

The Meaningful Pixel and Texture: Exploring Digital Vision and Art Practice Based on Chinese Cosmotechnics

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Abstract

The study introduces a fresh perspective on the digital realm by examining the Chinese concept of *xiàng* (images), elucidating how it can build an understanding of pixels and textures on screens as digital trigrams. This concept offers an outlook on the intersection of digital technology and the natural world, thereby contributing to discussions about the harmonious relationship between humans and technology. *Xiàng*, the basement of Chinese visual art, is rooted in ancient Chinese philosophy and connected to the eight trigrams. The discussion of connects art, philosophy, and technology. This paper connects the meaning of *xiàng* with the truth appearing philosophically through the analysis of the concepts of phenomenon and noumenon and the unique Chinese way of observing. Hereafter, the historical interconnection between ancient painting and writing in China emphasizes their relationship between technical craftsmanship and artistic expression. In digital, the paper blurs the traditional boundaries between images and text on digital screens in theory. Lastly, this study identified an ensemble concept relating to pixels and textures in computer vision, drawing inspiration from AI image recognition in Chinese paintings. In art practice, by presenting a fluid visual experience in the form of pixels, which mimics the flow of lines in traditional calligraphy and painting, it is hoped that the viewer will be brought back to the process of the truth appearing as defined by the *xiàng*.

Keywords: Chinese Cosmotechnics, Computer Vision, Contemporary Neo-Confucianism, Texture and Pixel, Xiang

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Introduction

Chinese philosopher Yuk Hui has proposed the concept of Cosmotechnics, which argues that different cultures can achieve cosmic and ethical unity through various technological activities, be they crafts or artistic creations, rethinking the issue of technology to cope with crises such as global warming, energy shortages, and the decline of biodiversity in the Anthropocene. This study follows the above concepts and builds a theoretical and artistic practice that responds to the concept of Cosmotechnics based on the Chinese theory of *xiàng*. The original meaning of *xiàng* is the elephant, which symbolised the communication between heaven and earth in ancient times, and later, it was derived into specific meanings such as divination, communication and imitation. Words related to *xiàng* include abstraction, quadrant, symbol, and image. This study needs to explore *xiàng*'s meaning as truth appearing and unify the images that serve as the basis of Chinese visual art and the trigrams associated with divination techniques.

Xiàng and the Truth's Appearing

Dào qì (way and objects) are a pair of important research categories in ancient China, equivalent to the relationship between abstract reasoning and concrete things, between spirit and matter, as stated in The Book of Changes, '*What is above form is called dào (way), and what is under form is called qì (an object)*'. According to Chinese scholar Pang Pu (1928-2015), there is an intermediate position between the *dào* and the *qì*: the position of the *xiàng*. 'Heaven hangs down an image to see good and bad fortune, and the saints look at it'. Heaven always foretells some signs so that those with high intelligence can discover the rules and principles through insight, where *xiàng* can be interpreted as the appearance of the way of heaven. All things in the world have its *xiàng*, '*on its xiàng for the construction of implements*', that is to say, to look at the *xiàng* of all things and to make concrete and shapely the construction of implements'. Therefore, according to Pang Pu, the complete expression of '*dào qì*' should be '*dào, xiàng, qì*'. *Xiàng* is the intermediary form in which humans take the initiative to relate to *dào* and *qì* (pu, 1995).

This study was established with the critique of Kant's concepts of phenomena and noumena by Mou Zongsan (1909-1995). It continues to explore the topic of "appearing" based on the "Moral Metaphysics". If *dào* is regarded as noumena and phenomena as *qì*, then *xiàng* is the process of 'appearing'. As a representative personage in contemporary Neo-Confucianism, Mou Zongsan, along with his teacher Xiong Shili (1885-1968) and other modern Chinese thinkers, confronted the philosophical and scientific issues of the Western world at that time. They claim that the Western tradition of mechanistic, objectifying, and substantializing metaphysics lacked a sense and emotion of life. Therefore, they attempted to draw from the traditional Confucian concept of *rén* (benevolence) and Wang Yangming's concept of *liángzhī* (conscience), aiming to construct a moral metaphysics centred on the *běnxīn* (original mind). Unlike Kant's Metaphysics of Morals, which highlights a metaphysical interpretation of the concept of morality, contemporary Neo-Confucian Moral Metaphysics emphasizes that moral practice based on the original mind can access the ultimate source of the universe (Mou, 2020).

Kant delimits the boundaries of what one can acquire about an object over the manifold of appearances that the thing in itself acquires by stimulating the senses. The thing in itself is not accessible to sensuous intuition but is only capable of being grasped based on intellectual intuition, which is not possessed by human beings. According to Mou Zongsan, based on the

perspective of traditional Chinese thought, it seems that human beings have always possessed intellectual intuition and that things in themselves are knowable. Conversely, Kant's shaping of the thing in itself from subjective consciousness makes the thing-in-itself not acquire its valuable implications. However, it becomes only a concept of limitation, like the number '0', which is causal logic without actual content. This meaningless limitation makes the concept of phenomena equally unstable. Thus, he initiates a transformation of the Kantian concept of the thing-in-itself and noumena.

Firstly, within Kant's framework, noumena and thing in itself are not synonymous. Thing in itself refers to the unknowable transcendent object that is opposed to phenomena, while noumena refers to the intellectual realm opposed to phenomena. In addition to things in themselves or thing in itself, noumena also encompasses three transcendent concepts: freedom of the will, the immortality of the soul, and the existence of God. Mou Zongsan understands noumena as the only absolute infinite essence in the Chinese sense of the free infinite mind or the original mind, the moral metaphysical entity. The thing in itself is then subsumed into this infinite mind and transformed into a valued, meaningful thing in itself that can be known by intellectual intuition.

In contrast, 'intellectual intuition' is understood as zhī tǐ míng jué (awareness of the inherent luminosity of the mind) on the basis of Wang Yangming, which is a comprehensive way of understanding the relationship between the self and others (or the universe) from the perspective of the moral subject rather than the cognitive subject. In this framework, Mou subsumes technology under the category of phenomena, where science and technology generated from the cognitive subject may not be able to explain the explanations provided by intellectual intuition generated from the moral subject. From the cognitive subject, the world is known analytically and deductively, whereas, from the moral subject, the interrelationships of things need to be examined through integrative reasoning. This intuition unites phenomena with ontology. In this relation, the object is not objectified to meet the subject in the phenomenal world, but the co-manifestation and existence of the object and the I obtained through "intellectual intuition" in the moral metaphysical ontology of the "original mind," which is the mutual corroboration of the subject and the object. In this way, the meaning of appearing is far from Kant's transcendental objects of objectification, it enters into the field of the study of the xiàng in Chinese thought. A way of 'appearing' that is different from Kant's epistemological path also serves as the background and core of this study of the problem of the truth appearing.

Writing and Painting Are Derived From the Xiàng

Writing and painting share the same origin, also a traditional topic in Chinese painting, which is expressed as a close relationship between Chinese painting and calligraphy with a mutually reinforcing development process. The exact origin of writing and painting is still a matter of debate, as there is no accurate historical fact about the origin of writing and painting. There is a common misconception that Chinese characters are hieroglyphics, implying that they originally evolved from the abstraction of images. While it's true that there is significant archaeological evidence linking images to writing, such as murals and primitive images, it's not accurate to assume that the simplified abstract evolution of Egyptian hieroglyphics "from pictures to letters" can be applied to the development of Chinese characters. Chinese scholar Gao Jianping interprets the phrase "writing and painting share the same origin" to mean that the act of creating visual images and the use of vision to convey information are both the

origin of writing as well as the origin of painting. Ancient painters and historians hoped to use this discussion to link painting to the origins of human civilization (Gao, 2018).

The earliest discussion on the origin of writing and imagery comes from Xu Shen (c. 58 ~ c. 147) in his "*Shuowen Jiezi*". He traces the origin of character creation back to the ancient practice of observing natural phenomena and divination activities such as drawing hexagrams, recording events with knotted cords, and observing animal footprints by Cangjie. The process of writing began with the observation of *wùxiàng* (appearance of things) of things to obtain pictographic symbols, which gradually evolved into the formation of characters. Later, it transitioned to the process of recording on bamboo and silk. According to research by Shuowen Jiezi, Writing and painting originate from different ways of recording the *wùxiàng* of manifested things. Therefore, it can be said that both the written word and the painted image in 'Writing and painting share the same origin' originate from the manifestation of the nature of all things, and this manifestation and presentation activity is also known as *xiàng* (He, 2016). Likewise, the *xiàng* is the technical activity of storing the truth of all things in the universe in definite symbols, and both calligraphy and painting originate from this activity. The images of painting and the words of calligraphy created for this purpose not only express the beauty of their temporal and spatial settings, order, position, rhythm, and rhyme but also enable the truth of the world and the original mind of man to emerge from their respective states of darkness and obscurity. What Writing and painting share the same origin seeks to answer is the emotion of life between man and nature, as well as man and man.

Disappearance of Boundaries Between Text and Images in the Digital Age

In the digital era, the relationship between writing and painting has changed significantly. Friedrich Kittler (1943 - 2011) argues that computer images are the result of computer graphics, which is a software program that provides both readability and visual effects when run on appropriate hardware (Kittler, 2001). Digital images, on the other hand, are simply optical perceptions that are formed by our eyes on a screen. Regardless of whether it's text, images, graphics, or sound files presented on a screen, everything in the digital era originates from a set of mathematical instructions written in computer code. These instructions consist of strings of 0s and 1s and two different voltages during electronic pulse transmission. Digital media is essentially an intermediate code generated by discrete units, which break down everything into consistent and interchangeable bits or bytes. Computers represent objects using binary code, and all codes within the system consist of strings of 1s and 0s. Therefore, from a material perspective, there is no difference in appearance between image and text, since all binary codes are "reduced" to two different voltages in circuits or electronic pulse transmission. As a result, this electronic process cannot be directly seen or felt, making the system "virtual" for the media it produces, such as the internet (Dewdney & Ride, 2006). Kittler argues that images were authentic and had the qualities of phenomenological artifacts, but now they are virtual (Fictional); they are just information. Kittler describes this process as a general digitization of information and information channels, erasing differences between individual media (Kittler, 2006). Images, sounds, and texts become interface effects. In other words, the essential difference between image and text in the digital has been eliminated; it is not three or two dimensions, but 0-dimensional information and code, the virtual and the real intersecting on the terminal screen.

Take the historical development process of Chinese character input in the computer age. The complexity of Chinese characters has become an obstacle for the Chinese language to face the digital world. The primary character set for inputting Chinese characters is 6,763, while

the standard English keyboard is 101, and the main problem was how to convert Chinese characters into usable and displayable characters. We will examine only some of the early computer display technologies here. There were many options for displaying Chinese characters, such as the planar display method and the cathode ray tube display method. Depending on the scanning method, the tube display method is mainly divided into vector and raster. The most common is the raster tube display method. The raster principle is to represent Chinese characters as a dot matrix and then modulate the brightness of the scanning electron beam according to the dot matrix to produce glyphs. Generally speaking, the dot matrix of Chinese characters needs to be 15*16, and a number less than this will not be able to represent the complex strokes. In terms of hardware, the Chinese character system technology either chooses a new type of computer to develop or modifies the display mechanism on the basis of a Western computer by adding a Chinese character library, a Chinese character discriminating circuit, and a half-word processing circuit, so as to make it capable of displaying both single-byte Western characters and double-byte Chinese characters, while the graphic form of the display mechanism remains unchanged. Without changing the basic structure of the computer, Chinese characters in software are stored as images and displayed on the screen as sub-graphics in a text-based screen format. Chinese character input emphasizes the exploration of the harmony between Chinese culture and technology represented by Chinese characters, relying on the existing technology of early monitors and display methods to input Chinese characters in graphical form and to store and display them. We have briefly traced the ways in which Chinese characters were inputted in the mechanical and digital eras, where the essential distinction between text and graphics was dissolved on the monitor, and they were given technological life. In *On the Existence of Digital Objects*, it is mentioned that digital objects are computational objects that make up a new type of industrial product - web images and texts (Hui, 2016). They exist both on the screen (with which we can interact) and at the back end or inside of electronic programs. The problem is that this image and text are shown to represent not just their representations but also the entire operating system and the choices of the viewer. If we bring the internet and big data into our thinking, the text image is not just passive but in the actual interaction between man and the world, software, and hardware.

The *Soft image* is Ingrid Hoelzl and Rémi Marie's new vision of the digital image. The digital image is the moment when the network accesses the image. While the screen mediates the subject-object interaction, the digital image is the in-the-moment confirmation of code projection and visual interaction on the screen. New media has changed the perception of images because it has turned the viewer into an active user. The new media image is something that the user actively enters. It is interactive. As a result of interactivity, the relationship between subject and object is shaken; images are no longer mere reproductions, and images no longer exist as physical entities. This operationalization of the soft image implies an understanding of the world as a database. The image is a continuous realization of networked data. The inclusion of the network makes the image no longer just a passive and fixed representation but a real-time data refresh. Images are transmitted and generated by unseen information and signals; images are self-contained operational procedures (Ingrid&Remi, 2015).

The image on the screen has a certain fluidity and relative stillness in time, a condensation of disembodied information. Anything we frame on the screen can be called an image. The subject somehow notices and imagines the signals; the image is a summons. In the process of loading and updating, we wait for confirmation from the next visitor, and the code is evoked and resides on the display through technical means. In other words, digital images are not just

mappings of physical objects but where code and consciousness converge in digital objects. Furthermore, When the network is augmented, the city is configured as a real-time database, and all human activities are digitized; digital images become semantics on terminals dedicated to vision, connecting the virtual and real worlds.

The process of digital image generation is the process of convergence and visualisation of different codes from multiple environments, in a similar way to the way everything condenses in Zhang Zai's (1020 - 1077) *qi* (air) theory, the image is shaped and adapted by the stimulation of codes and waves and by the subject's expectations. The digital images that appear before our eyes are code mappings, the unfolding of a certain consciousness thousands of kilometers away. For individual, there is no specific difference between text and image, writing, and drawing on the screen, but a new digital world is incorporated into the traditional world and that human beings coexist with the digital objects in this technological cosmic.

Chinese Painting and Calligraphy Under Computer Vision

The previous section roughly summarised text and images as information and code, and the imaging of interfaces is understood as the visualization of code, and we participate holistically and synergistically in the operation of the digital world. Yuk Hui draws on Gilbert Simondon's associated milieu to illustrate how his digital object exists. It essentially discusses the aggregation and formation of digital objects under the continuous participation of individuals and the intertwined network of relationships between computer-operated software and hardware. Let us borrow feature extraction from computer vision as a case study to continue this discussion and further extend the understanding of text and painting in the digital age. Computer vision is a field of artificial intelligence (AI) that enables computers and systems to derive meaningful information from images, videos, and other visual inputs and to act on or provide recommendations based on that information.

The recognition of Chinese paintings has become increasingly important. Unlike Western paintings, which use light to express the form of objects, Chinese paintings rely on lines as their primary modeling method. This means that traditional recognition methods used for Western paintings cannot be fully applied to the recognition of Chinese paintings. In Chinese painting, lines play a crucial role in forming the image, and the way the brush is used determines the variation of lines. Edges are essential in representing the content of an image, containing a vast amount of visual information. To distinguish Chinese paintings from general images, researchers detect the consistency and granularity of image edges in different pixel sizes and color channels. Sheng Jiachuan (Liu, S., & Sheng, J. 2017) has developed an algorithm inspired by the appreciation of painting authenticity. This algorithm brings together the visual screening of brushwork styles by the brush used in paintings. Stroke composition and texture are extracted from a matrix of pixels with various features, computed, and recognized using various mathematical models. This ultimately achieves efficient recognition of Chinese paintings.

The primary objective of extracting local features lies in capturing all brushstrokes within the entire painting, thereby pinpointing the regions that best encapsulate the detailed brushstroke information and characteristics associated with the painter's style throughout the artwork. During the process of feature extraction, he classifies the extraction of features from ink paintings into two main categories: firstly, scrutinizing the structural aspects of the overall image, and secondly, analyzing the distribution of points or local features characterized by specific properties such as geometric features, area, and shape within designated regions of

the artwork. Initially, in the context of overall recognition, the limited color palette typically found in ink paintings renders color unnecessary, thus leading to its exclusion and the direct utilization of grayscale processing. In the context of regional display, Chinese paintings predominantly feature lines and brushstrokes, facilitating the extraction of local features such as brush direction, intensity, and speed. Edge detection techniques prove instrumental in capturing significant changes in pixel grayscale values, thereby enabling the identification of line features, which encapsulate local image characteristics including texture structures and abrupt arrangements. Leveraging algorithms, edge features can extract pen shapes and intensity distributions within a 64*64 pixel area. Typically, the artistic style of ink paintings in the pixel domain can be accurately discerned based on the painter's brushwork and distinctive characteristics. Additionally, the extraction of style within regions involves a nuanced understanding of crucial aspects such as brushstrokes and ink texture. Brushstrokes serve as reflections of various painters' unique brush techniques, encompassing factors such as brush direction, intensity, and speed, all of which play a pivotal role in delineating the artist's distinctive artistic style. Consequently, the primary objective of extracting local features lies in capturing all brushstrokes within the entire painting, thereby pinpointing the regions that best encapsulate the detailed brushstroke information and characteristics associated with the painter's style throughout the artwork.

Image extraction has various aspects, such as color, light, dark, and composition. Different researchers have different theories to describe them. However, we can define them generally as the analysis of Chinese painting or ink painting based on the texture of brush and ink, which is a clearer quantitative feature than color and lightness. The texture of Chinese painting is related to the artist's brush and ink characteristics, writing habits, and composition. It exists on the screen as a texture in the form of a pixel matrix with brightness, grayscale, and orientation, storing information about the painting. The extraction of texture has its limitations and needs to be supplemented or integrated with other features. Traditionally, natural features of painting and calligraphy are extracted centrally from computer images. For instance, the sampling method based on pixel arrangement can make a relatively clear distinction between Chinese paintings. As technology advances, there may be more transparent and more precise methods. However, we now refer to this texture as "meaningful pixel combinations." Texture and pixels are a small intersection between calligraphy, painting, and exhibited digital images. Can we understand the relationship between painting and calligraphy in the digital realm as "a regular arrangement of pixel matrices and similarities in identifiable features such as light and dark, grayscale, and shape?" Ink colors, brushwork, writing styles, lines, and edges are stored digitally in the regularity of the pixel display. The pixel matrix can be used in mathematical formulas to reveal its information and meaning and act as a cross-center between the real and virtual worlds, with the display as the endpoint.

Practice in the Flowing Pixels

We initiated our discussion with *xiàng* and gradually led the topic to pixels and textures in computer vision. Pixel and texture become the symbols connecting the present virtual and reality in the computer era in this study, and like the trigrams of a thousand years ago, they are a kind of present record of the flow of everything revealing itself, which contains the transmission of information and the connection between human beings and everything. The pixels and textures in front of the screen have similar functions and behaviours in our discourse, and they become the mapping and intersection of the two environments of reality and the virtual, so we express them as a kind of 'digital trigrams'. To develop our artistic practice according to the above, we will use the theme of flowing pixels to simulate the flow

of rhythm in landscape paintings and calligraphic works. According to the theory that writing and painting share a common origin, Chinese painting is often referred to as writing mountains and water. However, a closer examination reveals that it is actually a unique way of capturing the essence of nature, painter or writer takes the truth of what he sees and stores it symbolically in the ink paper. In today's digital age, this process translates into a series of "meaningful pixels" translated onto a computer screen. To explore this concept further, we captured a segment of a scenic landscape on camera and added a stylised, pixelated texture using post-production software. By observing the movement of these pixelated frames, viewers can gain a deeper appreciation for the interconnectedness of the universe. This immersive experience not only transports us into a virtual world but also allows us to explore the inner workings of our minds (see Figure 1 to 4).

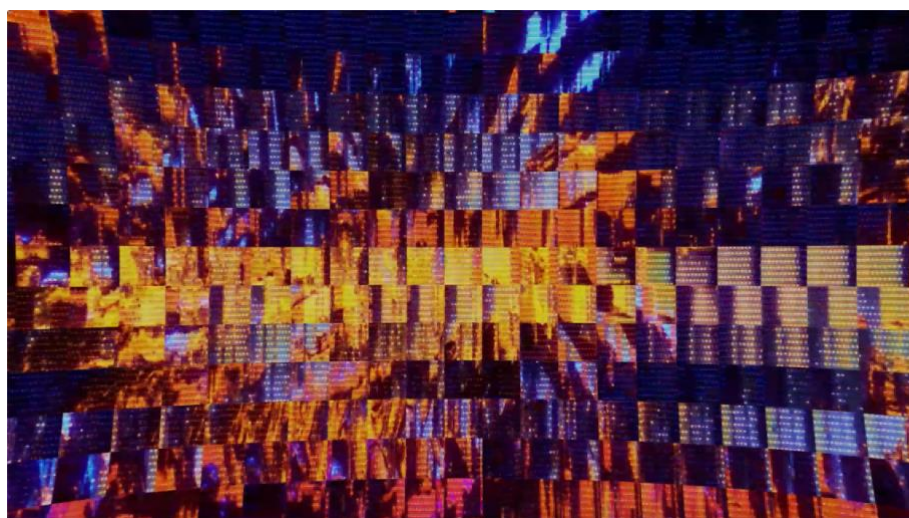


Figure 1: Xindu Wang, 2023, video work1, flowing pixels.

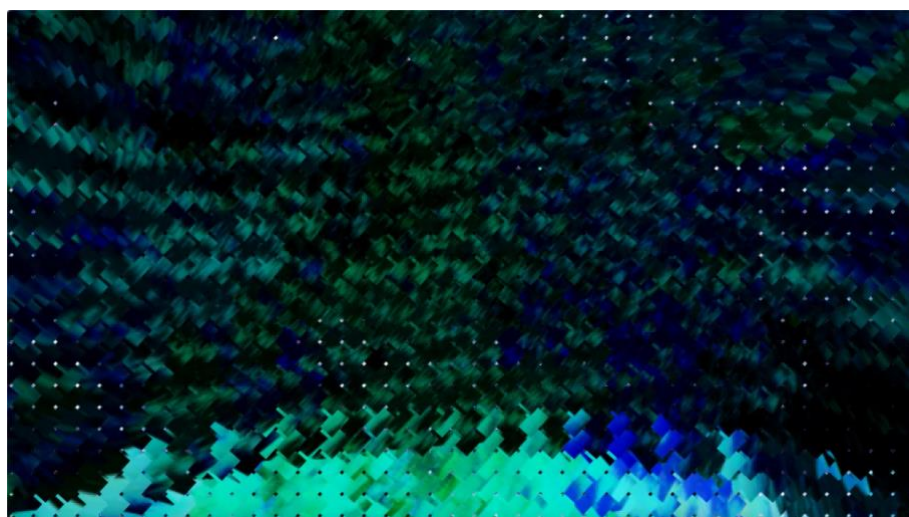


Figure 2: Xindu Wang, 2023, video work2, flowing pixels.

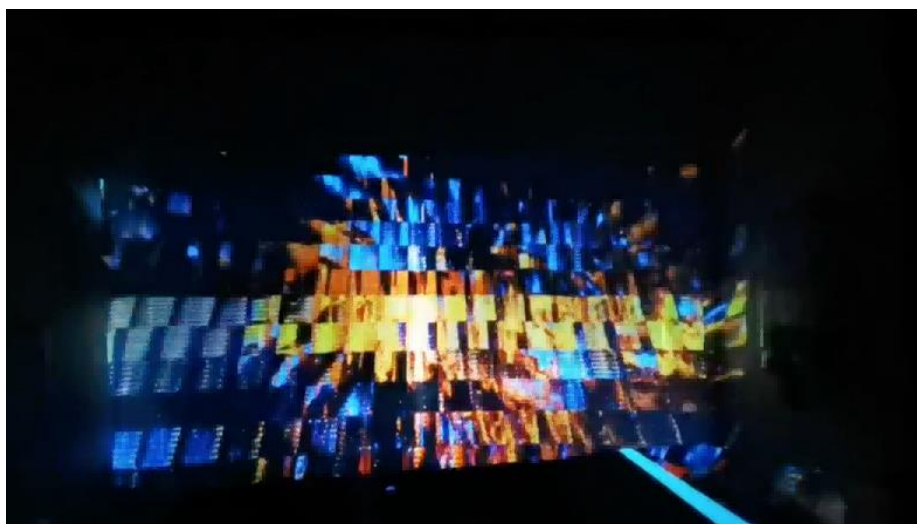


Figure 3: Xindu Wang, 2023, video work1, flowing pixels.
darkroom display.

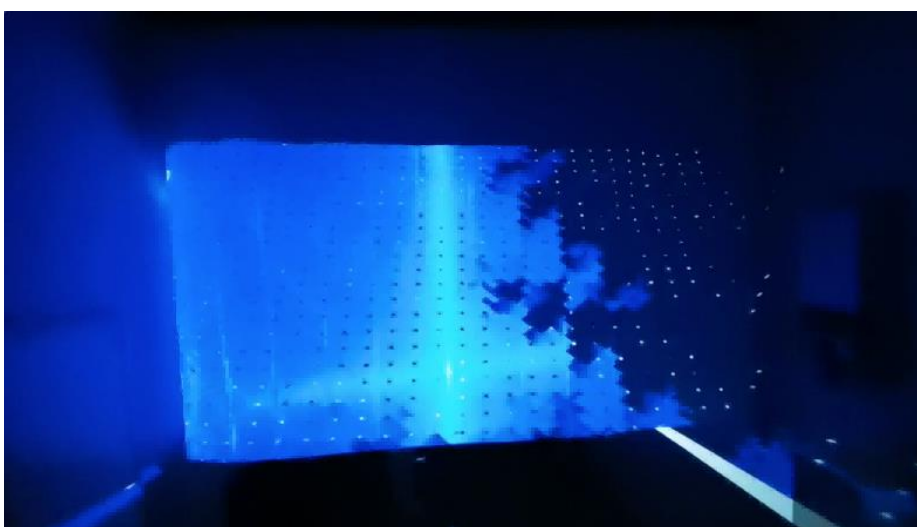


Figure 4: Xindu Wang, 2023, video work2, flowing pixels.
darkroom display.

Conclusion

We have traced an interpretation of current digital technology based on Chinese culture and described and presented it in theoretical and artistic practice. On the one hand, it can serve as a response to Yuk Hui's Cosmotechnics, and on the other hand, this kind of thinking also tries to answer the contemporary encounter between human beings and digital objects. How the heavy body can embrace digital technology beyond imagination has been a topic of discussion for many art and philosophical practitioners. We must try our best to orientate this future towards a living world that allows us to exist as living individuals. It is necessary to think about how we can effectively and rationally co-exist with technology. The human mind can inspire this thought, provided we believe in the potential creativity of our respective civilizations.

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