Chapter One

Review of
Projection Ideas and Apparatus
“If I have been able to see further, it was only because I stood on the shoulders of giants.”

- Sir Isaac Newton.

**Prelude**

This chapter explores the phenomenon of projection in theatre performances. The recount of the projection history is a process of knowing its origin. An in-depth literature review of projection module aided the researcher to formulate a chapter. Wide-ranging sequences of literary knowledge required to understand the projection phenomenon before assembling a design. Therefore, the review of literature for theatrical projection design require a comprehensive domain of knowledge. Through this chapter, the researcher successfully contented the prerequisites to construct media projection design. This comprehensive review of literature will demonstrate the research findings and understandings on projection media development.

The literature regarding projection aspect was found in a scattered form. There was no distinctive compiled information related to the art of theatrical projection. The researcher attempted to cluster the consistent literature based on the research questions as topics and subtopics. The evidences helped the researcher to frame concrete objectives for the research. The arguments and opinions encircled by projections considered as building blocks for theatrical setting and it was established through this literature review. This orientation regarding the projection phenomenon will help the readers to follow, recognize and understand the dimensions of research area.

**(Re) Search**

The primary design elements in theatre production classified into five types. Most of the writings describe these five categories in various levels. As per an online query “what are the design elements in theatre?” answered by a theatre professional, Alan Stephenson included
projection also one of the design elements in theatre production\(^1\) practices. In fact, most of the theatre productions embed all these five elements within various degrees of manipulation. The projections are included, notably as one of the fresh design aspect in contemporary theatre performances around the world. However, the Art of Projection is not new for Theatre productions.

The theatre productions consists numerous visual elements on the stage to make over a complete visual narrative. These visual aspects are intersecting with the physical art of theatre. The visual elements assists to interpret, clarify and intensifying the event. The mise-en-scene elements are lighting, setting & props, expression & movement, and costume & makeup. A theatre director can present the visual narrative creatively by gaining control over these elements. The arrangement of each element will produce a unique creative environment. In the recent production practices, all can identify the prominence of media projections in a heightened level. Apart from the above visual elements of mise-en-scene, Media projections can be acceptable to include as a one another potential visual element in theatrical production design.

The individual component of the mise-en-scene elements will help to understand the functions of the each element. There is an extensive study conducted regarding mise-en-scene elements in the theatre domain. The visual art element projection has undersized in it. The exclusive study on this element will certainly help the designers, directors, technicians and spectators to sense and make use the potentials of theatrical media projections along with its enormous visualization possibilities. A structured design element in a production will help the

\(^1\) Abiodun Ogunbayo posed an internet query regarding the design elements in theatre. A theatre scholar Alan Stephenson reply has founded in the website as projections as one of the design elements among the theatre design practices. See the web page in Yahoo Answers – Retrieved on 15 April 2013 http://answers.yahoo.com/question/index?qid=20101212022616AAenIZd
process of making and sharing of performance experience. Before designing an element, we must have in-depth knowledge encircled about the element.

**Literature Review**

According to Franz Paul Liesegang suggests in the book ‘Dates and Sources’, the formal projection system developed by Athanasius Kircher, it published in 1646 in Rome later 1671 in Amsterdam. The Kircher system was developed on the basis of Johann Baptista Porta’s earlier experiments in 1589.

Projections formed across the entire environment encircled by us in viable ways. In the contemporary 21st century, most of the populace became victim of the projection environment experiences through at least one of the given below modes. The public modes of projections have appeared in cinema theatres to entertain public, in archaeological sites like those that forts used to enhance the beauty of it, in conferences and seminar's presentations for educational enrichment, in planetariums to describe the planets position in the space. Apart from these projection instances, it can extensively use in scientific research and development laboratories to elucidate the information in the form of visual allegories. In the fields of medicine to diagnosis, in space centres to examine, in architecture for elevation designs construction, and in industrial applications. The most of the disciplines are widely utilising the application of visual projection to empower their presentation.

The visual projection application has become as a successful visual communicative medium among the various communication modes across multiple disciplines of human communication. In the work of art, the application of projection integrated aesthetically from long back. This chapter has endeavoured to review the traces of projection application from the existed literature. It can encompass the development of the projection tools

---

and its significant application along with the inventors. The literature review is organized in three sections as technical review, theatrical review and theoretical review.

**Technical review**

The early projection devices have no clear-cut distinctions like camera and projector, both the functions unified in a single apparatus. Gradually with various experiments of scholars and practitioners, it evolved as individual functional devices. In order to get projected images we will need four basic components to take together. Those are source of Light, the object that needs to be projected, a device to form an image, and a surface to project the image on it\(^3\). Early camera was an optical toy. The joy of playing with lenses, mirrors and light with a wide experimentations pull to the invention in the art of photography.

People are experimenting with projection since they observed their shadows casted by a light source. The basic principle structure of projection system has not changed from hundreds of years. Nevertheless, it became simple and sophisticated with the benefit of advance technologies. The technical review conducted for explain the projection phenomenon based on the two important components of the projection system that, source of light and type of projectable medium. Light source for projection was sun, candle light, oil lamps, limelight, carbon arc and the electric lamp. Slides, transparent sheets, celluloid film, video signal and digital data were the different types of media for projection.

**Projection Apparatuses**

The projection tools are developed based on the ideas, which can be shaped out of the curiosity of humans regarding on the magical phenomenon. This apparatus positioned into four categories based on the chronological order of its evolution.

---

Phase - I

The Phase – I, Projection arrangements are explaining about the organic formation of image projection effects in nature. It embraces the descriptions about natural shadows, magic mirror and stained glass.

Shadows

Shadows are occurred by light. Shadows formation is an organic phenomenon in the nature. The sun, moon and fire are the natural light sources. In a sunny day the passing clouds cast static or moving shadows on the earth. Depending upon geometric planes the shadows appeared as distract shapes. The shadow is an unavailable area of light where direct light travel from light source and cannot reach due to obstruction by an object. It occupies the space behind an opaque object with light in front of it\(^4\). The opacity of object regulates the depth of shadows behind the object on to the surface.

The twinkling stars in dark nights appears like decorative ornaments of the sky. The intensity of stars cannot cast identical shadows on earth; it may create shadows on some other planet. The shadows of moon light are not much solider than sunlight cast shadows. The fire creates diffused shadows of an object on a projection plane. The projected shadows can be dived as static and dynamic. The mountains, rocks and trees can create static shadows. The passing clouds, animals and movable objects create dynamic shadows. A solar eclipse is the best examples of natural projection phenomena for cast shadows on the earth. The shadows are representations of real objects or may be implied objects. The length of shadows casted on the surface is depending upon the proportion of light source angle, object distance and intensity.

The Chinese and Japanese are made magic mirrors. The earliest record established in the 5th century A.D Chinese documents. The magic mirror was a highly polished disk of bronze. When light from a small bright source is reflected from the mirror onto a screen, an image is produced (usually of Buddha) although no image is visible on the mirror itself. Once the bright light stroked the polished reflecting surface of the magic mirror, the ornamented back of a bronze casts a reflection on a dark wall. In the Japanese storytelling tradition, the characters Takasago that form part of the ornamental design refer to the title of a No play (Roy 16).

Stained Glass

Stained glass images is one of the pictorial art form. The purpose of the stained glass windows projecting the images on inside church walls. It will admit light rather to control it. It was described as ‘illuminated wall decorations’. It includes narratives drawn from the bible, history or literature, may represent saints or patron, or use symbolic motifs, in particular armorial. It may be thematic, like church – episodes of Christ.

---

Phase - II

The second phase tools are more cultured with the first phase primary projection concepts and principles. This phase grips the descriptions about pinhole images, camera obscura and magic lantern.

Pinhole Images

In Palaeolithic period, the cave man experienced the natural image projections in their dwellings, apart from natural cast shadows of the outside world. The tiny hole in the cave mouth hidings established the natural pinhole camera, which produce outside images on inside the cave walls.

The outside real world objects projected on the wall appeared as inverted images. These pinhole camera works based on the light principles. The projected images are dynamic in nature. The cave man attempted to trace the projected moving images on the cave wall may be the starting point of rock art. The forms of animals with motion are discovered on the walls of caves in the ‘Grotte de Lascaux’ in France\(^7\). The multi-media artist Matt Gatton called these natural occurred pinhole cameras as ‘Paleo-Cameras’. Gatton conducted a wide range of research and experimentation to explain the Paleo camera theory as the existence of cave rock art may originate through the Paleo-camera projections\(^8\).

The researcher is assenting with the Paleo-camera theory proposed by Matt Gatton. The image projections of living beings may be the inspiration for cave man to draw or trace two-dimensional objects on the cave walls as representations of three-dimensional objects in the real world. The drawings may be shared in community discourses for knowledge transmission.

---

\(^7\) Bob Lansdale’s online publication of the book *The History of the Discovery of the Cinematography* in chapter one he mentioned more details regarding this. Retrieved on 17 September 2011, http://www.precinemahistory.net/900.htm

The natural cave dwelling has the most primitive of camera obscura. This principle of pinhole photography was that, the light passes through the hole and an image was formed in the back wall as upside down. The light travels in straight lines, the crossing at the small hole invert the image upside-down. The pinhole images can be seen through crossed wicker, crossed fingers and leaves in the trees.

![Figure 1.2: Illustration of Paleo camera projection in cave dwelling.](image)

Paul burns have researched, compiled and written the history of the discovery of cinematography, he stated that, a Chinese Philosopher ‘Mo-Ti’ in the 5th B.C documented the observance of inverted pinhole images onto a screen in a darkened room. He called the darkened room a “collecting place” or the “locked treasure room”\(^9\). Aristotle observes crescent shaped images created during an eclipse, through small holes in the leaves of trees, furniture and the crossing the fingers. He notes that smaller hole crates the clearer the image. The common use of pinhole cameras was to capture the movement of the sun over a long period called Solargraphy. The images are projected onto a translucent screen for real-time viewing.

---

like observing solar eclipses\textsuperscript{10}. ‘Alhazen’ an Arabic scholar wrote the observance of the naturally occurring rudimentary pinhole cameras in his \textit{Book of Optics} in 1021 A.D.

**Camera Obscura**

Camera Obscura was an optical projection device. It can project an image of its surroundings on to a screen. The Latin meaning of the Camera Obscura was “dark chamber”\textsuperscript{11}. This device was constructed as a sealed black chamber only with a single tiny hole. The light pass-through the hole and strike the inside surface and reproduce upside down whitened colour image of the outside world. The image can be project and traced by using paper and glass to gain accurate representation of the source image.

The Camera Obscura used most often as drawing aid. The architectural designs traced by using the Camera obscura. The observance of solar movements became possible in a big room sized Camera obscura. The usage of lenses and mirrors are made possible to extend the potential of the device. It aided the artist to draw portraits and present moving images as an art form.

The 13\textsuperscript{th} century showman ‘Arnold Villeneuve’ used camera obscura to present “moving shows” or “cinema” by placing his audience in the darkened room and the actors perform outside. The image of performance casts on the inside wall. He often enacts the war, or the hunting animals with the actual noises of such, which would be heard from inside.

In the first half of the 18\textsuperscript{th} century, the Camera Obscura was widely used as drawing aid. Prior to photography, the camera obscura employed many ways in the scientific disciplines. A physician ‘\textit{Willam Cheseldon}’ used it to illustrate the human skeleton. The \textit{Canaletto} was much influenced by camera obscura and used as a painting aid in the Venice

paintings. The device employed as a perspective assisted aid. By the 1830’s, the Camera Obscure was ready and waiting for a medium to capture its images and keep them forever. The Camera obscura’s cousin, the magic lantern had an illustrious career of its own.

**Magic lantern**

According to Franz Paul Liesegang in his book *Dates and Sources*, the formal projection system developed by Athanasius Kircher, it was published in 1646 in Rome later 1671 in Amsterdam. The Kircher system was developed based on Johann Baptista Porta’s earlier experiments in 1589 (Walne 1). ‘Giovanni Baptista Della Porta’ published *Magiae Naturalis Libri Viginti*, in which he described the ancient art of projecting mirror writing.

‘The Magic Lantern is the forerunner of the modern slide projector. It has a long and complicated history and, like lots of fascinating inventions, many people were involved in its development. No one can say for sure who invented the Magic Lantern. It is part of the marvellous world of optical projection and stands alongside the Camera Obscura, Shadow Shows and the Magic Mirror. Like them, the Magic Lantern has been used to educate, entertain and mystify audiences for hundreds of years.’

The Roman scholar ‘Athanasius Kircher’ was first in the history detailed about the magic lantern along with camera obscura. He believed that, through a candle illumination behind a slide could present a projected image on a screen. He improved the Della porta’s work. The most mentioned name in reference to the magic lantern was Kircher descriptions in *Ars Magna Lucis Et Umbra* (The Great Art of Light and Shadow) which was published in 1646 in Rome. The Encyclopaedia Britannica, Ultimate Reference Suite states that,

‘Kircher is not now considered to have made any significant original contributions, although a number of discoveries and inventions (e.g., the magic lantern) have sometimes been mistakenly attributed to him. Rather, it is his extensive reporting activity that secures his place in intellectual history.’

---

The lens less projection lamp similar to Fontana’s lantern was illustrated at the second edition of Kircher’ *Ars Magna Lucis Umbrae (1671)*. Kircher system relies on the reflection from mirror incorporating the image of an object in front of or painted on the mirror. The sunlight or candle was used as light source and the image focused by means of ‘bi-convex’ lens. ‘Andreas Tacquest’ was used the Kircher system for first time public demonstration of projected images between 1653 and 1654. The projected pictures where the journey of china to the Netherlands, which was taken by his colleague.

‘Johannes Zahn’ described about a number of projection arrangements using magic lanterns. In his publication ‘*Oculus Artificialis Telediopticus Sive Telescopium*’, referred the revolving slides, projection clocks, and suggested tracing book illustration onto glass. He used lantern for anatomical lectures, large camera obscura used for solar observations purpose. Zahn suggested the presentation of images under water and proceeded to explain, and stressed the importance of holding the magic lantern out of sight of the audience. He showed a how a clock can project onto a larger screen, and how a wind direction can be shown by having a connection from the lantern to a wind vane on the roof of the building. He foresaw the use of lantern project the image on glass, which allowed several to view at one time.\(^1^6\)

People became aware that, the magic lantern was useful for educational purpose. This idea supporter Johann Zahn worked extensively with projections, featuring small living animals, which were contained in a trough, the image presumably being projected via a mirror system. Projection of slides from two or more projectors, synchronised to overlap the each beam of it and cross fading between projectors, they achieved overlapping / dissolving effects.

In the early 18th century, the magic lantern was placed opposite to screen at the middle of the audience. Oil and lime light was used as a light source. By adjusting the iris they achieve

---

\(^{16}\) Bob Lansdale’s online publication of the book *The History of the Discovery of the Cinematography* in chapter one he mentioned more details regarding this. Retrieved on 17 September 2011, http://www.precinemahistory.net/1650.htm
dimming effect as well as moving the lantern on track towards and backwards they produced a zooming effect.

In the 18th century, a number of people had involved in the development of the lantern and its accessories. The improvement of lenses, mirrors and lighting sources improved the projectionist abilities to perform shows even in public spaces also. The showmen used to produce horror shows. These shows known as ‘Phantasmagoria’ shows. The researcher gave a detailed review of these shows in theatrical review section.

Early 18th century, the mechanical slides were becoming accessible. Oil burners replaced the candle light, because the increasing demands of light intensity required by the optical system for brighter and sharper projection (Walne 2). During the early part of the 18th century, ‘Pieter Vam Musschenbroek’ attempted first time to erect motion through the magic lantern. It was different arrangement then Zahn’s circular disk and Kircher’s horizontal series of slides. He created slides both the fore and background, thus producing the primitive form of movement. The forward slide connected to a string. When it will pull slightly would give an illusion that the figure was separated. By using two sets of frames simultaneously, he was able to create a sense of motion for the first time through magic lantern. He presented a private show to the scientist ‘Abbe Nollet’ in Holland. It consisted that, a man taking off his hat, a female walking down the street and then bowing, and a windmill, which appears to revolve17.

Later part of the mid-19th century with the popularity of the photograph and with the advent of Chromolithography, slides could be printed with superior quality image. In the lantern entertainment, the subjects began to include scenes from the scriptures, travelogues, and vocational scenarios. The photograph made its introduction in 1858, the majority of slide

manufactures began to produce photo-slides by replacing the poorer-quality hand-drawn and painted slides.

‘A. E. Dolbear’ projected moving pictures in 1877 by means of either sunlight or limelight, which was focused through a disc onto slides, apparently pictures of 3” (76mm) wide were common and light levels quite acceptable at the time. In 1853, Ludwig Dobler became the first to exhibit moving pictures using a device developed by Uchatius. It has limelight as light source and the condenser revolved the slides and objective lens remaining stationary. This was credited as being able to project satisfactory images up to 2.5m.

**Phase - III**

The projection tools in the third phase are widely utilised by public for educational and entertainment purpose. It embraces the descriptions about Opaque projector, Gobo Projector, Slide Projector, Overhead Projector and Enlarger.

**Opaque Projector**

It was one of the earliest forms of the projection. It allows the user to project printed material or small objects without having to convert them into another medium.\(^{18}\) The projector projects the image of an object by shining the object with bright light, the reflection of object directed through the projection lens to the projection screen. The books, magazines and small three-dimensional objects can project through this projector. The heat generated by the light source can potential for damage the heat sensitive documents or objects. It can used to demonstrate and tracing art works.

**Gobo Projector**

The profile spotlights are used for controlling the shape of emitted light by placing template between light source and optics. The name was derived from “Goes before Optics”.

---

It was a lighting pattern projection illumine. These simple projectors may also call ‘Lekos’. This unit consists an ellipsoidal reflector, a gate and an objective lens system. Because of the ellipsoidal reflector, the light beam angle can be adjusted according to desired spread. The gate can able to hold metal or glass slides. The projected patterns are used for adding additional texture for scenic surface. Simple Gobos incorporated in an automated lighting system can be used to produce moving shapes. Glass gobos produce colour areas unlike Metal gobos, which can produce shadows. New technologies make it possible to turn a colour photo into a glass Gobo. Apart from metal and glass slide gobos custom-made plastic gobos are also used in low budget theatrical productions, but the durability of the plastic slides was very limited period.

Recent days, the gobo projectors are widely used in DJ clubs and event parties for static and moving gobo projection on the surface of the floor, wall and buildings. The light source of LED made the contemporary gobo projectors to run the show longer durations. The theatrical gobo projectors are more powerful than the simple DJ gobo projectors.

**Slide projector**

The slide projector was an Analog projection device. It will project glass slides on to the aimed surface in varying sizes. The delivery system of the slide projector has the basic structure. It contains a light source with reflector, condenser lens system to distribute light over the surface, slide locating mechanism and the objective lenses. The housing will also contain heat absorbing glass and filters, which might be damage the slide and to remove the optical spectrum caused by the light source.

In earlier versions of slide-projectors don’t have the automated slide changer and dimming mechanism. In the later periods, the slide projectors are sophisticated with these.

---

advantages and able to project the images with the remote location operation (Walne 22). Based on the ability of slide manipulation and delivery of a number of images in quick succession produced different variants in the market to fulfil the seamless entertainment needs of the public. The professional and domestic slides projectors are popular in between 1950’s and 1960’s. The large screen projectors with zoom object lenses were used in professional theatrical works.

**Overhead Projector**

The overhead projector functions on the basic principle of projection system as like as slide projector. It has a large box containing a very bright light source inside along with a cooling fan. Top of the box a Fresnel lens used to adjust the emitted light from a source to an object evenly. A long arm attached to this box. It has lens set for focus adjustment, a reflective mirror to redirect the light forward instead of up.

The transparencies are placed on the top of the lens for projection. The emitted light from the box travel through the transparencies, redirected by mirror then projected on the screen. The size of the image can be changed by adjusting the distance and focusing lens of the projector arm. The presenter can able to supplement the additional material during the presentation. The interactive nature of overhead projector gains popularity and creates an enlighten position among the projection devices in education and business presentation sector. Printed material on transparencies can save the presentation time and give an opportunity for the presenter to include additional information during performance. The first overhead projector was used in police identification work. The U.S. Army in 1945 was the first use is it in quantifying for training as Word War II wound down.\(^{20}\) The overhead projector was a low cost interactive tool for educators.

In the period of 1980’s the overhead projectors are equipped with Liquid Crystal Panels. The LCD panels connect to computer data systems for obtaining visual data. The monochrome data panels very soon replaced by colour displays with minimal refresh rates. The overhead projectors were now replaced by multimedia projectors, which can able to serve the contemporary needs of the society in various levels.

Phase - IV

The Fourth phase projection tools are the 20th century projection devices. All these devices inhabited the projection phenomenon throughout in the century. Most of the projection tools were like film projectors, video projector and multimedia projectors integrated into theatrical projection practices by practitioners. It embraces the descriptions about motion film projector, digital data projector, video projector, multimedia projector, handheld projector, planetarium projector, sky projector, retinal projector and interactive whiteboards.

Motion Film Projector

This is one of the Optomechanical devices for displaying moving pictures by projecting them onto a projection screen. The motion film projector function based on the concept of persistence of vision. The ability of the eye and brain retains an image for a period of time results illusion of motion. The motion film projector projects a succession of images in a fraction of a second. According to the visual perception phenomenon, the eye and brain system is combination of motion detectors, details detectors and pattern detectors, the outputs of combined to create the visual experience.23

The human eye can perceive the illusion of motion at the lowest frame rate of 16 frames per second. Silent films have various frame rates in a show. According to the notes given by distributor the projectionist, change the frame rates during the show. The sound film has

---

constant frame rate at 24 frames per second. Early movie theatre projectors have carbon arc lamps as a primary source for cinema projection, later it was replaced with the introduction of Xenon arc lamps. A curved reflector redirects the light towards a film gate. The dossier is a blade type of device fixed in the light housing to cut off prolonged light, which may cause melting the film.

A misconception regarding film projection was that, simply a series of individual frames dragged very quickly in front of the light source. If we did like that, we get a continuous series of blurred images. A rotating cylindrical shutter interrupts the emitted light during the time the film advance to next frame. The flicker frame threshold varies depending upon projection system between 16 Hz to 75 Hz.²⁴ Different object image lens used for projection depending upon the aspect ratio of the film. The projection screens have a reflective surface, either aluminised or white surface with glass beads. The screen has very small holes to pass the sound, which came from the rear side of the screen.

The film projectors classified by the size of the film used, like 8mm, super8, 9.5mm, 16mm, 35mm and 70mm. The 8mm projectors are widely used for home entertainment before arrival of video entertainment. Before televisions, the 16mm film projectors were popular in educational and entertainment sectors. 35mm film was the common size for theatrical production in the 20th century. Excluding Digital cinema theatres, most of the film theatres have the 70mm film size for projecting movies.

**Video Projector**

It was digital replacements for the earlier type Analog projectors, such as slide projector and overhead projector. It can project the images based on the feed of video signals. In early 1990’s it was the popular home entertainment device. The video signal come from the

---

Television satellite receiver, local video broadcaster, video cassette player, DVD Players. It has a bright light source inside, capable to project on reflective and rear projection screens. The display resolutions are varied from minimum 800x600 pixels to maximum 1920x1080 pixels. The amount or light output will play a vital role in selecting a video projector. Depending upon size of the room and lighting environment at the time of projection were the influence factors for frame specifications for procuring project.

**Multimedia Projector**

The multimedia projectors are capable to combine and able to project audio along with digital data and Analog video signals. The contemporary multimedia projectors are presenting the shows in wireless mode efficiently. Depending upon the requirement and budget, the features of the projectors vary from brand to brand along with technology. Based on the display technology used in the projector, it may classify into six categories as, CRT Projector, LCD Projector, DLP Projector, LCoS Projector, LED Projector and Laser Diode Projectors.

**Handheld projectors**

It is a product of an emerging revolution of compact portable device, called as Pocket projector, Pico projector, and Mobile projector. Mobile phones, Personal Digital Assistants, Digital camera, Digital camcorder are the most common handheld devices of the 21st century. These devices has capability to capture, store, retrieve and display the images. The small screen is not enough to view the image for a group. The embedded projector chip taken place in this device to fulfil these needs. The performance of these projectors has to be improved. The research and development departments of projector manufacture companies attempting to develop products, which are more powerful.

The Pico Projectors consists five major parts. The battery works as the primary power source for handheld devices. DC adapter used for longer presentations, but it is not advisable. The electronic system converts the digital image data as an electronic signal. Laser light sources
are ignited by this electronic signal. The combiner optic was combined different light paths to one path of the light colour palette. The inbuilt mirrors collect the colour information pixels wise and project the image towards the projection surface. Viewing Photographs, video presentation and gaming are primary applications. Newly some hand gesture recognition and point-based computer control applications are developed by combing web camera 25

**Planetarium Projector**

The Planetarium projector is using for project images of celestial objects onto the Doom Screen of the Planetarium. The Germany Company, *Carl Zesis Jena* designed and built the first modern Planetarium projectors between 1923 and 1925. 26 An IMAX Projection system was developed from the Omni Max Planetarium projection system.

The early planetarium projector was 13-foot long dumbbell shape with 29-inch diameter spheres attached on both sides. It will represent the northern and southern hemispheres of the night sky. There were some dedicated projectors for planets, includes nearly 150 individual projectors in the total projection system. The star field plates were copper foil, which punched with holes in various sizes, placed between two glass plates. A bright light source place between two spheres and number of a spherical condenser lenses were placed within each globe to focus light onto the plates. Gravity based mercury filled shutter will block the light when particular star or planet dipped below the artificial horizon of the planet. Now, a single large powerful projector with a fish eye lens with a digital feed projecting the images in high quality.

---


Sky Projector

The sky projector will project clear pictures, in colour and motion, for a distance of several miles on clouds or buildings. The projector has an easy mechanism to change the direction at the time of excitation. Primarily it used as clouds as a medium for night advertisement. This Atmospheric advertising projector invented by a British inventor Harry Grindell Matthews in the late 1920s (Susik 80).

Theatrical Review

The theatre practitioner’s ideas in the utilisation of projections turn those as pioneers of projection art in theatre performances. This segment will focuses on the two aspects theatrical forms and theatre practitioners. In Theatrical forms, the researcher make an attempt to review on shadowgraphy, shadow plays, phantasmagoria, moving panorama, utsushi-e, and the technique of Pepper’s ghost. About Richard Wagner, Winsor McCay, Frederick Kiesler, Erwin Piscator, Bauhaus Theatre, Sergei Eisenstein, Robert Edmond Jones, Josef Svoboda, Bertolt Brecht, Nam June Paik, Moving being, Bill Viola and Robert Wilson was illustrated with their seminal works and endeavours.

Shadowgraphy

Nearly at 3000 B.C.E, Chinese entertainers use firelight to project silhouettes of puppets onto the screen. It was the basic principle of projection, casting light onto a flat surface to communicate visually. Hand Shadow art, the most primitive way of mimic animals and people in motion. Shadowgraphy is the art of performing a story or show using images created by hand shadows. It can be called ‘cinema in silhouette’. Performer of the art form frequently called as ‘shadowgraphist’ or ‘shadowgrapher’. The art has declined since the late 19th century after the electricity became available to homes. The intensified bulbs are not enough

---

to produce interesting shadows on the wall. At the same time, the popularity of cinema and television draw the attention of peoples towards the new entertainment medium.

Shadows are greatly defined by candle light so hand shadows were common in earlier centuries. Shadows are existed since the objects are obstructing light; it was difficult to say when it was used as art. It may be originated and practiced by far eastern countries, notably Indonesia (Walne 13). This art is popularised by the magician and French entertainer ‘Felicien Trewey’ in the 19th century, and he inspired many magicians to follow. The magician well known today in Shadowgraphy is the Australian ‘Raymond Crowe’.

The light source to be used should be small and bright. The best shadows come from light proceeding from the smallest possible point. ‘Albert Almoznino’ is an Israeli hand shadow artist. He suggests using candles, lens and reflector removed flashlight or any very small light will suitable as a good light source. The projection surface was a white or light coloured wall, if rear projection he suggest, rear projection screens will better in results. The hands usually exercised and different finger positions was practiced to help aid in forming the shadows.

The performers sit or stand between projection surface and the light source. He may perform in front of a surface or rear side of the projection surface. He may perform from the left or right side of the light sources also. The hand movement towards the light source and projection surface helps to manipulate the size of the casting shadows. At the time of performance, the performer always observes their shadows instead of hands. Some of the shadows performed by using accessories to achieve movements or images which were not possible to perform hands alone.

**Shadow Play**

Shadow play performances originated during the ‘Han Dynasty’. To bring back to life of a dead concubine of Emperor Wu of Han, the court officers made a shape of concubine with separate leather pieces and adorned with painted cloths. Manipulating joints created illusion of
animation movement and cast the shadow of the concubine by using an oil lamp.\textsuperscript{30} It was spread by conquering Mongols to distant countries like Persia, Arabia and Turkey.

‘Karagoz’ was a type of Turkish Shadow Play, means ‘Black eyes’ or ‘Gypsy’, named for its stock heron ‘Karagoz’\textsuperscript{31} It was highly developed in Turkey by the 16\textsuperscript{th} century and was adapted in Greece and North Africa. In the 20\textsuperscript{th} century, it lost its popularity because of cinema and other entertainment mediums. These performances are mostly confined to the Muslim holy month of Ramzan.

*Wayang kulit* was a classical Javanese puppet drama that uses the shadow thrown by puppets manipulated by rods against translucent screen lit from the behind. It developed before 10\textsuperscript{th} century; the form had origins in the leather puppets of southern India ‘Tholu Bommalata’. The art of shadow puppetry probably spread to Java with the spread of Hinduism.\textsuperscript{32} Elaborately painted leather puppets are used for narration of the Hindu epics like ‘Ramayana’ and ‘Mahabharata’. Wayang influenced European puppetry, through the puppeteer ‘Richard Teschner’. UNESCO designated *Wayang kulit* from Indonesia as one of the ‘Masterpieces of the oral and Intangible Heritage of Humanity’.

According to Samuel Chakraborty claims that, the ancient Indian art of storytelling with the help of pictures, began with the Harappa’s civilization. The archaeological findings prove that, *Pat*, the folk painting of Bengal exists before the arrival of Aryans in India.\textsuperscript{33} Shadow puppetry is an ancient form of storytelling by using articulated figures to create the impression of moving images. The shadow puppets have a traditional history in Indonesia, China, India, Greece, Nepal, and Turkey. Earliest shadow theatre screens were made with mulberry paper.

\textsuperscript{32} Cited from Wayang. *Encyclopædia Britannica. Ultimate Reference Suite*
Shadow Puppetry is based on light penetrating through a translucent sheet of cloth, the “shadows” are actually silhouettes seen by the audience in profile or face on.\textsuperscript{34} Shadow puppetry remains popular in modern India. Tholu Bommalata in Andhra Pradesh and Togalu Gombeyaata in Karnataka is popular leather puppetry shows.

European version of Chinese shadow-puppet show \textit{Ombres chinoises}, introduced in Europe in mid of the 18th centuries by French Missionaries returning travellers.\textsuperscript{35} The French Puppeteer ‘Dominique Seraphin’, presented the first popular \textit{Ombres chinoises} in Paris in 1776. \textit{Ombres chinoises} with local modification and establishment, it became as \textit{Ombers francaises}. Instead of colour transparencies using silhouettes cast by solid cardboard figures popular in Chinese Shadow puppet theatre. The \textit{Ombers} evolved into numerous theatrical Productions and had a major influence on Phantasmagoria. In Europe, ‘shadow shows’ were given from the late seventeenth century in Paris and London where they were frequently mounted in the Punch and Judy theatre.

\textbf{Phantasmagoria}

Showman presented horror shows to public using Magic Lantern called ‘Phantasmagoria’ shows in the late eighteenth century. ‘Etienne Gaspard Robertson’ was a famous Phantasmagoria showman. The projector was behind the translucent screen, out of the view of the audience. It became the mystery of the show. A variety of horrific images was projected on walls and it moves around to frighten the audience. Normally the subjects of the shows have been black magic, ghosts, spirits and dead relatives. Techniques included the use of smoke, the shadow play, using more magic lanterns, rear projections, hidden projection,

\textsuperscript{35} Cited from Ombres chinoises. Encyclopædia Britannica. \textit{Ultimate Reference Suite}. 
projection on glass, use of mirrors, projection from below the stage, and movement of the lantern, which create the illusion of subject motion and may other ingenious moves.\textsuperscript{36}

Phantasmagoria shows were travelled and popular in Europe, particularly in Germany. The magic lanterns were carried throughout the country and performing shows by showmen. They carry the lanterns, oil, slide and stories along with them. Phantasmagoria first introduced by ‘Paul de Philipsthal’ to the UK in 1802 at the Lyceum Theatre in the Strand. The advertisement announced for the event as,

‘Phantoms or apparitions of the dead or absent, in a way more completely illusive than has ever been offered to the eye in an unfold themselves in various forms and sizes, such as imagination alone has hitherto painted them’ (Walne 4).

The master of Phantasmagoria ‘Etienne Gaspard Robertson’ did more for this art form than any other performers, magicians or showmen’s. He inspired by the works of Porta and Kircher. He also had been impressed with the works of the shadow play artists including ‘Seraphin’. He used a variety of techniques and strategies in order to scare his audience to death. He used huge sheets of glass, roving lanterns, smoke and mirrors, very soon he became the talk of Europe.\textsuperscript{37} Gaspard Roberson obtained a patent naming the instrument ‘Fantascope’. He used this magic lantern on wheels for great effect in motion and realism. His concept of motion-projectors precedes the concept of dollying and panning.\textsuperscript{38}

Henry Langdon Childe credited with the invention of the chromatrope, in which two pattern interact, the effect produced by revolving two patterned discs in the opposite direction (Walne 5). The projections are mostly taking place in the dark environment, or at least in the shadow. Until the end of the nineteenth century, both the stage and auditorium were brightly lighted. The audience became the part of the spectacle event of the performance. Only at the

\textsuperscript{36} See Phantasmagoria in Paul burns Discovery of Cinematography.
\textsuperscript{37} Cited from Gasperd Robert in Discovery of Cinematography.
\textsuperscript{38} Cited from Gasperd Robert in Discovery of Cinematography.
end of the century the darkened galleries appeared, first in ‘Wagner’s Bayreuth’, then in ‘Antoine’s Theatre Libre’, and later in the ‘Cinema’ (Gunning 23).

If we break down the light structure does and create its own world, we can easily comprehend the projection phenomenon. According to Tom Gunning, projection indicates a throwing forward, in this case of light, but also of shadow, with a collision occurring between light, shadow and a surface. There is space in front of a screen that seems to be cancelled out by darkness, by the “throw” of a beam of projection. If darkness cancels out this space, the screen or projection surface opens up another space, a space of illusion perhaps or representation or a purely play of light and shadow.

The phantasmagoria presented by ‘Etienne-Gaspard Robertson’ in Paris at the end of the eighteenth century. It created to think about the nature of shadow and illusion. The show plays a dual role of cancelling and conjuring up space. It engages space as a transition between the tangible and virtual; engage basic aspects of human perception and cognition, along with the two fundamental categories of word formation and orientation of belief and confusion. The screen is only the final destination of Robertson’s Spectacle. The Robertson’s phantasmagoria show describes by Tom Gunning as like as live commentary. Before reaching the first exhibition space the ‘Salon de Physique’, audience have to pass through walking pathways between crumbling walls of the convent, gravestones of deceased nuns, along the corridors of the former court cloister. The corridor had decorated dark and fantastic paintings.

The first exhibition room ‘Salon de Physique’ set aside of scientific experiments and devices. Here Robertson demonstrated the ‘Galvanism’, the power newly discovered electrical, optical and aural devices like distorting mirrors, peep shows, ventriloquism and invisible woman, which can answer the visitors' questions with disembodied voices. Robertson’s demonstrations recreated Galvani’s application of electrical shock to the leg of a dead frog, which then twitched uncontrollably. All these scattered devices designed to confuse and
transform the senses, in a position that, whether what they were seeing and hearing was actually, what it seemed to be. Actually it meant to convince viewers that at the end of the eighteen century, humankind was about to enter a brave new world and embark on a new path of scientific progress (Gunning 25).

The Phantasmagoria literally took place on the threshold between science and superstition, between the enlightenment and terror. Robertson’s gathering of phantoms took place behind a huge archaic door covered with mysterious hieroglyphics. It was connected to the main auditorium of phantasmagoria. An aural cue, tones of glass harmonica, signalled the opening of this passage. He most likely lay in the use Franz Anton Mesmer made of the ‘Celestial harmony’ by the glass harmonica.

The audience found their seats in the large hall. A single hanging lamp initially dimly lit the room draped in dark curtains, its funeral pall broken only by bleached skulls and ancient masks hanging on the walls. When this one dim light source was extinguished, the silence was penetrated by sound effects imitating rainfall and thunder, tolling church bells and return of the glass harmonica.

The Phantasmagoria differed from traditional magic lantern shows primarily in that it concealed the apparatus from the audience’s view. The magic lantern, the mechanism itself, had previously played a visible role. The ‘Phantascope’ of Robertson was placed behind the screen instead of in front of it, so that viewers saw the projected images but not their sources. Phantasmagoria created illusions primarily by concealing its means of projection. This technique is adapted from the magic shows. Limiting the audience viewpoint and manipulating their perception by withholding sensual information or by overstimulation the senses.

The “Phantoms” of images are suddenly loomed out of the darkness. This looming effect greatly enhanced by the illusion of motion. The Phantascope wheeled smoothly towards

---

39 The ancient Egyptian symbols, which has mysterious meaning had not yet been deciphered.
or away from the screen along polished brass rails. The synchronised movement of lantern along with lens focus projected image on the screen to either increase or decrease in size. This unusual effect truly shock up the spectator. Certain slide emphasis the effects of movement in the audience. Some slides showed the images of those who had recently died. Apart from a projection on screen, the wavering appearance of phantom images projected onto smoke emitted by a burning brazier. This type of immaterial visions can fulfil the Shakespeare’s spirts.40

In 1973, ‘Philip Polidor’ introduced the phantasmagoria in Paris. He clarified about the show like there is no ghost such thing existed, he was producing enactments and images, which are imagined to be ghosts, in the dreams of imagination. However, he will surely astonish the spectators through his show. One way we can say the Phantasmagoria show was an Art of total illusion.

**Utsushi-e**

Utsushi-e is a Japanese Traditional Magic Lantern Show. It was very popular in the 19th century. It was one of the historical aspects of Japanese visual culture. Today we are enjoying the imaginary world created by digital technologies such as computer graphics or virtual reality. The representation of fantasy did not start with cinema, prior to cinema people entertained with colourful moving images along with a narration in travelling magic lantern shows. Optical entertainment toys like peepshow boxes were also popular in this century.

Utsushi-e, which was also called ‘Nishiki-Kage-e’ in kansai region,43 was the most high-tech visual entertainment of the time.44 The Magic lanterns brought from Holland and developed a Japanese original visual entertainment form ‘Utsushi-e’, which is close to

---

40 Quoted from Shakespeare’s Tempest, “melted into air, into thin air”. etc.,
43 It includes Kyoto and Osaka.
phantasmagoria. It enchanted by the Japanese audience with the vivid colours and dynamic animations along with traditional Japanese music.

Instead of modifying Magic Lantern, aspects that are more theatrical were added to the show. ‘Kameya Toraku’ was a talented magic lantern fabricator and showman in Japan. He mastered in the art of comical story telling through his paintings and drawings. Inspired by the magic lantern slide shows he performed a show for the people of Edo in 1803. Utsushi-e merged the tradition of storytelling with image, accompanied by music.

In the performance of Utsushi-e, colourful figures painted on glass slides would dramatically move on the screen, a traditional storyteller told the stories of love and hate, or tragedy of noble samurai, with the supporting musician. The screens were made of thin, strong and half-transparent Japanese paper, which was ideal for rear projection. The audience could not see the trick. Toraku’s performance happed after few years of Robertson’s first Phantasmagoria show. It was an interesting parallel in the history of visual entertainment.

Toraku used lightwood for lanterns instead of metal. So, it became easy to handle and travel for the show. Titles performed on the Utsushi-e were mainly taken from other popular theatrical entertainments such as Kabuki, bunraku, rakugo or sekkyobushi. Ghost stories were most popular for summer nights. Apart from classic theatrical titles, local tales and local dances also performed on screen. One night programme consists, one classical title, one local tale and short pieces of tricks. The short tricks are may be buds turn into flowers, a tree in winter without leaf would suddenly bear gorgeous cherry blossom.

The lantern called as ‘Furo’, which means ‘bath tub’. The wooden case of lantern exterior could not get too hot even for a long time the oil lamp burning inside. Therefore, the showman can easily hold the lantern and able to project dynamic and delicate animation

---

techniques behind the screen for a long time comfortably. Operative techniques were archive through ‘Furo’ with the collaboration of multiple operators. With the combination of wooden and glass masks, the use of threads, they produce the effects like, fade in / fade out, cut in/ cut out, zoom in, overlap in the shows. In the performance, they will use more than one lantern. Approximately 100 images were used in one story. The slides are called ‘Taneita’.

In the above image, at least five lanterns are in use, three for backdrops, and two for the characters. Backdrop slide lanterns kept on stands, the handheld lanterns are used for characters. The popular form of Japanese Magic lantern shows ‘Utsushi-e’ forgotten after the arrival of cinema. It has not developed as a new entertainment genre or art form. It was replaced by the new visual entertainment for of cinema. People were attracted to Utsushi-e, because of moving images. The more powerful moving images are hijacking the audience. In the west phantasmagoria also disappeared after the arrival of cinema. The cinema itself emerged from the magic lantern technology especially projection techniques. Magic lantern and phantasmagoria made the basis of the visual culture we have today.

Utsushi-e is a rare case in our history about an alien media technology merged with traditional culture and developed into truly Japanese mass entertainment in a short time. Karl D. D. Willis divided the Projection Techniques of Utsushi-e performance into four categories (Willis 5). Those are device movement, projection occlusion, multiple projections and image design. The defining feature of handheld projector was for mobility. The projector causes the image to move, shake, and distort with the every movement of the device. The movement of the projector used to animate projected imagery. The size, weight and heat-insulating qualities of Furo allowed the performer to control the size and location of the image on screen. Translating the image by moving the device up, down, left and right, Rotating the device to project on more distant surfaces, Scaling the image by moving the device toward and away the screen.
Projection occlusion occurs when the performer blocks the projection of light to the screen. Wiping to make an image disappear using a wooden board, fading the image in and out by lowering fabric over the lens, flickering the images by waving a hand in front of the lens. Multiple Projection systems montage projected images together on a single screen. In the Utsushi-e performance, imagery projected from each furo would make up one part of the overall image. Cross-fades between two images by projecting on the same area then fading one image out and the other image in. Superimposing separate images together by projecting from slides with a black background. Combining image segments together to create a single image, multiple projects are aligned side by side or top of each other, animating superimposed images by aligning them together then moving them apart.

Image Design consists of the spatial layout or temporal sequencing of slide imagery. Slides manipulation to animate imagery was one of the primary methods before cinema. Switching between slides by shifting the slide pieces from one slide to the next slide. Image rotation achieved by pulling a string to rotate a circular slide. Occluding parts of the image with black slide patterns to animate movement was achieved by pushing or pulling the entire black patterned slide or one segment of it. Segmenting slides into multiple parts to animate individual movement by directly manipulating slide. Colouring an image by moving a coloured slide over an outline slide.

Pepper’s Ghost

The date of the first use of the magic lantern in theatre was difficult to pin down. Generally assumed to be 1827 in a production at the Adelphi Theatre in London of the Flying Dutchman in which the ghost ship was projected (Walne 9).

Pepper’s Ghost was the outcome of combining a theatrical magic and a magic lantern show of ‘John Henry Pepper’ and ‘Henry Dricks’. Dicks created a model of an apparatus capable in theory of projecting a lifelike ghost onto a stage before an audience. According to
Thomas Weynants this appearance of a ghost-like projection was in fact the illumination of real actors, dressed as ghosts. John Henry Pepper builds a practical working model for use in the theatre. He make use of the light abilities which can able reflected sever times. He incorporated pepper’s ghost into “the haunted Man” by Dickens. The principle of pepper’s ghost was ‘the actor whose image was projected through the 45-degree angled mirror upward and onto the stage as it were. The projectionist operated from beneath the stage along with the actors. Other characters on the stage would interact with the ghosts.

At the Paris International Exhibition of 1900, the Lumiere’s presented their ‘Photorama Lumiere’. It was a 360-degree panoramic projector, which used 70mm film and an anamorphic stereoscopic motion picture system that was later introduced in 1935. In the middle of the 18th century, devices such as Robert Smith’s ‘Ocular harpsichord’ and the ‘Chase electric Cyclorama’ were popular and could have influenced ‘Adolph Appia’, who was popularly assumed to have introduced slide projection into theatre (Walne 9).

Adolph Linnebach developed a lens less projection system, Linnebach lantern. It was replaced the existing projection technologies in the early 20th century theatre productions. He demonstrated the effect at the court Theatre Dresden in 1976. The Linnebach shadow techniques are the only projection system, which enables the effect to be judged whilst the slide is being prepared in situ (Walne 13). It is concentrated filament, highly intensify lamp placed in a deep box painted black inside. One side of the box is open and contains a glass or mica slide carrying the design to be projected. It can project from behind onto a translucent screen or from the front of the stage onto a backdrop. It used to create silhouettes, colour and broad outlines can projected as a part of the background scenery. It was most useful on small stages and then only to suggest a background rather than to convey precise information. One early use

of this technique in the UK was for the production of *Tobias and the Angle* at the Westminster Theatre in 1931 (Walne 15).

George Bernard Shaw reported to ban the use of Coliseum clouds in his productions. His complaints that, audience are busy staring at clouds and ignored to hear his words in the play. Such reports of a distracted audience behaviour noticed at that time of using this system (Walne 16). Thomas J. Digby had developed an arc slide projector, which was called Pattern 85. The carbon arc was to remain the light source for projectors for many years. Strand Electric founded in 1914 and itself it became the dominant company with short time. For the Empire Exhibition of 1924 and 1925 at Wembley the company projected a waterfall 25 feet high and 7 feet wide. Ludwig Pani has founded a company in 1930. It was in the early days more scientific rather than theatrical. The company's core product is the BP4, which was introduced at the Bayreuth Festival in 1973. Paine produced servo operated glass sliders, which were gradually shaded to black.

**Seminal Works**

The experiments of practitioners, which has become seminal in the development theatre performances illustrated here along with their visions in this section.

**Richard Wagner**

J. L. Styan considers Wagner to be the seminal influence of experimental theatre (Stylan 182). Artistic Man can only fully content himself by uniting every branch of Art into the common Artwork (Wagner 4). In his writing ‘The Artwork of the Future’ (1849), Wagner has expressed the vision, which was the creative unification of multiple art forms: theatre, music, singing, dance, dramatic poetry, design, lighting, and visual art (Dixon 41). Wagner attempted to engineer a wholly immersive audience experience through a variety of technical and artistic strategies. He fulfilled his ambition by the construction of his own theatre, the Bayreuth Festspielhaus opened in 1876. It has designed with a fan shaped auditorium to ensure perfect
sight lines from every seat, and which eliminated the visual distractions of traditional nineteenth-century theatres to focus all attention on the stage action. The acoustically sophisticated theatre also utilized to intensify the illusion of Wagner’s mythic images.

Wagner was thus the first theatre producer to design and construct a sophisticated audio “mixing” system (Dixon 42). Wagner’s own version of the Gesamtkunstwerk (Total Artwork) has expressed in his epic “music-dramas”. The film projection with integration of theatrical performance we can find in the experiments of ‘Loie Fuller’ in 1911 during a light-hearted Berlin revue. In Paris, ‘Valentine de Saint-Point’ created an idiosyncratic multimedia dance performance at Comedie des Champs-Elysees in 1913 (Dixon 73).

**Winsor McCay**

McCay was an American cartoonist and animator. He toured with his animation film *Gertie the Dinosaur* in united stated in 1914. The animation film was integrated with the actions of McCay. He costumed with a pith helmet and long boots, along with a whip in hand for the performance. McCay stands on stage in the spotlight, issued gestural and verbal commands to Gertie. Gertie was an animated silent film character projected onto a movie screen at the back of the stage. The dinosaur responds instantly to the McCay’s instructions like head nodding, sitting up and rolling over. He achieved it by following precision timing of delivery. The emotional sequences also had been part of interactive performance. McCay throws of apple towards the screen in sync Gertie catches it. At the climax of the performance, McCay Walking behind one side of the screen and he instantly reappeared in the same position and in scale on the film, continuing the walk as an animated figure. The virtual McCay stepped onto Gertie’s back and they rode off into the distance (Dixon 74).

The researcher identified this work was one of the earliest picture-perfect examples of the integration of film in theatrical performance. The McCay enacted the role of live performer.

---

47 Film enclosed in Chapter two folder of enclosed DVD.
by using theatrical elements of lighting, costumes and property as aids to narrate the performance along with film projection. The Dialogic interactivity between live performer and projected image was one of the contemporary feature of multimedia theatre performances. Apart from interacting, the live performer walked through a screen and established his virtual counterpart was much used multimedia performance technique. The close timing to “cheat” a sense of “liveness” was a remarkable technique brought out by McCay through his performance hundred years before.

The researcher intensely assumed that, McCay’s Production ‘Gertie the Dinosaur’ at 1914 was the first Theatrical event, which embeds projection as integral significant element of the performance. In the 1920s, film projection was incorporated into many cabaret and music hall performances, and performers continued to experiment with and refine illusory conjunction effects. These included the French magician Horace Goldin, who juggled with the combination of actual and filmed objects; and Robert Quinault, who created dances that synchronized live movement with slowed-down film versions of the same actions (Dixon 74).

Frederick Kiesler

According to Roselee Goldberg’s in her book ‘Performance Art’, Frederick Kiesler’s 1922 multimedia design for the Berlin production of Karel Capek’s Rossum’s Universal Robots (R.U.R) was one of the most extraordinary and high-tech of the early 1920s (Dixon 75). He used circular and rectangular sized screen for film and live projection. Rectangular screen represented a type of closed-circuit television monitor for the factory director to observe and vet visitors approaching the factory. A backstage mirror arrangement reflected and “projected” the live image of (offstage) visitors who walked inaccurate perspective, as if towards the factory’s spy “camera”. When their admittance to the secret factory was authorised, the factory director used a remote control device to shut the screen window, and the visitors walked onto the stage from the wings.
The circular film screen was used to back-project pre-recorded film sequences of the robot factory workers. The use of a moving camera to film these sequences created an engaging illusion that, the actors on the stage walked into the perspective of the moving picture too (Dixon 75). Kiesler constructed a trough of water system above the screen, because of the allegation raised by Berlin police that, the film projection system may pose a fire hazard in theatre. Thereafter, the film sequences were projected on waterfall, creating a beautiful, translucent effect (Goldberg 116). Kiesler secured the production place in history as first to marry projection and flowing water.

**Georges Méliès**

The early films were shown at music halls and vaudeville theatres with a mixed program, which includes comedy turns, magic demonstrations, songs and dances. The fictional settings of films depended on popular theatre practitioners in its creation. Greg Giesekam states in the book staging the screen, George Méliès, a theatre practitioner who became a pioneer of cinema, produced a film specifically for use in a theatrical production in 1904. The George Méliès experiments with film became fundamental techniques for filmmaking. Historians treated his works too theatrical (Giesekam 31).

**Erwin Piscator**

Erwin Piscator attempted to adapt drama into the modern context. His theories were influenced the contemporary theatre practitioners of Germany. Piscator introduced mass media to the stage in order to make the theatre capable of handling twentieth-century issues (Innes 2). Fusing film into a dramatic action was Piscator's decisive innovation. To make appropriate film sequences for his productions, to train actors to conform to the new conditions, to compose incidental music suitable for the mechanical nature of his stage and to provide scripts that he could use, Piscator opened his own theatre founded as a teaching studio in 1927. This brought every aspect of drama under his direct control, which made it possible for him to produce
practical examples of the ways modern technology could represent contemporary existence in its range and complexity, opening fresh areas of experience to the stage and providing it with new means of expression (Innes 5). Piscator formulated his theory by observing the effects of his practice. His contemporary Brecht overshadowed Piscator. His post war experiences draw him towards Dadaism and Expressionism.

The shortest scripts he produced has designed to make an immediate propaganda impact, initiated the Agitprop movement in Germany and formed the basis of his mature work (Innes 3). He used film in stage production first in 1925 for *Despite All!* Piscator’s most successful productions are, *Hoppla, We are Alive!* By Toller, *Rasputin* by Alexei Tolstoy, *Schweik* and *Economic Competition* by Leo Lania. These complex productions are combining the extreme elements of Total theatre with fully developed documentary techniques.

Each of Piscator’s ventures is short lived, because of his constant experimentation and his exorbitant use of machinery along with the contemporary situations in the Weimar republic. His Dadaistic principles and criticism of local figures lead to close his Das Tribunal. He worked at the New School for Social Research to conduct the Dramatic Workshop in 1938 at USA. His productions rise questions, which are significant for contemporary theatre as a whole, the relative claims of utilitarian and aesthetic principles, and the use of evidence as against imagination (Documentary Theatre), the effectiveness of audience involvement (Total Theatre) or distancing (Epic Theatre), and the nature of propaganda (Innes 8).

**Artistic Contributions**

Piscator was the first stage director to logically employ the mixed media of film and live performance on the legitimate stage (Kerz 364). Piscator brought the edited newsreel film into the theatre space to emphasize the political dialectics of his devised documentary production *In Spite of Everything* (1925). According to Hugh Rorrison, Piscator contrived for
the first time in the theatre’s history a dialectical interplay of factual material, for example setting off political intent against its military consequences (Dixon 77).

Piscator controversially inserted film of Lenin in his staging of Ehm Welk’s play *Strom over Gotland* (1927). His conception of the play was “an episode in the march towards communism”. He specially shot footage of five of actors marching toward the camera. As they march, their period costumes transform into a series of cinematic dissolves, placing them as characters within four historical left-wing revolutions – the Peasant’s War, 1789, 1848 and 1918 (Dixon 77).

**Theatre of Bauhaus**

The Bauhaus school was best known for its contribution to industrial design. The scholars undertook a wide range of aesthetic investigations to examine the formal principles of abstraction in painting, photography and sculpture. They also explored the influence of technology, which had a profound impact on their work and ideas. Based on the experiments Moholy-Nagy and Schlemmer develop a new kind of theatre based on these principles. They employed modern science and technology for artistic ends.

Moholy-Nagy integrated mechanical motifs in all his work. His concept of the ‘Mechanized Eccentric’ injected the qualities of machinery into every aspect of the stage performance. It emphasized the physical rather than the literal. It reduced the importance of the written word and the presence of the actor, placing them on an equal plateau with stage design, lighting, music, and visual composition (Packer 17). Moholy-Nagy proposed replacing the traditional movie screens and its connotation of the picture frame with convex or concave screens of different sizes and shapes; in one 1924 version, three films were to be projected simultaneously onto the inner surface of a hemisphere (Kirby 50).
Robert Edmond Jones

Edmond Jones one of the American leading theatre designers, he toured the country between 1941 and 1952 delivering lectures with such titles as “The theatre of the future” (1941). Robert Edmond Jones vision was the fusion of theatre and cinema.\textsuperscript{48} According to Jones, “in the simultaneous use of living actor and the talking picture, there lies a whole new theatrical art, an art whose possibilities are as infinite as those of speech itself.” He argued that the film offered a resolve to the theatre dramatists’ problem of how to express effectively the inward reality and subconscious of their characters. In Jones “Theatre of Future”, the live actor would thus represent the character’s outer self and the screen imagery the inner world of imagination, subconscious and dream: “the two worlds that together make up the world we live in.”

Robert Edmond Jones developed his obsessive theme, the synthesis of film and theatre in a book named \textit{The Dramatic Imagination} in 1941. It was a leading theatre book for American theatre students. Delbert Unruh published the reworked and distilled lectures by Robert Edmond Jones, as \textit{Towards a New Theatre} in 1992. He explains in quasi-Freudian terms how film images can used to reveal a character’s inner thoughts and feelings, concluding in typically direct and economical fashion.

On the stage: their outer life; on the screen: their inner life. The stage used objectively, the screen used subjectively, in a kind of dramatic counterpoint. Not motive as it is revealed in action, but action and motive simultaneously revealed to us. The simultaneous expression of the two sides of our nature is an exact parallel to our life process. We are living in two worlds at the same time – an outer world of actuality and an inner world of vision (Dixon 81).

The relationship to the live performer, the film image becomes “visible thought” and “visible emotion,” creating a new expressive form conjoining the subjective, dream quality of

\textsuperscript{48} First discussed in a contribution to the Encyclopaedia Britannica in 1929 entitled “Theory of Modern Production”.
film with the power of actuality, where the “unembodied part” of the performer meets the embodied part. Jones defines fundamental principles and divisions between theatre and moving-image media, including their contrasting modes of spectatorship that affect the sensory and psychological experiences of audiences. He is one of the first theorists to analyse and define precisely why our mental energies and physical metabolisms appear to alter when watching a live or recorded body in performance.

Jones’s understanding of the filmed and projected body as unembodied part of the self-sent forth at will. His argument differs from some fields of virtual theory is in his call to reunite the virtual and physical bodies. He stresses that it must be brought into conjunction with the live body to ignite a total theatre based on a quasi-spiritual paradigm of making the split subject whole. Jones’s theatre concerns their symbolic unification in space and time – real and virtual, mind (film) and body (stage) (Dixon 82).

Josef Svoboda

Josef Svoboda was an architecturally trained stage designer. In less than twenty-five years, he has designed almost three hundred fifty productions. He worked as chief designer and technical director of the National Theatre in Prague. His name was chiefly associated with a full-scale exploitation for stage purposes of the latest mechanical, electronic, and optical devices, with wide-ranging use of sophisticated lighting and projection techniques. His scenography is a basic pragmatism49, slightly ambivalent and requires elucidation. He welcomes the contribution of the latest techniques and devices and is able to derive maximum benefit from them, but their presence is not even essential. What is essential is the approach to the job. We have to use expressive means that precisely fit the production concept. Svoboda

---

49 Thinking about solving problems in a practical and sensible way rather than by fixed idea and theories.
used the given element as an instrument after mastering on it. He would like to eliminate dilettantism and make theatre truly professional.

According to Jakara M. Burian, Svoboda’s scenography mode like as primarily symbolist, constructivist, expressionistic or even illusionistic. His works reflect instances of each of these modes as well as a combination of them. Svoboda depicts each element is unique, and we have to consider the features special to each one. Theatre is synthetic, componential phenomenon that ideally needs balancing.

Svoboda dislikes a fixed, static stage. He sees dynamism as fundamental to any work of theatre art. It can capable of expressing changing relationships, feelings, moods. He encouraged by the term ‘kinetics’, that has been applied to his scenography. The fundamental scenography effect intended by Svoboda was suggestive. The setting should evolve with the action, cooperate with it, be in harmony with it, and reinforce it, as the action evolves. Scenography is not a background or container, but in itself a dramatic component. It can able to integrate with every other expressive element of production and produce a cumulative effect upon the viewer. Dramatic space is psycho-plastic space, which means that it is elastic in its scope and alterable in its quality (Burian 126). Svoboda believed that, the theatre distinguished from all other arts precisely by its intangible forces; time, space, movement, non-material energy- in a word, dynamism.

Svoboda distinctively evolved few scenography techniques to illustrate the principle of dynamism. Those are kinetic scenery, mirrors and projections. The use of kinetic scenery and mirrors are evident in Svoboda’s productions of *Romeo and Juliet*, *Insect Comedy*, and *Hamelt*. The kinetic architecture created one kind of psycho-plastic space, which fluidly responsive to the emotional demands of the activity.
Projection techniques

The creative work of slide and film projection created a metaphoric and poetic vision for the production. These techniques are concerned with space and synthesis. Svoboda states that, we can enhance the theatre space by many means, whereas film can only transcribe space. In theatre, we can enhance space by the use of film; that is why theatre is the art of greatest synthesis (Burian 133).

Svoboda devised two forms of primary projection systems, Polyekran and Laterna Magika. Polyekran literally means ‘multi-screen’. It is one of the Svoboda’s contributions to the Brussels World’s Fair of 1958. It is fundamentally pure projection form. It has not combined with live action or scenic elements. It is a responsive product of Svoboda’s to the development of various wide-screen techniques in 1950’s. Through this, he attempted to eliminate the impression of a screen and to give the spectator the sensation of being part of the picture. Polyekran deliberately emphasizes the presence of the screen, or, rather, screens. Its principle is a simultaneous and synchronous projection of slides and film on several screens during which the images on the individual screens are in the dramatic interplay with each other in the creation of a total, organic composition. Svoboda articulates that,

Polyekran offers the possibility of free composition, a free shaping and creation on several screens. Images of real objects and people are projected, but the relationship among them are not realistic, but rather supra-realistic, perhaps surrealist… it’s the principle of abstract and pure collage, which is an old and basic technique of theatre… the contrast of varied things on stage is basic to the theatre; the objects there by acquire new relationships and significance, a new and different reality (Burian 133).

The ten-minute Brussels production has seven screens of different sizes and shapes in different angles suspended from horizontal wires in front of black velvet backdrop. Eight automatic slide projectors and seven film projectors, synchronously controlled by electronic tape, threw images upon these screens. The visual collage accompanied with a stereophonic sound. Polyekran was totally a film spectacle and technically concern of film.
Laterna Magika was a new, hybrid medium. It is a theatre, with living actors, singers, dancers, and musicians on the other hand a scenography techniques, slides and film projection were added to enhance the expressive possibilities. The uses of mobile screens employed in the performance along with live actors. Svoboda commented about Laterna Magika as,

“The play of the actors cannot exist without the film, and vice-versa – they become one thing, a synthesis and fusion of actors and projection. Moreover, the same actors appear on stage and careen, and interact with each other. The film has a dramatic function” (Burian 134).

Laterna Magika was devised for the Brussels fair of 1958, as like Polyekran. It involves three film and two slide projectors, synchronously controlled, plus a device that enabled deflection of one projection beam to any desired spot, including a moving screen. Directional reflecting surfaced eight mobile screens, including a diaphragmatic frame curtain. Which could capable of rise, fall, move to the side, fold up, rotate, appear and disappear in precise rhythm with the actors employed for the performance. The stage itself was equipped with a moving belt and special scissor traps to accommodate the need for virtually instantaneous live action in response to the film. The presentation was enhanced by multi-speaker stereophonic sound. Jan Grossman states that, the technique of Laterna Magika offered a new language to theatre to make production.

The Laterna Magika experienced some of the problems. The filmed portions had to be prepared far in advance of their integration with the live performers, which meant that many artists decisions had to be made and became binding long before there was any way of knowing how they might work out months later.50 A more profound problem was that the film virtually enslaved the live performer, whose margin of variability in performance approached zero, because the film was a prefabricated element to which the performer must inflexibly adapt. Svoboda overcome this problem to some extent in a few productions by employing live TV

50 This is also one of the problem of contemporary Indian theatre projection practices.
transmission onto screens in live performance. Laterna Magika never experienced the ultimate test of presenting a work that was written especially for it.

Bertolt Brecht

Brecht was collaborated with Piscator’s productions in his first company in 1927. Brecht significantly contributed to Piscator’s landmark productions in dramaturgical writings. The Piscator’s productions influenced Brecht’s ideas about staging and design, and altered him to radical potentials offered to the epic playwright by the development of stage technology, particularly projections.

Theoretical Review

Media Projections existence in theatre play productions stimulated a lot of discourse on different aspects of its integration. Avant-guard movements acquainted with earlier projection practices in theatre. Before that, also the researcher traced the descriptions about the discourse of projection events. The researcher here attempted to illustrate the a few theoretical discourse with the relevance of the study.

Allegory of Cave

Allegory is a device in which characters or events represent or symbolise ideas and concepts. Rhetorical allegory is a demonstrative form of representation conveying meaning other than words that are spoken. In the book of ‘Republic’, Plato illustrates “our nature in its education and want of education” by using analogy of the cave allegory. It has written as in the form of dialogue between Plato’s friend Socrates and Plato’s brother Glaucon.

A group of prisoners chained and facing them towards the wall since their childhood in a cave. Their heads are also not possible to turn side by side. They are watching their own long

---


52 In the beginning of the book Plato’s Republic VII.
shadows cast by the big fire behind them. They are unable to distinct their own shadow with other shadows. A long heightened wall has a walkway between fire and the wall. The cave dwellers are manipulating the puppets and objects to cast shadows on the wall with bigger noise. The prisoners are imagining the shadows of the puppets and synchronise the echoed sounds of puppeteers. This illusionistic world is the real world for them. They try to name the shadows and remembering them with subsequent appearances. The wise among them will guess the next appearance of the image and get applause from the remains.

A prisoner made him release and showed the fire and object, which cast the shadows on wall. He was unable to see the fire, because his eyes are not accustomed to watch bright light. The objects he unable to recognise like the shadows on the wall. Slowly, he came to understand the cause of the shadows on the wall and sound. He had broken his illusionistic world of shadows and enlightened by observing the facts of the fire, objects and puppeteers. The prisoner came out from the cave to the physical world. The nature made him astonish. In a period, he can able recognise the reflections of objects in water, shadows of object on the surface and he understands the truth and the cause of all, the light source Sun.

The prisoner intends to share the acquired knowledge with his old prisoner colleagues. He entered into the cave, elaborates about the existing real world out of the cave along with cause for shadows. The remains unable to understand, what he tries to explain. They laughed against him and concluded that he may become blind, by going out of the cave. The prisoners are very comfortable to live with their illusionary shadow world.

Through this allegory of cave illustration the Plato illustrates, the normal people like a prisoner in the cave, comfortable with the imaginary world projected by the manipulators of the society. They try to expertise on what they imagine and know, without consideration of the causes. Puppeteers are the group of people try to persuade the others. Who helped the prisoner to release from chains and made him to demonstration the fire and finally drag out from the
cave to physical world was represented the path makers in the society, which leads to
knowledge. The realised prisoner realised the truth by exposure of the knowledge and became
a scholar, intend to share the facts regarding with physical world and the imaginary world. He
tries to empower them with his findings, but they rejected him like philosophers.

The Plato’s allegory of cave relates to this current research in two ways. First, the
discrete documentation of the phenomenon of projection of shadows, by placing objects
between fire and wall by manipulation of puppeteers. Even though, the allegory was a
metaphorical representation of Plato’s philosophy. Second, the effort of this study by
researcher has a resemblance in which he tries to understand the facts regarding the projection
phenomenon in contemporary theatre practices.

**Paleo-Camera Theory**

This was a one of the theories related to the art origin theories. Matt Gatton proposed
this theory by working through across a series of experiments in Paleo cave art. The invention
of art (and eventually the written word) enabled communication in the physical obscene of
communicator, spreading ideas and beliefs, and engendering social cohesion over greater
distances and populations (Gatton 4).

Matt Gatton claims that, ‘there was a time before the art and then there was art. What
happened? Where did anyone get the idea of depiction, that it is possible to make a small flat
approximation of real object? How could a person stumble upon the idea of images on the
wall?’\(^{53}\) He gave a solution like, in the Palaeolithic period human beings have lived in the caves
to protect from natural forces. Most are living in rudimentary huts and tents. Inside the caves
has dimmer lighter than outside brighter sunlight. The contrast between a bright outside and a
dime inside is the foundation of camera Obscura formation (Gatton 962). Small holes in the

---

dwellings are happening because of the agents of material deterioration like ants, rats, bees, and weather, etc. ultimately natural camera Obscura evolved. The contemporary camera built based upon this basic principle of camera Obscura. The camera Obscura was not a human creation, but its occurrence happened coincidentally.

The reflected light from the outside environment of the cave can pass through the nature made aperture through camera obscura, cast upside down inverted moving image on inside cave wall. The people inside the cave can see the living animals outside and the same time they can see its image inside. The image and objects were in opposite directions from each other. In that, perceptual movement the animal on the wall was independent of any real object. It was a ‘representation’, a two dimensional approximation of the physical world. A randomly projected image stands for a real object; it says bison without being a flesh and blood bison, planting the idea of referent, the conceptual beginning of art.\(^{54}\)

Not all the holes in the cave can produce the camera Obscura effect inside every time. Based on the trajectory movement of the sun, the light reflective angle may vary time to time. The distance between aperture and projection surface, the size and thickness of the aperture were the controlling factors for the Paleo camera Obscura images.

**Avant-guard Movement**

Futurism was an Italian movement as artistic and social movement in the early years of the 20\(^{th}\) century. It fed on the dynamic and rapidly changing social and political situations of twentieth century life.\(^{59}\) Futurism was born out of a faith in and fascination with significant, life-changing “new technologies” that all emerged and converged around the same time: film, automobiles, airplanes, and electricity. The futurists are admired with Speed and technology.

---

\(^{54}\) Cited from Paleo-Camera online webpage, Retrieved on 22 April 2011 at, http://www.paleo-camera.com/

\(^{59}\) Aaron Yontz’s Futurism, Futurist Practices and Modern Futurism, retrieved on 17 July 2011 at, http://www.unc.edu/~jimlee/AaronYontzFuturism.htm
Publishing manifestos was a feature of futurism. Filippo Marinetti published the first manifesto of futurism in 1909. He believed that, it was time to create a new form of art for the people, based on the beauty of speed and the power and force of machinery. Futurism wanted to leave behind the old static art of the past and move forward into the future. In order to transfer these ideas futurist playwrights wrote dramatic scenes known as ‘sintesi’.

The futurists used the mechanical eye of the camera to suggest a new view of the world, a mechanical one, able to observe and preserve time and space in a way beyond normal human capabilities (Dixon 52). The Futurist Synthetic Theatre manifesto of 1945 announces an “entirely new”, mechanical theatre, and in Russia, the 1921 Eccentrism (Aka Eccentric Theatre) manifesto opens with a plea to the actor to “forget about emotions and celebrate the machine”. It goes on to propose a “mechanically exact” theatre where the author becomes “inventor-improviser” and the actor is “mechanized movement” (Dixon 53). Yuri Annenkov described in his 1921 manifesto ‘the Theatre to the End’ perfectly encapsulates late-twentieth-century understandings of the role of the director and programmer within digital performance practice as,

‘The master of the new theatre will have a conception of the theatre completely different from that of the contemporary playwright, director, stage designer. Only the mechanical and the electric will be the creative ones in the new liberated theatre. A chronometer and metronome are going to be on the directional table of the master of the theatre (Dixon 54). After eighty-two years later, in 2003, Patrice Pavis would both cut confirm and lament Annenkov’s prediction had come true.

Enrico Prampolini’s 1945 manifesto, ‘Futurist Scenography’ conjures another precise and accurate premonition, describing luminous stages and virtual bodies in exactly the forms that we now see them, almost a century later. His description of the replacement of living actors

---

by luminous forms is a commonplace in digital performance through digitally manipulated human forms, as well as computer-generated figures and avatars (Dixon 55). A computer generated animated head appears on the rear screen and interacts autonomously in real time with live performance (Broadhurst 157).

The Italian futurists worked toward a new synthesizing and technological performance form, just as performance practitioners using computer technologies are attempting today. Exactly “the machine” and the new technologies of their day, the futurists sought a multimedia convergence of art forms and the marriage of art with technology (Dixon 47). Futurists termed synthetic theatre as a mathematical formula like,

\[ \text{Painting} + \text{sculpture} + \text{plastic dynamism} + \text{words-in-freedom} + \text{composed noise} \]

\{intonarumori\} + \text{architecture} = \text{synthetic theatre (Marinetti 15)}.

The 1915 futurist manifesto *The Futurist Synthetic Theatre* screamed in capitals that “EVERYTHING OF ANY VALUE IS THEATRICAL”. The central philosophical and stylistic elements of futurist performance were such as plastic dynamism, compression, simultaneity and the involvement of the audience (Kirby 49). The futurist principle of “divisionism” applied in painting (divided brush-stroke) and photography (Chrono-photography) to the depiction of motion in relation to time. The temporal movement was captured across the space. Futurism influenced art movements such as Constructivism, Surrealism, and Dadaism.

Vsevolod Meyerhold developed his training system “Biomechanics” with futurist impulse, and first publicly demonstrated the techniques in June 1922 (Dixon 64). The Frederick Winslow Taylor directly influenced Meyerhold’s biomechanical system.\(^6\) The system of physical performance training was embraced the ideology and aesthetics of the new

\[^6\] American industrial time-and-motion studies, which were transforming soviet approaches to industrial production. He pioneered in motion economy and work cycles in order to maximize output.
mechanised age and rejecting the “unscientific and anachronistic” approaches of Stanislavski and Tairov (Dixon 64).

Meyerhold argues in the paper “The Actor of the Future and Biomechanics” that, the actor’s art has always conformed to the social context and that in the future, the actor “must go even further in relating his technique to the industrial situation.” The “actor of the future” is compared not to a machine, but a skilled industrial worker who demonstrates rhythm, balance, stability, and an absence of movement superfluous to productivity. He presents a quasi-mathematical formula for acting like synthetic theatre (Dixon 65).

Russian constructivist Nikolai Foregger developed his own mechanically inspired physical training system ‘Tafiatrenage’ (Taffy pulling). It highlights the dancer’s body as a machine and volitional muscles as the machinist. His experiments in attempting a ‘cinefaction’ of the theatre included the projection by employing pioneering filmmakers including Eisenstein and Yutkevich. Sergei Eisenstein had worked as designer with both Fogger and Meyerhold. He revolutionised the art of cinema through his shot construction and editing as a “montage of attractions”. His artistic philosophy is akin to Meyerhold’s in relating art to industrial labour. Meyerhold had offered a Taylorization of theatre, Eisenstein announces a Taylorization of cinema (Dixon 65).

“What we need is science, not art. The word Creation is useless. It should be replaced by labour. One does not create a work, one constructs it with finished parts, like a machine. Montage is a beautiful world: it describes the process of constructing with prepared ingredients” (Rutsky 91).

Dziga Vertov’s controversial Kinoki (Kino-Eye) theory rested on a belief that “the eye obeys the will of camera”. Kinoki propounds the techno-positivist stance of the futurists, the sense of dream-realities of the surrealists, and formal geometric systems of constructivists (Dixon 66). Lev Manovich states that, Vertov’s Man with a Movie Camera as a starting point and guide to understanding the language and paradigms of new media (Manovich xv).
Futurism forms a fundamental philosophical and conceptual basis, constructivism provide its mathematical model and formalist methodology and the other movements in early European avant-garde provide fountains of inspiration for much of its content and styles of artistic expression. A digital performance commonly explores representations of the subconscious, dreams, and fantasy worlds as well as surrealist art. The Dadaistic experiments of “narrative disintegration”, cut-and-paste montages are then practiced in the art of theatre also. The destabilization of time and space and, equally significantly, the visual fragmentation of the human body, unite the artistic thrusts of many surrealist and digital performance experiments (Dixon 68).

Consider cubist paintings have also important precursors to multi-layered and split-image aesthetics of digital arts. Artaud discussed a “body without organs”. The Artaud thought should be the inspiration for the creation of new avatars and virtual bodies. The expressionist theatre design was closely related to lens based media, mirroring the cinematographic effects of extreme wide-angle and distorting lenses.

Liveness

Liveness has been a perennial theoretical problem since the incorporation of film footage into live theatre (Dixon 115). Early projection footage in theatrical productions was not relied on computer-generated imagery. It has derived initially from lens-based optical recording technology, called photographic system and handmade slides.

British art critic John Ruskin himself struggles with the notion of Liveness of the photographic image, which has a precise degree of closeness and its exact relationship to its referent and the real. Walter Benjamin’s “The work of Art in the Age of Mechanical Reproduction” (1936) was one of the most cited texts in theoretical discourses of Digital Arts and culture (Dixon 116). His central argument is that “even the most perfect reproduction of a work of art is lacking in one element: its presence in time and space, its unique existence at the
place where it happens to be… The presence of the original is the prerequisite to the concept of authenticity” (Benjamin 214). He distinguishes in mechanical reproductions a depreciation of the presence of the artwork and a withering of its essential aura (Dixon 117).

Performance scholars cite Benjamin as guardian of the incomparability of “liveness” tends to omit that he is also aware of the unique aura and incomparability of photographic art. The photographic reproduction is incomparable not because it is less than the live moment that it captures, but because it is, in another artistic sense (the photographic sense), the original that is designed for reproduction (Dixon 117).

Philip Auslander argues that, the live performance is just one more reproduction of a given text or one more reproducible text (Auslander 50). “The work of Art” used by critics on both sides of the liveness debate. On one side, it stands as evidence for the unique aura and presence of liveness, and on the other side, as proof that technological incursion does not significantly alter reception of the performance.

**Alienation Theory**

Brechtian alienation is usually presented as a theory of acting in theatre training often used to indicate a non-Satanislavskian performance by an actor. Grotowski reminded us that Brechtian alienation is not a method of acting. Josette Feral asserted that it could indeed be an effect produced by the play itself, and/ or by certain characteristics of the stage. There is no universal form, which consistently describes this specific process of alienation.

Alienation is an effect produced solely by the text. The appearance of the actor behind the character is primarily an effect of discourse. This appearance suddenly breaks out of the story in order to point it out to the audience. The songs in Brecht’s plays traditionally assume this. In narrative, alienation occurs first in the story line. It stops the narration and fragments the story. Through these holes in the narration, alienation blocks the progression of a fiction. According to Josette Feral, in his article ‘Alienation Theory in Multimedia Performance’,
Alienation can also be produced by embedding of signifieds or the superimposition of discourses (parody), and by the mixing of various rhetorical forms of performance (cabaret, film, slides, and pictures). These forms are nested one within the other; they appear; they vie for recognition; they make themselves known to the audience decentring its perception. The effect of alienation is the result of their juxtaposition (Feral 468).

Imagery brought to the stage by the use of the various media creates a rupture that forces us to adopt a critical stance with respect to the stage. Media such as screen, video, television, and film introduce a non-polarized subject, a new subject of enunciation that disbands the process of representation in progress.

**Phaedre Bell**

Phaedre Bell has discussed how the film or video may be used as a primary or secondary medium within the theatre – whether the event is primarily a film that also uses performance, or a theatre performance that also uses film. Apart from these two categories, she coins a third category ‘Dialogic media Production’, where there is an equal balance between the live and the recorded, and where the film /video has real agency and interactive impact on the performance through “inter-media exchange” (Dixon 104).

Bell’s analysis centres on Laura Farabough’s solo performance *Bodily Concessions* (1987) as a Dialogic media production. The live Farabough on stage represents her sleepwalking self, video monitor footage represents her conscious self, and a video projection screen represents her dreams. The subtle interactions between the three elements – live performer, video monitor and screen are at the core of the piece. The Dialogic exchange between stage and screen in the form of spoken dialogue exchanged between live and recorded performers has been commonly used in multimedia performances. Apart from that, the performer gradually drawn into the screen spaces and make free movements between stage and screen was also one of the mode of Dialogic exchange.