

The Unique Aesthetic Experience of VR Technology

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Abstract. VR as an emerging medium holds potential as a new visual form that has applications in diverse fields including but not limited to educational, artistic, or entertainment. New elements of presence, immersion, and interactivity characterize a completely new aesthetic experience for its users, which will be explored in this paper. Aesthetic experience is defined to be the experience that differs from everyday life, in which psychological focuses are completely on the subject at hand. Different aspects of the aesthetic experience include: fascination, or the user's attention analyzed through lenses of physical and psychological; appraisal, or the cognition of the narrative story and compositional elements within VR works; and creativity, or the user's ability to interact and create within virtual worlds. Through research and cumulation, this paper will conclude and create a holistic view of the future of VR and the aesthetic experience.

Keywords: Aesthetic experience, immersion, appraisal, creativity.

1. Introduction

Virtual reality is the ultimate application of multimedia technology that builds a computer simulation system through multiple information fusion, as well as interactive and three-dimensional motion. It provides users with the simulation of visual, auditory, tactile and other senses, allowing users to observe things in three dimensions in a timely manner and without limitation as if in an environment situated in reality. As an upcoming medium, virtual reality is growing in popularity, and has proven to be a technology that has applications in many fields, including education, medical, art and so on. With the development of virtual reality technology, the design mode, usage scenarios and interaction design tend to be stable. What's more, the accumulation of VR hardware performance has influenced qualitative change that will occur in the next few years. For instance, in the realm of art, special characteristics unique to VR like interaction will improve the ability of artistic expression and the methods of appreciating art. In the field of industrial design, the 3D models of complex products enable the designers to understand the performance of each part of the product and evaluate it more accurately. When it comes to the military, the simulation of dangerous combat scenes will reduce the risk of bodily harm while achieving the purpose of training [1-3].

The scope that the article is going to discuss is an aesthetic experience, and appreciation process of beauty, which can be considered the subject of aesthetics. It is a process of receiving external stimuli and producing aesthetic feelings, similar to exceptional states of mind. The first aesthetic experience is arousal, attracting the audience's attention. Then producing high cognitive engagement, coming into the appraisal of an object [4]. However, as a kind of free mental activity, aesthetic experience also contains the action of creativity consequently, which is often overlooked. On the whole, the aesthetic experience is not only the perception and interpretation of aesthetic objects, but also a process of creation.

However, although virtual reality and its aesthetic experience are intriguing concepts to explore, there are relatively few review papers that explore holistically this topic, due to the fact that VR is still a developing technology. Thus, this paper hopes to accomplish a review that analyses the characteristics of virtual reality that make it different from other traditional forms of art from the lens

of the aesthetic experience. Specifically, the article will explain how virtual environments have provided a new form of the aesthetic experience including elements of aesthetic fascination, aesthetic appraisal and aesthetic creativity.

2. Factors AFFECTING AESTHETIC EXPERIENCE

2.1. The aesthetic fascination of virtual reality

As a crucial characteristic of the aesthetic experience, aesthetic fascination refers to the attention given by the audience to the subject at hand. In order to explore this characteristic comprehensively, the section will describe it from two lenses: sensory and psychological— in the following paragraphs.

2.1.1. Aesthetic fascination in the aesthetic experience

In the study by Slobodan Markovic' [1], the aesthetic fascination was defined to be elements of high attention and arousal within the aesthetic experience. In this state of mind where the audience is strongly focused on a particular object, they lose the sense of oneself, the surrounding environment, and concepts of time, similar to psychological states like mental flow. The metrics for analysing levels of fascination can be divided into factors of immersion and presence viewed from sensory and psychological lenses.

2.1.2. Aesthetic Fascination: Immersion

In the context of the aesthetic experience, immersion refers to the sensory experience that influences the amount of attention that the audience gives to the subject; in more general terms, immersion is defined as 'the extent to which the computer displays are capable of delivering an inclusive, extensive, surrounding, and vivid illusion of reality to the senses of a human participant'. [2]. That is to say, immersion provides "real" experiences by simulating various somatosensory indexes in the target environment accurately. This simulation of sensory inputs can dilute the presence of media and become a better way to achieve more immersive environments, thus improving the aesthetic experience by increasing the user's arousal and fascination.

VR is a technology that embraces computer electronic information and simulation technology (Figure 1). The most basic principle and goal of VR is to simulate real environments with computers and technology, and create a sense of immersion. This simulation is achieved through head-mounted displays that run data and programs to create virtual worlds. Thus, VR has achieved sensory stimulation that enhances immersive aspects and optimizes the aesthetic experience. Compared to traditional forms of audio and visual arts like films, VR affixes additional senses other than visual, such as touch, or even smell within art pieces, allowing for concentrated attention in the audience. Considering other developing technologies such as 4D experiences that resulted from the transformation of cinema equipment, VR shows similarities to this technology as the sensory stimulation within also adds special effects like wind, smells, or vibrations on top of the 3D form. However, the extent to which this sense of immersion is conveyed to the user is limited, as VR technology still holds more capabilities in simulating an entirely new world using realistic inputs.



Figure 1 Simulation of all kinds of sensory

Another way of increasing a sense of immersion is to dilute the audience's consciousness of the medium. This concept is shared and assumed by the VR research community where they discount the notion that VR is a medium [3]. This is attributed to the fact that in the virtual world, the audience can only view the scene constructed by the operator while the real environment is concealed by the VR device. The VR environment engulfs them and somewhat forcefully occupies all their attention, hence increasing the audience's arousal or aesthetic fascination. Compared to the 360° video medium, which also provides the world without a limited screen, VR also displays certain superior capabilities. The creation of 360° videos is done by shooting objects from multiple angles at the same time. In this medium, the audience is positioned in the camera's position, unable to move or wander. On the other hand, one aspect of appreciating VR works is being able to travel to artificial universes, where the audience is allowed to walk around and explore every corner of this world. Therefore, this reveals that, VR provides a more immersive environment than 360° video.

2.1.3. Aesthetic Fascination: Presence

As another metric of aesthetic fascination, presence was defined as the feeling of 'being there' by one of the leading editors in a leading journal in 1992 [4]. This feeling is a phenomenon of everyday life that can be described as "a basic property of normal conscious experience" [5]. For instance, when a person appreciates a movie of high aesthetic fascination, all their attention is 'in the movie', or an unconscious feeling that places the individual as part of the movie itself (Figure 2).

When it comes to virtual reality, presence also is considered as a subjective phenomenon that results from experiences induced by immersive VR technology [6-8]. Commonly, the more immersive the VR system is, the higher the feeling of presence [6]. This theory is possibly explained by arousal which leads to alertness, and in turn leads to higher presence ratings [9-12]. However, as this theory has not been tested, more studies on it should be learned to find the relationship between presence and the aesthetic experience.



Figure 2 Being in the virtual world

2.2. Aesthetic appraisal in Virtual Reality

Aesthetic appraisal or the cognitive engagement that a viewer has with the media at hand, is characterized by an appraisal of the symbolic reality within the medium. In the process of this aesthetic experience defined by Marović [1], the viewer first conducts an appraisal of the basic characteristics, developing aesthetic fascination, and then further appraises the deeper meanings both at a narrative and compositional level. The narrative includes symbolism and metaphorical meanings, while the composition is related to the structural regularities. Specific to virtual reality, this means the cognition of VR narratives given its unique qualities of immersion and interaction, and its compositional characteristics including the new method of 360 video narrative portrayal and perception of artistic qualities in virtual environments.

2.2.1. Narrative Appraisal

The precondition of learning the special fascination of the form of virtual reality is to define the concept of aesthetic fascination. In the study by Slobodan Marković [1], the aesthetic fascination was considered as the attentive aspect of aesthetic experience, which delineated the state of high arousal and attention. In that situation the audience strongly focuses on the particular object, losing the sense of themselves, the surrounding environment and time, having similar psychological states to mental flow. According to the concept of aesthetic fascination, the metrics for the level of fascination can be divided into immersion and presence from the perspective of physical and psychological.

2.2.1.1. Aesthetic Cognition of Story

The cognition of narratives within virtual environments differs from those of traditional mediums such as mobile games or film due to the nature of virtual reality with its sense of presence and immersion that is brought to the player. While films are really on the camera as an objective source, VR changes the users' perspective to first person, and the effect of a change in the viewer's movement can affect how they perceive narratives. The new form of 360 videos has created an environment where the viewer is constantly bombarded with high information intake, which has been shown to affect their recollection of narrative events in a study conducted in 2021[13]. An experiment was conducted where the viewing experiences, memory characteristics and recollection accuracy of participants in a viewing experience of the VR animated film Pearl [14-15]. The study determined that although responding with more emotion and a sense of presence, the virtual reality medium has negatively affected the extent to which these viewers are able to recollect narrative elements.

These findings also reveal a limitation in VR storytelling, where the medium places more motion control within the hands of the player. Unlike film, where the screen and camera limit and directs the focus of the viewer, this allows them the freedom to change their perspectives and focus. Although virtual reality has enabled heightened senses of engagement that can show a deeper emotional connection to the narrative at hand, and thus aesthetic appraisal of symbolic elements within VR narratives, the basic cognition of the content itself has been affected by the viewing experience and high information intake of the medium.

2.2.1.2. Aesthetic Appraisal of Symbolic Meaning

On the other hand, the symbolic meaning behind each narrative is enhanced by the emotions and social purposes that have been attributed to the medium due to its immersive and interactive qualities (Table 1). This unique purpose has been utilized in several works including a new genre—immersive journalism, or works that “elicits a connection, works against indifference and relies not on presentation, but on experience”. More specifically, this form of journalism removes the traditional objectivity within journalism and instead incorporates subjectiveness through the role of the reporter. Outside of virtual reality mediums, this form of journalism has raised concerns about the “cult of personality” that is created through this subjectivity, or the ability of the reporter to manipulate elements to stretch truths [16].

Table 1. Mann-Whitney U Test: Mean Rank and Median Values, z-Scores, and Effect Sizes

		VR		Screen			
Variable	Scale (from 1 to 7)	rank	Median	rank	Median	z-score	r ²
Viewing experience							
1. I felt that I was involved in the visual world of the movie	not at all-completely	79.85	5	86.35	5.5	−.90	.005
2. I felt I was inside the story**	not at all-completely	92.68	5	72.71	5	−2.74	.046
3. I felt I was at the places in the displayed environment***	not at all-completely	102.93	5	61.83	4	−5.62	.191
4. I empathized with one or more character(s)	not at all-completely	87.65	6	78.06	6	−1.35	.011
5. The story affected me emotionally	not at all-completely	88.43	6	77.23	5	−1.54	.014
6. I became less aware of the real world and my personal problems while watching the movie	not at all-completely	83.51	6	82.46	5	−.14	.00012
7. When I was watching, time seemed to fly quickly***	not at all-completely	95.96	5	69.23	4	−3.65	.081
8. This experience was fascinating***	not at all-completely	97.45	6	67.65	4.5	−4.08	.101
9. I felt nauseous while watching the movie*	not at all-completely	88.74	1	76.91	1	−2.12	.027
10. I felt dizzy while watching the movie	not at all-completely	86.06	1	79.75	1	−1.14	.008
Memory characteristics							
1. When I think of the movie, I can see with my mind's eye what took place*	not at all—as clearly as if I watched it now	89.92	6	75.65	5.5	1.98	.024
2. My memory for the movie involves sound	little or none—a lot	84.39	7	81.53	7	.44	.001
3. The relative spatial arrangement of people and objects in my memory for the movie is***	vague-clear	96.64	6	68.51	5	3.93	.094
4. At parts, the movie made me feel moved. This feeling was	weak-strong	88.46	6	77.20	5	1.55	.015
5. At parts, the movie made me feel sad. This feeling was	weak-strong	86.69	4	79.08	4	1.04	.007

When applied to VR, immersive journalism has appeared in different projects such as Chris Milk's films to depict the impact of United Nation policies on people's lives. According to Milk's 2015 Ted talk, the identification and conception of VR as the "ultimate empathy machine", has characterized the medium as a method to place the user within another life so to speak, gathering empathy from the users that may not be available within traditional news mediums. In a study conducted in 2017, a focus group was given immersive journalism VR films to watch, in which data was collected and more than half of the respondents stated that they felt "more of a sense of atmosphere/emotion" to this form of storytelling" [16]. In addition, the deeper aesthetic appraisal of the symbolic elements within the narrative is associated with the stronger emotional connection and understanding of the story created by the "ultimate empathy machine".

However, this "great" social justice purpose that has been placed within the aesthetic appraisal of VR has proven to be controversial. Arguments stating the "overtly 'orthopedic'" nature of virtual reality narratives within works have divulged the problematic nature in which "personal narratives become a pedagogical tool" (Empathy and nausea). Orthopedic in this context means the ability of VR to reform the audience's understanding of the subject completely. The pedagogical purpose and orthopedic nature combined are meant to present a case where VR is the perfect medium to elicit empathy and knowledge, where "particular phenomenology that orients one through a history of lived experience [17] is assumed to be transmitted – completely, directly, cognitively – through technological simulation" (Empathy and nausea). However, this logic assumes that the work itself contains a more holistic and more "morally correct" perspective, that is transmitted through the aesthetic experience. This problem also occurs in other mediums, where narratives portrayed to the audience are edited and cut such as the news on tv. But VR as a medium that has proved to elicit the

same empathy as a real lived experience [17], the appraisals of narratives become a more prominent problem that deserves consideration. The aesthetic appraisal of symbolic meanings within narratives is enhanced relative to traditional works due to VR's ability to form deeper emotional connections, but has problematic considerations.

Table 2. Summary of Aesthetic appraisal

Narrative Appraisal	Film	VR
Story	Screen limits clearly directed focus of the viewer Longer exposure to the medium allows better appraisal and recollection of story elements	Hard to direct the focus of the viewer -information bombardment reduces the viewer's ability to recollect certain story elements Greater sense of presence and emotional connection to the story
Symbolic meaning	Emotional engagement through being "immersed" in the story Viewers are influenced by the character's emotions and the plot	Similar to film, VR is largely immersive, but adds an element of presence that brings the viewer closer to the symbolic meanings of the story The unique purpose of being a medium that can allow the viewer to live another person's life Attributed with greater social purpose and promise But this purpose is subjected to controversial opinions including the fact that this purpose gives the aesthetic VR experience more weight as morally unchallenged

2.2.2. Compositional Appraisal

The other type of aesthetic appraisal stems from the compositional appraisal elicited by the temporal compositions such as editing and camera view within the VR work itself. As narrative structures shift within new mediums, the role of the view has shifted from passive within film or television to more active in a 360-degree space. New challenges that are presented due to this factor include the lack of a screen edge, as well as the need to hide technical equipment and crews as the entire space is projected into the work [15]. Not only have to factor in the practical and technical factors within the creation of VR films, but there are also problems of having to consider audience acclimation and incorporating stimulus to direct the audience's attention. Within traditional mediums, the director is able to confine the audience's view to a rectangular box, giving the choice for the viewer to either close their eyes or watch, directing their attention through camera shifts (such as close-ups) and film editing. However, the freedom within 360 environments has completely changed this form of "screen grammar", thus forming the need for VR to develop its own unique cues. For example, auditory cues are especially important for directing the user's attention such as the gunshot in VR Noir or a ringing mobile phone in The Next Striker [15]. The new possibility for viewers to explore and miss the narrative of the story presents a new need for a type of pre-intervention. When appraising VR works, these compositional elements come into play and become part of the aesthetic experience [18-19].

2.3. The aesthetic creativity in VR

"In virtual reality, many forms of interaction between the observer and the content are possible. Citizens are not only "users" of the technology, artists are not only "producing" art objects" [20].

In the eight traditional arts, from the painting of Velazquez's "Las Meninas" to the sculpture "David" by Gianlorenzo Bernini and the music "The four-season" by Antonio Vivaldi, the public seems cannot always enjoy the aesthetic experience, part of the reason is limited by the audience's

own aesthetic understanding and aesthetic education. However, there is another way to let normal people enjoy the aesthetic experience that can bypass this problem: create. As a kind of non-mainstream aesthetic experience, creation seems to be the creator's exclusive right, which is easier to be ignored; this led to aesthetics being more likely to be labeled as "passive." Instead, "aesthetic experience is not passive but is an active process of discovery and creative self-expression – a doing in and of itself." [21]. With the appearance of VR technology, enjoying the aesthetic by creating has become more possible, and the audience will play a more active role during this experience.

2.3.1. VR strengthens the interaction in aesthetic

VR's unique high interaction enhances the participation of the audience while aesthetic.

When appreciating others' artwork, the audience's creative desire will be stimulated. This situation revealed how interaction prompts creative ability. "Situating aesthetics looks at creativity as resulting from the interaction between agents and their environment, and places creativity in the context of the necessary role of discovery and exploration in all processes underlying life" [23-24]. Alejandro also says, "Interactivity and its use are an expression of a creative effort that is reflected in the specific game design."

In the ninth art—game, the sandbox game satisfies the creative desires of ordinary people to provide the experience that traditional arts can't bring. Will the appearance of VR technology strengthen this attribute? In 2019, Kyungjin created an art museum in the sandbox game "Minecraft" (Figure 3) to discuss this problem—whether VR Minecraft Museum gives something that regular art museums can't provide to enhance the audiences' experience? Using VR devices, users' body movements in real life were synchronous in the virtual environment; the VR museum guided the visitors by engaging in scavenger hunts to achieve in reality and encouraged them to use the material they gathered to create. From the result of the questionnaires, VR does have the ability to bring the effects that traditional aesthetics can't get.

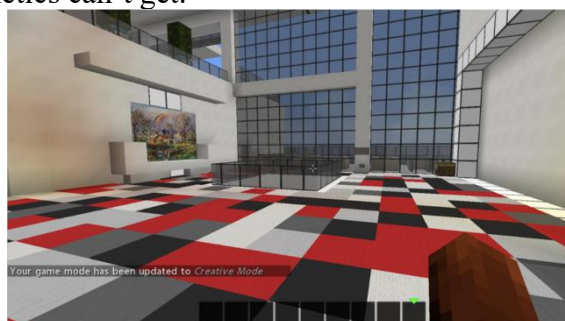


Figure 3 VR Minecraft museum

In the experiment of Kyungjin, VR subverts the subjective and objective position of visitors and artworks. "The person perceiving is not a consumer passively taking something but, in fact, a producer." [22]; people no longer act as passive experiencers but more active participants in it. It highlights the interactivity between the artwork and the audience, which even made the interaction of visitors and artworks become a "second creation." This kind of feeling—being part of the work—gives the visitors a sense of satisfaction and achievement.

2.3.2. Multi-dimensional creation in VR

VR technology can provide a multi-sensory, richer experience and significantly eliminate the sense of distance, making the creator perceive their work multi-dimensional. At the same time, VR can give a sense of "immersive" for users by creating a suitable virtual environment which is an essential element while making. This keeps the creator in a state of "flow."

In the traditional arts (including digital drawing), "Artists have not yet freed from two-dimensional constraints, there is always a barrier between them and the works, so they cannot feel the immersive feeling." this means the connections between creator and artwork is still not strong enough which limited maker to express things in a great extent [25].

VR technology enables artwork to be felt from more dimensions like tactile, visual, auditory, etc. For example, the visual and auditory of traditional masterpieces are usually separated or connected by the pre-produced video. However, Alejandro thinks in VR technologies, audio feedback is controlled to provide sound texture and spatial volume and works through “synesthesia,” which strengthens the connection between audio and video to work together with the user's overall senses play a better role. This means the sounds and pictures in a virtual environment are combined more tightly to simulate the natural effect better and bring a more realistic experience. “It can give full play to the users’ senses, let people get information from different levels, and strengthen the deep understand of art design means.” [12], the creators no longer feel their artworks through 2D dimensions, the multi-dimensional presentation of VR brings the close connection between creators and artwork to a new, unprecedented level. The artwork can be more vivid, and creators can also use more complicated and richer ways to express their thoughts [26].

In the article “Passivity in Aesthetic Experience: Husserlian and Enactive Perspectives,” Tone pointed out that the process when people appreciate the artworks is the “merging” of person and artwork; experiencers described it with “out-of-body experience,” “disappear in it,” “subject-object blurring.” This is the active feeling and exploration of the audience when they passively accept the information in work; it’s pretty like the state of “flow”— also called “the moment of inspiration” by artists. VR provides an ideal virtual environment (like forests or an ocean, instead of an office in reality), a more open communication environment, and a more accessible creative environment, making sense of “immersive” to make the creator maintain a more extended state of “flow.”

2.3.3. VR reduced creative costs

Traditional creation is a very time and labor-consuming, and highly technical-required process. Still, VR tools reduce the difficulty and help the creator improve efficiency, significantly reducing the cost of creation and creating in a way that is impossible in reality while meeting users’ multi-sensory needs for art design.

In virtual reality, users can create, admire, and experience the effect of art design without time and space limits. The works created by artists with traditional 2D-dimension are usually one-sided, with limited demonstration angles. Still, in VR, “the designers can move back and forth in the painting at will, to more intuitively feel the fluidity of lines and the richness of colors.” [12,27]; this allows the users to design from angles that are difficult to achieve in two dimensions, or even in reality, besides, having a more fully expressed artistic design value.

On the other hand, traditional arts have a high demand for creators’ skills. A person needs to take a lot of time to master enough skills— like painting— to design the things they want to demonstrate, even in digital creation. What’s more, people also need to spend a lot of time learning how to operate the tools. As one of the representative art tools, the Tilt brush (Figure 4) is easy to use and dramatically reduces the process unrelated to the creation— learning how to operate the tools— but getting users to pay more attention to the artwork itself. Nevertheless, because of the immaturity of VR technology, using these tools may reduce the precision while creating.



Figure 4 VR design tool: Tilt Brush

In the meantime, VR technology can also decline the creation cost. Jun Qian had mentioned a phenomenon in his article “Application of VR in Art Design”: visitors seem cannot always have a satisfactory experience; there are two situations: if the artworks in the exhibition are not good enough, visitors will think this is a waste of time, and the organizers had also wasted a lot of materials and money; if the exhibition is too popular, crowded visitors will also lead to a bad experience, and everyone can’t have enough time to appreciate the masterpiece. Both of these results are not ideal for the visitors or the organizers. The appearance of VR has just broken the deadlock: VR exhibitions allow every visitor to have equal opportunities and enough time to stay with the works and have a deeper interaction [28-29].

The emergence of VR technology redefines the subject and object status between audience and works; the audience can also have the aesthetic experience by acting as a creator, just like what Alejandro wrote, “all is coordinated and influencing, entropy and equilibrium are part of the same reality.”

3. Conclusion

This study discusses and analyses the renewed aesthetic experience that has arisen as an effect of VR technology from three different aspects: aesthetic fascination, appraisal, and creation. In aesthetic fascination, VR’s qualities of immersion and the sense of presence that is invoked within users contribute to a realistic sensory and psychological experience that enhances their attention or fascination. This change links to the development of aesthetic appraisal of VR works at a narrative and compositional level as the medium creates new purposes and techniques, but not without losses. Lastly, aesthetic creation has been developed and improved by VR technology by making works more three-dimensional, while reducing the cost of creation, creating a more open and public platform where anyone can become an artist.

Aesthetic fascination as an initial phase of the aesthetic experience largely relates to the initial arousal or attention that the user gives to the subject. The discussion of aesthetic fascination proposes that the technological simulation of sensory inputs provides an immersive environment that allows the audience to forget the existence of the medium and real-world environment. These simulated sensory inputs coupled with the fact that people’s perception of the environment is commonly founded on the stimulation signals received by sensory organs that are transferred and processed in the brain reveal how VR improves the aesthetic experience and enhances the user’s sense of fascination. In the future, VR is likely to find a way of stimulating the brain nerves directly, creating more rapid and accurate audience perceptions of the environment. What’s more, in order to reduce the interference of the heavy devices which pulls the audience out of the aesthetic experience, manufacturing more portable and light devices will also become a direction for further improvement.

As a component of the aesthetic experience, aesthetic appraisal, divided into narrative and compositional sides, form the basis of the viewer’s intake of information and cognition of the meaning and plot of the VR work. The appraisal of narrative elements includes the story and symbolic meaning. While the high information intake in the VR medium causes problems that detract from the cognition of the story, the high emotional connections with the work itself allow better understanding and greatly increase the empathetic levels. This detraction can be an area of improvement in the future as people either get used to this large intake of information or technology aids people in receiving this information. The symbolic meanings and social purposes within VR narratives also raise concerns about the “orthopedic” nature of VR. This may raise further severe concerns in the future when VR becomes more and more prevalent as technology and can create more influence on public opinion. On the other hand, the appraisal of compositional elements within the work is influenced by the creation of a new screen grammar, where there is an additional need to direct the user’s attention. The development of the process of compositional creation will thus also become a hurdle that needs to be jumped to create improved VR works.

VR technology has shown incredible potential in the development of new tools for creation (Table 3). However, from the results of Laura's experiment in 2019 and Joundi's experiment in 2020, there are still some issues that are needed to be solved by the developers if people want to apply VR in art design. First, higher accuracy. VR tools need to set a guiding program and provide precise scalar values. Second, the simulation of realistic visual aspects in design creation such as "brushstroke", lighting, shadows, weight, permanence, and other general physical properties. Third, VR technology should provide a method to make the transition works from 2D to 3D. As proven in previous experiments where results showed that volunteers said they prefer to design the prototype in 2D, but use VR tools to achieve them in 3D, VR is shown to be more suitable for later stages of "carving", instead of the initial stages of "creation". Overall, it is expected that in the future, VR design tools can play an essential role in the post-creation stages of design projects.

Table 3. Comparison between traditional design and VR design

Feature\Create Method	Traditional design	VR design
Advantage	Design precision Available tools Brushstroke	Higher immersion Greater interactivity More design angles and display method More intuitive Easy to use Freedom, less restraint Communicate ideas more effectively
Disadvantage	High skill required, slow to get started High creative cost	Lack of accuracy Rely on VR devices Long-term wearing causes discomfort

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