narrative
MID_02 Magic Lantern (1659) Athanasius Kircher			●	○	no impact on visual narrative
MID_03 Thaumatrope (1825) John Ayrton Paris			●	○	no impact on visual narrative
MID_04 Phenakistoscope (1833) Joseph Plateau			●	○	no impact on visual narrative
MID_05 Zoetrope (1834) William George Horner			●	○	no impact on visual narrative
MID_06 Stereoscope (1838) Charles Wheatstone			●	●	low impact on visual narrative
MID_07 Choreutoscope (1866) Lionel Smith Beale			●	○	no impact on visual narrative
MID_08 Kineograph (1868) John Barnes Linnett			●	○	no impact on visual narrative
MID_09 Praxinoscope (1879) Charles-Émile Reynaud			●	●	moderate impact on visual narrative.
MID_10 Zoopraxiscope (1879) Eadweard Muybridge			●	○	no impact on visual narrative
MID_11 Kaiserpanorama (1880) August Fuhrmann			●	●	high impact on visual narrative
MID_12 Kinetoscope (1891) Thomas Alva Edison			●	●	very-high impact on visual narrative
MID_13 Mutoscope (1894) Herman Casler			●	●	very-high impact on visual narrative
MID_14 Cinématographe (1895) Lumière Brothers			●	●	extreme impact on visual narrative

5. CONCLUSION

The film historian P. Potoniee says that the origin of the art of cinema is not, as it is believed, the invention of photography, but the invention of moving image devices. People who saw the motionlessness in space realised that by combining the frames of photographs they could reach the fact that life itself could be created anew. This realisation was an extraordinary imitation of nature (Küçükcan, 2011, p. 31). In this perspective, within the framework of this research, which studies the representation of physical space in the pre-cinema period through the historical evolution of moving image devices that are accepted as precursors of the art of cinema, the technological development of moving image tools, which are traced back to their most primitive and original form, is discussed in a chronological context and continuity.

The first finding of this qualitative research is that the representation of space first appeared in the visual narratives of the stereoscope invented by Wheatstone in 1838. The Praxinoscope, invented in 1879 by Charles-Émile Reynaud, who is also considered the pioneer of animated cinema, made the representation of space an prominent element of visual narrative. This finding provided an answer to the first research question (RQ1) of the study. The second finding of this research is that the Kaiserpanorama, invented by Fuhrmann in 1880, the Kinetoscope, invented by Edison in 1891, and the Mutoscope, invented by Casler in 1894, made the representation of physical space an important part of the visual narrative. The Cinématographe, invented by the Lumière Brothers in 1895, completely broke the moving image's link with the two-dimensional regime and made physical space an integral part of the visual narrative. In this context, the shows of the Lumière brothers are considered to be the beginning of the art of cinema and the end of the research on the animation of movement (Teksoy, 2005, p. 14). This conclusion provided an answer to the second research question (RQ2) of the study.

This research, which discusses the experimental environment for space established by the art of cinema through moving image devices, is important in terms of making traceable the place and applicability of spatial representation approaches in pre-cinema devices, drawing inferences about the interaction between the pre-cinema period and spatial representation, and synthesising the wealth of research already available to contribute to the existing literature. However, the fact that the research was collected from fourteen different moving image devices invented in 1558 and later is considered to be one of the major methodological limitations of this study. The limited sample size weakens the possibility of generalising the findings and negatively affects the external validity of the research. It can therefore be concluded that the analyses are explanatory rather than conclusive. In order to overcome the problem of low external validity and to ensure that the data obtained from the study can represent the study population, it is recommended that new studies be planned that include different pre-cinema moving image devices (Anorthoscope, Stroboscope, Kinora, Mutograph, Kaleidoscope, Phantoscope etc.). Furthermore, it may be limited to fully understanding the effects of the spatial representations of pre-cinema moving image devices on visual narrative without examining them through the concept of fictional space. This framework presents a potential research topic: the impact of fictional space on visual narrative in pre- cinema moving image devices.

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