Data Transformation: New Visual Data Based on the Printmaking Model

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ABSTRACT

This paper discusses how printmaking methods can be used as a methodology to re-examine and analyse works in the field of digital media. It presents the history and theory of printmaking from a Chinese perspective and investigates the relationship between the unique indirect creation mode in the printmaking system, and data transfer and transcoding in digital media.

Various digital technologies have gradually replaced the original function of traditional printmaking as a mass medium. Nevertheless, printmaking has continued to develop as an independent art form in the context of contemporary art. The history of printmaking has always been closely related to the development of industrial printing tools and materials, and different printing techniques have often derived from periods of technological change. The core of that change has been the production of new types of printing matrices. Although the original function of printmaking as a mass medium has lost prominence in today's digital age, the relationship between the plate and the duplicate can offer insights into the artistic status of digital copying and reproduction.

This paper proposes that the history and theory of printmaking can lead to a better understanding of digital images. First, the paper defines how printmaking functions and its relationship to the image. Second, it analyses how the relationship between printmaking and the image can be applied to digital media to form an equivalence between the digital file and the digital image. Finally, this paper uses the printmaker Chen Qi as a case study for discussion and analysis. Chen Qi has been chosen because his research examines how Chinese water-based woodcut print techniques can be augmented and transformed with digital technology. He emphasises the importance of breaking away from the conventional concept of the printmaking matrix, where the 'plate' becomes the platform from which to generate the unique artistic value of the printmaking imprint. Using his practice as an example, I hope to demonstrate the broader utility of analogising printmaking and digital images.

INTRODUCTION

The history of printmaking has always been closely related to the development of industrial printing tools and materials, and different printmaking techniques have often derived from periods of technological change. The core of that change has

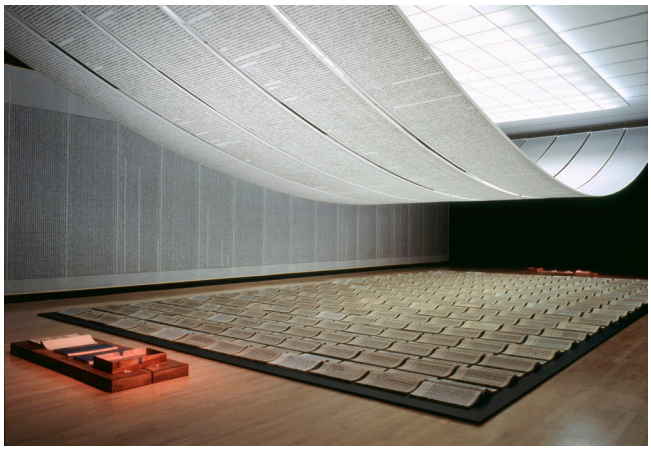

Figure 1

Figure 2

Figure 1. Xu Bing, Book from the Sky, Installation View at Crossings/Traversées, National Gallery of Canada, Ottawa, 1998. ©Xu Bing Studio
Figure 2. Xu Bing, Ghosts Pounding the Wall, Installation View at Elvehjem Museum of Art (now Chazen Museum of Art), University of Wisconsin-Madison, Wisconsin, 1991. ©Xu Bing Studio

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been the production of new types of printing matrices. The printing matrix is typically combined with ink and paper and together they produce the image that we call a print. The matrix can be any material; for example, the matrix of woodcut prints is wood, the matrix of etching is copper, the matrix of lithographs is stone, and the matrix of silkscreen prints is silkscreen. In printmaking, the matrix can be understood as a carrier for the image. According to Abidin, Daud and Rathi (2013, p.406), "printmaking can be described in a variety of media developed to create multiple images. The images can be produced by using a plate as a matrix and an intermediary to convey the idea". The concept of the printmaking matrix also brings out a unique artistic feature of printmaking, which is an indirect and mediated form of image-making. The Museum of Modern Art in the United States defines prints as "a work of art made up of ink on paper and existing in multiple examples. It is created not by drawing directly on paper, but through an indirect transfer process" (The Museum of Modern Art, 2001). That is, the most significant difference between the creation method of printmaking and other two-dimensional traditional art media, such as Chinese painting or an oil painting, is the indirectness of the process. Most traditional visual media are directly expressed when they are created. The image that the artist wants to make can be directly expressed on canvas or paper by controlling the brush or different drawing tools directly, through his or her physical manipulation. When a print is completed, however, it needs to go through the process of sketching, plate-making, and printing. Throughout the entire process of printmaking, the image requires several conversion steps before it can take shape. It is a form of 'mediation'.

Figure 3

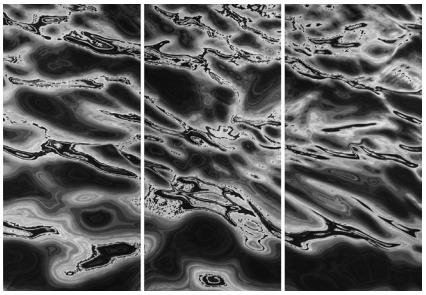

Figure 4

The paradigmatic norms of traditional printmaking are also being constantly challenged by the development of digital printing technology and materials. Some may expect the gradual obsolescence of printmaking as digital technology becomes more pervasive. However, according to Ludovico (2013, p.54), "print has not (yet) become obsolete. But it does seem to be in a period of profound mutation, mainly because of how the electronic screen is already taking over several of the functions of paper". Professor Chen Qi, from the Printmaking Department at the Central Academy of Fine Arts, published a feature article in Art Magazine titled Why are we working on printmaking today? As Chen (2022) stated, this topic is at the heart of today's most basic logic of printmaking scholarship. While Chen Qi addressed this core topic from three perspectives, historical and ontological studies of Chinese printmaking and experimental case studies, this paper analyses the concept of printmaking starting from Chinese academic printmaking, and discusses the printmaking process as a methodology for understanding how its discourse is made in the digital age.

Taking the basic nature of printmaking as a mediated, or indirect, form of image-making, can we start to talk about printmaking in relation to an 'indirect' form of media art? Coldwell writes that "in this digital age, the computer has enabled us not only to think new thoughts and challenge how we print but also to revisit previous technologies

Figure 3. Xu Bing, Five Series of Repetitions, Installation View at "Three Installation by Xu Bing, Elvehjem Museum of Art (now Chazen Museum of Art), University of Wisconsin-Madison, Wisconsin, 1991. ©Xu Bing Studio
Figure 4. Scrap Gold (Triptych) by Chen Qi (2015). Woodblock Print, 380cm x 540cm. © Chen Qi Studio

to form hybrids" (Coldwell, 2015, p.176). From this perspective, it is assumed that the printmaking matrix, as an indirect medium of art, can be used in harmony with digital media in the post-printing era. If the printmaking matrix is no longer limited to physical objects and materials but expands into computer software platforms and the indirect thinking process of media conversion is realised through software operations, then can this indirect conversion of printmaking be used as a methodology to help us understand digital images? I would like to make a relatively controversial argument that software processes can be thought of in terms of printmaking. This argument relies on the distinction debated by Lev Manovich and Jay Bolter and Richard Grusin about whether we understand software processes as 'remediations' of noncomputational methods. Bolter and Grusin (2000) point out that electronic media are not the opposite of painting, photography or print media. Instead, computers are used as a new means of obtaining materials from old media. In their view, electronic media remediates the old media. It is the reproduction of one medium in another, so no new differences should be expected from the computer. For example, they state that CD-ROM or DVD image galleries (digital photography and painting works) are "an older medium… highlighted and represented in digital form without apparent irony or critique" (Bolter and Grusin, 2000, p.45). However, Lev Manovich (2013) responds by pointing out that digital remediation can be distracted by how the new digital media will appear to the old media, without realising that these media are fundamentally different. He mentions Bolter and Grusin's argument that digital photography is simply an imitation of the appearance of traditional photography. If digital images are returned to physical objects, such as through the printing of wall posters or T-shirts, its functionality is then the same as traditional photography. But if we leave the same photograph inside its native digital environment, however, it can function in ways that make it radically different from its traditional equivalent (Manovich, 2013).

But perhaps computer software can be described as a digital matrix for printmaking based on the relationship between digital media and pre-digital media, allowing the intervention of the indirect mode of printmaking. Digital creation is the main intent of computer software processes and may provide us with new insight into how to understand the relationship between printmaking and digital media. Is it possible for media transformation to independently form a model for a thinking methodology with printmaking characteristics and apply it to the field of digital media to find a new similar relationship?

THE PRINTMAKING WAY OF WORKING ON AND THINKING ABOUT THE IMAGE

To support the argument that software processes can be thought of in terms of printmaking, I introduce the phrase 'printmaking sensibility' , a phrase often used in academic printmaking circles in China. What exactly does it mean? To clarify the definition of this term and the reasons for its widespread use in China, it is perhaps helpful to start with the development of the academic printmaking context there.

Kang Jianfei (2013), a professor of printmaking at the Central Academy of Fine Arts, points out that the historical development of print in the Chinese context is roughly divided into three stages. During the first stage, it was a tool of communication, mainly referring to prints created between the time of the topography of the Han dynasty portrait bricks to the period before the Modern Woodcut Movement. This was a period when printmaking was primarily used as a technique for reproducing prints, as a tool for and an act of the dissemination of visual information. During the second stage, printing was an artistic discipline during the Modern Woodcut Movement from the 1930s to the 1980s and 1990s; a stage when printmaking as an art form became a tool for artistic expression. Finally, in stage three, print became a way of thinking or a sensibility, referring to the theoretical proposition that the study of the ontological language of printmaking naturally arose after printmaking became a medium of artistic expression. In addition, Chen (2022, p.20 [author's translation]) adds, "unlike the linear development of the history of traditional visual arts, printmaking was not previously included in the category of pictorial art". He emphasises that the concept of printmaking in the modern art sense did not exist in China before the nineteenth century. Instead, printmaking was a proprietary art term, translated from Japanese in the 1930s (Chen, 2018).

According to Kang (2013), it is with Xu Bing's famous Books from the Sky (1987-1991) and Ghost Pounding the Wall (1990-1991) that the Chinese art world began to focus on the ontological language of printmaking art and a printmaking sensibility, with concepts such as imprints, pluralism and proceduralism becoming objects of study for artists. As early as 1987, the artist Xu Bing completed his MFA thesis work on Five Series of Repetitions (1986-1987), followed by the publication of his influential article A New Exploration and Reconsideration of Pictorial Multiplicity (1987), which had a profound impact on the academic world of contemporary Chinese printmaking to follow. In that article, he states:

. . . that printmaking undertakes a prescribed treatment of the medium based on the artist's creative intentions as an intermediary art form. Then, passing through the intermediary printing process, the medium is transformed into the form of a mark presented as the visual image.

(Xu, 1987, p.50 [author's translation])

The main points of Xu Bing's text are that an imprint of multiplicity and prescription is the essential characteristic of printmaking. He emphasises that the 'plural' is not a technical feature of the printmaking process in the usual sense, as such plural features are found in, for example, sculptural remoulding or photographic prints, but rather the aesthetic sense of 'multiplicity'. Similarly, Chen (2018) argues that the paradigm of printmaking encompasses the medium's materiality and value of the plates and imprints. The plate is not only the model of the image but also its independent spiritual structure. The imprints contain not only the physicality of the plate but also the artist's rich artistic vocabulary and cultural genes.

Dorota Folga-Januszewska's essay entitled Printmaking as a phenomenon of thinking (2016) brings printmaking as a thinking phenomenon into the discourse of contemporary art. In her essay, she points out that one strategy for understanding printmaking is to consider it as implicit thinking, and she encourages us to explore the meaning hidden behind the discipline's subject matter. If we want to consider printmaking as implicit thinking, we need to consider the matrix as an essential component compared to a concept, idea or device. The matrix and its potential image are used as the start of all things (Folga-Januszewska, 2016). In terms of conceptual discussions based on implicit thinking to link the printing matrix, Chen Qi's (2018) arguments can be used as a complementary note to Folga-Januszewska; he points out that in the past, the printing matrix was a printing intermediate based on the image of the drawing. What was printed was meant to reproduce the image following a set process of printing one plate after another. In the production process, the plate is the intermediate bridge between the reproduction of the image and the original sketch.

In this sense, printmaking is a process-oriented and tool-dependent medium because when creating prints, artists need to perform several conversion processes before achieving the artistic effects they seek. Printmakers, trained for an extended period to think about indirect media transformation while creating their works, may have unconsciously developed a unique set of thought patterns about media transformation. The indirect thought process behind printmaking refers to the matrix of printmaking as another kind of textual resolution that helps produce the image. The main reason printmaking is indirect is that the artistic ideas of printmakers, whether they want to create an image or make a mark, must be carried and transmitted by an intermediary and then transformed by machine or hand via the act of printing. The printmaking process goes from idea creation to dissolution, distribution, superposition or recombination by making plates in different plates and finally translating the transformed idea using various printing techniques. The original sources of production prints and the generation of non-mechanised plurality could be used as methodology. Rather than discussing the final visual composition of printmaking artwork, it is essential to discuss the creative process of printmaking work, as a mature and unique set of logical thinking embedded in the printmaking system. However, the transformation process of the medium is the key. Printmaker Chen Mingming (2015, p.11 [author's translation]) proposes that "the technical language of printmaking and the rational approach to production has contributed to developing rational modes of thought in printmaking". Therefore, in this paper, the way of thinking about printmaking can also be understood as the printmaking aesthetic sensibility, which includes the understanding and knowledge of what kind of feeling the image could be valuable for in terms of the other creative technical processes of printmaking. Our sensitivities are different, and so are our sensibilities due to our personalities, education, interests and life experiences. The aesthetic sensibility of printmaking here refers to the quality of being able to appreciate and respond to the aesthetic impact of printmaking.

In addition, such sensibility encompasses the technical language of visual transitions, layer overlays, outline line-tracing, imprint texture, pluralistic features, and so on, which result from the plate-making and printing process.

HOW THE PRINTMAKING SENSIBILITY CAN BE APPLIED TO DIGITAL MEDIA

According to Manovich (2013), there are two functional categories of software. The first category creates, edits, and organises media content. The second distributes, accesses and combines (or 'publishes', 'shares' and 'remixes') media content on the web. If one compares the functional characteristics of the printing plate throughout the printmaking process with those of the software, one finds similarities between them. For example, the operational aspects of the software are mainly used for the creation, integration, and distribution of information content, echoing the core function of a printmaking plate, which is to recombine and change image information. The difference between the two is that digital software is a digitally virtualised medium, where the final output of digital image processing mainly occurs on a digital screen.

In contrast, a printing plate traditionally means a physically materialised medium where the final image information (imprint) is transmitted to paper. However, when the printing matrix is a digital object, the similarities can be investigated at a conceptual level by comparing aspects of digital image processing, such as storage, decomposition, classification, transfer, programming, decryption and conversion, with parts of traditional printmaking, such as image transfer, plate-making, test printing, retouching and final printing. A further parallel between the creative processes of printmaking and digital image manipulation might more clearly show the similarities in the conceptualisation of the creative process between the two:

- The printmaking process is flexible within this broad framework: A, drawing the sketch (the idea); B, making the plate (the role of the matrix, which is also the vehicle by which the concept takes shape, an approach that focuses more on the methodological use of the characteristics of the plate, mainly to combine the information of the image); C, printing the image (the fermentation of the idea in the matrix process, which requires human or machine collaboration, an approach that focuses more on the thinking and methodological use of the act of printing).

- The digital software creation process varies flexibly within this broad framework: D, acquisition of the source data (for example a digital image); E, software processing (transformation of the source data); F, final digital data integration (automatic generation of algorithms for display on the digital screen or output with digital devices).

Based on the parallel comparison of the creation process above,

Steps A and D are the original image selection, which is the starting point of the creation process; this stage comprises the selection of the original image material according to the idea; Steps B and E are the production part where the image information is stored, combined, and changed. The final Steps C and F transmit, decode, and convert the image information and the presentation. In terms of the functional characteristics of the production process, the operational aspects of Step B, the plate production stage, are similar to those of Step E, the software processing stage. They both aim to integrate and change information. In the printmaking sense, Step B, the plate, as a technical object, serves as a connecting link between the preceding and the following parts of the printmaking process and is also the primary vehicle for producing the language of printmaking. A similar function, in the sense of digital media creation, is seen in Step E, the stage of software digital data processing, where digital data are also treated as a technical object, allowing software processing, storage, decomposition, combination, and so on. However, when comparing Steps C and F in the final presentation of the image information, Step C is the printed image stage; as the last part of the entire printmaking process, the technical production of the image information (imprints), in addition to being linked to the technical language of the printing plate, depends on the final choice of the material and on how the image information (imprints) is presented. Similarly, in Step F, as the final stage of the technical presentation of digital data, the final visual form of the digital image depends not only on the degree of structural change of the digital data after being processed by the algorithm program but also on the presentation device, where the final digital data are decoded and transmitted. In this sense, there is a similar relationship between the functional properties of the plate and printed image stages of printmaking and the software processing and data decoding and output stages of digital image creation on a conceptual level.

The formation of the printmaking sensibility needs to be considered and analysed by focusing on the two core concepts of the printing matrix and the imprints. Suppose we understand the printing matrix as a technical entity and the digital data as a digital printing matrix. In that case, the printmaking sensibility is applied at a conceptual level to guide the conversion process of the digital data. Then, the software process can be understood in terms of the printmaking sensibility, which can be used as a methodology for understanding the data conversion process when using software to convert digital images.

SOFTWARE PROCESSES CAN BE CONSIDERED THROUGH A PRINTMAKING SENSIBILITY

To investigate how software processes can be considered the aesthetic senses of printmaking, this section uses Chen Qi's practice as a case study. Chen Qi was chosen as a case study because he advocates that the traditional Chinese water-based woodcut printing technique can be reinvented using digital technology. He emphasises the importance of breaking the conventional conservative concept of

the printmaking matrix and making the plate a platform for generating the unique artistic value of printmaking marks. His large-scale water-based woodcuts combine the ancient traditional water-based woodcut process with contemporary digital technology. For example, his water-based woodcut Scrap Gold, measuring 380 x 540cm, is digitally augmented and executed.

Those familiar with water-based woodcuts should know that it is challenging to create such large-scale works because they require sketches with rigid structures and precise levels in the early stage of creation, as well as a well-designed subplate in the later stages. In addition, the moisture and humidity of the paper must be rigorously controlled during printing. In Chen's work, during the image drawing and layout design stage, two graphic design software packages, Adobe Photoshop and Adobe Illustrator, were used. During the engraving stage, a laser cutting machine was used to assist. Chen (2019, p.418 [author's translation]), describes how digital technology is involved in this work:

> The way I draw with vector software is through layered drawing, where different colour blocks or layers are drawn on different layers, from light to dark, layer by layer, and finally combined. This is entirely consistent with the principle of plate division in prints, so drawing a draft represents the process of visual expression of the image. The completion of the drawing also means the end of the division.

Chen's work creation process is as follows: three steps of drawing-engraving-printing. Except for the last step of printing, which he insists must be manual printing, the last part in the process, from drawing to engraving, is executed through digital technology. During the two steps in digital intervention creation, drawing and engraving, he used the logical thinking of printmaking to guide him on how to carry out the process of computer software transformation. For example, he applied the original working principle of printmaking. He started with drafts that he drew digitally by hand in Adobe Photoshop and used that same software to process the composition of the drafts, including the initial image input, editing, shading, tone, distortion, stitching, filter use and final draft generation. Once those were finished, the drafts needed to be organised in layers according to the different blocks of colour for the subsequent printing of the plates. In the traditional printmaking process, this step involves layering the sketches with tracing paper; however, he completed this step digitally in Adobe Illustrator to eliminate the need for the tedious manual process of retracing the drafts. After completing the different layers of tracing on copy paper, he covered the surface of the wooden board and traced again to make the image transfer onto the surface of the board (completed using RDWorks, which saves the step of transmitting the image to the surface of the board), and then he used an engraving knife to engrave the board (completed using a laser cutting machine). Additional steps were followed to transfer the image to the digital software control platform for creation. Following my comparison to printmaking, graphic design

software such as Adobe Photoshop, Adobe Illustrator and RDWorks can be seen as equivalent to the image preparation and manipulation of the matrix. Chen uses the powerful editing functions of these software tools to complete part of the plate-making steps according to the logic of the line engraving and colour block layout design of woodcut prints. For example, when using Photoshop software, he also considered the draft composition, the deformation of light and dark tones and other factors. For many digital image theorists, the ability to press 'undo' and make nonpermanent changes constitute the crucial differences between an analogue and a digital image. The printmaker has similar abilities, such as the ability to create multiple prints with different inking, different press pressures, different papers, etc. When using Illustrator, more consideration should be given to the design logic for the lines and colour blocks that are required during the printing step; when using RDWorks, consideration can be given to ways to manipulate the precise working path of laser cutting to engrave special concave and convex marks to serve the printing step.

In the sketching and plate-making stages, Chen's use of the printmaking sensibility was enacted with digital software. The visual transformation of the technical language of printmaking guided his use of Adobe Photoshop for preprocessing during the drawing stage. At the plate-making stage, it is mainly the technical language of printmaking and the layering that influence the use of Adobe Illustrator to categorise the layers. Scrap Gold is a work that embodies a hybridisation of techniques that enhance traditional printing methods. This hybridisation allows for a re-examination of previous techniques, resulting in a hybrid print. In this sense, the images created by thinking in terms of printmaking sensibility in the software process are not simple digital images in the usual sense. Nevertheless, these images are also printmaking works that are characterised by digital traces. The printmaking sensibility guides conceptual change as a determining factor in the software process. The printmaking sensibility influences decisions during the transformation steps, direction, sequence, and use of the software operations. The final hand-printed work retains the traditional traces of hand-printing. However, due to the influence of digital technology at the plate-making stage, the digital information (traces) is materialised and transferred to the paper as perceptible textural surfaces by the functional properties of the plate.

The unique value of the print matrix is often hidden behind the image; apart from the printmaker, few admirers are aware of its existence. Printmaking sensibility makes it essential to highlight, and has the opportunity to reveal, its unique value. Similarly, the imaging process of digital images is often hidden. Thinking of graphic design software as the image preparation and manipulation equivalent of the matrix provides a language to understand the inseparable relationship between the invisible automated process of the digital image and the printmaking process.

CONCLUSION

In summary, this paper has examined the defining characteristics of print media and how these characteristics can help us understand the structure of digital media, focusing on how images are produced and processed. It is not a controversial suggestion but a highly plausible premise with a solid argument, that software use can be thought of in terms of printmaking. Based on the evidence presented in the paper, from the context of contemporary Chinese academic printmaking to the defining of printmaking sensibility, the constituent elements of print media depend on the cultivation of the technical language of printmaking. Printmaking sensibility refers to an aesthetic and responsive ability based on the conceptual theory of printmaking techniques. The premise of a software process that uses a printmaking approach to thinking is to encourage a return to the two core printmaking concepts of a printing matrix and its imprint for analysis and reflection. The fundamental nature of printmaking as an indirect form of image-making is due to the mediation of the printmaking matrix as it carries and conveys image information, which is then transformed through the act of printing.

Experimenting with the print matrix as a digital object in relation to the creation of the digital image, computer software can be described as the digital 'matrix' of printmaking, based on the relationship between digital and pre-digital media. This allows a parallel for the intervention of the 'indirect' mode of printmaking to exist in digital printmaking to compare traditional methods of printmaking with the creative process of digital image processing. The plate and print image stages in printmaking have an analogous relationship at a conceptual level with the software processing and data decoding output stages of digital image creation; this relationship is based on a comparison of the functional attributes characteristic of the image production process. As the case study here has demonstrated, there is an inseparable relationship between digital imaging and printmaking, linked by the printmaking sensibility. The images created by employing printmaking sensibility as a methodology in software processing are not ordinary digital images in the usual sense. Rather, they are printmaking works characterised by digital traces. The printmaking sensibility leads the conceptual changes in the creation of images and is a decisive factor in software processing. This is reflected in the fact that the printmaking sensibility determines the transformation phases, direction, sequence and decisions made during the use of the software. Transforming image data under a printmaking sensibility can be guided by the technical language and conceptual use of printmaking, a mode of creative thinking that offers unique insights into the relationship between contemporary printmaking and digital media.

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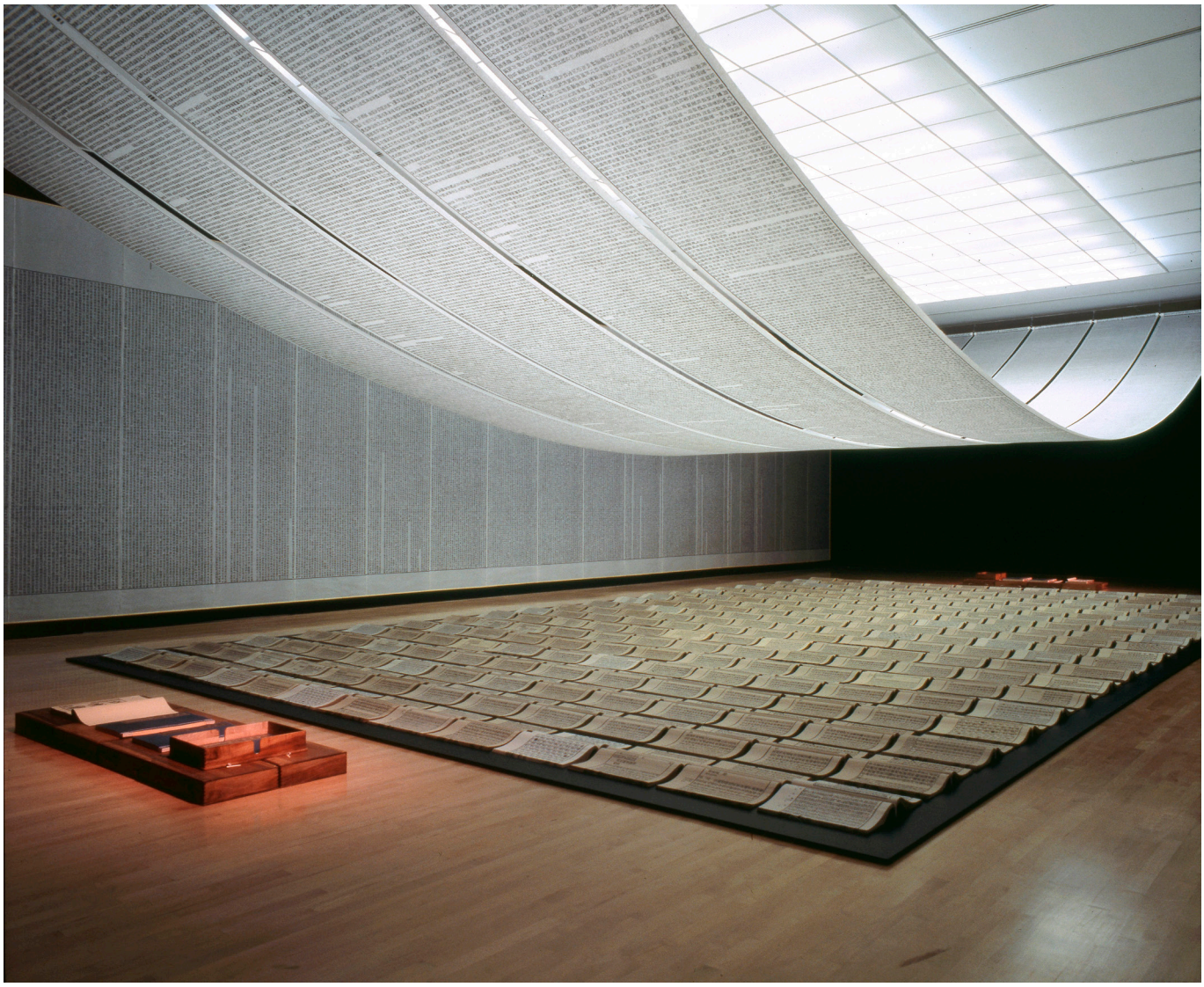
Xiaoqiao Li is an artist, PhD candidate and current board member of the Council of Macau International Printmaking Art Research Centre. His research analyses digital print-matrixes via the dialogue between analogue and digital imprints. Through a practice-based approach, his research is engaged with the question of how the printmaking process can help us understand how information is captured, retained, lost, and transmitted in digital imaging functions.

He completed his Bachelor of Arts in Visual Art at the Faculty of Arts and Design, Macao Polytechnic University, in 2011, and his MA Visual Arts: Printmaking at Camberwell College of Arts, University of the Arts London, in 2016. In 2019, he was awarded the Hong Kong PhD Fellowship Scheme by the Research Grants Council of Hong Kong to pursue PhD in visual arts studies at the Academy of Visual Arts, Hong Kong Baptist University. He has exhibited nationally and internationally and won awards, including the Clifford Chance Purchase Prize in the UK and the Chinese Young Artists Award at the Beijing International Art Biennale.

He has undertaken the International Artist Residence Program at Nansha Ancient Village Artist-In-Residence, Guangzhou city, China, 2019 and Hu's Art Gallery, Auckland, New Zealand, 2017. In addition, he continually publishes his research activity through international conferences and symposiums papers.

IMAGE GALLERY



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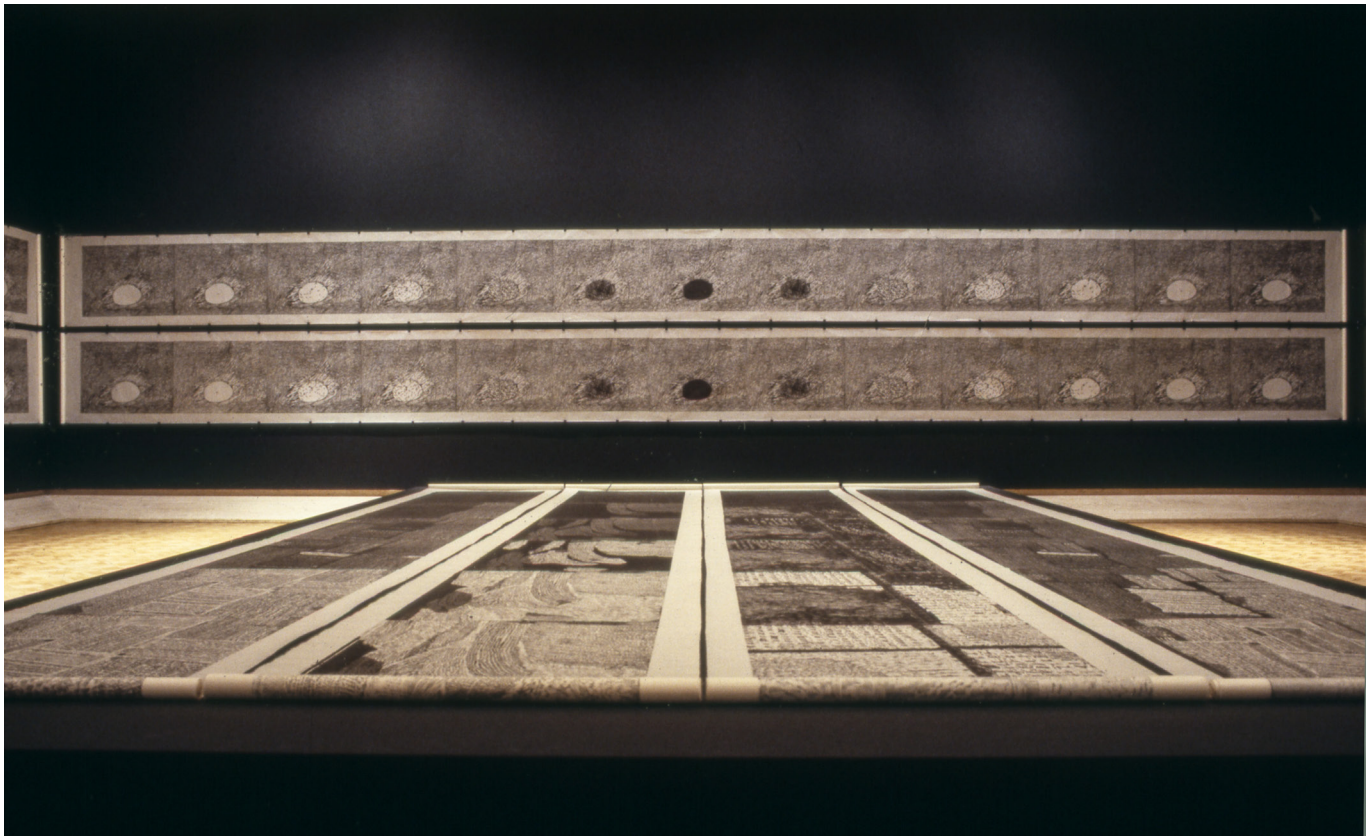

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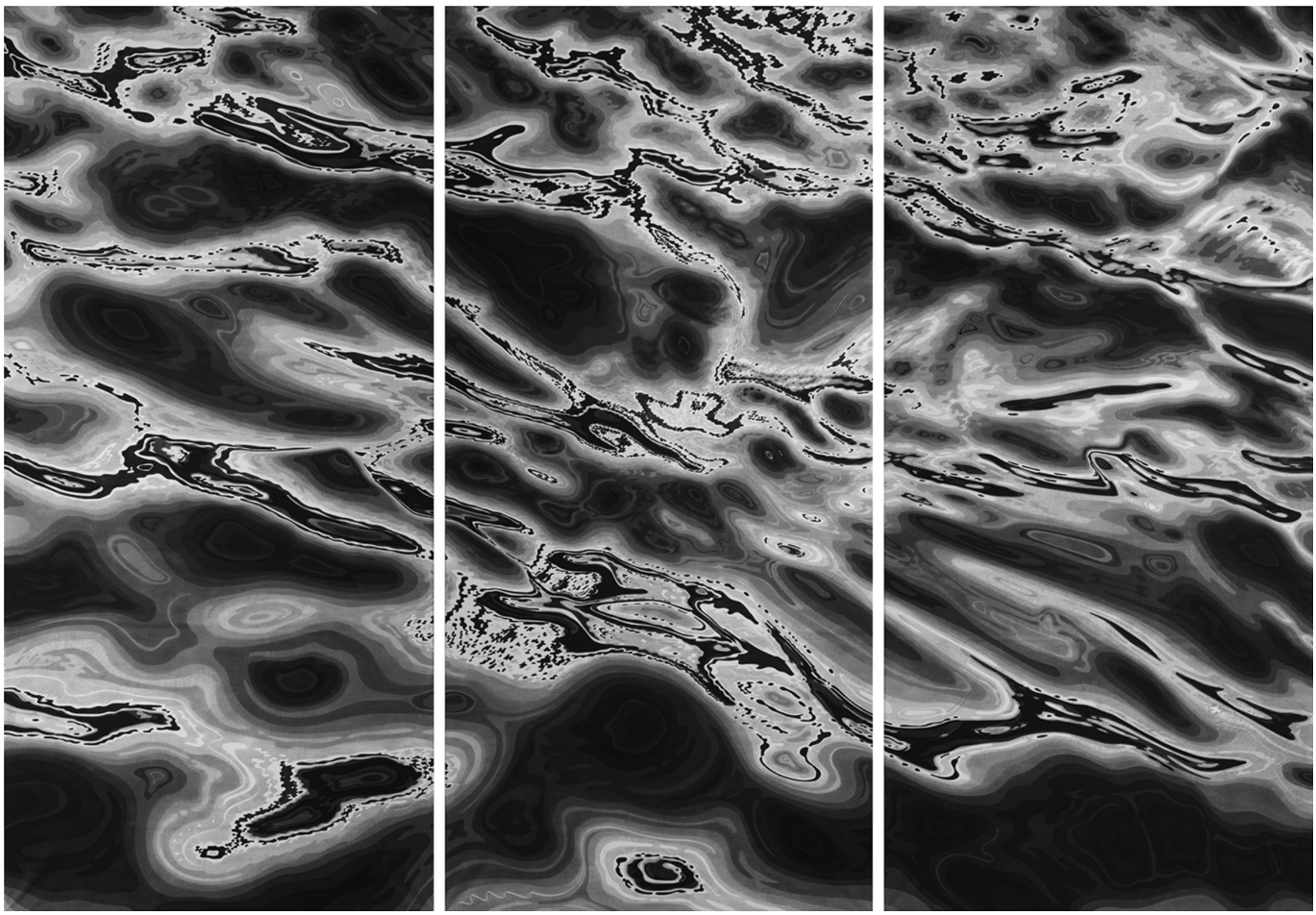

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