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Digital Storytelling
Content and Application

Edited by Şenay Sabah

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Preface

Storytelling, a kind of communication that has existed for a significant duration of human history, involves the use of verbal and visual cues to both entertain and educate individuals who engage in the act of listening to stories. Digital storytelling is an emerging narrative that exhibits both parallels and discernible differences compared to conventional modes of storytelling. The advent of new-generation technologies such as augmented reality (AR), virtual reality (VR), mixed reality (XR), and others has greatly expanded the potential influence of storytelling and the range of application areas across multiple disciplines. From a broader perspective, it is possible to perceive storytelling as a valuable instrument that holds the potential to yield advantages for a variety of entities, such as corporations, non-profit organisations, tourism operators, educators, developers of online and mobile games, marketers, and several other stakeholders across diverse contexts. These benefits include enhancing engagement, facilitating training, fostering connections, inducing behavioural changes, and disseminating information.

This book comprehensively examines the conceptual framework and diverse applications of digital storytelling. The first section discusses the concept of digital storytelling. Chapter 1, "Introductory Chapter: From Traditional to Digital Storytelling", focuses on the ideas, differences, similarities, and applications of digital and traditional storytelling.

Chapter 2, "Perspective Chapter: A New Space of Storytelling", discusses the relationship of new display and sensing technologies (AR, VR, and XR devices, platforms, and communities) with storytelling, arguing that these innovative technological developments "provide a new space for storytellers to tell their desired stories." The chapter discusses this in the context of VR works from various countries.

Chapter 3, "Perspective Chapter: Storytelling in Developing Countries – Changing the Narrative from the Perspectives of Learners in the Digital Spaces", examines emerging modes of communication that are distinguished by the utilisation of print media, increased incorporation of technology, and the engagement of varied audiences within the African community. Additionally, the chapter investigates how the narrative structure and setting of the tale are portrayed across various places.

The second section of the book discusses different applications of digital storytelling.

Chapter 4, "Perspective Chapter: Re-Inventing Communicative Spaces – A Study to Assess the Shift of Traditional Puppetry Artifacts into Computer-Mediated Objects", analyses traditional puppetry's transformation with the effects of digitalisation and social media.

Chapter 5, "Perspective Chapter: The Creative Surrogate", presents the idea that the systematic use of artificial intelligence is increasingly assuming novel functions

within the realm of the creative process. Within this context, it is asserted that artificial intelligence can impact various intellectual domains, including "intelligent" software, art, design, photography, and writing.

Chapter 6, "*Thumb.CAD:* Essays on Technology, Design and Image", reviews the drawbacks associated with the fascination that arises from the capabilities technology offers within the field of architectural practice.

This book contributes to the literature on digital storytelling, which is currently experiencing a surge in popularity. It provides a comprehensive yet concise examination of this fascinating field.

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Section 1

A General Framework

Chapter 1

Introductory Chapter: From Traditional to Digital Storytelling

Şenay Sabah

1. Introduction

Almost as old as human history, storytelling is a mode of communication in which verbal and visual signals entertain and educate "story listeners". Digital storytelling is a new style narrative with similarities and apparent distinctions to more traditional types of storytelling. The influence of new generation technologies (AR, VR, Mixed reality, etc.) has significantly enlarged the potential impact area of storytelling and prospective application areas for various disciplines. In this sense, it can be viewed as a tool with potential benefits for businesses, non-profit organisations, tourism operators, educators, online/mobile game creators, marketers, and others in a variety of settings (engagement, training, building relationships, changing behaviour, informing, etc.).

2. Traditional storytelling

The notion of storytelling predates recorded human history, and before to the development of written language, oral diffusion served as a means of disseminating wisdom, knowledge, and information, frequently in the form of narrative accounts [1]. The rapid spread of personal computing and the Internet has resulted in a significant transformation of the dynamic between storytelling and technology within a relatively brief timeframe [1]. The following developments have resulted in significant transformations across various aspects, including the narrative objectives and the methods employed in storytelling [2]. Previously, technology served as a means to disseminate narratives to a broader audience. However, it has now evolved into a tool that can be intricately woven into the storytelling process and become an integral component of the narrative itself [1].

The utilisation of storytelling as a means to clarify complicated concepts has been recognised as a straightforward yet influential approach [2]. The utilisation of storytelling as a means of transmitting information, beliefs, and traditions has been identified as an effective approach [3]. According to Van Gils [2], individuals exhibit a greater inclination to allocate their attention towards information that is presented within the context of an engaging or attractive narrative. Consequently, this approach represents a significant and enduring means of conveying information, whereby the integration of spoken and visual elements serves to educate, instruct, and engage a certain audience [4].

The act of storytelling inherently involves a social dynamic, wherein a narrator and a listener are both actively engaged [5]. According to Spanjaard et al. [4], a narrative that is deemed "good" should effectively establish credibility and enjoyment in both the storyteller's construction and the receiver's interpretation of the story. A distinction exists between the process of creating a tale and the process of consuming a story, when the decoded narrative undergoes a transformation within the mind of the recipient, as described by Pera and Viglia [5].

3. Digital storytelling

Due to the multifaceted nature of its usage, providing a specific definition of digital storytelling proves challenging. One example of utilising digital media, such as digital images or video clips, is the act of narrating personal tales [2]. Based on this perspective, digital stories can be characterised as narratives that incorporate various multimedia components such as images, video, text, and audio. The incorporation of multimedia artefacts, such as photos, music, and video, serves to enhance the narrative experience and develop a more comprehensive link between the narrator and the audience [6].

A different approach is based on the concept that computers have the capacity to produce narratives that involve human interaction and perhaps function independently [2]. Digital storytelling is a comprehensive concept that incorporates diverse modalities and procedures of narrative that are generated and disseminated in digital formats, as indicated by Ref. [7]. The various forms encompassed within this category are narrative stories, stories consisting solely of images, internet radio stories, podcasting, and multimedia narratives that integrate visuals, sound, and potentially text. According to Rossiter and Garcia [6], contemporary digital tools facilitate the seamless integration of many aspects, enabling digital storytellers to effectively convey their narratives.

The fundamental assumption of this research is that technology is undergoing a rapid transformation of society, culture, and consciousness [7]. The origins of digital storytelling may be traced back to the 1980s [6]. Based on this perspective, the rapid development of visual culture and computing technology has rendered traditional teaching approaches, particularly in the arts and humanities, obsolete for several modern university students [7].

The transition to digital platforms necessitates storytellers to expand their technology skills, although the fundamental principles of storytelling remain unaltered [1]. Digital storytelling, similar to its conventional counterpart, entails the act of communication and involves a creative effort that necessitates individuals to employ their imaginative faculties [8]. The process of narrative transportation involves the emotional immersion of story recipients into the narrative world created by the storyteller. This immersion is facilitated by the recipients' ability to empathise with the characters and visualise the events described in the story. As a result, the recipients internalise the stories, forming a connection with the character. Video storytelling possesses a significant advantage over written storytelling in terms of its ability to evoke the emotional aspect of consumer relationship experiences, hence converting individual consumption experiences into collective ones [5]. Similar to conventional storytelling, Digital Storytelling contributes to the development of cognitive abilities such as comprehending a narrative and employing inductive reasoning to address

challenges. However, the process of crafting digital stories also necessitates the acquisition of technological skill by utilising software and other related resources [8].

Nevertheless, distinctions persist between conventional and digital forms of storytelling. One of the primary concerns pertains to the transformative impact of digital storytelling, which has significantly expanded the capabilities of storytellers. This medium not only enables them to access previously untapped audiences, but also allows for a novel approach in engaging with these audiences [1].

4. Various application domains

Both conventional and digital storytelling has a multitude of applications. There is a wealth of evidence demonstrating the integration of digital storytelling in many social, cultural, and educational initiatives within the last twenty years [6]. Storytelling has various purposes, ranging from providing amusement to imparting knowledge and fostering learning among individuals [2]. Both of these methods can serve as effective educational tools for individuals of all age groups. According to Van Gils [2], storytelling presents a potent approach for imparting knowledge to individuals. The acquisition of skills through digital storytelling holds relevance for the contemporary job market in a broad manner [8].

According to Clarke and Adam [7], digital storytelling was perceived as an innovative method of conveying grassroots culture, which refers to the public culture that is not adequately represented by mainstream media and entertainment institutions. In accordance with scholarly discourse, digital narratives have been suggested as viable substitutes for conventional academic essays, serving as a medium for the examination of cultural phenomena and facilitating the cultivation of personal identity [6]. The emergence of digital storytelling occurred within a context where artists were dedicated to promoting cultural inclusivity, aiming to elevate and amplify the voices of persons and groups who have historically been silenced, marginalised, or overlooked by dominant cultural norms [7].

5. Conclusion

In a general sense, digital storytelling is presently employed as an educational instrument, a research methodology, a means of community involvement, and a therapeutic medium. According to Clarke and Adam [7], the tool in question serves as a means of communication, education, research, and personal reflection. Accordingly, this book aims to address the concept of storytelling holistically.

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Chapter 2

Perspective Chapter: A New Space of Storytelling

Yangli Liu

Abstract

Following decades of inventing new display and sensing technologies, augmented, virtual, and mixed reality (XR) devices, platforms, and communities provide a new space for storytellers to tell their desired stories. While we are in the process of developing new conventions for fully immersive storytelling, we must first define the properties and functionalities of the new digital medium. This chapter is based on my research in the field of virtual reality (VR). I would like to share some insights I have gained through exploring a wide range of VR works from various countries.

Keywords: virtual reality (VR), digital storytelling, emptiness, presence, emotion, space, education, interactivity

1. Introduction

Imagine yourself flying through a dark room, a room that feels so enormous as it fills with words, drawings, and stories. You are led by a voice or music but try hard not to get lost. You end up seeing a tree, with all its leaves being letters that are falling into dust. You find yourself wondering if this is a dream or something so common in life: a feeling but end up returning to your reality. What I just described is a famous virtual reality experience called Chalkroom [1] created by Laurie Anderson and Hsin-Chien Huang. After decades of innovation in creating display and sensing technologies, new forms of digital media, especially virtual reality, have provided a space that radically changes our perception of stories or storytelling.

"Story" is a fascinating word, as it suggests magic itself. It is a magical analog that attracts and entertains people. It has a structure and a background with a number of characters involved. It is created and told by a storyteller who has the skills to reassemble all sorts of materials in a way that both pleases and challenges readers. It may fit into certain types, like fiction or nonfiction, comedy or tragedy, etc. Considering that we live in an era of consuming TV shows, Movies, or short video clips from social media on a daily basis, we can certainly say that story is nothing but a sequence of media objects. If reusing some ancient concepts, a story can be defined by its beginning, middle, and end. If you happen to be interested in Artificial Intelligence (AI) technology while reading this chapter, I will highly recommend you generate your own stories through AI by using the prompt of the three ancient concepts just mentioned above. Considering the capacity of AI technology to create stories, it is crucial

to acknowledge that we humans might not be the only storytellers in the future. While defining AI as a storyteller seems obnoxious to some, as it is opposed to human writers' authority and their talents for telling stories, I find it quite inevitable since it invites a discussion about the core concept of stories, creating meanings and hence resonating with people. Can AI understand meanings or human emotions? As AI is not within the range of our discussion and I am not an expert in it, I am going to leave this question and discussion to you, my dear readers.

2. Storytelling and digital storytelling

What is storytelling? Storytelling is the act of telling a story. It is the sharing of experiences, ideas, and emotions through words, images, and sounds. Storytelling has many basic elements, such as characters, plot, setting, theme, point of view, style, and tone. Characters can be people, animals, or even objects. They are the ones who play a role in the story and move the story forward. We are most familiar with human characters and often define two main types of them: protagonist and antagonist. In literature, a plot is most commonly defined as the series of events that make up a story. Without a plot, a story becomes a collection of unrelated elements whose meaning most readers are unable to read. The setting is the time and place in which the story takes place. Storytellers may also use the settings to create symbolic or metaphorical meaning. A theme is the main idea that the narrator wants to convey or the universal meaning that the narrator seeks to explore. A point of view is the point of view from which the story is told. It can be first person, second person, or third person. Style and tone are the way an author writes a story, including word choice, syntax, and imagery. It can convey moods, emotions, and atmospheres. These elements work together to create a cohesive narrative. Narrative refers to the way a story is told. It is the structure and composition of the story. In storytelling literature, there are several commonly used narrative structures such as Chronological structure, Flashback structure, Nonlinear structure, and Open-ended structure. When telling our stories, we intertwine the various elements of meaning, emphasizing or relativizing them in a never-ending process [2]. In this process, we wish to create something that is inspiring and memorable. By creating a sense of anticipation and engagement, a well-crafted narrative ensures that the audience truly cares about what happened to the characters. Hence, storytelling can be used to educate people about how to build relationships. According to Roland Barthes, "narrative begins with the very history of humanity" [3]. It is an ancient practice that has been used since the dawn of civilization to share stories and preserve culture and history. As a cultural practice and life form, storytelling is deeply embedded in the history of different societies. It becomes a constructional tool to bridge the gap between self-perception and social surroundings.

What is digital storytelling? This can be a harder question. Combining these two words, the word digital can suggest any digital device or medium that uses some degree of digital technology. The term emphasizes the use of various platforms and technologies, such as interactive video, mobile apps, websites, virtual reality, and augmented reality. Almost 60 years have passed since the first digital electronic computing device—ENIAC—was released in 1964, and now we have a vast and ever-growing toolbox of digital devices. And old technology like the camera, which was invented in 1816 now has also taken advantage of digital technologies to display real-time image capturing. If it is difficult to concisely define the word "digital devices" or "media that

use digital technologies" in a short sentence, we arrive at the fact that we are living in the most innovative period of human history in terms of the development of a "digital world." With the unstoppable force of inventing new digital technologies and media, the word "digital storytelling" has an ever-increasing societal value when fusing two domains together. In the new digital world, we are witnessing a new future with many possibilities, from more engaging content created by incorporating various multimedia elements to user-centered interactive experiences. Digital storytelling captures a wider range of audiences for different purposes. This allows for a more nonlinear story structure, as it can contain multiple plots, different points of view, and nonlinear events. This gives the audience more freedom to explore the story and experience the story in their own way. In addition to technology, digital storytelling has been used for creative and artistic expression. Digital storytelling allows YouTubers, vloggers, and all kinds of social media influencers to create stories that reflect their unique perspectives, experiences, and identities. Expressing your identity through personal stories is becoming the new norm of our time. Most importantly, by sharing personal stories, we can gain a deeper understanding of ourselves or others. We will dive deeper into the functions and purposes of digital storytelling in the next few sections, taking virtual reality (VR) as the targeted digital technology.

But first, let us identify the properties of these two domains. We, humans, cannot easily "plug in" to the digital world but are naturally connected with story and storytelling. Hence, the digital world is desolate and cold while the story field is approachable and warm. As long as we can extract a storytelling act or some analog content from the digital world, it is sufficient to recreate meanings intrinsically. From a different perspective, in a digital world, it is not only a story that can create meanings but elaborated data patterns are also likely to generate meanings. With meanings created, and narratives formed, a series of influences can be observed through its receiving audiences. Ever since the huge success of television shows and broadcasting, dozens of academic research studies have been conducted and put into place for suggesting the negative impact of television exposure on young children. However, as time goes by, we do not throw out television or stop shows but, instead, realize the capacities of new generations to adopt and adapt to new technologies. It will not be truthful to suggest there are no negative impacts found from any new digital storytelling content, but I want to highlight the possibilities that new technologies can transcend the cognitive development of a generation. So far, we have dealt with some basic ideas about stories and digital storytelling. In the next section, more elaboration will be given to describe the uniqueness of VR storytelling.

3. The space of your presence

First of all, the core concept of VR is explored as both a technology and an emerging medium. Virtual reality technology is a computer-generated simulation of a three-dimensional image or environment through special electronic equipment, such as a helmet with a screen inside. It tracks the user's head movements and provides a realistic, 360-degree visual experience. The medium of virtual reality technology is rapidly transforming. It is not enough to define this medium by only using a technical definition. In one of my previous research papers, I explored five individual building blocks [4] for creating immersive VR storytelling experiences. Simply put, I believe that the best-designed VR experiences, which will release this medium's full potential require (1) innovative visual effects, (2) professional sound design, (3) self-embodied

and user-centered spatial interface, (4) complex or creative narrative structure, and (5) a robust but unique interactive mechanism. Among all these five important elements, I would like to reexamine the third one: spatial interface at a different level. How to define space? What are the roles of audiences in the virtual space? Answering these questions will help us better understand how they might affect the formation and characteristics of the narrative subject.

Space, the matter of the boundless three-dimensional span, is a framework in which events take place and objects have relative positions. Artists view the space as more than a conceptual framework, but as an individual intimate area that can be shared, embraced, explored, and cocreated. Chinese philosopher Laozi believed that space was a concept of emptiness, a lack of form, and an absence of anything that could be perceived or experienced. He viewed space as a metaphysical reality in which all things exist and interact with one another yet remains part of the same unified whole.

He wrote in the book Tao Te Ching:

"Thirty spokes join together in the hub. It is because of what is not there that the cart is useful. Clay is formed into a vessel. It is because of its emptiness that the vessel is useful. Cut doors and windows to make a room. It is because of its emptiness that the room is useful. Therefore, what is present is used for profit. But it is in the absence that there is usefulness [5]."

From a conceptual framework to an intimate creator place, then to a metaphysical reality, combining all these three ideas, we might be able to peek into the ultimate truth of VR as a spatial medium. In other words, it is the illusional space that is different from the audience's current physical environment that enhances the audience's feeling of immersion. Yet we have not asked the question about how exactly the illusional space works. Why is it important to the audiences?

Typically, when reading a novel, a reader does not need to enter a location or scene where a character lives or is acting. Whether the setting is a twenty-first century study room in Louisiana or the picturesque British countryside of the eighteenth century, the reader will be able to picture the story's universe based on the written descriptions and their own experiences. The reader will merely be the observer in the stories and has no control over how the plot unfolds. This is the same as listening to your friends telling their' personal life stories but with a small difference: you may interact with a friend by asking questions, and hence you can switch from being a passive listener to an active audience. Even if you still have no control over the general plot, you may have the ability to interrupt the conversations and affect how the story is told, because now your friends will be recalling additional details to address your questions. It is difficult to determine which type of narrative is more appealing, being a passive reader or an engaged listener. Because you might identify strongly with a book but not so much with your friend's humorous anecdotes, or vice versa. It is crucial to understand that while the levels of engagement are different in the two scenarios mentioned above, the audience in neither case has access to see, hear, or feel the stories' settings.

Movie watching is another example. Audiences are passively taking in the story as well, but they will be able to visually explore all the designed scenes on the 2D projector screen in front of them. We are aware that music and sound can be important components to entertain our bodies and change how we feel about things because we frequently observe people tapping their fingers or feet while listening to music. As a result, movies with sound-image synchronization can offer the audience more immersive content. But even after including two more components, the audience still has no control over the plots or the outcomes of the characters in this kind of storytelling.

Let us now examine storytelling in virtual reality. The high-end VR headset will provide you with six degrees of freedom, also known as 6 DOF. The system can track the change in angle and distance between you and the 3D objects, as three rotational axes and three directional axes are all being tracked simultaneously. In other words, the viewer is free to walk around the virtual environment and view nearby items from any perspective. For the developers of VR experiences, realistic-looking, vivid 3D assets can be easily found on the Unity Asset Store or the Sketchfab website. In addition, the photogrammetry technique has been tirelessly developed by researchers, technicians, and artists. It is now a simple method for integrating real-world content into VR experiences. As of the time this paper is written, users of the most recent Apple products, such as the iPhone 12 Pro, 12 Pro Max, or iPad Pro 2020+, could create scans of huge objects or areas in the real world using the top-rated LiDAR sensors. By bringing these scans into the virtual space, one can easily reconstruct a "real" world. No wonder why the scholar Mel Slater stated in his paper that "The strength of the experiences created using VR technology is that they feel especially 'real,' thanks to the illusions arising in the virtual environments; the place illusion of 'being there' (in the location depicted by the VR application), and the plausibility illusion [6]."

Besides the virtual environment and objects, spatial audio increases the immersion of the VR experience by bringing an additional layer of realism to the virtual environment. Spatial audio is a type of audio that is designed to create the illusion of sound coming from different directions and distances in a three-dimensional space. There are numerous methods for producing spatial audio in VR, such as binaural audio, which uses two microphones to record sound in a manner that simulates how our ears perceive sound in the actual world. Other methods include wave field synthesis, which uses a huge number of speakers to simulate the sound of a certain location, and ambisonics, which employ a number of microphones to record sound from all directions. In all forms of interactive storytelling, spatial audio is particularly effective at creating a sense of presence and immersion. Put simply, users feel they are present in VR; they are dropped right into a scene as if they were part of the story [7].

As another way to enhance the immersion of VR experiences, olfactometers (odor machines) are also explored by some developers. These are devices with use of scent-emitting chemicals to produce specific smells. However, it is important to note that olfactory displays are still in the early stages of development and are not widely available.

Audiences can even interact with the setting or plot moments with the aid of controllers or haptic gloves. Some controllers, like the Oculus Go controller, have very clear limitations and would not monitor the user's actual body motions (production stopped in 2020). So, some interactive VR experiences are hard to play with this product. For example, Vader Immortal, a Star Wars-themed VR series that puts you in the role of a Force-sensitive smuggler who encounters Darth Vader on the planet Mustafar. You can only play this game on Oculus Quest and Rift systems. Meanwhile, there are several options of haptic gloves available on the market right now, including the HaptX Gloves, Captogloves, SensoryX VR Free Gloves, and Hi5 VR Gloves.

Overall, highly realistic and immersive VR experiences can be achieved through a combination of visual, auditory, and smell stimuli, as well as tactile sensation, which allows users to touch and manipulate objects within the virtual world. In addition, if it is a storytelling piece, then the first-person perspective is extremely important. In first-person interactive storytelling, the player can control the character from whose point of view they are experiencing and make decisions that influence the plot's

progression. As a result, the player feels more directly connected to the events of the story, allowing for a more immersive and personal experience.

Hence, I would like to utilize a particular VR storytelling experience to highlight the difference between passively consuming stories and engaging with them from the first-person perspective. *Is Anna Ok?* is a two-part combined narrative of one story, told by a twin Anna and Lauren, about the traumatic experiences that resulted from an accident. The audiences can engage in the story by choosing Anna's or Lauren's side of the story in their preferred order. Following a series of baby pictures and brief anecdotes about their childhood, you will begin your actual journey by taking a photo frame of the two of them from either Anna's or Lauran's hands. It is a very intimate moment as if you are stepping into someone's life story. In the following dark scene, listening to Anna's or Lauren's description of that night when the tragedy happened, you can tell their emotions become tangible through the tone of their voices. The transition from the third-person perspective to the first-person view is so smooth that you do not need any further explanation to realize that you are no longer an audience but have become Anna or Lauren in the following scenes.

As Lauren, when you visit Anna in the hospital or rehabilitation center, you can see her struggle through her facial expressions. You start learning about the interaction mechanism by picking up your phone or playing Lego with Anna. After bringing her home, you notice Anna's personality shifts and mood swings when she throws away her clothes. You must also digest your own feelings of horror by returning to the night when you witnessed Anna's accident, the flashback of Anna's torn jacket surrounded by giant shards of glass in front of you. In Anna's side of the story, her narrative about losing her sense of time drags you with her in that time period to also experience memory loss and brain injury. You surely will notice that the TV show is incomprehensible because there are no actual human figures but color blocks; you will pick up objects for the purpose of rehabilitation only to have them vanish from your grasp. Every small interaction you make, such as picking up things, will trigger snippets of narrative. You will go for a walk in the hill scene after picking up a coffee cup with a tiny hill scene inside. Inside the bedroom, by holding a glowing lantern with a pocket-sized Christmas fair inside, you will be transported to the end scene of Christmas night, an open market. As Anna, you will then experience the overwhelming feeling through the fast-moving motion-blur human figures around you and their intermittent dialogs.

All of these magical moments for you to follow along with their daily lives, feelings about the situations, and scene transitions between story plots create a very unique storytelling structure. It is so one-of-a-kind that it can only be experienced through the medium of virtual reality, by interacting with the story. And, at the end of the two stories, by holding Lauren's or Anna's hands, you will have another major disembodiment experience. As you see Anna and Lauren walking away from you at the end of the story, you no longer use their bodies or their identities. In both stories, the very last voiceover is about how you, Lauren, will accept Anna's personality change and how you, Anna, believe Lauren is the only person who truly understands yourself. At the moment, you will receive a huge emotional impact from this VR storytelling piece as the third person who is left inside the story while Lauren and Anna faded into the darkness. The work is extremely powerful because participants always feel a strong connection to Lauren and Anna. Participants are also deeply touched by their unwavering love for one another. It is true evidence of arousing empathy and embodiment through VR experience.

Is Anna Ok? is a masterpiece of VR experience and an innovative work of first-person interactive storytelling. The feeling of presence in this experience is clearly

influenced by a number of factors, including the design of the virtual environment, the actual physical space, and the participants' own expectations and experiences. I saw this piece at the 2018 Sheffield Doc Festival, and many attendees told me that they were immediately drawn into this story when they interacted with the traffic accident scene. Shifting red and blue lights have strong reflections on shards of glass, allowing you to touch and swipe away glass while seeing Anna's favorite jacket torn apart in front of you. But you cannot get closer. The soundtrack you heard is very intense and clearly resembles the sound of an ambulance. And all of the sudden, all the glass was dropped from the air. The next thing you know is that you are in the hospital lying in bed as Anna or standing next to Anna's hospital bed as Lauren.

The scene is highly impactful as participants will associate the abstract elements with their social expectations and life experiences. Even most people have never been in a car accident. We know from all of the TV shows and movies that the car's windows will be shattered during the accident. Just like we expect to picture an ambulance at the accident scene. The true genius of this brief plot is that the meta-phoric scene can be easily related to an emotional experience in a traffic accident. The participants are informed by voice narration and immediately realize that the torn jacket is a symbol of performing surgery with Anna to save her life. The limits of body movements convey a sense of desperation. In this plot, the ambiguity of time and space contributes to an atmosphere in which participants experience visceral feelings of loss and confusion. Synesthesia is a non-pathological sensory condition where specific sensory inputs or concepts automatically trigger additional (often visual) sensations, which can be more or less complex [8]. All of the elements and visual representations are meticulously designed to enhance the scene's impact and trigger synesthetic sensations.

The physical installation of the piece was well-designed to match the virtual experience. You are instructed to sit on the bench for Anna's story or stand on the other side for Lauren's story. When your physical body's position is matching with the VR experience, where Anna mostly sits in the rehabilitation, hill park, and bedroom scene while Lauren mostly stands up in those scenes. Embodied cognition is a psychological theory that suggests that our understanding of the world is not just a product of our brains. Just like what Donghee Shin suggested: "Embodied cognition acknowledges that the mind and body are agents working together to make meaning of VR experiences [7]." Research has shown that a strong sense of presence can have a significant impact on the user's emotional and cognitive responses to the VR experience, leading to increased engagement and immersion. Participants are truly involved in this experience by interacting with vivid story scenes and a distinct storyline, as well as feeling immersed by unique visual and sound designs.

Besides the feeling of presence, I have every reason to believe that most participants experience a mental state called "flow" when interacting with the small objects in the scene. One of the missions for Anna(you) to adapt to normal life is to learn how to put a plate on a table. Lauren will encourage you to do so by saying "You just want to put it on the table, Anna." It is a simple mission but a strong statement emphasizing the fact that you are still suffering from brain injury. Learning how to master a VR controller like using your own hand with this mission creates a feeling of learning things like a kid. Flow is related to presence; it is a state of profound enjoyment and concentration experienced during activities or performances [9]. Here, the participants are fully engaged in the narrative and gameplay. They will feel a sense of control over the story and their actions within it, and the narrative and gameplay are well-balanced, with neither element dominating. And inside the bedroom scene,

participants can choose what objects they want to pick up: a shoe, a small bike toy, or a teddy bear. A flow state can be enhanced by using techniques such as branching narratives, player choice, and dynamic gameplay that adapts to the player's actions and decisions. By creating engaging interactive gameplay, designers, and storytellers help participants achieve a flow state and become fully immersed in the story.

As a new form of digital storytelling, VR storytelling experiences provide an empty canvas with a unique framework for storytellers, artists, and designers to create deeply immersive stories. An amazing VR story like Is Anna Ok? is an illusional space for anyone to engage, embrace, be emotionally attached to, and have fun with. As participants, we actively shape the experience by selecting the order of two parts of the story or the objects with which we interact. The feeling of presence, the state of flow, the synesthetic sensations, and the emotions from the participants fill in the space of emptiness and eventually bring the metaphysical reality to life. Last but not least, a good story can bring us together and make us feel deep empathy for others. We create a real entity from learning and understanding in this process, something truly useful and meaningful.

4. Recreating historical and cultural space

One of the key functions of storytelling is to preserve culture and history. Historical sites, such as landmarks, buildings, public places, and structures, can be preserved and maintained as a way to honor and remember the past. Virtual reality (VR) is one of the ideal mediums for representing places that no longer exist or that went through a radical transformation from the past [10]. It is also a perfect medium to tell historical stories for educational purposes. If a personal story can be told by "reliving the memory" as individuals articulate their past memories to convey the story to the listener. The relationship between public memory and storytelling is a little bit more complicated. In general, public memory refers to the collective memory of a society or community. They are closely related as storytelling shapes and transmits public memory, and how stories are told can influence how public memory is formed and shared.

The representation of cultural heritage in virtual reality transcends space and time: (1) users can visit remote places that are not accessible to regular users, or places that are too far; (2) users can visit places the way they were at a different time in history through the digital reconstruction of a historical building [11]. For example, The Mogao Caves, also known as the Thousand Buddha Caves, are a UNESCO World Heritage Site located in the Gobi Desert in northwest China. The caves contain a large number of Buddhist paintings, sculptures, and texts dating back over 1000 years. As a popular tourist destination in China, the Mogao Caves attract millions of visitors each year. The Mogao Caves, however, are now under significant threat from climate change due to rising temperatures and increasing desertification in the region. Furthermore, the large number of visitors has raised concerns about the potential impact on the caves and their contents. In order to protect the caves, a number of measures have been put in place to limit the number of visitors allowed inside the caves at any given time. Besides, some caves have time limits for visitors, in order to give more people, the opportunity to see the caves while still protecting them from overcrowding.

Looking back at history, as a form of prehistoric art, cave paintings were created by ancient humans in cave systems around the world. Cave paintings have played an important role in storytelling and the transmission of cultural knowledge, and the

Mogao Caves have been a major site of Buddhist pilgrimage for centuries. These caves are also an important source of information about the cultural, artistic, and religious history of China, as they contain a wealth of historical artifacts and manuscripts that provide insight into the lives of people in China during the fourth to the fourteenth centuries. In 2018, NTU imLab present a virtual tour of Dunhuang Mogao Caves (神遊敦煌–莫高窟第61窟 [12]). You can use teleportation to explore the caves and appreciate the spatial characteristics of the entire space. The VR experience recreates the stories behind the murals by connecting a series of murals for you to examine closely. It also restores some statues and murals that have already vanished or been damaged. Because flashlights should be avoided in actual caves, you can only enjoy some vivid details of art using a virtual flashlight in this VR experience. There is no need to be concerned about travel costs or visiting restrictions because virtual reality technology transforms this ancient art space into spatial content that Chinese society's public memory can easily perceive, experience, and interact with.

Taking a look at the world today, the COVID-19 pandemic has resulted in unprecedented travel restrictions all over the world. Border closures, travel bans, quarantine, and test requirements, for example, have varied greatly from country to country. Overall, many countries have taken drastic measures to limit the virus's spread. These measures have had a significant impact on the global economy and have disrupted tourism industries around the world. Virtual Reality experiences, particularly immersive experiences or applications related to historical sites and cultural heritage, address the pandemic challenges. It creates a precious window through which people who are confined inside can look out, travel around, and live their lives.

Even today, more and more researchers believe that VR storytelling should be classified as interactive digital storytelling (IDS) because it is an experience where the user actively tailors the story. Still, there are many projects using 360° videos or 360° videos mixing other interactive elements for showing cultural heritages or communicating historical events. According to VR Nonfiction: A Mediography project: "Virtual Reality nonfiction is an emergent and a rapidly evolving new medium for filmmaking that draws from—and builds upon—traditional forms of nonfiction, interactive media, gaming, and immersive theater [13]." Thanks to this VR Nonfiction Mediography database, we can easily access 603 VR nonfiction titles released between 2012 and 2018.

There are several pieces in the database that I want to explore here. First, the VR short *The Last Goodbye* uses CGI, billboarded stereo video, and photogrammetry techniques to share an emotionally impactful historical event with us. The audience will embark on an intimate journey around the Majdanek concentration camp, accompanied by Holocaust survivor Pinchas Gutter. In May 1943, around 20,000 Jews were deported to the camp, and Gutter's twin sister Sabina was one of them. Sabina was sent to the gas chamber as soon as she arrived. Gutter never got the chance to say goodbye to her. The audience will walk with Gutter inside the railway car, gas chamber, shower room, and barracks of Majdanek. Through the process of sharing his story as an 11-year-old child, Gutter achieves a level of relief and emotional healing that his virtual presence within the experience amplified audiences' own sense of emotional and social presence, which contributed to it being such a profoundly moving VR experience. This is the experience that teaches us what we should learn from history and the consequences of losing faith in humanity.

Second, *Apollo 11 VR* is a 5-minute multisensory VR experience. It tells the story of humanity's greatest journey, Apollo 11, to the moon. As an audience, you can experience this historic event of that day as if you were there in 1969. Before embarking on this thrilling virtual journey to the moon, you will first view John F. Kennedy's famous

speech on the projector. Then, before boarding the rocket, you enter an elevator with Neil Armstrong. After exiting the elevator, you take a seat in front of a control panel with small windows on the rocket by your side. You can sense the nervousness and excitement of being an actual astronaut by hearing the countdown and rocket launch. A floating pen in front of you will soon indicate that gravity has officially shifted, and you have entered space. The view from the windows is spectacular, with a distant view of the moon. After landing, you will see Neil Armstrong take his first steps on the moon and place the American flag on the moon's surface. The visual representation can easily fool viewers into thinking they are experiencing space travel. The audience cannot interact with the scene *via* controllers and must instead sit back and watch the story unfold. But even without any fun interactions, the whole experience is still very engaging. There is a YouTube video showing the tears of joy when a father experiences this piece of work with help from his son [14]. The father was deeply moved as he said he always wanted to be an astronaut since he was a kid. This VR storytelling piece made his dream come true. Even if it is not a perfect VR experience, this piece allows you to relive the events of 1969 and gain an insider's perspective on an event that is etched in the collective memory of Americans. Furthermore, it is an excellent piece of educational content for children who are interested in space travel.

The last one I want to mention is a VR app called *Anne Frank House VR*. During WWII, German-born Jewish girl Anne Frank and seven other people lived in the annex of the building at Prinsengracht 263 for over two years. Anne kept a diary in which she wrote about her life in hiding under Nazi persecution. This Secret Annex was established as the Anne Frank House on May 3rd, 1957, with the help of Otto Frank, Anne's father. The VR app provides a rare glimpse inside the Secret Annex. The audience will be able to tour the furnished rooms, where all furniture was meticulously built in accordance with the actual history from 1942 to 1944. Because the Secret Annex is empty in the actual museum, this app adds a practical and meaningful layer to our reality. After the people who lived there to hide from the Nazis were arrested, Anne's father requested that the rooms of the secret annex be intentionally left empty. Most people interpret Anne Frank's existence through her diary because of how well-known her story is throughout the world. Although Anne Frank is a master storyteller, it still can be challenging for readers to visualize the actual chamber where she lived. Fortunately, the breathtaking details from this app, such as the portraits on the wall, the books in the shell, or the light coming through the windows, really help you feel the mood of their living place as you are connected to their daily experiences. By clicking the quotation marks on the walls or touching the gloves on the objects, you will get snippets from her diary. You can also pick up a few items to observe as it activates voice-overs from the diary. When you touch the door, it will fade to black. Then, all you have to do is move to the predetermined location for the next room to appear. The entire experience is intuitive and engaging, mirroring audiences' previous interactions with other digital interfaces. During the tour, you are presented with more details and information about this meticulously reconstructed space. You are given the opportunity to explore the space at your own pace and learn about topics of interest to you. Overall, it's a very powerful app that allows more people to experience an important piece of history, as well as a valuable emotional experience that serves the greater purpose of education.

VR technology has the potential to create immersive and interactive historical and cultural spaces that allow users to experience and learn about the past in an engaging and memorable way. VR can create historical and cultural spaces by accurately and authentically recreating historical events or locations. Nonfiction stories in virtual reality transport viewers to different locations and times, allowing them to experience events as

if they were physically present. Individuals can learn about and connect with their town's or society's history and culture by participating in storytelling within this spatial medium.

5. The social space

In contrast to spatial presence (the "sense of being there"), social presence describes the "sense of being together" [15]. In the world of virtual reality, "social space" can refer to how people use technology or platforms to connect with one another and create a sense of community or shared experience. *AltspaceVR*, for example, is a social VR platform acquired and developed by Microsoft. Users can create or join events, participate in group activities, or simply hang out and chat with friends using their own customized 3D avatars. There are several features and activities available at *Altspace VR*, such as virtual reality games, karaoke, trivia nights, yoga lessons, and more. It is compatible with a variety of VR headsets and can also be used on desktop computers. It might be worth discussing how this desktop VR application can use the affordance of a spatial medium within a 2D screen to make the experience easier and more accessible to people who do not have a VR headset. This discussion, however, will not be directly related to the topic of this paper. I will therefore leave it to other scholars or authors. Other virtual reality social platforms with similar features to *Altspace VR* include *VR Chat, Rec Room,* and *Bigscreen.* I am excited to see what kinds of storytelling activities are taking place within these virtual reality social platforms.

I have participated in several small presentations, conference events, and meet-ups in *AltspaceVR* since the pandemic. The social urge to interact or even work with people in the same environment was met. You will get the opportunity to socialize with people from all over the world inside the predetermined theater or conference room environment. People brought their personal stories into the room. In the year 2019, for example, a video clip began trending (俩老外在中国服务器里疯狂飙中文！甚至还互相教学 [16]) on the Chinese famous video-sharing website Bilibili. At the time of writing this paper, the video clip has received over 11 million views. Three users are hanging out in VR Chat and talking about learning Mandarin in the video clip. The user who used the Robotic avatar is Chinese, the user who used the big sausage avatar is American, and the user who used the small black cat avatar is from Iraq. The "sausage man" joked about being French before revealing that he is actually an American. After becoming acquainted, they began making various Chinese jokes as a language-learning exercise. The sausage man even sang a Chinese song. It's a funny song about counting from one to seven and wondering where my friend is. "I am here, your friend is here," the black cat added. They also shared some dirty jokes. The sausage man expressed his desire for finding a girlfriend in real life. Soon after, the video was posted online and quickly went viral. When they met again in the space, their personal stories came to light. The black cat fell silent for a while after learning that they had become famous in China. Just when everyone assumed he had gone offline, he began telling his personal stories about being unpopular in real life. He did not have any friends at school, and he felt like this was the only time in his life that he could get so much attention. At that moment, everyone felt for him. You would never expect a person you have only met twice to make such a sincere statement about his loneliness if you were not in the VR space.

Virtual togetherness is influenced by the sense of being in the virtual world and the communication between the users in the virtual world [17]. Because of the embodied experience and the sense of community, as well as the fact that users will

remain anonymous for the majority of the VR social experience, it is not difficult to notice that users can be opened up quickly and remain more open than in real life. Narratives play an important role in shaping people's memories, knowledge, and beliefs [18]. And the overall narrative for VR social space is about creating a community that benefits from communication without geographical barriers. In this way, social experiences on VR platforms form a new kind of storytelling, one that should be understood by artists and developers. To better understand this kind of storytelling, we should pay attention to how users are shaping the experience. Just like what Marcin Wieczerzycki pointed out "For the co-creation narrative and collective storytelling, despite dedicating a lot of attention to the impact that this experience exercises on consumers, consumer influence on the narrative-based goods themselves has been largely overlooked [19]."

During the process, a fundamental belief between users can be formed within the social scene: trust. It is not surprising that the sausage man would disguise his true identity at the start of their three-person conversation, given that he was only communicating with the other two in his sausage avatar. It is also not surprising that he quickly realized that there was no need to keep his disguise on and that he should reveal his true identity. What made this kind of transformation and attitude shift possible? It can be extremely difficult to analyze. I am sure he was fully aware that he might never meet the other two users in the same place again because meetups are usually random, especially if they did not change contact information later. There is a lot more going on inside this type of social space, and anyone can expect to hear a good story if you are truly committed to having genuine conversations with others. Loneliness in your real-life circle can be chased away, and your emotional needs can be met. The fundamental property of the VR social scene as a spatial medium is void, a void that represents the gap between real life and virtual life. Storytelling within the VR space acts as a means for closing the gap and creating new personal memories. However, when users serve as characters but are not genuine storytellers within the scene, role-playing becomes an option; by pretending to be a character, you can gain popularity or attention. This will undoubtedly put humanity to the test. Fortunately, a good VR social space can provide users with the ability to switch between realities, as well as a sense of safety, physical privacy, shared experience, and a sense of belonging [20]. All of this will contribute to a socially acceptable experience.

In another scenario, the "sense of being together" fulfills deeper human emotional needs. MBC, a South Korean broadcaster, aired a VR documentary: "*Meeting You* [21]" that is about reuniting a mother with her deceased daughter 2 years ago. This piece helped the family to cope with the grief of death. Meeting You tells the story of a family who lost their 7-year-old daughter, Nayeon, due to illness. Jang Ji-sung, the mother, was able to touch, play, and talk with her daughter again after using a Vive headset and trackers with Noitom's Hi5 virtual reality gloves. As the mother and daughter exchange "I miss you," Nayeon's father, brother, and sister look on in tears, sharing in the grieving process [22]. The little girl picked a flower for her mom and then told her mother that she is not sick anymore. After reading the letter she wrote for her mother, the young girl told her mother how much she loves her, and her mother also expressed her feelings. "I still have things to do, but when I'm done, Nayeon, I'll be with you," she said. They expressed their undying love for one another. The little girl then said her goodbyes and fell asleep peacefully next to her mother. Finally, she transformed into a beautiful butterfly and flew away. Even though this work raises some ethical concerns, it is without a doubt the most heartbreaking piece of VR storytelling I have ever seen. Because death is frequently unpredictable and abrupt, people who have

lost loved ones do not always have the opportunity to say their final goodbyes inside the hospital. Personally, I hoped that this work would eventually assist the family, particularly Nayeon's mother, in overcoming her desperate feelings of loss. Although virtual reality is not a replacement for professional therapy or support, it may assist people in feeling more connected to the world around them and finding ways to move forward after a difficult experience. People may find it easier to return to a healthy life with inner peace after releasing negative and overwhelming emotions.

6. Conclusion

In recent years, virtual reality systems and associated devices have become more affordable and accessible. VR is very likely to be widely used in a variety of contexts for a variety of purposes in the near future. For example, VR can be used for a range of therapeutic and educational purposes, such as treating phobias or helping people learn new skills. By employing high-end VR headsets, spatial audio, odor machines, and haptic gloves, a well-designed VR storytelling experience can create an immersive and realistic experience, thus creating empathy and changing perception. As a spatial medium, it has great potential for digital storytelling. It is crucial to recognize its potential for creating new narrative structures or even forms of storytelling, regardless of how we define the audience's function as a participant, viewer, user, or player within the medium. It expands the territory of digital storytelling into a corresponding philosophical bound where Laozi has portrayed a unique concept and scenario. The empty virtual space brings all kinds of creative designers, developers, artists, and many others into the same universe. Here, all creators can equally contribute to a new storytelling convention. As an illusional space, virtual reality storytelling may help you better understand who you are and how you think. It prompts you to consider how you can experience your existence physically or emotionally. As a fantastic tool for transporting people to experience the past, the future, or wherever you want to go, VR storytelling entertains, educates, and touches you. From a historical perspective, it is most powerful for cultural practices and the creation of a new form of life. In addition, virtual togetherness provides a new approach to some existing social issues, as many are feeling lonely and isolated to some extent due to the pandemic, remote work, or technology. Through a shared experience or within a cocreated community, virtual reality storytelling allows you to express your opinions and share your personal stories. It opens channels for people to cocreate their lives and embrace who they are, especially their inner feelings. It also creates unique moments that are deeply moving through some seemingly impossible cases. It is a magical space that may remain unknown until you, my dear readers, come in for exploration.

Conflict of interest

The authors declare no conflict of interest.

Notes/thanks/other declarations

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Chapter 3

Perspective Chapter: Storytelling in Developing Countries – Changing the Narrative from the Perspectives of Learners in the Digital Spaces

Anne Achieng Aseey, Vera Anap Aaron and Colleta Atieno Otieno

Abstract

Much of the African continent was known as a jungle. In its own transformation phases, the continent has changed. The continent is known for two major civilizations developed in African antiquity: one around the Nile River in the northeast and the other, somewhat younger, around the Niger River in the West. Ancient Egypt and Nubia are also prominent in history textbooks and other West African civilization. The folktales, narratives and myths assisted the African community build their story telling sessions in different contexts. With the advent of technology and other current emerging and mobile devices, storytelling that served the purpose of educating, motivating, warnings, behavior control, genealogy awareness and bothers keeper, preparation for adult youth and adulthood, understanding your role in the society and any other purposes changed. For the listeners and story tellers who are the focus of this study, there has been a generation gap coupled with globalization, digital divide and other global changes that has given new impetus to the story telling. This study explores new channels of communication characterized by use of print media, enhanced use of technology and diverse audience and plot of the story in different spaces.

Keywords: culture, digital spaces, learners, system thinking, storytelling

1. Introduction

Africa, considered as the origin of modern humans and Homo sapiens is one the continents with diverse geographical settings. Its population is currently increasing drastically and is projected to be at 1.4 billion people making it the second-largest and second most populous continent on earth [1]. UNICEF Report [2] noted that;

> *"By the middle of this century, Africa will be home to a billion children and adolescents under 18 years of age. This will make up almost 40 per cent of all children and adolescents, worldwide UNICEF Report [2]" p. 8.*

Figure 1.
A story teller dressed in traditional attire.

With three out of five people under the age of 25, and half of its population between 3 and 24 years old, Africa has the youngest population of any continent. In 2020, the population under the age of 25 was nearly 800 million, and 677 million were between 3 and 24 years old (see **Figure 1**). Africa's population is not only young but also growing fast. Compared to 2000, the 3- to 24-year-old population has increased by 58 percent, and it is estimated to further increase by 22% over the next decade (A Report by UNICEF and the African Union Commission [2].

The benefits of these youthful generation are both social, political and economic. The continent needs to leverage on this young generation to achieve the 17 Sustainable Development Goals (SDGs), assist in creating a better future, and ensure this demographic growth is not a burden to them. This will only be possible if opportunities and clear pathways are available and opened up for the young and adolescents growing population to operate on.

This paper is an overview of the changing narrative of storytelling in Africa with a focus in Kenya and Nigeria. The purpose of the paper is to establish how storytelling in developing countries is changing in the face of digital spaces that the leaners are exposed to as opposed to the old story telling habits that thrived in various historical epochs. Theoretical, digital devices have changed the way people work, think and operationalize their activities. In education, it has changed the major facets of education hence storytelling and other components of school and family or social fabrics has changed for the children and other learners. Social learning theory notes that through thinking and conceptualizing, new ideas and behavior are recognized ([3]:22). In essence, from the current listener's perspective, narratives and stories are entangled in the new media and one needs to understand the new media first then enjoy the story telling. Also ownership of the technology is a factor in engaging and enjoying the stories and narratives in the current ecosystem.

The significance of this study is that it will generate new knowledge in this field of digital story telling from the learner's perspective as the world moves more towards digital spaces and enable them to resonate with the circumstances and opportunities of digital evolution. The study will also help in understanding the benefits related to immersion in new digital spaces and environment that connects and relates listeners to the contemporary society through knowledge construction and assimilation. Digital platforms are useful and quite accepted by the new generation of students in schools [4]. Digital storytelling can help reduce adult's loneliness and isolation hence

improves on their health and social wellbeing. For the young ones in school and out of school, storytelling provides unique online and offline engagement that counteracts old methods of community discourse [5].

This study is grounded on the premise that, narratives from different sources and societies are recreated, through processes using various digital devices to serve their purposes. This study applied qualitative methodology which combined both in-depth interviews combined with discourse analysis, and observations which generated adequate data among the targeted respondents who were basically the leaners and the community of practice around Study telling phenomena.

2. Story telling complexities and diversity

Falchetti et al. [6] indicated in their study the MEMEX project (Memories and Experiences for inclusive digital storytelling; https://memexproject.eu/) that all the storytellers narrate their stories with an engaging, strong and evocative, charming tone of voice that determines also the involving pace of narration; no uncertainty or hesitation emerges from their voices. They further found out that, they appear pleased to have this opportunity to express themselves without limits and constraints; probably, this opportunity promotes their self-esteem, their imagination and creativity and reinforces social bonds by the sharing of experiences and feelings and the awareness of the interest shown by the project partners.

Africa needs a characterized knowledge economy that can serve its people and relies on utilization of generated ideas to oversee its diverse functions. For Africa to be on the same footing with other continents, upgrading of skills and digital transformation is quite critical to the continents diverse population for continuity (The World Bank [7].

Just as lifelong learning takes an induvial life from a holist perspectives meant to storytelling also serves the same purpose. Stories are meant to educate, entertain, act as social activity, wrap up knowledge and a good story in narrated in the best ways will connect both the explicit and tacit knowledge [8]; Ruggles R. [9]. UNESCO [10] indicated that;

> *"The power of education lies in its capacities to connect us with the world and others, to move us beyond the spaces we already inhabit, and to expose us to new possibilities. It helps to unite us around collective endeavors; it provides the science, knowledge and innovation we need to address common challenges. Education nurtures understandings and builds capabilities that can help to ensure that our futures are more socially inclusive, economically just, and environmentally sustainable". p. 10.*

As a continent, Africa has had success in story telling either through traditional ancient writing or in modern digital forms and spaces [11, 12]. Traditional oral stories of African people are part and parcel of life in the continent [13]. Though riled with several challenges like poverty, war, corruption, banditry, terrorism in social circles, this paper is more focused on story telling in the digital as perceived by current learners. Colonialism and imperialism led to various changes in the African social fabrics. This led to adjustment, adaption and adoption by individuals at various levels in the society [14, 15]. Another challenge in Africa which has affected its ecosystem is the rapid diffusion of technology. Technology has made possible such sweeping advances in communication, which in turn have created opportunities for potential

radical changes in all sectors of the economy education included. The proliferation of electronic mobile devices in the continent has brought in both the good and the bad. The continent is currently well connected through various service providers and with the fastest-growing mobile telecom market. Africa can leverage on this to improve on its knowledge acquisition and utilization [16].

Nigeria is considered the most populated country in Africa with diverse languages spoken throughout the country, including Yoruba, Igbo, Hausa, English, Nigerian pidgin and other over 300 languages. This is a good source for story telling as the many societies form a basis for diversity in knowledge acquisition and dissemination. While for Kenya, the population is estimated about 53, 527,936 people in 2020 with diverse ethnic groups. They are 43 recognized dialects in Kenya with English and Kiswahili as the official languages while for Nigeria the dominant languages are Hausa, Igbo, Yoruba and Nigerian pidgin.

3. African culture and education

The story telling sessions in traditional African societies acted a links between the old and the new and away of catching up with the society's happenings in narrative form. Traditional societies congregated together in story telling sessions [17]. African education is noted to have existed in different forms even during the pre-colonial period but kept improving with time. The type of education during this time could be closer to rote learning which memorization of information based on repetition is.

In the colonial period the education system took another turn with several changes in the education and structures both at community and school level. Mart [18] noted that;

> *"The colonizer's educational goal was to expose African's to a superior culture. Colonizers thought they were developed and well educated. Colonization which started with the goal of colonizers" providing modernization for colonized people turned into a means of service for white people" p. 190.*

In Kenya, the colonial education was infiltrated by the influx of white settlers who were not only educationists and explorers but were also geared towards trade and development [19]. The British, who colonized both Kenya and Nigeria believed that, to maintain social control, the British Empire misused education. Colonial education was used for several purposes one being to civilize African, enable them acquire white color jobs and also to remove them from their traditional practices [18].

Modern Education after colonialism in Kenya, Nigeria and other African countries is now operating in different structured system as per various countries policies and strategies. The root cause of Education was that it reduced poverty and created a sense of hope since it was able to make people survive and thrive. Just like the African stories enabled people to thrive and survive, education was seen as enabling people to be civilized, enlightened and to reason beyond societal settings. Education is also associated with understanding in communities, peaceful existence, enhanced civic participation and existence of stronger democracies [16]. Anthony Lake, Executive Director, UNICEF had this to say about education.

> *"Education is the key to a better life for every child and the foundation of every strong society-but far too many children are still being left behind. To realize all our development goals need every child in school and learning".*

4. Storytelling in the digital age

The rapid growth and integration of ICT and related digital services in Africa over the past decade has increased peoples opportunities to access and utilization of information and other related services. Digital technologies change the nature of work, including by facilitating the automation of certain tasks and creating jobs requiring new skills [20]. Change has also been realized in other sectors like in planning of cities and urbanization which to some extent has changed the socialization and interaction of children and youths in Africa and the place of storytelling [21]. Scholars have also noted that, Africa has as many stories as the continents diverse population. Chapman, [22] noted that digital storytelling connects learners to the content they require for use. Students can effectively watch, reconnect and share all on their devices, snippets of videos from television, radio and movies. The digital savvy students make their own videos, stories and share them immediately to a larger audience. With the advent of social apps like WhatsApp, YouTube, the digital story telling landscape is now changed as more emerging new concepts of storytelling takes place. This concept has been given further mention by Mendoza [23] in his article the evolution of storytelling.

> *"Media platforms such as blogs, Twitter, Facebook and Instagram have grown in popularity in the 21st century. All of these platforms allow users to express their thoughts in a public manner with everyone on the Internet or to choose with whom to share their information. Twitter and Facebook allow users to post statuses, photos and videos of memories and personal stories. Instagram, a photographic-based platform, enables users to share only photos or videos" [23]. p. 2.*

Different learning spaces and environment have also provided opportunities for storytelling and other narratives to thrive and benefit the learners. The education landscape is diverse and leaners are available for the children, youngsters and older generation. In these spaces, education, though facing challenges in continents like Africa, still plays a role in knowledge management and acquisition. One of these approaches of ensuring learning through various channels and in engaging different persons is through Lifelong learning. This is a method of organizing and delivering leaning in a manner that is intended to be leaner, vs. institutionally, driven. Lifelong learning encompasses learning over the entire life cycle (from early childhood to retirement) and all learning systems (formal, non-formal, and informal). Lifelong learning is increasingly important in the global changing economy. Lifelong learning is not a new learning system [24].

5. Research methodology

This study was carried out among 300 school going children of ages 6–15 in Nairobi Kenya and in Nigeria during the COVD 199 pandemic. This is because learners were more at home during this period hence technology was more used for learning and other purposes. Other participants were teachers and other story tellers outside the school system. Questionnaires and interview schedules were prepared to understand storytelling from the current digital era. Observation of what goes on in story telling was also used to create an experiential experience and deep understanding of the digital storytelling ecosystem in these two countries. Questionnaire had open ended and closed questions.

6. Study findings

Storytelling is still quite popular in Africa and most leaners connect with the practice. It gives leaners a sense of practice of the speaking, listening, coding and decoding information in various spaces assisted with various devices. Since creation, man has also used the mouth to pass information from one point to the other but there were also some symbols of traditional communication like smoke, sound and others.

African diversity in terms of cultures, languages and other uniqueness was noted to be on the strengths and pillars of the various societies in Kenya and Nigeria involved in this study. With digital storytelling, the participants still identified with stories and narratives from their region and tribes. Nsamenang and Tchombe [25] noted that Africa has a diversity in culture that needs recognition. This richness in philosophical ideas and thinking, forms the basis of the children and the young understanding and resonating with their societies through the lenses of storytelling and other African folklores that combine to strengthen and create clear understanding of the scenario. With technology and available digital devices, learners can now create, co-create and recreate their story telling sessions. Digitalization has led to ease of use and access to learner's use of story books and other audio, video, kindle or eBooks. In various technology driven formats, story books and videos can reach a wider population of the young and the youths in Africa. The shared social media platforms like Facebook, Twitter, WhatsApp, Instagram and others has also made sharing, creating and co-creating of stories quite easy and enjoyable.

Digitalized story telling was found to be popular and used by children and youths in various spaces and at different times. Story telling is among the 43 tribes in Kenya is still there in traditional format models but mostly being taken over by digital technologies devices. Among the over 270 tribes in Nigeria, storytelling is quite popular in traditional languages but digital story telling is also picking up though with difficulties because of access to devices, electricity and illiteracy level among some communities in the Country. An evaluation of African stories and other folklore presents several instances and play a critical role in the society and the upbringing of young generation in the society. Within the concept of African togetherness, belonging to a community of people constituted the most vital aspects of one's life experience [26]. Stories and other folklores and tales served many functions to Africa traditional set up which they all connected with an acceptable manner [21, 27, 28].

Africa societies have been complex and continue being more complex with global changes. Stories can enable the young generation relate and understand their society despite the form in which it is relayed to the audience. This can be compared to the current use of the term community of practice which is, a group of people who share a concern or liking for something that adds value to them and their society. In normal circumstance during the story telling sessions in Africa, despite the digital story telling paradigm shift to digital spaces, majority of people were involved. Story telling sessions were also held during initiation ceremonies among some communities to enable the young people understand their societies and their role in the society. With digital story telling sessions, this scenario has changed a bit as the young can watch stories through YouTube, Facebook, Instagram and many others. This is quite a big shift from the traditional ways of storytelling which comes with new benefits and challenges.

The invention of the printing press changed the way stories were told in the traditional societies. Books and other printed material became available and stories could

now be read. This era now gave anew understanding to the concept of storytelling, as children's aptitude increased and they could now learn in general things in schools and other settings. By learning how to put words and sentences together, it makes it easier for them to communicate and express themselves freely. Reading or telling stories was also believed to restore leaners emotions and this could help in balancing mental health. According to students can now subscribe to stories via a YouTube and other channels and post them to Facebook or share on twitter, whatapps and other social media platform which reaches a wider audience within the shortest time possible [29].

In Africa, storytelling was considered as a way of carrying on people's legacy, preserving culture, learning new cultures and staying alive. Several stories were composed for war heroes, kings and others who have served the society well. The bad were not well enumerated in the stories. This was notices in case studies form both Kenya and Nigeria Storytelling can be a way of making human connections. Jenikns noted that

> *"As humans groups become sufficiently large, complex and diversified, they suffer an erosion of the cohesion and stability that they formerly had. Patterns of behavior become uncertain and insecure. Men find themselves in novel situations and relationships that are not covered by common usage become uncertain"...p. 337*

Story telling was well related to the place. In traditional Africa societies, stories were told by the elderly and the wise in place designated for them. But with digital technology, this scenario has changed. The most significant place for story telling in African communities was at the fire place which could mostly be outside or in a designated house in case of rain and other threats. The instinctual urge to gather around a fire is a primal one and as ancient as time itself. Fire has always had the capacity to draw people together.

> *"Stories in popular culture such as Star Wars, Game of Thrones, Harry Potter, or superhero sagas in the Marvel universe, are examples of stories which are increasingly told across a wide range of media, from novels and books to (animated) television series and feature films, jigsaw puzzles and computer games, online blogs, vlogs, webisodes, social media, and so-called mobisodes—short episodes made specifically for viewing on mobile phones" [30].*

The invention of the printing press drastically changed the storytelling format. Story telling was verbal because the written language only came to Africa in the late 16th century. Only then missionaries and explorers begin to put an alphabet to the spoken African languages. Before that, for thousands of years, African stories, fables and myths was carried forward verbally from generation to generation, and sadly quite often forgotten.

Most traditional African traditional folk tales, myths and fables have common message to tell us. They have a moral point to them, or is use to educate, or entertain, or to explain behavior, educate on. African mythology stories generally all have a specific moral theme to share and learn. The folk tales and stories of the San, the Igbo, Yoruba, Hausa, Swahii, Luo and others connect to origins of people and their way of life which is worth preserving. Digital devices have the opportunity of doing this and allowing this stories to be stored for several years and available either in the open source or prescribed source. This can help preserve the community's culture for use by future generation.

Figure 2.
Bushmen of southern Africa has a rich story-telling culture.

Story tellers had a way of dressing which was unique and served a purpose. This is applicable both in the traditional and digital spaces where story tellers tend to be unique in one way or the other. This could be to attract attention or a sense of identity for an individual or the society (**Figure 1**).

Clothing for story telling: Who are they?

Storyteller are ordinary people in the society who have artistry skills, talented, trained, resected men and women in the society or at times have been experienced a number of storytelling sessions hence want to share their stories with others. At times story tellers could be visitors or eye witnesses of different historical events who are called upon to narrate the story to others. Achebe Chinua [31] in his book "Things Fall Apart" noted that the most accomplished storytellers are initiates (griots, or bards), who have mastered many complex verbal, musical, and memory skills after years of specialized training. This training often includes a strong spiritual and ethical dimension required to control the Special Forces believed to be released by the spoken/sung word in oral performances. Poulos [32] posited that the production of all the other human speech sounds (the other consonants, as well as all the vowels) began to take place from approximately 50,000 years ago. This was dependent on the gradual development of a well-proportioned vocal tract which included the mouth, the area behind the mouth (the pharynx), the nasal passages, and the all-important larynx with its vocal cords. Three airstream mechanisms evolved for the production of all speech sounds, and they evolved gradually in successive stages (**Figure 2**).

Agatucci (n.d) posited to understand why do stories get told in the first place? Orature fulfills a much wider function than just keeping people happy. Of course, it entertains, but it also informs and instructs (Agatucci n.d.). It sets models for human and cultural behavior and establishes and reinforces social and political order within African communities ([33, 34], 2). Linguistik et al. [35], in their annotation a story from the Ega people living in the Côte d'Ivoire in the region of Divo in the Diés Canton, stated that, unlike in the proposal for a paradigm for African storytelling, which involved five constituents, the Ega only need two people to tell a story—the one who actually tells the story and the one who listens to it. There is no particular "dress code" for story tellers and it is not possible to tell by the clothes, ornaments or jewellery who is going to be in which role (i.e. ,story teller, chorus, and responders). Usually, the roles change throughout a session anyway and it is everybody's turn to tell a story at one point. Again, if someone fails to do so, the punishment is frightening—this time something bad is going to happen to the mother: "sa merè va blanchir."

7. Modern story telling

In modern times, social network sites (SNSs) such as MySpace, twitter, Facebook, WhatsApp. Cyworld, Bebo and others have attracted millions of users, many of whom have integrated these sites into their daily practices. As of this writing, there are hundreds of SNSs, with various technological affordances, supporting a wide range of interests and practices. While their key technological features are fairly consistent, the cultures that emerge around SNSs are varied. Most sites support the maintenance of pre-existing social networks, but others help strangers connect based on shared interests, political views, or activities. Some sites cater to diverse audiences, while others attract people based on common language or shared racial, sexual, religious, or nationality-based identities. Sites also vary in the extent to which they incorporate new information and communication tools, such as mobile connectivity, blogging, and photo/video-sharing [36].

Social construction as the background and overarching theory behind the process of learning contributes to the broader understanding of how learning occurs and how knowledge is constructed in the classroom [37]. Aseey [38] noted that with more electronic devices available for leaners and other education stakeholders, it is necessary to harness video games for learning and teaching purposes to allow for innovation, discovery, critical thinking, and experiential learning among learners. This relates to storytelling in the digital age where children can use various devices to get and read stories.

Stories can also help people understand and resonate with their circumstances like during COVID 19 pandemic one the scholars of online learning had this to say; what is the story we are telling ourselves as we step back;

> "*.What is the story we are telling ourselves as we leave lockdown? Is it the story of how we were initially rocked by the enormity of death and suffering this pandemic brought to every corner of the world but gradually adapted in creative and innovative ways. Is it a story of terrible things that happen to us or a story of how life has*

Figure 3.
The new generation gathering to hear stories.

Figure 4.
A small girl reading stories from a printed story book—Digital verses offline.

> *a way of continually renewing itself? It is the story about helplessness in the face of catastrophe or a wakeup call to how our everyday actions can unintentionally harm each other or save each other's lives. Is this pandemic an aberration or a warning light, a glimpse into our collective future, where the truth of our interdependence—on each other and on this earth—will come home with even more devastating force?" [39].*

Okatch [21] stated that urbanization and digital divide has brought new changes in the society which affects the way people live, relate and gather information. He further noted that the youth, which are the majority of the current population in developing countries like Kenya seems not to have had a chance to hear night stories from their grandparents. Traditional tales from Africa and African stories, myths, traditional tales which light up the African growing up the society is missed through new innovations and inventions (**Figure 3**).

The new technologies and ways of storytelling comes up with a lot of sharing and knowledge exchange. The new normal is complex but allows easy flow of stories

shared on social media sites like WhatsApp, twitter, Facebook and others. Matt Gallivant had this to say about sharing;

> *"There are too many benefits to living with a certain degree of openness for Digital Natives to "grow out of it." Job opportunities, new personal connections, professional collaboration, learning from others' experiences, etc., are all very powerful benefits to engaging openly with others online, and this is something that Gen Y understands intuitively. When Gen Y gives birth to their first "Gen Z" child, they will not close themselves off to the world, they will post pictures, videos and anecdotes not only to share their happiness, but to elicit tips from their social grid on how to deal with the challenges of parenthood. The same goes for other aspects of their life: Which car to buy? Which recipe to use? Which book to read or movie to watch?"—Matt Gallivan, senior research analyst, audience insight and research, National Public Radio (US).*

Digital transformation offers a path to economic growth and social well-being (**Figure 4**). However, divides in Internet access and uptake of digital technologies—across countries and regions, gender, age, income or skills can perpetuate inequality. Online content sharing services, like social media, allow people to communicate, build communities and share knowledge. But the spread of harmful content, including misinformation and disinformation, can polarize society and undermine democracy. Digital technologies can help tackle environmental issues through accurate predictions and increased efficiencies, but can also mean increased energy use and e-waste [40]. p1.

8. Conclusion

The paper relates to how the concept of storytelling has changed from the tradition to the current spaces. Kenya and Nigeria are both leading ICT countries with high concentration of electronic devices which can be used for story telling purposes across board. Others parts of Africa too have embraced technology and new devices for various uses. The story narratives from the current perspectives of learners and the society in digital spaces is quite disruptive. With technology, stories can also be found on YouTube sites with links, eBooks, kindle and in many more formats. But as media becomes all-powerful, man becomes more invisible. The interpersonal relations that connect children youth, adults and their societies through story telling are lost. The aspect of communal learning in the eyes of African folklore being is replaced by individual or online learning. Relations which could build up individuals are replace by technological devices, media sites and links replace the fire place and community story telling joints are erase. The human voice which has been in use for centuries is facing challenge as Robots another devices can do that. Creative writing is also under a major threat as Artificial intelligence (AI) and other writing aids generated through technology penetrate and overrule the writing spaces. The position of storytelling could improve or get lost in the process. The human experience of space-time relationships is winding out. There is need for more research on digital devices and use in the society.

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Section 2

Application Examples

Chapter 4

Perspective Chapter: Re-Inventing Communicative Spaces – A Study to Assess the Shift of Traditional Puppetry Artifacts into Computer-Mediated Objects

Neelatphal Chanda

Abstract

Puppetry has always remained a major tool of storytelling for masses. From its inception, this communicative art form has undergone changes, and with the advancement of technological interfaces, its structural space has received a series of modifications. Most puppetry involves storytelling, and its impact is determined by its ability to create patterns into the psycho-spaces of viewers. With changing times, the analog formats of puppetry are getting replaced by the digital objects. These digital objects are computer mediated in nature and have a key characteristic of engaging audiences with multimodal performative interactive system. In the current scenario, under the deep influence of 'convergence culture,' the traditional puppetry art form has not remained insulated from the digitized formations. These spaces are allowing a new alternative media output, which is digitized, watched, as well as promoted on digital screens. Under the wider array of networked spaces, this paper is an attempt to theorize the changing landscape of traditional puppetry art form into the corridors of digital objects. These digital objects have a nature of accommodating themselves into multiple channels of communication and triggering a plethora of imaginative spaces for spectators.

Keywords: multimodal, technical structures, puppetry, computer-mediated, communicative spaces

1. Introduction

Puppetry, as a traditional art and practice, involves storytelling, which is determined by its ability to create a fictional space for the viewers. However, with the advancement in the digital technology, there is a huge progression in the mode of "spectatorship."

The animation of digital objects triggers the imagination of spectators in a different way. More and more spectators interacting with digital objects enter into a fictional space, which can be transformed into real time, which will provide possibilities for the process of engagement and co-creation.

With advancement in modern technology, we can simulate and preserve our cultural arts and heritage in a more interactive manner compared to only plain recording [1]. According to Kaplin [2], the digital puppetry is a revolutionary idea that expands the notion of puppetry beyond all definitions. He also describes that digital forms of puppetry will not mean the death of puppetry; rather, it's the preservation of historical, spiritual, and folkloric values.

While delineating the aspects of puppetry in India, there are different forms and practices among which string puppets, rod puppets, glove puppets, and shadow puppets are the most popular ones. The strings, rods, and gloves often used by puppeteers to animate and inanimate are getting replaced by animatronics and computers in this DIGI-driven spaces. According to Stephen Kaplin, there is a direct relationship that revolves around performers and the performing objects. He highlights the role of technology in assembling the gap between the performers and the performing objects. Specifically, the crafting pattern of various puppets comes up with the mechanism that helps puppeteers to involve into conversation through various means of technological possibilities.

> *"The puppet, poised between man and machine, a figurative, anthropomorphic character, but operated by technological means—whether rod, string, or something more—provided an artistic site through which to explore new potentials and anxieties around these developments" [3].*

2. Extending the frontiers of puppetry into technological spaces

Puppetry as a communicative art space is gaining more and more momentum across multiple corridors, and in a parallel manner, it's becoming more globally interconnected. The relationship between the human actors and the puppets is undergoing drastic change. According to Kaplin [2], the actors and puppeteers do the same job of projecting characters. Generally, actors involve with the character through voice modulation, action, gestures, and costume elements. The mask becomes an aided element for projecting character, which gets classified into a crafted object. The crafted object when executed into performance takes the shape of a performing object. It is to be noted that as the distance widens between the object and the actor, more and more complex technological interfaces are needed to maneuver around the object and performance.

To understand the relation between humans and the inanimate world, we need to have an entry point through puppetry, which depicts our daily practices with technology. Jane Benett, in philosophical terms, theorizes the new paradigm with a term she calls "thing power."

> *"Thing power has the rhetorical advantage of calling to mind a childhood sense of the world as filled with all sorts of animate beings, some human, some not, some organic, some not. It draws attention to an efficacy of objects in excess of the human meanings, designs, or purposes they express or serve. Thing-power may thus be a good starting point for thinking beyond the life-matter binary, the dominant organizational principle for adult experience" [4].*

The spectators associated with this art form go through the process of imagination through the animation of digital objects and digital puppets. The imaginative space

is fictional in nature and has the key characteristic of digital "beings." Digital objects are computer mediated and can be transformed into different ways that also provide opportunities for engagement and co-creation.

3. Puppetry and the newer aspects of media production

The digital puppetry is broadly dissected into two major segments, namely, puppetry in digital media and puppetry in live theater. While delineating this form of puppetry with digital media, it is to be noted that "mediatisation" plays a vital role in the meta-process through which almost all areas of social and cultural life are affected by the increasingly dominant role of modern media [5]. For this paper, the term "mediatisation" here generalizes the transfer and migration of puppetry to modern digital media. According to Tillis [6], digital puppetry offers the greatest challenge to conventional puppetry theory. Unlike live puppetry performances, puppetry in digital media is lacking in its presence in time and space, its unique existence at the place where it happens to be, and its aura of performance [7]. The digital puppetry is the process under which the digital code takes the form of live puppetry performances. The numerical representation of binary codes takes the shape of performative objects on the digital screens and creates fictional images in psycho spaces.

Due to its flexibility and wider acceptability, digital puppetry has gained enough momentum among the masses. According to Wang [5], digital puppetry is without a doubt much more advantageously positioned in the marketplace when it competes directly with theater and other forms of live performance.

Despite drawing a strict line between puppetry and virtual puppets or performing objects, Kaplin [2] mentions four types of puppetry in digital media that are contradictory to the definition given by Levenson. These four types of puppetry, which Kaplin calls as "emerging sub-genres" of media puppetry, are: (i) docu-puppetry, (ii) virtual-puppetry, (iii) hyper-puppetry, and (iv) cyber-puppetry. According to Tillis [6], the digital puppetry performance is recorded, and the recordings further can be edited or manipulated prior to showing them to the audience. In this type of puppetry, the performance at all times works under the control of a human puppeteer performing in "real time." The "real time" generally defines the synchronicity between the puppeteer's control and the puppet's result but not the vocal performance.

From the media production aspect, the "tangible puppet" holds a significant position. According to Tilis [6], the tangible puppet is that which is capable of being touched physically, and it also refers to the digital films and video images that are a direct reference to original materials. Further, Tilis [6] proposes another theory on digital puppetry that classifies digital puppetry into three broad categories: (a) digital puppetry using tangible puppets or performing objects that are tangibly moved or manipulated; (b) digital puppetry using virtual puppets or performing objects; (c) digital puppetry using tangible puppets or performing objects that are intangibly moved or manipulated. On the other hand, "intangible or manipulated" puppets are related to the computer input device such as keyboard, mouse, and the joystick, which can be used for the movement, control, and manipulation of the puppets without puppeteers' involvement in physical spaces.

While discussing digital puppetry, it is mandatory to discuss about CG (Computer Generated). According to Sinha and Udai [8], there are two main divisions of CG: non-interactive and interactive. Non-interactive or passive CG is a form of CG that

only allows one way of relaying information in which observers have no control over the images. On other hand, interactive CG allows users to interact with it. An example of this type of CG is a game of chess whereby the user makes a move before waiting for the computer to make its move. There are instances when interactive systems can be converted into passive computer-generated objects. We may take the example of a printed digital photograph, which has a nature of passive viewing and non-interactivity, but with proper usage of electronic data and appropriate CG software, it can be manipulated into an interactive object.

4. Puppetry as an instrument of storytelling

In India and in other parts of Asia, there are numerous forms of storytelling processes, and one of the classical ways is puppetry. Taking consideration of India, *Katha* (story) and *Kathakar* (narrator) plays an important role in narrating stories from societal, political, and cultural spaces. In this age of digital techno spaces and with the advent of new-age media culture, puppetry as a communicative space is getting under serious danger of extinction.

The starting point of this traditional storytelling process had evolved from theatrical performances, which has its anchoring in the oral material tradition. Gradually, storytellers used different visual devices and oral instruments such as scroll paintings, shadow figures, dolls, and other musical instruments. The process of storytelling got augmented by body movements, dance, mime, and gesticulation.

In different parts of India, there exists puppetry culture. Rajasthan has *Phad* (Scroll Painting), in which the narrator tells a story on a huge picture scroll. The scroll has important scenes from local traditions. The storytelling process evolved with shadow theater that primarily focused on picture panels and scrolls. Themes of the shadow theater centred around *Puranas* and great epics like the Mahabharata and the Ramayana. In Indian states like *Kerala, Karnataka, Maharashtra, Andhra Pradesh, and Odisha,* the shadow theater genre is popular.

Sizes of puppets differ from 10 centimeters to 1 meter, and symbolically, puppets are linked to the traditional visual arts of different regions. With the passage of time, three-dimensional puppet theaters (rod puppets) and glove puppets (operated with a hand inside the puppet) evolved in India.

5. Involvement of puppetry in digital media

The computer performance and the digital technology have been major disruptive forces between humans and puppets. Specifically, in a DIGI-driven society, digital advancement and computer-generated imaginary provides ample space to come up with different categories. The most popular categories are:

> a. Live puppetry in digital media that may be edited; b. Stop-action puppetry; c. Non-interactive virtual puppetry; d. Interactive virtual puppetry.

The digital revolution of computing and communication technology that has taken place since the 1980s has resulted in a rapid switch from analogue mechanical to digital technology. During the beginning of the 1990s, it was already time to affirm that digital was the emerging dominant media form, replacing analogue

tele-visual technology [5]. Over the past few decades, CG technology has become an area of proven artistic and commercial potential and has had significant impacts on non-interactive puppetry in digital media. In the present scenario, many recordings of live puppetry performances have been refined and blended with visual effects and computer animations prior to their releases. Apart from digital shadow puppetry that uses 2D, flat and tangible, puppets, there are also some examples of using recordings of hand shadows in digital media. Also known in cinema as silhouette, hand shadowgraph is a genre of shadow play where shadow images and videos are created using human hands. Although hand shadowgraph technically does not belong to the category of shadow puppetry, the terminology and visual esthetics of both performing arts are the same.

Digital media has been used not only to produce and create puppetry but also as a practical medium of preservation. The development of television and archiving of recorded broadcasts provide an excellent way to document puppetry performances [9].

Stop-action puppetry in digital media is also known as stop-motion animation or stop-motion photography [10]. Any tangible object can be used as a performing object of a stop-action puppetry animation; it generally consists of three major categories: jointed 3D marionette puppets, 2D paper cut-outs, and clay objects. The jointed 3D puppets or models for stop-action puppetry are made of latex, silicone, or silicone skin with a wire armature. Stop-action puppetry film and animation that uses 2D cut-outs was influenced by the development of shadow theater in Europe. The most famous and commonly used input device and approach in interactive digital puppetry is the motion capture as some computer technology experts simply employ the term "motion capture" when referring to digital puppetry or computer puppetry. Sturman [11] defines "motion capture" as the combination of the art of puppetry (animating inanimate objects through direct manipulation) with computer animation.

Unlike real puppets, virtual puppets are not bound by natural and physics laws and are able to distort, float, and contort in any manner that may be unnatural to their physical versions. The virtual puppets can be controlled or manipulated by animator(s) using computer keyboard or other input devices without the participation of recognized conventional puppeteer(s). With the advancement of technological interfaces, the dimension of puppetry is undergoing meteoric changes while maintaining its social structure and cultural values. The digital interface is enabling the traditional communicative art form to relocate its venture into the virtual environment while upholding the basic tenets of communicative principles.

6. Conclusion

With the advancement of technology, there has been significant growth in storytelling techniques. The storytelling spaces are getting adjacent with digitized devices marked with the feature of convergence, interactivity, and non-linear synchronicity. However, since puppets have their roots in the traditional storytelling process and with the advancement of technological spaces, the digital code is transcendent in live puppetry performances. This transformation marks the significance of binary codes that take the shape of the 'screens performative object' and play an essential role in the storytelling spaces.

In the computer-mediated storytelling process, gestures and expressions do not remain confined to tangible and physical objects; the dramatic enactments cross over

to digital objects. This evolved space is powerful enough to acquaint with cognitive competence and also to interline with the contemporary storytelling process assisted with features of motion-sensing technology and computer animation. Interestingly, puppetry as a communicative platform has a classical storytelling orientation; however, with the growth of medium and technological shift, this medium transcended into an 'Object,' capable enough to acquaint with digital-storytelling mediums.

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Chapter 5

Perspective Chapter: The Creative Surrogate

Andy Deck

Abstract

It is not just manufacturing jobs that are being replaced by digital automation: creative careers now face this specter. As generative techniques advance, both for images and text, the application of expert systems will not stop at replacing mundane tasks. Instead "smart" software is making incursions into intellectual fields as diverse as art, design, photography, and authorship. Systematized applications of artificial intelligence are beginning to play new roles in the creative process. Intellectual surrogates are becoming a new front in the centuries-long cultural transformation brought about by technical innovation and automation. Production trends in digital culture suggest that we will be treated, increasingly, to "automagical" software authorship and artistry. If past is prolog, the degree of intellectual dependence on software will be a guarded secret. Human input into creative products may begin to resemble the fruit content of packaged juices, as for example "Contains 2% human input." The time has come to evaluate the likely consequences of the systematized generation of (formerly) creative products.

Keywords: creativity, artificial intelligence, innovation, art, automation

1. Introduction

Until recently cautionary treatments of machine intelligence were representations of the possible. In the late 1960s, Stanley Kubrick's disobedient space station assistant HAL 9000 reflected popular distrust of new computing technology. But it was just a story. After decades of hardware and software engineering and the emergence of ubiquitous computing and personal digital assistants like Siri and Alexa, the assessment of artificial intelligence has shifted from an imaginative thought problem into the realm of day-to-day experience. In short, AI has left the realm of science fiction and become a part of our daily lives.

Since most of us are not decision-makers at Apple or Google, the creep of machine learning into our daily lives has an air of inevitability: It is simply a part of new phones and other devices that we buy. Software keyboards, for example, now use algorithms that mine our personal data to guess what we are trying to type with our fingers. From grammar correction to "suggested reply" buttons in email software (reply: "Thanks!" or "Got it!"), the promotion of normative expression is well upon us. Had a Dadaist like Tristan Tzara written his absurd and irrational poetry in today's word processing tools, his creative process would have become a fight against auto-correction.

Of course there are still "dumb" typewriters available in thrift shops, and for many the convenience of these corrections outweighs other considerations. But it is not too soon to reflect upon the ways that machine learning is changing both habits of mind and modes of expression, especially as it relates to the arts.

1.1 Shortcuts in academic writing

Not long ago, I lectured in a graduate program in fine art that had many foreign exchange students who spoke English as a second language. Around 2018 the poorly written essays turned in by numerous students seemed unlike any I had received in the past. After considerable research, it became apparent that the papers were a byproduct of automated translation. The translated source texts were not attributed, making this misrepresentation a form of plagiarism. Although software detection tools exist to flag plagiarism, those tools typically declare texts to be free of plagiarism if they are first translated into another language and then back into English. While plagiarism is nothing new, the ease with which words can be acquired and "processed" to meet assigned criteria is striking. What is more, these problems were just the tip of the proverbial iceberg.

In 2021, it was reported that a senior software engineer at Google was put on leave for having the audacity to maintain that a software research tool (Language Model for Dialog Applications) being developed at Google had crossed over into the realm of sentience [1]. An article on the current state of A.I. text generation by Steven B. Johnson, published in the New York Times [2], confirmed that the latest capabilities for synthetic text generation are mind boggling. Johnson related how a person need only type one sentence and a generative text system can produce pages of text that feel like they belong to the same topic and style. This startling shift in word processing technology will have a momentous impact on academic practices. Students now have access to generative tools like OpenAI's ChatGPT, and academia is beginning to take note of it [3]. With the emergence of this technology, every paper read by a professor resembles a Turing Test. Is it an essay written by a student or is it a synthetic conglomeration of words and sentences chosen according to a complex probabilistic algorithm? If the degrees conferred by universities and colleges are to signify that students have engaged in research, reflection, and critical thinking, the methods of assessment will have to keep pace with generative text technology that can spit out topical essays on demand.

In a cautionary column assessing the merits of using AI for writing, author and columnist Mitch Albom "asked" ChatGPT why a student should NOT use it to write papers. Albom's critique of the reply was that it left out joy and satisfaction. "There is a joy in taking the language you have learned and reassembling it to create your thoughts....There is satisfaction when you read over something you have created from scratch, something that only exists because you made it exist, something that took the impulse in your brain's gray matter and sent it through your fingers and onto the page, where your eyes can read it and your heart can appreciate it" [4]. While Albom's point of view is reasonable, the proliferation of fascinating interactive AI spectacles leaves little doubt that joy and satisfaction can be generated in ways that do not qualify as "from scratch" creativity.

Looked at from the perspective of the budding writer, this new ability to produce pages of coherent text based on one sentence is rather seductive. In many creative disciplines, it is not uncommon to seek ideas from reference material as an aid to production. For example, many designers peruse color palettes, often made by others, in an effort to choose exactly the right colors for a design project. An argument can

be made that having a software writing partner that suggests possible sentences (to follow the current sentence) is little more than a source of inspiration, like a book of color palettes. But if the majority of writers draw inspiration from text generative systems, what would be the cultural impact?

Since the essence of a machine learning system is the digestion and regurgitation of a training set, they are fundamentally imitative. Admittedly, much of what passes as human "creativity" is often highly imitative, too. Still, the use of writing prompts is a problematic turn for the practice of writing. It would appear to tip the scales in favor of writing products that are similar, corrected, and normative. Also, it contributes to a kind of intellectual laziness. Instead of thinking through which sentence, idea or argument, should come next, the writer is encouraged to treat writing as a kind of multiple-choice activity. It is certainly a kind of writing, but it represents a new habit of mind that's reliant upon software.

How does this compare to the use of navigation systems? Before global positioning system (GPS) navigation became common, people internalized more of the knowledge required to get from point A to point B. They used maps and asked local residents for help, but the process involved cultivating memory to make the process smoother the second and third time around. With reliance on navigation systems, the impetus to learn the route is diminished. One can simply turn on the navigation system each time. It is easy and efficient. Navigation systems are able to incorporate current traffic conditions in ways that were not possible in the past. Ultimately people will disagree about the best way to navigate, and there are reasonable arguments to be made for older ways and newer approaches. Citing anthropological research and the philosophy of Albert Borgmann, Jeff Robbins argues in his analysis of GPS that "our addiction to the power of technical order [renders] us increasingly helpless without our conveniences" [5]. Could the same be said for using machine learning as a creative prompt for writing?

It has been suggested by Aeschylus that memory is the mother of all wisdom. Does an intellectual surrogate like ChatGPT apply the right sort of memory to evoke the insight of wisdom? Isn't there an important difference between the data model of cloud computing and the human mind? Profound human experiences like loss, betrayal, and love can impact how a person thinks, what she remembers, and what feels valuable. But machines do not have those kinds of experiences or feelings. Nor do they experience mortality, urgency, regret, and so on. In short, human experiences and emotions are unavailable to a machine algorithm that is optimized to predict the next sentence based on the previous sentences and a database of models.

This is not to say that machine learning should be banished from the domain of writing. Software grammar correction tools—and suggested reply email buttons—can help to teach a language. There is intriguing potential in learning to write with expert systems that can convey which vocabulary and grammatical structures are most commonly deployed in a given form of written discourse. The point at which this process of guided writing becomes problematic is when the writer begins to rely upon it to generate ideas and to inform the thoughts that they are expressing.

When the academic intent is to expand student understanding, plagiarism—no matter how technological—typically grounds for expulsion. Institutions of higher learning do not exist simply to generate text, they are also founded upon ethical and idealistic principles about education. But it is not hard to see that the use of technology to game the academic system—to circumvent rules—is the kind of corner-cutting tactic that brings success in other contexts. In social media, like Twitter, a misrepresentation akin to plagiarism has already proven to be effective in influencing people: bots and bot farms inject content into social media using fake accounts and automated

scripting. The practice has afforded some people an outsized influence in promoting messages, candidates, and ideological agendas. Arguably this kind of strategic messaging is a bit like false-flag public service advertising: corporations masquerading as benign-sounding trade organizations to promote their own interests.

Another kind of fraud also excites influence: so-called deep fake technology makes it surprisingly easy to produce photorealistic videos that simulate events and actions that never took place. Although it undermines the truism that seeing is believing, ultimately the deep fake is simply a new tool in the expressive arsenal of video producers. That deep fake products are often a hot commodity in the meme culture of social media shows how the application of advanced technology can be both rewarding and ethically problematic. These memes can be a form of slander and an instrument of propaganda. But some bleed over into the domain of parody and prank, as well. Used with a parodic intent, the deep fake is not that different from a prank by celebrated artists like the Yes Men.

If there is a potential for new tools and digital practices to generate buzz, followers, and media attention, their eventual use is assured regardless of ethical complications. Contemporary media culture has created an appetite for visual novelties and innovation. Whether newly minted tactical media strategies are clever or corrupt may simply depend upon the context. Each institution, it seems-whether it be a media corporation, an educational institution, or an art competition-must establish its own set of rules about what sorts of deceptions are permissible.

1.2 Template-driven visual culture

Demand for visual innovation has not been a historical constant. Visual practices in many cultures have been founded upon the ability to reproduce the representational qualities of a master or of a regional style of painting. Though they are often beautiful, these kinds of visual orthodoxy tend to constrain creative practices. Works by one artisan can look strikingly like those of another. The visual modes in such cultural traditions resemble a kind of decoration that reflects an assortment of models.

The approach is reminiscent of the template-driven qualities that dominate contemporary web design, in which authors are offered minor variations on a set of pre-built templates. There is a practical side to this, since web design encompasses complexities of software engineering today. For years artists and designers have experimented with web design and struggled with it. The design process has changed as a result of the growing complexity of building websites that meet usability goals as well as visual design goals. The field of user experience design and user interface design (UX/UI) is largely an outgrowth of the demand for elegant solutions to complex interactive design challenges. It has been a growing sector of design for decades.

Today, however, one can generate Web site imagery and mockups of branding designs by summoning them forth from an AI image generation system (**Figure 1**). One need only describe images with a few words to obtain something usable. This easy emulation of design, illustration, lighting, and photography portends some radical changes of working processes in design. Moreover, as visual design merges with software engineering, there is an opening for systematization and machine learning to usurp a surprisingly large amount of the visual designer's work. In a scenario anticipated by Steven P. Anderson in his address at South By South West (SXSW) in 2019, feedback can be applied to interactive designs through a process known as "A/B testing" [6]. In essence, Web site visitors are presented with subtly different versions of the Web site. User response times and click-through rates can be observed

Figure 1.
Example AI generated designs 'created' by the author.

and designs can be optimized to establish the best fonts, colors, text sizes, and so on, until the results are as good as it gets. For decades the notion that machines and new technology would supplant a lot of arduous physical labor has been a commonplace assumption. Now, however, the specter of automating more conceptual professions like interactive design demands consideration of whether it is desirable to relinquish to machine "intelligence" the very activities that define the expressive qualities of our visual culture.

1.3 Controversy surrounding generative imagery

In 2022, a state-wide art competition in Colorado awarded its first prize to an image that judges undoubtedly had assumed to be produced in a traditional, painterly manner. Despite an oblique clue appended as part of the entrant's name, they were unprepared for the possibility that the image had in fact been generated using algorithms that applied machine learning and deep convolutional neural networks. In short, the contestant, Jason M. Allen, fed a series of textual descriptions into the Midjourney software package until it spat out the prize-winning image. The products of that process are both familiar and unanticipated due to the ways that the content and visual style are reflected through the matrix of other images that have been used to train the system. Not surprisingly, artists who had used more traditional means for their submissions to the contest were suitably miffed by the decision. In fairness to the judges, the image that they chose adhered to principles of composition, balance, and color that traditionally have only been applied by knowledgeable artists who are familiar with painting and art history. The controversial selection raises a salient question: why should the contestant be punished for using artificial intelligence to generate an image if judges felt it was the best?

There are a variety of potential responses. For one, the winning image was comprised only of colored pixels. Unlike many of the other submissions, there was no

physical artifact. Yet there is no reason that, eventually, machines could not reproduce the physical textures and qualities of paintings, too, using similar machine learning techniques to establish the most desirable properties of famous canvases. Would it have been more acceptable if the winning contestant had used paints and brushes to copy the image he generated procedurally onto a canvas? It is tricky to defend traditional image-making approaches on the basis of the visual difference of the products themselves because it is impossible to anticipate the myriad correlations that "AI art" could involve, or the training sets of images that comparable software systems could be provided. Is the real problem, as with plagiarism and academic integrity, that the AI artist just cut too many corners?

It is quite common in art schools for students to copy great paintings and to make sketches from paintings. Practices that resemble forgery are permitted in the academic context as a way to understand great works in more detail. The point of these exercises is not to train people in the art of forgery. It is to comprehend the process and content of revered paintings so that the knowledge acquired can later be applied to new works. In this model of art training, which sometimes also involves apprenticeship, the trainee must understand the canon and learn to reproduce its qualities before departing on a more independent path. While these rites of passage have not been universal, they have been a very common pattern of training in the arts of the last few centuries. The sudden emergence of an image-making practice that involves calling forth images, with a few clicks of a mouse, flies in the face of this tradition, which is a tradition of both painting and knowledge transmission. In some ways it resembles the challenge to painting that was posed by the Daguerrotype, about which the painter Paul Delaroche pronounced, in 1840, "from this day, painting is dead."

But in truth the challenge to traditional painting posed by software has been arriving for a long time. In 1988 Timothy Binkley wrote:

> One hallmark of interactivity with an "intelligent" machine is the ability to discourse in generalities and dispense with the need to delineate all the specifics: we can tell the computer to adjust properties of objects or images without delineating each and every detail as a painter must in manipulating pigment. Since the computer understands concepts, we can tell it to make the mountains rougher without saying exactly how it is to be done. This makes it possible for the artist to work at a higher level of generality [7].

What is astonishing about a tool like Midjourney is the way that it functions with only the most general instructions from its human operator. It removes the practice of image-making from the realm of labor and expertise. This break is centuries in the making. The Western tradition of painting has long cultivated a mystique about the genius of the artist who was able to translate a rich imagination into paintings and sculptures. With the emergence of perspective in the Renaissance, artists worked increasingly in styles that reflected a cohesive point of view, as if the artist's eye were a camera. As David Hockney argued in his BBC series *Secret Knowledge* [8], the artistic application of imaging technologies like concave mirrors, lenses, the Camera Lucida, and the Camera Obscura contributed to the transformation of European painting styles. Representational practices that were extremely difficult to achieve with the unaided eye became common. In his assessment, the use of optical imaging technology began to spread beginning in the fourteenth century, even though their use remained a guarded secret. The secrecy not only conveyed a competitive advantage vis-a-vis other artists, it also sustained impressions of

artistic genius and skill. In effect the imaging tools permitted artists to focus their attention differently. They were able to work "at a higher level of generality" by tracing the contours of a scene from a projection rather than having to precisely observe every detail of position and proportion. Since art historians have largely neglected the implications of Hockney's work, many young artists who encounter secret knowledge for the first time are surprised to learn that imaging technologies have been around for centuries.

Even today many artists keep their digital cooking a secret. Computer imaging technologies have quietly pervaded contemporary art to the point where it is uncommon when artistic practices do not involve the computer in some way. In this context, it does not really make sense to ask whether artists and art competitions should be required to use only traditional media and techniques. Instead the problem is how to address certain technologies that seem to break too radically with conventional practice, and how to respond to the dissatisfaction with the encroachment of new modes of generative imaging based on machine learning.

In 2022, a French game developer known by the name "5you" created an artificial intelligence (AI) tool for people to generate manga without artistic skill. Suddenly people with no illustration talent could generate manga that looked professional. This use of AI to simplify the generation of anime and manga, in the style of the artist Kim Jung Gi, sparked a furious backlash from Japan's anime community. 5you reported that he received death threats from Jung Gi loyalists and illustrators who resented this appropriation of the recently deceased artist's work. According to 5you, the reaction also reflects a kind of panic among the artists and illustrators. "I think they fear that they're training for something they won't ever be able to live off because they're going to be replaced by AI" [9].

Like photography, which made obsolete the practice of hand-painting slides for projection, this automagical production process does threaten to disrupt career paths. The replacement of skills with software systems brings the specter of technologically-driven unemployment to a whole new class of professions, ones that until recently seemed safe from the tumult of automation. From expendable illustrators and artists to outmoded fashion models, who are being supplanted by evergreen virtual avatars (like Lil Miquel with over 2 million followers), the visual culture is evolving in some unanticipated ways.

Although in the current state of AI art, controlling the results remains somewhat crude, the public's fascination with visual effects and simple "creative" practices insures that these kinds of image generation are not going away. Already there are countless apps for mobile media, that permit people to see themselves as a cartoon, make themselves bug-eyed, or wear cartoon animal masks that adapt to their facial expressions.

These visual effects unlock new dimensions of digital media as a performative context. From "machinema" to the "deep fake" technologies, the world of computing is becoming a playground filled with low-hanging fruit techniques of image manipulation, filtering, and enhancement. With social media as a venue for these types of spectacles, the need for "art competitions" and the imprimatur of artistic exhibition are in many ways becoming unnecessary.

Nevertheless, mobile phone camera effects software makes photos produced by different users all start to look the same. When users are presented with limited style options this is inevitable. Such canned effects now appear uncritically in admissions portfolios for art schools. In many respects the style of these photos belongs more to the "app"than to the artists. They are baked into the software systems in a way.

Of course if the only criterion that matters is whether the student photographer experienced joy while making the images, then the glib application of styles is no mistake, just a happy accident. Assuredly the makers of simplistic software tools would like people to adopt this point of view. The marketing of software tools routinely exaggerates the usefulness of such products. What is more it attempts to fool consumers into believing that they will become creative simply by buying the product. Such marketing is hardly new, but with the popularization of easy media production tools, the *zeitgeist* of self-centered and intoxicated pseudo-creativity has been taken to new levels.

1.4 Ideal creativity

In the classical Greece of Plato, painters were not even thought to be creative. Their work was imitative rather than intellectual. Through the Middle Ages in Europe, creativity was God's work. Even centuries after the Renaissance the term "creativity" seemed a bit too proud for Christiandom, where the term evoked the Latin notion of creation "*ex nihilo*" (from nothing). By the nineteenth century the idea of art as human creativity became more commonplace.

Even so, in the mid-nineteenth century, when Henry Fox Talbot titled his book of innovative new (photographic) calotype prints, he chose *Pencil of Nature*. Like other early inventors of photography, Fox Talbot saw himself more as mid-wife to the creative process, revealing the images that nature had generated on his treated paper. Today marketing rhetoric for popular software has departed from this modesty. If we are to believe the software industry hype, it takes no effort for anyone to generate results so astounding that it is unclear which is more impressive, the new technology or our casual mastery of it. In this new world, illuminated by the glow of marketing, there is no cause to credit nature, or the almighty: the credit for this wonderful creativity is all ours.

To articulate an "anti-technological" ideal of creativity today would amount to a rejection of the modern world. In the wake of a century and a half of staggering technological change, it should be quite clear that technical standards and methods are eventually surpassed. That some of the new methods seem too easy to be "artistic" has rarely prevented artists from using them. For men like Daguerre and Nadar, who were already successful before pioneering photographic media, it is clear that the potential of the photographic medium drove them as innovators within a new field of expression. Similar motivations have driven artists to adopt computers in their creative processes. But for most people who adopt new media tools today, the rationale for using such technology has little to do with a clear artistic or innovative purpose. In the years since the introduction of the personal computer, at the beginning of the 1980s, the software offerings have become less tool-like and more toy-like. Today people use technology because it is "cool" and fun, not simply because of what things it can help to create.

Figure 2 shows an interactive artwork that I made in 2001 named "Robotross—a pun meant to evoke both a robotic version of the TV painter Bob Ross and the mythic albatross sea bird, a symbol of inescapable troubles. The work addresses the issue of creativity in new media. Specifically, it is a mediation on the seductiveness, potential, and shortcomings of digital media as a vehicle for creativity. Unlike painting, which permits great latitude for content and stylistic choices, the Robotross interface implies that it offers paint brushes, but it actually only delivers pre-painted elements. While it is possible to configure this small collection of elements—a sky, a mountain, a tree,

Figure 2.
Robotross, Andy Deck, 2001, artcode.org/robotross.

etc.—into a variety of digital "paintings," the transformation of the brushes into buttons that paste pictures calls attention to a restriction of freedom and control as compared to traditional painting. Robotross is a form of culture jamming that responds to a general culture of computing technology (and "computer art") that seems to take progress for granted. It poses the question of why artists would use and celebrate tools that force them to make images based on a limited set of model paintings? Ultimately, it seems that there is a novelty value in producing images in a new way, whether it is with Robotross or digital image filter operations that draw upon deep convolutional neural networks.

I am certainly not the first to reflect upon the impact of computers on the creative process. In the 1960s, A. Michael Noll produced a variety of monochrome images using computers and pen plotter printers. He also wrote perceptively about the artist-computer rapport.

> *In the computer, man has created not just an inanimate tool but an intellectual and active creative partner that, when fully exploited, could be used to produce wholly new art forms and possibly new esthetic experiences …. The artist's role as master creator will remain, however, because even though the physical limitations of the medium will be different from traditional media, his training, devotion, and visualization will give him a higher degree of control of the artistic experience. As an example, the artist's particular interactions with the computer might be recorded and played back by the public on their own computers. Specified amounts of interaction and modification might be introduced by the individual, but the overall course of the interactive experience would still follow the artist's model [10].*

In many respects the passage above is a reasonably accurate description of the actual relationship that many artist-programmers have attained with computers in the intervening half century. Yet like many enthusiastic pioneers Noll overlooked some pitfalls. With time it has become clear that in addition to being an "intellectual partner" the computer is also a product. Moreover, most people using it are not programmers. Consequently its software is, more often than not, a product, too. Commercial tools may require periodic relearning and sizable investments. Though in some respects artists may be "master creators" using such tools, in other ways

the artist is boxed in by programmers, lawyers, and executives in the software and computer industries.

This is not to suggest that software tools are always problematic. Like conventional tools, some are good and some end up in the back of a junk drawer. It is worth noting, though, that "creative" software is not the same as a brush. Paint brushes do not record your actions and location, and they do not put demographically targeted advertisements in front of you while you are working. Paint programs can. If software is an intellectual partner, and its savvy nature is coded into it by a programmer, then who is the creative force behind the interaction of the user and the software tool? The poet W. H. Auden insisted that the true men of action in our time, those who transform the world, are not the politicians and statesmen but the scientists. He made similarly dismissive comments about the impact of artists [11]. His provocative claim begs the question of whether science, engineering, and industrial design may be more creatively influential than the people using their PCs to make pictures and stories? Indeed, there are types of products that issue from software that are largely predefined by the hardware and software, leaving only minor decisions to the operator of the software. One example is children's "art" software, which often trivializes the creative process in the name of colorful entertainment.

To employ a baseball metaphor, are we headed for a period in which young artists grow up thinking that they have hit a triple when in fact software programmers have put them on third base? In some domains, like immersive and interactive entertainment, it is entirely possible that consumers of interactive narratives will not really care about the relative contributions of man and machine to their experiences. Indeed they may come to think of themselves as the co-creators of their own personalized adventures.

In the aforementioned column addressing ChatGPT, Albom asked it: "What would the writer Mitch Albom think about a computer-generated story?" It answered, in part, "as a professional author and storyteller, he may feel that the use of computer-generated stories undermines the value of human creativity, imagination and the emotional connection that a human author can create with the readers. Additionally, he may also feel that the computer-generated stories lack the unique voice, perspective and the emotional depth that a human author can bring to a story" [4]. Albom agreed. But the fact that the tool had anticipated his perspective is remarkable. Indeed it is easy to underestimate the potential of machine learning when it is the focus of research. When I first read Wendy Lehnert's 1981 treatise on narrative notations, her hand drawn plot units and narrative summarization seemed rather obtuse, if not preposterous [12]. Forty years later, that work has become foundational research into AI storytelling, notable for its event-driven understanding of narrative plots, and part of the broader field of narrative understanding. Whether by parsing the logic of events in a narrative, or by modeling characters and their relationships [13], or by analyzing visual changes from moment to moment in an image stream [14], synthetic "understanding" that seemed beyond systematization only a few decades ago is becoming a part of the software that we live with.

2. Conclusions

To conclude, there is a profound shift occurring in the realm of what has been known as creativity. Creative professionals are now lurching toward engagement with tools and practices that challenge assumptions about the need for expertise and

human intelligence in a wide array of art and design fields. More than ever before, humans are being guided through operations rather than using innate tools and internalized knowledge. These new capacities can be seen in both positive and negative lights. Either they represent low-having fruit to be exploited easily, or, alternatively, the shift represents a deterioration of creative control on the part of the artist, who operates in a playground of code that is largely written by others. One consequence of the emergence of simplified production tools is that seemingly anyone becomes an artist, writer, or designer. The barriers to entry drop, but at the same time, the prospects for careers in these domains dim. The emergence of artificially intelligent creative surrogates means that intellectual careers that used to seem to be safe from automation are suddenly at risk like manufacturing jobs before them. The significance for the broader culture of the destabilization of these creative professions is a matter of concern. Will the transformed cultural sphere be more derivative as its creative products are perpetually remixed? Will the easy tools engender habits of mind that are too reliant on software for ideas? Maybe the future is brighter than bright, but this is a moment of inflection for the intellectual and the next steps feel like they are into the unknown.

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Chapter 6

Thumb.CAD: Essays on Technology, Design and Image

Caio Almeida, Renato César Souza and Lucas Luciano

Abstract

This work seeks, through the use of jargon from the internet and computing to make an analogy game to situations found contemporaneously in image, digital culture and architecture, showing the intertwining between many factors that increase the complexity of tasks and demanding answers that are also compatible. The essay seeks no to argue against technology and its use, but to discuss the pitfalls of the enchantment generated by its facilities. In this way, questions arise about how to face the problems of a world moulded by accelerated information and communication technologies, in which our ways of thinking are highly influenced by electronic mediation. Finally, it is proposed to discuss a dialogical and cooperative involvement between technology and man that emphasize possibilities and reenchants our tools to reformulate the architectural practice and promote openings for emancipation.

Keywords: architecture, digital, culture, image, technology

1. Introduction

The text follows an essay structure, and using terms linked to the technology field allows us to deduce two brief statements: the terms, being recent and linked to information science, can generate an ambiguity or misunderstanding of its concepts. It is worth emphasizing that the use of some of these words is done to establish a bridge between the different names treated, to make connections and not to transfigure meanings between them or employ new uses.

Current image consolidation scenario is reinforced by the recent proliferation of generative images conceived by Artificial Intelligence. Obtaining increasingly significant results and reaching a number of users and dissemination on a large scale, their capabilities range from obtaining images by text prompts to videos with non-real human faces and 3D spaces obtained with a simple mouse click. These transformations impact not only art the concept of authorship, plagiarism and the future of design professionals in their various fields.

So, there is no alternative but to deal with the new "soft" infrastructures that are emerging: knowledge, program, cultural and virtual infrastructure. The demand for design and de-design in the ultra-designed, ultra-mediated world is huge, but most architects still respond to these demands in the medieval language of stoic and autonomous construction [1].

What is certain is that this new visuality does not arrive free of problems and para-doxes. At the same time that it opens us up to unprecedented and auspicious perspec-tives regarding our relationship with the world, it has also distanced us from the world. The way we use the computer and its interfaces today, it has paradoxically expanded the possibilities of our action in the world, and at the same time impoverished the quality of our experience of the world. Computerized representations bring us the world imagetically, but they also serve as a barrier, creating a distance between us and the represented world. And since we started to take the representations sufficiently, as if they were the world, we fall into a simulacrum cult, into a reinvented idolatry [2].

In this way, we will try to address in this text questions about the performance of design and the architect in the face of technological advances and the image and digital technology affirmation as at the momentum, the definitive instruments of communication and production.

2. Thumb.CAD: technical image under the finger tip

The term thumbnail designates an image with the function of intuitively assisting in the navigation of pages and content on the internet, especially for children's and naïve users. On the internet, it has common use, which designates a miniature image use to draw attention to a particular video, link or page. For content producers in this media, it is a fundamental item that directly interferes with the search results for videos and news, as well as the possible views number and the reach (interactivity) that certain content can receive. This miniaturized image seeks to represent the possible content to be treated by the click made on it, also refining the search engines, with a more commu-nicative, direct and why not democratic role, than would be the textual form.

However, the resource has also been used to act against this same search engine, mainly through the thumbnail image's communicative capacity. This tactic of access-ing false and sensational content can be observed at all times on platforms such as YouTube, Facebook, Instagram, and popularly it is called clickbait.

The images start to be produced more to orient themselves from the digital plat-forms' perspective with strong aesthetic and communication appeal. This indis-criminate use of image processing and digital manipulation is compounded by the sometimes-illogical way in which text and images are correlated by search engines.

The representations detach themselves from their referents and start to act in an erratic way, almost free recombination [3]. This is added to the constant novelty sen-sation experienced through an infinite scroll bar, conveying an imaginary seduction experience that is not of a repetitive void, but that of constant new information [4]. The technical image is summarily produced by devices; it is no longer made by planes but by dots and pixels, and it is zero dimensional.

According to Cabral [2], photography carried out using analogue means had as its main elements: the automation of its production, the replacement speed and the ease of its distribution. With the arrival of digital means, such elements will suffer a sig-nificant displacement: the automation transmutes into immediacy; replacement speed turns into manipulation; and the ease of distribution creates omnipresence (ubiquity of a photographic universe). The most visible effect of the increase in the speed of the technical image essential characteristics is undoubtedly a generalized banalization in their use. An inflation of images will mark our daily lives and permeate all our most common activities, and they are calculated images.

Thus, computerized representations bring us the world through images and serve as a barrier, creating a distance between us and the represented world. Canadian architects and theorists Alberto Pérez-Gómez and Louise Pelletier [5] argue that if we want to understand the current excessive image proliferation scenario, we will have to refer back to a crucial moment in the History of Western Culture, when even in Greek Theater the separation between stage and audience. With this distinction, a "distance" arises between the show, the author and the audience, making theatre a different manifestation of ancient rituals where these "distances" did not exist. Interestingly, while the ritual reinforces and corroborates specific worldviews, the theatre opens itself to experimentation with new worldviews. The establishment of this distance in the theatre will be especially characterized by three aspects: predominance of the visual (and to a lesser extent the auditory), the feasibility of a rational development (through the institution of authorship), and a bodily disengagement from most of the people involved (the audience).

The thumbnail goes towards this miniaturization idea and availability at your fingertips, a latent reduction and technical devices compression, the videos length, less text and writing, attention, patience and goes on. Images transform all our desires, objectivities and conditions into them [6].

The image return is not revolutionary news as Flusser [6] had already warned 40 years ago, but a comeback to its importance as a majority communication after the writing invention and the importance of texts. At one point, it was the writing that explained the images of the world, in the present-future it explains the text's illustrations. The cognition and thinking abstraction are nothing but a progressive subtraction of the object's dimensions, their roughness and imperfections.

The visualization itself becomes a trap, and we jump between scales and engage in this centesimal universe of pixels, codes, data and zero dimensionality. Alienation starts from this moment, when we try to incorporate linear thinking into the surface thinking. Decisions, design and work gradually become semi-autonomous. The virtual is interwoven in the way of experimentation in increasingly abstract forms, but simultaneously intentional. Data are said to be disembodied and neutral but are stained and occluded somewhere. The main implication that technical images, device proliferation, automation, emulation, semi-autonomy and memetic culture always will generate is the program affirmation.

The fiercest critics fear the objectification of desire (through automation) and the dissolution of communication (through interaction).

In this sense, a discussion on how we deal with this images production and interpretation becomes important, which will directly impact on culture, behaviour and workings, especially designers, architects and other professionals who manage the communication of their ideas with others, the world and the multiple technological devices and social media, through images.

2.1 The programmatic image: memetic cultures and semi-autonomy design

In 1936, the German philosopher and cultural theorist Walter Benjamin published one of his best-known essays, "The work of art in the age of its technical reproducibility" [7], where he analysed the impact of new technologies, in particular photography and cinema. For him, the new techniques will lead to a gradual disembodiment of thought embodied in artistic production, causing a constant loss of aesthetic affection which he called "aura" of the art object, understood by him as the character that

defines the uniqueness of each work, and which is now being reproduced indefinitely due to the many technical advances.

Benjamin [7] noted that the works of art were always reproducible throughout history, with falsification by copies and moulds but with the technical emergency, the authenticity of the original is lost. In a reproduction culture, the original does not matter much, and consequently, this artwork and image "aura", weakens and loses its charm. Sixty years later, the French sociologist Jean Baudrillard [8] remakes the argument by saying that it was no simply that the importance of the original had been lost by the proliferation of copies in our simulation culture. Instead, in this era dominated by third-order simulation, we have entered a new phase. If the second order was the moment as Benjamin observed, when the distinction between original and copy was broken, the third order is marked by the complete disappearance of any reference to the original notion and often to reality itself, giving rise to a new kind of charm.

Several other contemporary studies seek to deepen the view of repetition and copying, giving rise to meme neologism. Coined by biologist Richard Dawkins [9] in 1976, the word meme refers to how ideas and culture (music, phrases, words, images) spread, reinforcing the argument that culture is propagated by imitation. The task of technical images is thus to establish a general code to reunify culture [10].

The technical improvement allows digital reproduction to clone, emulate and cut without suffering the deterioration that usually happened in the previous mechanical era. In this memetic culture fuelled by likes, tweets and shares, it is not the original that becomes important, but the number of times it is replicated. Originality gives rise to replication and repetition as a discourse enhancement.

An obvious question is whether the memetic culture spread in digital media is linked to copyright issues and image use. How to protect these rights when a digital file can be copied, emulated and reproduced endlessly? YouTube, for example, only "monetizes" original content, and uses algorithm and the platform's own users to identify videos that appropriate music, images and parts of other videos with protected rights, but the problem is much deeper. In 2013, the 3D print of the "Liberator" a firearm was made available online and epitomizes the potential but also the risk associated with the rapid digital file's dissemination. Days after its publication, distribution and manufacture were banned from the public. The American government justified that there was no way to regulate the data control and possession relationships, but the print files were available in many torrents for several years until they were started to be controlled.

It is not just a matter of dealing with the technical capacity question of replication generated by digital technologies. There are interlocking social and cultural factors that reveal or hide extreme conditions emerging from these technological capabilities.

For Weizman [11], the image goes beyond the mere representation question, but most of the things that are communicated and the decisions made, by humans or networks shared between humans and technological devices, are made through image sharing. The images, the aesthetic domain, become operationalized.

Suppose prehistoric magic ritualizes certain models and myths. Current magic ritualizes another kind of model: programs [10]. Technical images mean programs; they are projections that aim at their receptors and models for our behaviour [6]. The main implication that technical images, device proliferation, automation, emulation, semi-autonomy and memetic culture will generate is this program affirmation. Programs are characterized by systems in which chance becomes a necessity. Games in which all virtuality, even the least likely ones, will necessarily take place if played for a long time [12].

There is no last device or program for all programs, behind a program there is the need for a metaprogram for its programming. It is an opening upwards and tending to

the infinite [10]. The man-appliance relationship is then reversed, and it is we who now work in appliances function, even though we continue to deny the loss of that control. A Program affirmation and a desire for its affirmation, since the programs are getting better given their infinite possibilities amount that surpasses man's decision-making capacity.

The device's speech will become even more imperative, thanks precisely to these telematics and unintelligible dialogues. The devices always work more independently of the programmers' motives. And devices that have been programmed by other devices appear more frequently [12].

With digital information manipulation technologies, interactive systems can make use of automation to abstract repetitive and low-significance tasks, and thus enhance their scope; on the other hand, conversely, automation systems can now make use of interaction to become more adaptive and open.

2.2 Obfuscation: hidden the image and it's programs

Obfuscation is a technique in the programming language, which aims to mask the real code meaning and intention, thus serving either as an obstacle to the base code copy/decryption or to hide the algorithm real intention. The obfuscation method works by automatically and regularly shuffling the variables, leaving the code legibility impaired, with meaningless characters or changing the execution steps' order.

Obfuscation has some parameters that make it less or more complex, such as power (the complexity degree of the obfuscated code in relation to the original), resistance (to cyber-attacks), stealth (code camouflage with the rest of the program) and cost (runtime and overload on the obsolete system in relation to the original system). The obfuscation concept/practice can also be used in both directions. Ambiguity on how to note is a virtual constant factor. The technique can be used to protect passwords, personal data, programming lines, anti-piracy control against hacker's attacks, malwares and others stuff. But they also serve to monitoring, control, determine, presume, suggest, collect, and provide feedback, in short to increase the opacity of the so-called "black box system".

According to Glanville [13], James Clark Maxwell was a British philosopher and mathematician, who besides having contributed to modern theories on electromagnetism used the black box concept in a pioneering way. The concept was attached to cybernetics studies by W. Ross Ashby [14], as an artifice that allows the observer to construct a description explaining some system behaviour. One of the best examples to illustrate the black box concept is given by Flusser [10] when analysing the camera and its operation: "The photographer when using a camera must be only part of the device competence so that the whole camera never reveals itself. The box's darkness is the challenge. Although the photographer knows the box output and input, he does not know what is going on inside the box. The impenetrability of this system and its complexity is what can be called a black box".

Concept inserted not only in the internal machine structure such as cameras, computers and cell phones, but which is also rooted in economic, political and cultural systems, translating specific forms of suggestion and interpretation.

For Bridle [15], there is a concrete and causal relationship between the complexity of the systems we encounter every day and the opacity with which most of these systems are configured and their direct relationship with inequality, violence, populism and fundamentalism issues.

With the digital technology's emergence, the connection between magic and technology is frequently invoked again, since the functionality of digital devices challenges the common observer's understanding. We thus repeat the same behaviour of the primitive man in relation to the pre-scientific world: we call magic what we do not understand but which in the digital technology case is less linked to his experience as it was in the archaic sense, and more to illusionism resulting from ignorance in relation to what is programmed or, hidden in the black box [16].

The observation of these images/data and its programs, should not be performed uncritically, but rather explore ways to make more transparent the "black box" of the apparatus, see intentions in these programs and which are usually covered by complexity, opacity and impersonality layers.

Architecture is confined to representation, because instead of making it a philosophical problem, it has become a strategy, a space for manoeuver, a hiding place, and not a means of attack as it should be [17].

Sanford Kwinter [18] writes that the telescope and microscope invention, thus making objects on the smallest scale and those very distant visible to the human eye, were the main key in ending various historical tyrannies. Cabral [19] complements this by noting that this mobility allowed by the microscope and telescope occurs within the scope of scale, which is mainly a space question and only indirectly a question of time. The new visuality that comes with digital technologies allows us a similar mobility strategy, and the main factor that differentiates this mobility is that it does not only occur in space, but mainly in time. In some ways we can now cast our gaze back in time, simulating the past and to a certain extent, the future.

Returning to the questions raised, this is perhaps the great computer contribution to our culture: the possibility of making explicit the mechanisms behind complex processes. If the telescope and microscope showed us scales inaccessible to the unaided/naked human eye, the computer can give us access to the origin of the processes and to understanding of the whole otherwise inaccessible to the unaided/naked eye [18].

Cybernetics is a possible solution for dealing with complex systems (black boxes), transforming unpredictable situations into informative ones.

Complexity is a recurring theme in everything, it is mainly linked to technology and computing, information and systems theory, but it appears eventually more in other areas such as economics, design, architecture and urbanism. Among its many definitions, complexity is related to the difficulty level in forecasting the interconnections present in a system, and it is a way of thinking that can contribute to giving visibility to processes.

For a long time, everything was compared to a machine [3], and the importance of talking about machines, clouds, networks and other metaphors is a challenge that usually encompasses many understandings, many meanings, and, in a way, always ends up leading to a trivialized commonplace. The cloud is the moment metaphor, where we connect, work and store things. The cloud lands at all points and explores the ambiguous status they hold; it is able to mould itself to geographies of power due to its physical distance from the solidity of its intentions.

Technological acceleration transforms the planet, society and the individual daily, but has failed to transform our understanding of these things. The digital paradigm marks a knowledge expansion that results from the increasingly information intensity assets and their extensive dissemination that shape our reality, obscuring disciplinary boundaries [20]. We need not only new technologies but also new metaphors: a meta-language to describe the world that complex systems have generated. New

abbreviations, which at the same time recognize and deal with reality in a world in which people, politics, culture and technology and their images are all entangled [15].

2.3 For a cybernetic design: transformations in architectural practice and design process

Cybernetics emerged at the beginning of the information age, in pre-digital communications, creating a connection between human-machine interaction and systems among themselves. As a result, cybernetics frames the world in terms of systems and their goals [21].

The relationship between cybernetics and surveillance and control techniques has been strengthened by the continuous communication tools development and the representation of technical devices. Surveillance and control managed through large bits conglomerates, with the name of Big Data, are now interpreted by algorithms in increasingly larger volumes and collected by capture and information devices in smaller space and time intervals. Its influences range from political campaign promotion and data package sales to lobbying, as well as military strategies.

Weizman [11] points out that there are two forms of violence that are getting deeper: physical and digital. This digital violence was enhanced by the isolation caused by the Corona Virus pandemic, serving as an alibi for companies to use the connection between the two, collecting data, monitoring people and guiding practices that reflect on social/political space structures. Power and control (surveillance/security) are paradoxical variables when technologically oriented. Technology expands power but can concentrate if it is done unevenly. And control since the more sophisticated the security devices, the more sophisticated the attacks also become.

Thus, a search for attempts to solve complexity and reduce its abstraction arises. But the more one tries to explain the virtual world functioning, the more diffuse it seems to get. Flusser [6], adds: the more complex the tools, the more abstract their functions will be.

According to Spuybroek [22], architects have been more obsessed with shapes such as cubes, spheres and other Euclidean geometric shapes, and now they are attracted to clouds, swarms, patterns, automata, cells, rhizomes, substances, fractals, biomimetics and others concepts borrowed from fields like biology and philosophy. They start drawing less and simulating more. Proportion, perspective, typology and other arbitrary and stabilizing cultural forms are no longer the interest focus in the current digital architectural production model; this intermediation role was assumed by CAD software. A move from the generation of processes seen from the outside to the inside, propitiated by the growing importance given to the virtual dimension in architecture. Open dynamic systems bring an approach in which the meaning lies in unveiling potentialities of indeterminations.

A shift in the process generation seen from the outside in, brought about by the growing importance given the dimension of the virtual in architecture.

It is good to remember that the ultra-mediated computational universe becomes dangerous when it ceases to be a heuristic device, of possibility and becomes an ideology that privileges information, technique and access to these facilities, highlighting the image above all things, as is practised in many of the so-called digital architectures and the discourse that accompany them.

Graafland [23], will question if the incorporation of theories about composition, semiotics, philosophy, critical theory and the list continues, can still help in the discovery of a better design/project quality, or if they would actually be a sum of fields

belonging to a same postmodern universe that is disguised under a new discourse, in which the longing for theses interdisciplinarities is being used to put on a design and endow it with insignificant meanings.

But how to face the problems of a world formed by information and communication technologies, in which our ways of thinking are highly influenced by electronic mediation? These issues were not restricted to the "design means", but will also influence the ways we see and experience spaces.

So, the "digital shift" as put by Mario Carpo [24], became larger than was initially thought, in depth and comprehensiveness in architecture. There is no way to highlight only a duality, such as between representation and production, between criticism and design, technology and art, artefact and nature and other divisions, because they are nevertheless not able to understand the full complexity. The digital shift makes their relationships liquefied, and thus other needs arise, such as avoiding taking shortcuts and resisting easy solutions [22].

Profession increasingly needs to deal with the communication systems, work and space acceleration. Understand that cyberspace is not on a plane so different from ours, part of a virtual life taken apart, but that new reasoning is needed more than ever to capture our relations with these digital worlds.

The architecture role idea as an intangible services producer, whether they are digital files for manufacturing, interface design or as an organization model has grown a lot. Growth that goes hand in hand with the manufacturing distributed trend that breaks with the traditional supply chain, as several companies start selling information and digitalized data that allow the production of parts instead of manufacturing and selling them physically. Some factories, like some architectural firms, are moving away from services based solely on drawings and objects to being based on information. The tendency has already been seen in objects such as lamps, clocks and shoes for another time to make artefacts and buildings. For Spuybroek [22], design becomes more about the organization among infinite possibilities.

The material aspect mentioned by Flusser [10] is no longer what gives value or involvement with a particular object, but the software, the virtuality contained therein. In architecture, because it is an object with physicality, scale and wide appropriations, the issue is more delicate, but it is not foreign to these discussions. According to Bitoni [25], materials are no longer formed by the tool progression, as has been the case since the beginning of civilization, where from the first primitive stone tools, we continue to make more sophisticated ones. Our tools are now linguistic; language is now our hammer and saw.

The effective progress of technological advances in architecture will not be solved without organization and rationalization, and it will be done through flexible interactions and not rigid hierarchies, requiring a behaviour that is more adaptable than mechanical.

The essential mechanism for the eventual success of experiences with participation and indeterminacy is feedback. Some solutions go ahead and others do not, but all generate circularity. This requires greater connectivity between architects and other members of the system, to create a holistic workflow. This is the elementary design function of any nature, to improve people's lives and meet their needs. Put that away, one of the great design tasks nowadays is to adjust connections between things that appear to be disconnected. Task is currently called designing interfaces [3].

Some architects have sought to automate the intuitive realization of their ideas through algorithms, at the risk of falling into the classic trap that tools, regardless

of their nature, do not satisfy the objectives and are not even used to interpret their results in addition to computer simulations.

Thus, according to Gobin et al. [26], the use of digital is once again a generalizing specialist system, and the architect's dilemma continues as it has been since the profession's emergence, the classic difficulty of translating from conception to representation, and representation for realization.

When designing ontology, the objects, operations and relationships that can be described in an information processing system are determined. This indicates which attributes are stored in files and databases, and with which objects are presented to users to interact [27].

Potentialities that seek flexible interfaces with different abstraction levels capable of gradually involving users and their autonomy and the architecture craft can thus discover other paths for the profession, providing the interfaces that generate involvement and interest in architecture and its agency, challenges that Gordon Pask [28] had already glimpsed 50 years ago.

It is increasingly necessary to think about new technologies in other ways and criticize them to participate significantly in this cybernetic driving. Thinking about the project not as something sealed, but as part of a system open to possible indeterminations.

2.4 Refactoring the image

Refactoring is the process of modifying a system and its program to improve the internal code structure without changing its external behaviour.

The technique improves the software conception (design) and avoids its entropy, reducing its useful life. This entropy is caused by changes with short-term objectives or changes that were not considered in the system design.

Another feature is the ease of understanding, facilitating the maintenance and communication of their motivations, intentions and goals. When analysing the architectural design process, regardless of the tools, there are similar concepts to the refactoring importance in its various stages.

The computer must be a constructive means and not merely representational, not only be understood as a separate tool but as an organizational model, an agent capable of creating continuity in the process.

This continuity paradigm must also consider the body and the suggested spaces imbued with active, undetermined potential, but charged with trends that promote interaction as stated by Cabral Filho [4].

Creativity must start from dialog with the order, in language, in communication and in the community. Provoke a new consciousness emergence, a collective game strategy. After all, playing is an activity proper to human beings and tests that virtue that makes them privileged in nature: the ability to analyse a situation, weigh pros and cons and finally decide.

We need, as warned by Flusser [10], to invert the point of view when analysing the image. Not under the aspect that is usually given to detachment from reality, but from the need to ask what the image projects towards the world. Seek to break instrumental limits and implement ways to overcome obstacles in obtaining feedback and engagement. Refactor and reenchant are the available tools. Software, machines and devices will continue to be complex, but experimentation and integration can clear these conjectures.

Conceptual shifts can be listed at this moment as potentially revolutionary in the practice of architectural design, as a direct digital technologies dissemination result. The focus of the act of designing is no longer the object design and becomes the programming of processes that manage this object. In representation processes, the projective design strategy gives way to the construction of parameterized models, which opens up the possibility of experimentation and testing of the model before its effective construction [19].

Technology is, and can be, the guide of this thought, as long as we do not privilege its output. Computers are not here to give us answers, but they are tools for asking questions [15].

Real literacy in relation to systems goes far beyond attempts to understand their functionality, but to reveal contextual aspects and their consequences. Guiding for information production process awareness.

The designing gesture should not be held hostage to the idiosyncrasies addition linked to a flow of pre-existing forms, but should follow a similar path to what Koolhas [29] proposes, that there is a technological awareness inherent in the very modernization of the process and its realization. Therefore, we must be interested not only in how things are and what they mean but also in how they become real and how this real is produced.

Architects can no longer rely on the representation domain for resistance and control regarding the profession position; new ways of thinking, processing and finally refactoring and reinventing the profession are needed.

2.5 Storytelling: architecture and the image diffusion

As part of the subject, we will deal with a practical experience through storytelling. The faculty of architecture and urbanism at the Universidade Federal de Juiz de Fora is an academic unit like many others in Brazil dedicated to training future professionals in the field. One of the biggest perceived difficulties is the creativity associated with technological resources; most of them cannot describe the process or express their ideas in different media.

A couple of weeks back, in a classroom filled with architecture and urbanism students, an architecture teacher introduced the topic of artificial intelligence, authorship and its potential impact on the design field.

In order to introduce a debate on the progress of instruments such as artificial intelligence and creativity, it was proposed that each of them develop an image of a dream project, such as a house, describing it on open platforms such as Midjourney. Midjourney is a text-to-image generator powered by artificial intelligence. The tool operates within Discord app and works collaboratively. The choice of the tool was due to the results closest to the ideas formulated by the students.

They could make use of other reference images, and also use sketches and drawings to begin from a starting point for the image generation. The students were initially sceptical, but the teacher explained how AI-powered platforms like Midjourney could revolutionize the way architects and designers create and visualize their projects.

To illustrate the point, the teacher assigned the class a creative task: each student was asked to create an image of their dream house using Midjourney The students dove into the task with enthusiasm, experimenting with different design elements and features. Some students imagined fantastical scenarios, like a floating castle in the clouds or a treehouse village nestled in a dense forest. Others dreamed up their ideal homes, complete with all the features and amenities they desired.

As part of the assignment, each student had to create a client profile for their project. They had to consider the physical aspects of the design, as well as the personal tastes and behaviour of the supposed client. This helped the students to learn how to think about the needs and wants of their clients, and how to design spaces that would meet those needs.

After creating their designs, the students used Midjourney to generate images. The final step of the assignment was to shuffle the images and try to guess each image's author. This was a fun and challenging way for the students to test their skills and see how their designs compared to their classmates.

As the class progressed, the teacher encouraged the students to think about how AI could be used to enhance the design process and to consider the ethical implications of relying on technology to create images.

The students realized the potential of AI to enhance their creativity and were excited about the possibilities and obstacles for the future of their profession. They left the classroom with a new understanding of how AI could be used to augment their skills and help them create even more innovative and unexpected designs, while maintaining a critical position on the consequences of such instruments.

3. Conclusions

The ultra-mediated computational universe can become dangerous according to several types of research when it is no longer a device of heuristics and possibilities, and becomes an ideology that privileges information, technique, access to these facilities and the image over the rest of all things. Decisions, design and work gradually become semi-autonomous. The virtual is interwoven in experimentation ways in increasingly abstract forms, but simultaneously intentional. Data are said to be disembodied but stained somewhere.

Indeed, if there has been a digital revolution in the last five decades as we are led to believe, a large part of this revolution was a visualization revolution, or to be more exact, a revolution in how images are produced. A production mode that actually profoundly changes the modes of distribution and manipulation of images. Databases, digital models, multimedia presentations and others, are all more than ways of organizing data, ways of visualizing data. In the evolution of computer, we went from the calculation for the image through computer graphics to the image for communication through multimedia computers. And if the best-case scenario comes true, we will move from communication to conversational (or the truly dialogic) with the computer taken as a tool of indeterminacy [19].

With each new version, the tendency is that the language becomes more and more simplified; the software gives a direction towards more friendly and intuitive interfaces, less apparent buttons, less text to read, more patterns and more tutorials instilled in the step-by-step of how to do it. Maybe this will lead to a trend towards a trivialization of a technical, aesthetic, linguistic and conceptual order or on the contrary, will it expand the possibilities exponentially and will new forms of production and interpretation emerge provided by these facilities?

Reject technology is impossible, but the ability to articulate and design need not be limited only to their means. It is necessary to aim for syncretism, a reasonable vision and the capacities of each one to act dialogically for a legitimate mobilization. Focus on the here and now, one step back to a future better jump.

Acknowledgements

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Storytelling is a form of communication that has been present throughout a substantial span of human history. The advent of emerging technologies, such as augmented reality (AR), virtual reality (VR), and mixed reality, has significantly transformed the conventional narrative in the realm of digital storytelling. Currently, this technology has the potential to be utilised in various application domains spanning multiple fields of study. It holds significant value for various entities within a given society, including corporations, non-profit organisations, tourism operators, educators, developers of online and mobile games, marketers, and numerous other stakeholders operating within diverse contexts. Hence, one might suggest that digital storytelling possesses significant potential in contemporary society.

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