The Dialectic of Art and Technology: Taking Percussion Elements in New Music Works as an Example

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Abstract

The definition and development of art and technology have long been as difficult to distinguish and separate as the "twin brothers" of theory and practice, both from the understanding of ordinary audiences and at the philosophical level. This article, using specific works as examples, examines the definition and evolution of art and technology from the perspectives of audiences, performers, composers, and theorists. It aims to clarify the relationship between art and technology, progressing from concrete practice to ideological guidance. The methodology employs a multi-perspective approach, advancing from the basic sensory experiences of ordinary audiences through the technical displays of professional operations, and ultimately to the expansion, derivation, and leading iteration of theory. The results reveal a continuum of understanding, from fundamental perceptions to professional practices and theoretical frameworks. This research contributes to a more comprehensive understanding of the art-technology relationship, emphasizing the importance of considering multiple perspectives in its study and application.

Keywords: Art and Technology; Percussion; Marimba; Performance Theory

Introduction

The relationship between art and technology has undergone significant transformation in recent decades, particularly in light of rapid technological advancements and the emergence of artificial intelligence (AI). This evolution has profoundly impacted both the creation and perception of art, challenging traditional definitions and practices. The advent of photography and recording technology marked a pivotal moment, necessitating a reevaluation of artistic concepts and technological integration in creative processes (Smith, 2020).

In the contemporary landscape, where AI and robotics increasingly permeate daily life, the artistic realm faces unprecedented challenges and opportunities. As Johansen (2022) notes, the automation of various human tasks has led to substantial shifts in aesthetic preferences and artistic needs. This technological influence on artistic creation has resulted in novel and often unconventional artistic expressions, presenting a complex landscape for both creators and audiences.

The present study aims to address several critical research questions:

1. How has the proliferation of advanced technologies, including AI, reshaped the parameters of traditional art forms?

2. In what ways do technological advancements influence contemporary artistic creation and aesthetic appreciation?

3. How can we redefine and understand the evolving relationship between technology and art?

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4. What are the implications of technological integration for the fundamental nature and essence of artistic expression?

Exploring these questions is crucial for several reasons. Firstly, it allows for a comprehensive re-examination of the technology-art nexus in an era of rapid digital transformation. Secondly, it provides insights into the changing nature of artistic creation and reception, which is essential for both practitioners and theorists in the field. Thirdly, it promotes a more nuanced and cautious approach to technological adoption in artistic practices. Lastly, by delving into the origins and evolution of art and technology, this study aims to provide a foundation for understanding current challenges and future directions in the field.

As Brown (2021) argues, while technological progress has introduced innovative creative methods and expressive forms, it has also raised significant philosophical and practical questions about the nature of art itself. Therefore, this paper seeks to contribute to the ongoing dialogue by offering a critical analysis of the current state of art and technology, their interrelationship, and the potential trajectories of their future development.

Through this examination, we aim to foster a deeper understanding of how technology is reshaping artistic landscapes and to provide valuable insights for artists, technologists, and scholars navigating this complex and rapidly evolving domain.

Content

I. The Origins of Art and Technology

The concepts of "art" and "technology" are like "twin brothers" due to their "genetic" similarities in "appearance", making them difficult to distinguish. However, due to differences in personality, experience, and knowledge during their respective growth processes, their "personalities" are strikingly different. Even so, it is still very difficult to clearly distinguish between them.

From an etymological perspective, the concepts of "art" and "technology" come from Western languages, and the tension between them is not so strong. "Art" in English is "art", while "technology" is "technique", using two different words to express, just like in Chinese. However, in ancient Greek civilization, the root of Western culture, these two concepts were not distinguished, but used the same word "tekhnē" to refer to both "art" and "technology". (Harper 2023) In Plato's "Dialogues", making a table is "tekhnē", and creating a poem is also "tekhnē". During the ancient Greek period, the relationship between art and technology was closely connected, they were basically one and the same, difficult to distinguish clearly. Artists of that era were usually also skilled craftsmen, who integrated their creativity and skills into their works, making art and technology mutually integrated and complementary.

At the same time, by comparing the "Seven Liberal Arts" (grammar, logic, rhetoric, arithmetic, geometry, music, astronomy) of the Western Middle Ages and the "Six Arts" (rites, music, archery, charioteering, calligraphy, mathematics) of Chinese Confucianism, we can find that they both emphasized the importance of technology. Whether it's the "Seven Liberal Arts" of the Western Middle Ages or the "Six Arts" of Chinese Confucianism, they all covered a wide range of knowledge domains, all of which required a high degree of technical skill and exquisite craftsmanship. These skills not only involved the field of art but also involved multiple fields such as science, mathematics, and music.

During that period, the relationship between art and technology was very close, and many art forms required a high degree of technical skill to complete. For example, sculptors needed to master skilled sculpting techniques, painters needed to master painting techniques, musicians needed to master performance techniques, and so on. These technical skills were not only a means of artistic expression but also a way to express the artist's emotions and thoughts.

From this, we can conclude that the understanding of art and technology in ancient Greek times was closely connected, and art and technology were largely overlapping. This shows that artists of that era not only possessed a high degree of technical skills but also had profound artistic cultivation and humanistic spirit. This combination of technology and art made the artistic works of the ancient Greek period not only have a high technical level but also have profound ideological connotations and humanistic values.

However, during the ancient Greek period, the philosophical community had various different understandings of the relationship between technology and art. Plato, as an outstanding philosopher at that time, had unique insights into art. He believed that the core of art lies in inspiration, a supernatural power bestowed by God on artists, enabling them to create truly excellent artistic works in their creation. In Plato's view, the source of this inspiration far exceeds the scope of technology, it is a power beyond human reason, allowing artists to touch the essence of things.

Plato believed that only when artists create under the drive of inspiration can their works be truly regarded as art. Such artists are at the top of the social hierarchy, along with philosophers, because their works not only have aesthetic value but can also enlighten people's thoughts and guide people to pursue truth.

However, Plato held a different view of those creators who merely used technology to imitate the appearance of things. He believed that such creation only stays on the surface of skills and cannot penetrate into the essence of things. Therefore, this type of creator (mainly referring to poets) is similar to artisans and farmers in social status, considered as the sixth class.

In Plato's view, although technology can help people achieve certain creations to some extent, it often limits human creativity. True art should transcend the constraints of technology and pursue a higher realm. Technology is only a means, not the essence of art. This view of Plato had a profound influence on later artists and philosophers. His theory provided a new perspective for artistic creation, prompting people to think about the relationship between art and technology, as well as the true value and meaning of art.

In Aristotle's classic work "Metaphysics", he elaborated on the "Four Causes", which are material cause, formal cause, efficient cause, and final cause. He believed that the birth of a work of art is not accidental, but the artist skillfully uses techniques to transform specific material into meaningful works based on the "form" in their mind. This idea differed significantly from Plato's concept, which to some extent ignored the role of technology, while Aristotle paid more attention to the close combination of technology and artistic creation.

As time passed, art and technology remained intertwined in many aspects, forming an inseparable relationship. However, they also developed their own unique characteristics. In 1746, the French thinker Batteux, in his work "The Fine Arts Reduced to a Single Principle", made a new classification of art. He distinguished between "fine arts" and "mechanical arts", where "fine arts" mainly referred to the art fields generally recognized today, while "mechanical arts" specifically referred to scientific technology in the field of natural sciences.

This distinction clearly separated art from science, technology, and crafts from an aesthetic perspective, laying the foundation for the later development of art and technology.

It is worth noting that with the in-depth discussion of aesthetic concepts by philosophers such as Baumgarten, art gradually came to be seen as a sensory, emotionally rich experience. At the same time, technology gradually evolved into a rational, analytical field of inquiry. Although there were still intersections between the two in some aspects, in terms of overall concepts, aesthetic art and practical technology had shown a clear trend of separation. This evolution of ideas has had a profound impact on later generations, prompting people to pay more attention to the characteristics and values of art and technology respectively.

II. Technology Drives the Development of Art

In many discussions about technology driving the development of art in symposiums, journals, papers, etc., they often start by "setting aside the influence of political, economic, and other social forms". The author believes this is unnecessary and impossible. The art and technology we are discussing are all produced under the general environment of art and humanities. In other words, they are miniatures and reflections of life. Therefore, since they originate from life, and politics, economy, and other social forms are indispensable common elements in life, forcibly setting them aside is unfeasible for both art and life.

As the demands in life increase, the corresponding culture and feelings produced also gradually improve. Although they sometimes lead each other and cannot progress simultaneously, overall, with the continuously improving living environment and increasingly perfect social form, people's emotional needs become richer and more precise. But this is inseparable from the increasingly perfect politics and economy. It is precisely because of the additional value that the value of art makes people more affirmed and in demand. At the same time, it is also because of this demand and affirmation of values that a supply-demand relationship is generated, so the technology that matches it is born.

Taking music as an example, the earliest sounds were used for labor production slogans; warnings against beasts and enemies; the "mystery" of sacrifices. If the former is for the physiological needs of industrial production, the latter is for the spiritual needs of the human spirit. These two have been inseparable since ancient tribal times, until the increasing refinement and precision of social functions, the entertainment of music and other arts has been intentionally or unintentionally amplified. This has created the current stereotypical impression of art, either as a pure land in the hearts of top artists or as a carrier of entertainment and value symbols in the secular world. Its material value has been seen as more important by contemporary people, sometimes even becoming a synonym for money. However, its true meaning of emotional decoding and spiritual sustenance has been increasingly diluted, not to mention those that can inspire people's thoughts and guide people to pursue truth and authenticity. This is also why there are fewer and fewer artworks that are durable, listenable, and can be savored.

The characteristics of commodities lie in circulation and iteration, while the value of art lies in the "narrative" at the source and inspiring people's thoughts and guiding people to pursue truth. These had already shown their heads before the emergence of photography, video, and recording technology, but at that time, the uniqueness and singularity of art were very prominent. We call those who possess exquisite skills and exchange their craftsmanship for remuneration "craftsmen". Such people often have quite good skills, and these skills can be quickly replicated and converted into currency or useful materials. But art is different. Due to

its characteristics, it not only requires super high skills but also cannot be replicated and surpassed in a short time. At the same time, due to its inspiration and guidance of truth often surpassing people's understanding and recognition at the time, in most cases, it cannot be accepted, recognized, and transformed into something valuable by the public. From many famous musical works and paintings passed down through history, we can see that their authors were not famous or wealthy during their lifetime, some were only discovered by later generations after hundreds of years and became famous artists. If their inspiration and guidance formed different effects from the current politics and systems, then it is feasible to talk about "setting aside the influence of political, economic, and other social forms" at this time, because they were ahead.

III. Technology Triggers Reflections on Art and Technology Itself

Along with the wave of the Industrial Revolution, photography and recording technology emerged successively. In 1837, Daguerre, with his unique daguerreotype photography method, officially announced the birth of photography technology. In 1877, American Thomas Alva Edison invented the phonograph - the world's earliest recording device. This revolutionary invention not only provided us with a brand new means of recording the world but also opened the door to the era of mechanical reproduction. Since then, the dissemination and reproduction of images and sounds have become extremely convenient, greatly changing the way information is disseminated.

This change had a profound impact on traditional visual and auditory arts and forms such as painting and music. Music (mainly referring to music performance), as an art form that has long been created through live performance, suffered an unprecedented impact. The emergence of recording technology caused huge changes in the creative concepts and aesthetic concepts of music. Artists began to re-examine the essence and value of music, exploring the possibilities and future directions of music in the new era background.

In addition to the emergence of photography and recording technology, subsequent film technology not only challenged traditional art forms but also promoted innovation and development in the art field. Technology, as a medium and tool, gradually transcended its traditional auxiliary role and began to play a leading role in artistic creation. Artists began to use film and television technology to explore more forms of expression and creative means, making artistic creation more diversified and experimental.

The invention of recording and video technology at that time was a major revolution in the art field. It not only changed the status and role of traditional auditory and visual art forms, gradually affecting the music and painting circles to varying degrees, but also promoted the progress and development of the entire art field along with other art categories.

(I) The Debate between Adorno and Benjamin

Since its inception, photography has been in conflict with painting, and this controversy gradually expanded, leading to a broader field dispute. In the 1930s, a debate about art in the age of mechanical reproduction broke out within the Frankfurt School. Adorno, in "Dialectic of Enlightenment", firmly opposed art in the age of technical reproduction. He believed that art should maintain its autonomy, and mechanical reproduction made art lose its aura and redemptive function, therefore it was no longer true art.

Contrary to Adorno's view, Benjamin, in works such as "The Lyric Poet in the Era of Advanced Capitalism", "A Short History of Photography", and "The Work of Art in the Age of Mechanical Reproduction", elaborated on his views on art reproduction and cultural industry in the age of mechanical reproduction. He advocated that the reproduction of technologies such

as photography and film is to change its existing form through the internalization of art, thereby forming new art forms. These new art forms have unique shock power and will replace traditional beautiful, autonomous art. Although the aesthetic value aura of traditional art will be destroyed by mechanical reproduction, Benjamin believed that technology brought shock as a new aesthetic value, injecting new vitality into art.

Moreover, from Benjamin's book "Contemporary Art and Technology", we can deeply understand that contemporary society has a new cognition of art and technology. In the era background of the booming development of photographic technology and the Internet, we can no longer simply exclude reproducible technology from art.

Before the invention of photography and video technology, the irreproducibility of art was regarded as an important characteristic. However, nowadays, most people come into contact with art through the Internet, videos, and audio-visual materials. If these "reproduced arts" are denied their artistic nature, then the study and exploration of previous people's art will face more difficulties. Furthermore, without the record of these materials, the authenticity of art's existence is also difficult to confirm. But we must recognize that in contemporary society, people have reached a consensus on the authenticity of "reproduced art".

Art, as an important representative and display platform of humanities, inevitably has the characteristics of the times and regional characteristics. Technology is born with different life needs in different periods, meaning that technology is invented and developed to meet specific needs. This forms a causal relationship: to achieve goals, technical means and methods are developed and researched. In other words, technology without a goal is merely a single mode of movement, but with a goal, various technical means work together to achieve the goal. Once the goal is achieved, art is formed. It can be said that technology is the process, while art is the presentation of that moment.

This view enlightens us: art and technology are opposing in some sense, but from another perspective, they are complementary. An outstanding work of art often relies on advanced technology and practice to realize its brilliance. For example, modern artists use digital technology and new media to create stunning works, which not only demonstrate the advancement of technology but also reflect the innovation and imagination of art. At the same time, the continuous progress of technology has also given birth to new art forms and modes of expression. Therefore, art and technology are neither completely opposing nor completely the same.

This article aims to deeply explore this special tension and contradiction, analyzing the interactive relationship between art and technology in contemporary society. We will comprehensively demonstrate the dialectical relationship between art and technology through case studies, empirical analysis, and theoretical discussions. At the same time, we will also focus on the impact of technology on art creation, dissemination, and reception, as well as the inspirational and innovative role of art on technology. Finally, we will try to summarize the mutual influence and value orientation of art and technology in contemporary society, providing useful inspiration and reference for the future development of art and technology.

(II) Taking the Marimba Trio "Stubernic" as an Example

In music performance, due to the increasing maturity of photography, video, and recording technology, people's preference has gradually shifted from single personal skill display to multi-person cooperation, with works that have no less technical skill than solo movements. Therefore, a large number of works similar to "Stubernic" were born.

This work was created by Mark Ford, the former chairman of the Percussion Arts Society at the University of North Texas in Denton, Texas. Ford is not only a marimba soloist but also a contemporary famous marimba composer and educator. He often performs at international music festivals in South America, Asia, Australia, and Europe, and has participated in premieres, recordings of various types of new works and personal albums for marimba solo, ensemble, concerto, etc. His book "Marimba: Technique Through Music" has received unanimous praise from the industry and percussion enthusiasts.

"Stubernic" is one of his representative works, pronounced as "Stew bur nick". It is a unique, challenging marimba trio performed by three performers on a 4 and 1/3 octave marimba. Because this work is dedicated to Stefan and Mary K. Stuber and their music institute in Nicaragua, the title becomes more meaningful: "Stuber Nic", which often makes uninformed people search for a long time without understanding its meaning.

（1）From the Perspective of Audience and Listeners

When I first heard this work, like most ordinary listeners, I experienced it from an audience's perspective. Three performers playing on a "small marimba" - it's called "small" because usually, on a five-octave marimba, it's already quite crowded for two people to perform, sometimes requiring the two to coordinate how to switch angles and positions to complete the required performance. Now there are three adult Europeans in a performance area less than two meters long, completing a work with solo-level technical skills, each with special performance techniques, bringing more complex auditory effects and dazzling visual effects.

"Stubernic" as a musical work doesn't just stay at the level of auditory effect, its visibility is also excellent. The first appreciation gave me multiple highlights that made me exclaim or applaud. First, for audiences who are just getting in touch with percussion or who don't know much about percussion, the sound of the marimba itself easily attracts their attention. In my 7 years of study in Europe and subsequent performance experience in professional orchestras in China, I found that whether Chinese or Western audiences, most people's first impression of percussion is still the jazz drum. It's understandable that the jazz drum has indeed won a place for percussion on the world stage, but it's really only a part of the percussion category. So when audiences hear and see the marimba being played, many people show surprised or "magical" expressions. They realize that percussion can have such beautiful sounds and pleasing melodies.

Secondly, what follows is the completion of 3 performers on a "small marimba" less than two meters long with technical skills that are dazzling, non-interfering, and complementary. It's like a multi-faceted three-dimensional sculpture, you can appreciate each face individually with different scenes, or you can comprehensively appreciate how they echo each other, giving people a larger, richer feeling. If these are regular performances, then on stage, the form of three people completing a melody in a relay and then immediately separating to complete their own performances, this performance mode that originally only appeared in imagination and animation plots has become a highlight in the work "Stubernic". It makes the performers "run" from the confined space of their two feet.

Next, in terms of timbre exploration and development, it's also a highlight of Mark Ford's work. He truly utilized one instrument to the extreme, even making areas that were originally not for performance into performance areas. Through clever handling and matching of timbres, he made it seem so "harmonious". As we all know, the performance area of the marimba is on the keyboard. Ford made the metal resonance tubes and the barriers at both ends of the instrument into performance areas, truly creating a blend of metal sounds, instrument

sounds, and percussion sounds, all pleasing to the ear. And through such special timbre synthesis, he created a "ensemble effect" that doesn't feel dissonant at all.

Finally, the impact sound of striking the key surface and barriers with the marimba mallet tail blends with the instrument sound. The middle performer also uses a four-mallet technique to enhance the richness of the harmony, allowing more instrument sounds to envelop the special sound effects to balance the parts. In the end, the 3 performers complete large sections of up and down running sound groups in an extremely high-speed performance method, which can even be called a technical display method. This is more than just being "in unison" - besides being perfectly coordinated, in this small space, a slight carelessness could lead to mallets colliding with each other, affecting the next step of the performance. So when the performance is over, people pause for a long time before bursting into enthusiastic applause, just like when an athlete breaks a record.

This is from the audience's perspective, seeing this as indescribably superb technology. That time I myself was an audience member, but later when I was in the position of a performer, I observed that the public had the same feelings as I did then. But at the same time, as a performer, I had a whole new understanding.

（2）From the Perspective of Performers and Composers

From a performer's perspective, such a work with extreme performance effect is one that every performer wants to own and perform multiple times. Therefore, the analysis and research of the work will be more careful than before. In terms of performance technique, "Stubernic" can indeed be considered as a form of ensemble performance from Nicaragua, the Gulf of Mexico, and South American regions. But it is richer than this pure multi-person ensemble performance. The ensemble performances in Nicaragua and other places are basically one main performer with others as accompaniment or concerto. "Stubernic", however, is constructed in the form of a trio, with each person being an independent part. If separated, it can also be performed individually, and with slight modification, it can be an independent work. However, the cooperation of the three is where the essence lies. So choosing the right partners is very important when performing this work. Secondly, in terms of timbre handling, it's not enough for each person to use one type of mallet. For striking different areas, choosing mallets of different materials or models is necessary to obtain better effects. This requires the performer's keen perception and rich experience to obtain better timbre and harmony effects when the three perform together. In the "relay" section of the three, the uniformity of each person's steps and performance mallet technique is very important. These all provide a perfected feasibility perception through rich practical experience, and then through multiple experiments to verify its possibility. These are all technical developments and iterations, but the collection of these is for better expression of its musicality. There is no very specific theme or iconic main melody line in the entire work. But after understanding its creation background and the tribute to friends in Nicaragua's music features, it's not difficult to find out its meaning.

Mark Ford, through in-depth research on Nicaraguan music and iterative development of marimba techniques, not only pays tribute to his friends through this work but also pushes this regional traditional music onto the world stage, allowing more people to understand and recognize them. Isn't this the practical work done to understand music, explore life, and explain the world? At the same time, such works have a leading role for similar works, giving people outside this region more opportunities to pay attention. Thus, the connection between audience, performer, and composer is effectively established.

Conclusion

Through an in-depth exploration of the relationship between art and technology, we can draw the following comprehensive conclusions:

1. Complexity of Interaction Levels Artistic creation and appreciation involve multiple levels of interaction, including audiences, performers, composers, and theorists. Each role plays a unique and crucial part in the interpretation and dissemination of artworks. Audiences engage with works through personal interpretation and empathy; performers balance technical display with personal interpretation; composers navigate between original creation and adaptation based on feedback; while theorists summarize practices and form theoretical frameworks.

2. Guiding Role of Theory Theory plays a pivotal role in artistic practice. It not only enhances audience understanding but also imbues works with emotional resonance. For composers, theory aids in clearer expression of intentions; for performers, it facilitates the iteration of existing techniques and the development of new ones. The theoretical height achieved through summarization and refinement is essential for pushing artistic boundaries.

3. Challenges in the Age of Technological Reproduction The advent of recording, photography, and video technology has diluted the uniqueness and singularity of traditional art. This shift necessitates a reevaluation of the importance we place on originality versus reproduction. The concept of art's "aura" and its redemptive function, as discussed by theorists like Adorno, needs reconsideration in light of these technological advancements.

4. Redefining Art in the Technological Era The relationship between art and technology is both complementary and mutually restrictive. While technology often emerges from artistic needs, technological developments can also open new possibilities for artistic expression. This symbiotic relationship challenges us to continually redefine what constitutes art in an era of rapid technological change.

5. The Role of Contemporary Art Workers Artists today face the dual challenge of maintaining art's forward-looking nature while effectively bridging the gap with public understanding. It is crucial to create works that are both progressive and recognizable to a broader audience, balancing innovation with accessibility.

6. Art as a Component of World Explanation Drawing from Marx's philosophy, we can view art as an essential component in explaining and changing the world. Artistic practice, including its technological aspects, contributes to our understanding and interpretation of reality, thereby playing a role in societal transformation.

In conclusion, the interplay between art and technology in the contemporary world presents both challenges and opportunities. As we move forward, it is essential to thoughtfully integrate technological advancements while preserving the essence of artistic expression. The future of art lies in striking a balance between innovation and tradition, between technological prowess and human creativity, ensuring that art continues to evolve while maintaining its power to move, inspire, and transform society.

Recommendation

Based on our comprehensive analysis of the relationship between art and technology, particularly in the context of percussion music and the case study of "Stubernic," we propose the following recommendations:

1. Integrate Technology and Tradition: Encourage artists and educators to develop innovative approaches that seamlessly blend technological advancements with traditional artistic practices. This integration should aim to enhance creative expression while preserving the cultural and aesthetic essence of the art form. For instance, in percussion music, this could involve using digital technologies to expand the sonic possibilities of traditional instruments like the marimba, without losing the tactile and visual elements that make live performances unique.

2. Foster Interdisciplinary Collaboration: Promote collaboration between artists, technologists, and theorists to create new artistic paradigms. These partnerships can lead to groundbreaking works that challenge conventional boundaries, similar to how "Stubernic" reimagined the possibilities of marimba performance. Educational institutions should develop programs that encourage such cross-disciplinary projects, preparing the next generation of artists to work comfortably at the intersection of art and technology.

3. Enhance Audience Engagement and Understanding: Develop strategies to bridge the gap between technologically advanced art forms and public perception. This could involve creating interactive exhibits, educational programs, or immersive experiences that help audiences appreciate the complexity and innovation in works like "Stubernic." By demystifying the technological aspects of contemporary art, we can foster a more engaged and appreciative audience, ensuring that innovative art forms maintain their relevance and impact in society.

These recommendations aim to address the key challenges and opportunities identified in your research, promoting a balanced approach to integrating technology in art while maintaining artistic integrity and audience connection.

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