Art and Architecture Journal (2024) 5, (2) 130–144

ISSN : 2805-2838 (Print) ; 2805-2846 (Online)
Art and Architecture Journal
Available online at : https://aaj.journals.ekb.eg/

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**Keywords:**
printmaking; animation; animated Prints ;stop motion; stop frame

# THE HISTORY AND TECHNIQUES OF ANIMATED PRINTMAKING: THE RELATIONSHIP BETWEEN PRINTMAKING AND ANIMATION

## ABSTRACT

**Animated printmaking is an innovative technique. It involves creating a series of artistic prints that suggest movement when displayed in a row. This can be achieved through different methods and techniques, such as using multiple printing plates or incorporating colors and materials with different textures in the print, which provide the creative artist with completely freedom to express his ideas. The research focuses on the origins of animation and its early relationship with printmaking.**

**The research problem is determined by clarifying the link between some printmaking techniques and animation to tell a story in an artistic expressive way, and the different animation methods that can be used to animate artistic prints. The research deals with the descriptive approach in describing printing methods and the historical approach in identifying the origins of animation in drawings.**

**With the rapid technological development and the artist's urgent desire to use all new techniques and renewable materials, the animated prints has also begun to take an advanced form, such as using colored prints, photographing prints after engraving it successively to clarify the temporal factor and using printmaking techniques in the animated elements themselves. This effort is to produce the artwork in the form of an animated story and convey the idea to the viewer.**

**We conclude that different techniques can be used in animation and printmaking technique used can be made appropriate to the type of successive animation of prints to get a story or to add the temporal element and the third dimension.**

## الملخص

*تعتبر الطباعة الفنية المتحركة تقنية رائعة ومبتكرة، وهذه التقنية تتضمن إنشاء سلسلة من الطبعات الفنية التي توحي بالحركة عند عرضها على التوالي، ويمكن تحقيق ذلك من خلال تقنيات طباعية مختلفة، مثل استخدام ألواح طباعة متعددة أو دمج ألوان ومواد مختلفة الملامس في الطبعة الفنية، مما يتيح للفنان المبدع الحرية الكاملة في التعبير عن أفكاره، ويسلط البحث الضوء على نشأة الرسوم المتحركة وعلاقتها المبكرة بالطباعة الفنية.*

*وتتحدد مشكلة البحث في توضيح الربط بين بعض تقنيات الطباعة الفنية والتحريك لسرد قصة بشكل تعبيري فني، ومحاولة جعل حركة الطبعات المختلفة ملائمة لسرعة اللقطات المتتالية، ويتناول البحث المنهج الوصفي في وصف طرق الطباعة والمنهج التاريخي في التعرف على أصول الرسوم المتحركة في الرسوم.*

*ونخلص من هذا البحث إلى أنه يمكن استخدام تقنيات مختلفة في التحريك كما يمكن تطوير تقنيات الطباعة الفنية لتلائم التحريك المتتالي للطبعات للحصول على قصة أو لإضافة العنصر الزمني والبعد الثالث حتى يجعل الرائي أكثر تفاعلا مع العمل الفني وكذلك يمكن لفناني الرسوم المتحركة الاستعانة بخلفيات من الطباعة الفنية لما تتميز به من تأثيرات فريدة ومتنوعة تتسم بالأصالة وتنقل الحالة التعبيرية للمشاهد المرئية.*

*ومع التطور التكنولوجي السريع ورغبة الفنان دائما نحو استخدام كل ما هو جديد من تقنيات وخامات متجددة نجد أن الطباعة الفنية المتحركة بدأت تتخذ هي الأخرى شكلا متطورا مثل ادخال اللون على الطبعات وتصوير الطبعة بعد حفرها حفرا متتاليا لتوضيح العامل الزمني والانتقال من استخدامها في خلفية الرسوم المتحركة إلى استخدامها في العناصر المتحركة نفسها وكل ذلك سعيا من الفنان لإخراج عمله الفني في شكل سرد قصصي وتوصيل الفكرة للرائي.*

DOI :

## 1. Introduction

Animated printmaking is a comprehensive term used to describe any artistic printmaking technique used to produce animated images. There are various methods to create animated prints, but the basic method involves printing two or more images as frames that vary slightly and progress according to the intended movement. When displayed in sequence, the brain blends the images together, creating the illusion of continuous motion(Trethewey & Castieden, 2020).

The concept of motion in filmmaking serves as a foundation for exploring animated printmaking, combining the technical aspects of traditional printmaking with the imaginative and dynamic qualities of animation. This results in a unique artistic experience that maximizes interaction between the prints and the viewer. Through sequential frameworks, artists can push the boundaries of traditional printmaking and explore new technological possibilities for visual storytelling by animating prints one after another. Artists have the freedom to experiment with various techniques and materials, allowing their creative visions to come to life in unique and captivating ways.(Basahra,2020)

Printmaking enables artists to communicate their ideas and express themselves more effectively by offering a broad scope for experimentation and innovation. Mastery of different types of printmaking, such as linoleum cutting and lithographic printing, opens a world of artistic exploration. Animated printmaking can include cel-based printing, where animation relies on drawing images on transparent plastic sheets called cels, with up to 12 layered sheets roughly the size of A4. This technique produces unique visuals with foreground drawings on cels over static backgrounds (Arazzi & Sayahdikumullah).

### 2.1. Research problem difficulty

**Description**:

The research faces challenges in bridging the gap between traditional and digital printmaking techniques and animation techniques. Printmaking remains an underexplored field in animation compared to other techniques. Additionally, some printing methods require precise and complex skills, making their application in animation an added challenge.

**Causes:**

Lack of knowledge about printmaking techniques and their potential in animation.

The need to overcome technical constraints, such as precise alignment and continuous plate modifications.

### 2.2. Research Aims

1.Explore the relationship between printmaking and animation and how printing techniques can be integrated into creating animated works.

2.Highlight the aesthetic potential of printmaking in animation and demonstrate how it can be used as an innovative medium for artistic expression.

3.Develop a better understanding of traditional and digital printmaking techniques and their application in animation.

### 2.3. research importance:

1. Sheds light on an underexplored field, opening new horizons in visual arts.
Enriches artistic disciplines by integrating printmaking and animation techniques.

2. Provides new tools and methods for artists and designers to expand their creative boundaries.

3. Encourages the use of Printmaking techniques in innovative animation projects.

## 2.4. Research Methodology:

Historical: An exploratory approach that analyzes the historical development of printmaking and animation techniques, focusing on practical examples such as animated printmaking works.

Descriptive: Focusing on practical examples such as animated printmaking works.

**3. Results and Discussion:**

**Results:**

1.The research demonstrates that printmaking techniques, whether traditional or digital, can be effectively used in animation to produce unique effects.

2.Techniques like Additive Plate Printing and Subtractive Plate Printing offer extensive possibilities for animating printed images.

3.Combining printing and animation adds a temporal dimension to artworks, enriching the visual experience.

**Discussions:**

1.There is a need to train artists in advanced printing techniques to facilitate their integration into animation.

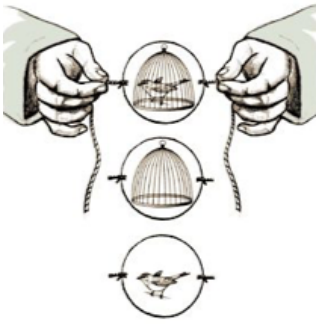
2.Providing resources and tools is essential to expand the use of printmaking in animation.

**Summary:**

The research clearly shows the immense potential of printmaking in the field of animation, while also highlighting the technical and knowledge-based challenges that must be addressed to achieve integration between the two fields.

## 4. The History of Image Animation and its relation to printmaking

Several different techniques for simulating motion emerged before the invention of cinema, such as the Thaumatrope (Figure 1). This simple device consisted of a disc with an image on each side; spinning the disc between two strings created a simple combined image. This technique evolved into the Phenakistoscope (Figures 2, 3) in 1832, comprising a slotted disc and a mirror. Reflections of a series of images on the disc's inner edge appeared as a moving picture when spun. The Zoetrope (Figure 4) followed in 1868, featuring slotted discs containing image sequences arranged around its circumference. When spun, images viewed through the slots appeared as a complete motion sequence (Madej & Lee, 2020).



**(Fig. 1)** *Taumatrope*

*Sadako5Primaria. (2012, January 19). Cinemática. retrieved from https://sadako5primaria.wordpress.com/2012/01/19/cinematica/*

**(Fig. 2)** *Phenakitoscope Discs*
*Toys Vintage. (2014, March 25).Retrieved from:*
*https://epqanimation.wordpress.com/2014/03/25/phenakistoscope/*

**(Fig. 3)** *Phenakitoscope.*
*epqanimation.wordpress. (n.d). retrieved from:*
*https://epqanimation.wordpress.com/2014/03/25/phenakistoscope/*

**(Fig. 4)** *Zeotrope*
*Darvideo. (n.d.).Retrieved from:*
*Zoetrope. https://darvideo.tv/dictionary/zoetrope/*

All these early innovations involved a series of copied and repeated images, closely resembling the concept of printmaking, which also revolves around reproduction. The difference lies in introducing changes to the movement of elements within the images to eventually produce motion. Early animations were referred to as "sequential art"

due to their use as comic illustrations arranged in a sequence to convey continuous movement (González Alvarado, 2020).

By understanding the various techniques in animated printmaking, artists can identify the most suitable methods for executing their animated artworks. These techniques include:

### 4.1 Traditional Animation

This type of animation was created differently than today's modern methods. Traditional animators painstakingly hand-drew every frame on paper, layering transparent sheets for moving elements without redrawing the background for each frame (Figure 5). Sequentially assembled images were photographed, creating animated films. A notable example is Disney's Snow White (Figure 6), the first full-length animated feature, which involved drawing all 24 frames per second—approximately 110,000 frames for the entire film.

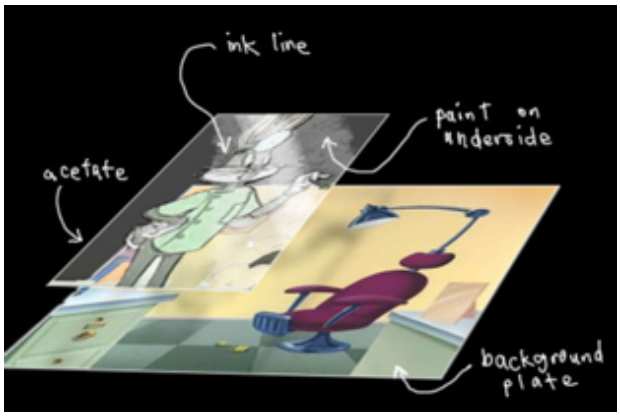



***Fig. 5*** *Using Cels in animation*
*Japanese Film History Timeline. (n.d.). Invention of cel animation, retrieved from: https://www.japanesefilmhistorytimeline.psu.edu/events/invention-of-cel-animation/*

***Fig. 6*** *From cels used in Snow white*
*Medium. (2020, December 1). Snow White: Making animation human, retrieved from: https://medium.com/film-cut/snow-white-making-animation-human-3dc539a57977*

The process began with sketches depicting key story points. The foreground typically included characters and primary actions, while backgrounds were watercolor paintings on separate sheets placed beneath the cels. Movement was achieved by layering printed or drawn images on transparencies, arranging them against the background, and photographing them frame by frame using stop-motion or live-action cameras(Bashara, 2020).

### 4.2 Computer Animation

Computer-generated animation can be linked to prints created using traditional and digital techniques, both in preparation and execution. Printed copies are created in a sequence similar to computer animation by building a two-dimensional image, making them resemble preliminary prints in Printmaking. This initial stage can consist of a series of drawings, which are then printed in black and white. Once the movement of

the image is confirmed to be correct, the artist applies traditional printmaking techniques to execute these printed drawings, aiming to achieve distinctive effects that can later be animated.
Traditional animations can be drawn or printed using an inkjet printer on acetate sheets and cut out for animation purposes. Digital images can also be printed on high-quality paper as a set of layered drawings, enhanced by the artist using colored pencils, pens, or ink to add depth and character often unique to traditional 2D animation. Afterward, the process transitions to computer processing, allowing the artist to benefit from both traditional printmaking and animation techniques(González Alvarado, 2020).

### 4.3 Stop-Motion Animation

Stop-motion animation involves manipulating real-world elements frame by frame, slightly adjusting objects for each frame. Pioneers like Willis O'Brian and Ray Harryhausen mastered this technique, with King Kong (Figures 7, 8) being a prominent example. There are two common forms: stop-frame and go-motion (Wells,1998).

**(Fig. 7)** *Willis O'Brian*
*IMDb. (n.d.). Ray Harryhausen.retrieved from: https://www.imdb.com/name/nm0639891/*

**(Fig. 8)** *Ray Harryhausen*
*MutualArt. (n.d.). Ray Harryhausen, retrivrd from: https://www.mutualart.com/Artist/Ray-Harryhausen/1B94FDFB39E7265D*

## 5 The Emergence of Commonalities Between Animation and Printmaking:

The 20th century brought radical changes in various fields, particularly the arts, with movements like Impressionism and Abstract Expressionism inspiring personal artistic expression. Similarly, Japanese Sosaku Hanga movements and technological advances in printmaking paralleled animation development. Printmaking often laid the groundwork for animation backgrounds, intertwining these disciplines.
The 20th century marked a period of radical change across many fields, with the arts experiencing significant development, particularly through artistic movements ranging

from Impressionism to Abstract Expressionism. Artists' need to express their unique visions and deep emotions inspired these movements and drove the evolution of animation(Wells, 1998). Similarly, the Japanese Sosaku Hanga art movement, along with technological and intellectual advancements in Printmaking, contributed to the development of animation(Drucker, 1996).. Both art forms progressed in parallel, borrowing techniques and ideas from one another.

Amid the diverse forms of animation emerging at the time, Printmaking played a role in creating backgrounds. It can be said that printmaking was a step toward traditional cel animation, where artists created multiple copies(Bashara, 1998). Techniques like woodblock and linocut printing were among the most advanced forms of printing at the time, just as cels represented the most advanced form of animation in the early 20th century. Both techniques, simple in nature, produced a rich blend of contrasts between light and dark, crafted by skilled artists of the era.

Traditional printmaking was also considered a form of narrative art, where a series of prints could tell a story. This narrative approach was often used in animation projects, especially in early 20th-century America, such as the animated adaptation of The Peasants and The Moneylender by Bruegel(Bashara, 1998).

One factor that led animators to incorporate printmaking into their work was their attraction to the unique aesthetic of printed art. By using traditional printing tools and techniques, which remained largely unchanged for centuries, they discovered the durability of intaglio plates. These plates could produce multiple prints, making them an ideal choice for projects requiring numerous hand-printed images, unlike woodblocks, which could wear out over time or with repeated use. Intaglio plates also offered various effects, such as fine linear etching, and could be textured with soft or coarse grains using resin to achieve watercolor-like effects (aquatint) (Mason, 2022).

Animators often spent weeks of continuous work and printing to achieve satisfactory results. Black-and-white animation printmakers found great satisfaction in the mirrored image produced from the printing plate and the unexpected effects that only appeared during the printing process(González Alvarado, 2020).

These intricate details motivated printmakers to attempt animating their prints, striving to simulate reality to the highest degree and adding the element of time to bring their work to life. Similarly, animators sought to master printmaking techniques to achieve the unique effects and variations that added a distinctive touch to their animations. This required overcoming the challenges of working with different printing surfaces and techniques to see their designs, engraved directly onto the printing plates, come to life in reverse.

As a result, the artists most invested in animated printing were those skilled in both printmaking and animation. These artists were driven by a desire to present their work and ideas in increasingly sophisticated ways and to constantly seek innovations that met their aspirations for artistic excellence.

## 6. Techniques in Printmaking for Animated Art

### 6.1 Traditional Printmaking

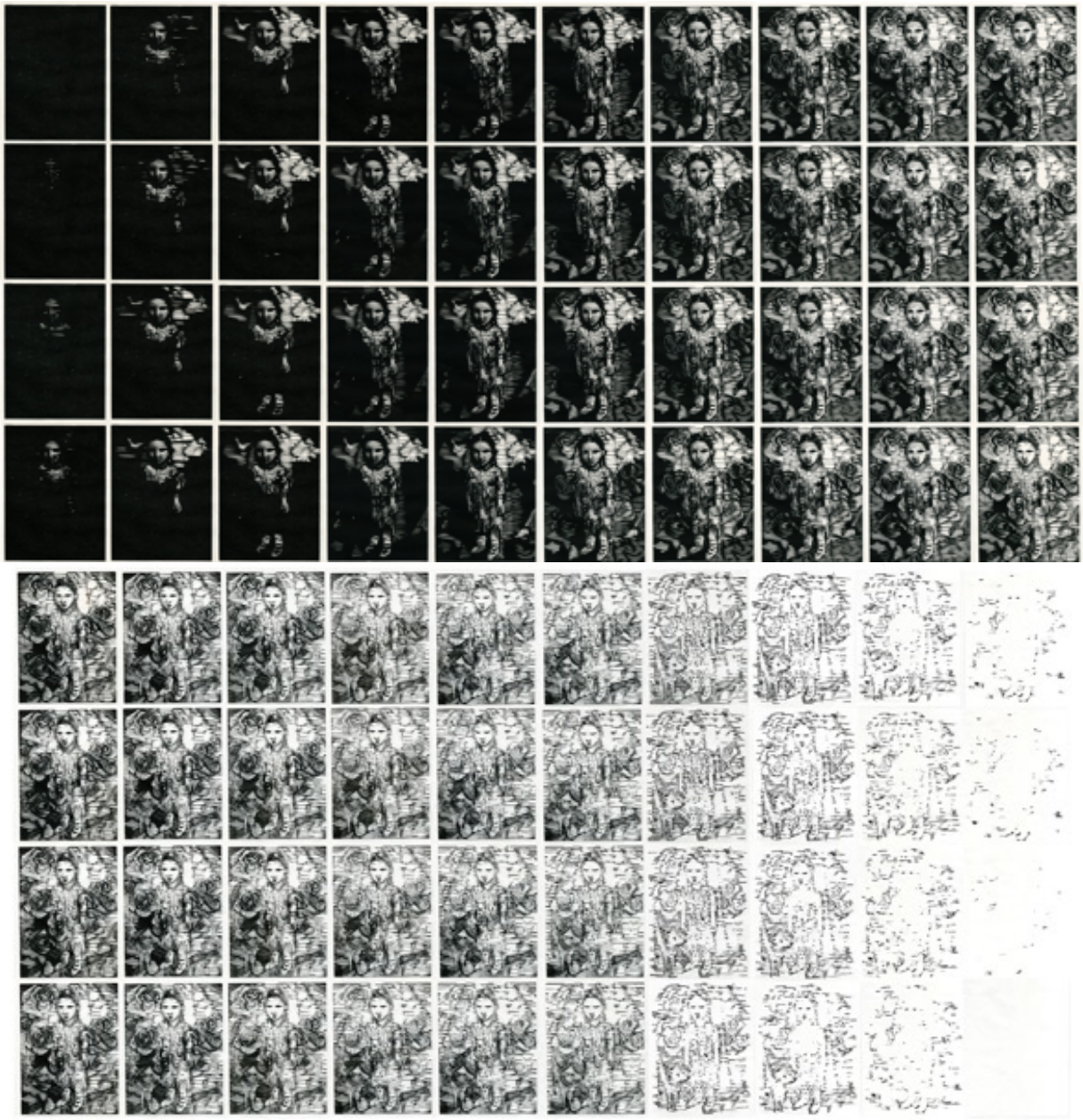
The techniques used in traditional printmaking range from woodcut, etching, lithography, linocut, and silkscreen printing, either in their traditional forms or in their more modern iterations. These modern approaches involve digitally processed images, prepared using software like Photoshop and printed using light-sensitive emulsions (Hall, 2010, pp. 52–55).

Animated prints can be created by producing a series of fine prints and then modifying them to create a sequence that results in motion. An example is the animated print Le Carrousel by artist Christophoros Katsadiotis (Hall, 2010, p. 58). (Figure 9)

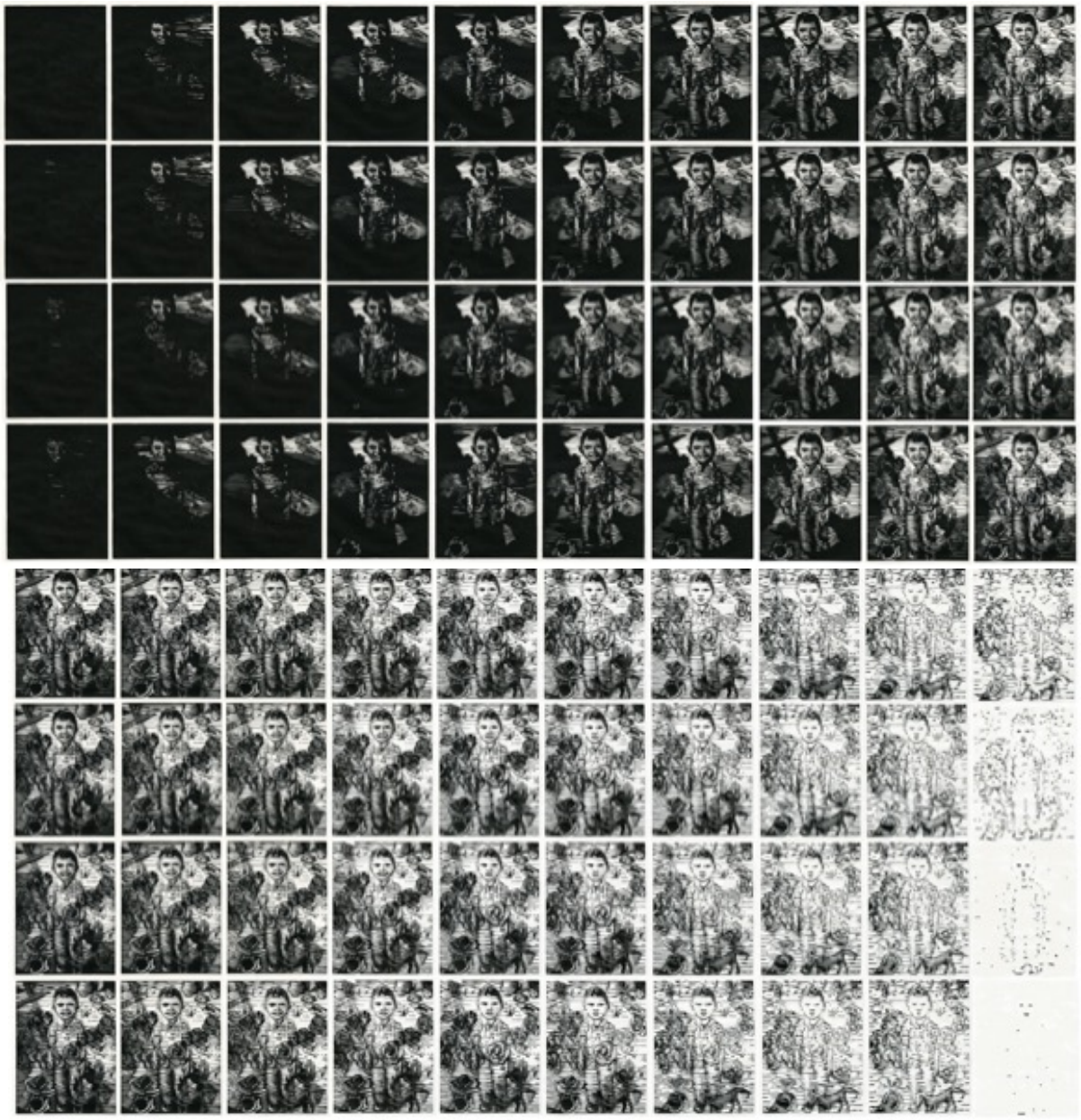
**(Fig. 9)** *"Le Carrousel"- Christophoros Katsadiotis*
*Saatchi Art. (n.d.). Printmaking Carousel II [Artwork], retrived from:*
*https://www.saatchiart.com/en-id/art/Printmaking-Carousel-II/403789/2611560/view*

Motion can be captured directly from the prints using a stop-frame camera, as seen in the films Shadow Boy and Shadow Girl (Figure 10), created using linocut techniques by British artist Wuon-Gean Ho. She printed her designs from two printing plates between 2015 and 2017, producing 1,500 frames animated using Photoshop after photographing each stage of the carving process (Figures 11 and 12) (Wells, 2002, p. 91).

**(Fig. 10)** *shadow boy"- Wuon-Gean Ho and "shadow girl*
*Vimeo. (2017, March 28). Shadow Boy and Shadow Girl [Video], retrieved from:*
*https://vimeo.com/208883758*



**(Fig. 11)** *The successive stages of a sequence of art print editions "shadow girl" - Wuon-Gean Ho PrintPlay. (2017, March 28). Shadow Boy and Shadow Girl, retrieved from: https://printplay.wordpress.com/2017/03/28/shadow-boy-and-shadow-girl/*



**(Fig. 12)** *The successive stages of a sequence of art print editions "shadow boy" - Wuon-Gean Ho PrintPlay. (2017, March 28). Shadow Boy and Shadow Girl, retrieved from: https://printplay.wordpress.com/2017/03/28/shadow-boy-and-shadow-girl/*

Prints can also be digitally processed after printing or created using a combination of traditional and digital techniques. Due to the wide range of possibilities offered by animated printmaking, the tools used in printing hold significant and varied importance in each technique. This diversity provides numerous effects unique to each tool (Chute, 2008, p. 460; Hall, 2010, pp. 59–62).

Animated printmaking, as a combination of printing processes, retains the qualities and distinct effects of prints while adding an additional dimension of time, which can be used to depict motion, create temporal shifts, and develop the intended mood for the viewer (Russett & Starr, 1988, pp. 18–19).

Given the possibilities that printmaking has introduced to the world, transferring these qualities to animation can result in powerful and emotionally engaging works. Understanding the techniques and processes involved in animated printmaking equips modern animators with an alternative and unique method of presenting their creations. The variety of printing methods allows for a wide range of visual aesthetics in animation (Wells, 2002, pp. 86–89).

The art of animated printmaking stands out by producing multiple copies of an image, with the option to modify the image before printing the entire series. This is achieved

by selecting the appropriate printing technique and materials (Hughes & Vernon-Morris, 2023, pp. 102–104). Despite its versatility, animated printmaking is often underexplored compared to other forms of animation, mainly due to a lack of knowledge and understanding of printmaking techniques and their vast potential (Chittenden, 2021, pp. 5–6). Additionally, some printmaking techniques require skill and precision, particularly for colored prints, to achieve their final form (Hall, 2010, pp. 48–51).

The techniques used in carving the printing plates for animated printmaking can be summarized as follows:

### 6.1.1 Printing from a Plate:

Animated printmaking relies on the concept of printing from a plate. From the primary plate surface, a series of individual prints is created. Changes are made to the plate, and prints are taken sequentially to reflect these changes (Hughes & Vernon-Morris, 2023, p. 105). Animated printmaking involves two main types of plate printing:

#### 6.1.1.1 Additive Plate Printing:

This method involves adding lines to the main surface, which overlap to form the complete design, such as in lithographic printing. However, making changes or removing elements later is challenging with this method, making it unsuitable for animation (Lipton & Lipton, 2021, pp. 398–399).

#### 6.1.1.2 Subtractive Plate Printing:

In this method, the main plate starts with a complete surface. The artist removes parts of the image or reshapes them to suit the motion layout in the print series. This approach is ideal for all types of animation due to its relative ease of modification (Zhao et al., 2021, pp. 106–107).

### 6.2 Advanced Techniques

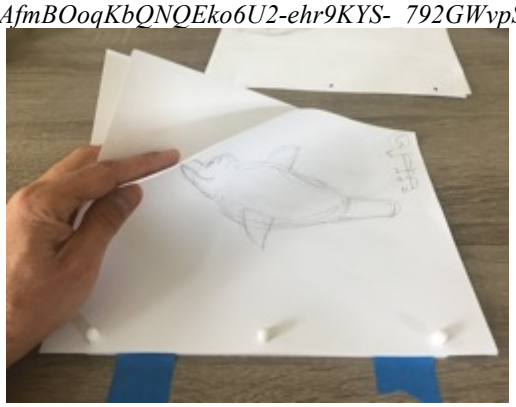
The true diversity in animated printmaking arises from using multiple printing plates simultaneously. This typically involves creating a sequence of images to form a storyboard, beginning with preparatory sketches and utilizing X-Sheets (Hughes & Vernon-Morris, 2023, p. 108) to map out the motion sequence. The artist then determines which images will be assigned to each separate printing plate. Typically, one primary plate is chosen as the base, with subsequent plates relying on the same image but incorporating variations to create the motion effect (Trethewey & Castleden, 2020, pp. 10–12).

When crafting the primary plate, the animator focuses on lines and shapes rather than color and tonal shading, which are added through another layer of acetate, film, or a separate print. The animator must be experienced in selecting lines that will print effectively and often conducts experimental prints to visualize how the designs will appear. Additionally, they plan their printing strategy from the outset to avoid wasted effort (Hughes & Vernon-Morris, 2023, pp. 109–110).


**(Fig. 13)** *X-Sheets*
*American History. (n.d.). Animation history, retrieved from: https://americanhistory*

Effects resulting from techniques such as graffito or aquatint, which produce shading similar to pencil drawings, require careful planning and significant time to assemble during printing (Hughes & Vernon-Morris, 2023, pp. 112–113). Proper alignment of prints is essential, so each plate must include registration marks that align with corresponding marks on the paper. Tools like Animation Disks, Animation Pegbars, or lightboxes are used to ensure precise alignment of prints (Hughes & Vernon-Morris, 2023, pp. 114–115; Trethewey & Castleden, 2020, pp. 13–14).

**(Fig. 14)** *Animation Discs*
*Indiamart. (n.d.), retrived from:*
*https://www.indiamart.com/proddetail/12-field-2d-animation-acrylic-disc-2854006647955.html?srsltid=AfmBOoqKbQNQEko6U2-ehr9KYS-_792GWvpSiDWa4ReSAMWFSD90W6wz*



**(Fig. 15)** *Animation Peg bars*
*Cults3D. (n.d.). 8.5 x 11 standard hole punch, retrieved from:*
*https://cults3d.com/zh/3d-m%C3%B3x%C3%ADng/y%C3%ACsh%C3%B9/animation-peg-bar-8-5-x-11-standard-hole-punch*

**(Fig. 16)** *Lightbox*
*X. (2022, November 19). Animation tools [Tweet], retrieved from:*
*https://x.com/MattR_Animation/status/1061226677584494592*

With the evolution of techniques and tools offering creative potential, artists, illustrators, and animators are increasingly inclined to experiment (Chittenden, 2021, pp. 7–9). The emergence of digital printing methods, such as photography, video, and

audio techniques, has enabled animators to blend moving images with printmaking. For example, the film Chado: Dreaming in Texture by artist Dominica Harrison tells a story through prints, featuring a film created from a series of digital screen-printed artworks. The artist showcased these prints alongside the film, preparatory sketches, and character designs to reveal the process behind the work, which was exhibited in galleries and film festivals (Hughes & Vernon-Morris, 2023, p. 116).

**(Fig. 17)**
*Character design prints created using digital sublimation printing by Dominica Harrison American History. (n.d.). Animation history, retrieved from: https://americanhistory*

Animated printmaking has the potential to evolve and encompass diverse ideas and stories. For instance, artist Paul Prudence creates animated works that culminate in graphic novels, combining multiple print series and animations simultaneously. Prudence emphasizes the importance of producing works beyond cinema and television, allowing the artist full control over the context, narrative, and presentation (Hughes & Vernon-Morris, 2023, pp. 117–118). Future animators seeking similar artistic freedom may find printmaking an accessible and exciting medium for realizing their creative visions and reflections (Trethewey & Castleden, 2020, p. 15).
By blending traditional and modern methods, printmaking allows for versatile and visually rich animated works, though it remains underexplored compared to other animation forms (Hughes & Vernon-Morris, 2023, pp. 119–120; Chittenden, 2021, p. 10).

## 7. Conclusion and Recommendation:

### 7.1. Conclusion:

1. Image animation techniques such as the Thaumatrope, Phenakistoscope, and Zoetrope laid the groundwork for motion simulation, closely resembling the reproduction principles of printmaking.
2. Early animations were referred to as "sequential art," where repeated images, similar to printmaking, created the illusion of motion.
3. Printmaking and animation developed in parallel during the 20th century, borrowing techniques and aesthetics from each other to enhance storytelling and visual impact.
4. Traditional printmaking methods, such as woodcut, etching, and lithography, were adapted for animated printmaking, enriching the medium with unique textures and effects.
5. Stop motion animation techniques intersected with printmaking, as seen in projects like "Le Carrousel" and Wuon-Gean Ho's linocut animations.
6. Both animators and printmakers were driven by the desire to simulate reality and add temporal dimensions to their art, showcasing the interplay of motion and narrative.

7. Digital tools and techniques, such as Photoshop and light-sensitive emulsions, have expanded the possibilities of animated printmaking, blending traditional and modern methods.
8. Animated printmaking offers a unique platform for storytelling, bridging multimedia, graphic novels, and experimental art forms, making it a promising field for future exploration.

### 7.2. Recommendations:

1. Encourage artists to study and incorporate historical animation methods like the Zoetrope and Phenakistoscope to understand the roots of motion simulation.
2. Develop workshops and courses combining printmaking and animation to equip artists with the skills to explore animated printmaking.
3. Utilize modern digital tools and software to enhance traditional printmaking techniques, making them more accessible and versatile for animation projects.
4. Support experimental projects that combine traditional and digital techniques, such as stop motion animation with printmaking, to push creative boundaries.
5. Facilitate collaborations between printmakers and animators to merge expertise and create innovative animated works.
6. Showcase the process of animated printmaking in galleries and festivals to educate audiences about the medium and its creative potential.
7. Expand the scope of animated printmaking by integrating it with multimedia elements, such as sound and video, for immersive storytelling.
8. Invest in research to refine printmaking techniques, such as subtractive plate printing, for smoother transitions in animated sequences.
9. Develop comprehensive guides and online resources to help artists understand the tools, techniques, and processes involved in animated printmaking.
10. Encourage artists to explore unconventional applications of animated printmaking, such as graphic novels, educational tools, and interactive installations.

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