The Influence of Art and Technology in the Modern Day: A Technological Momentum Analysis of Artificial Intelligence and its' Relation to Rap Music

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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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INTRODUCTION

Recently, there have been many cases of artificial intelligence being used to create new technology never seen before. One specific case that gained much traction is the song "Heart on My Sleeve," which was created by an unknown person with the TikTok username "ghostwriter977 (Robinson, 2023)." This rap song gained a large amount of traction because the vocals were created using artificial intelligence, and the artificial vocals were trained to imitate worldwide pop stars "Drake" and "The Weeknd." The song that imitated these artists' vocals started to gain many streams across multiple music streaming platforms, including 600,000 streams on Spotify, 275,000 views on YouTube, and fifteen million streams on TikTok (Snapes, 2023). The song has even gained 6.9 million views on an unofficial Twitter upload of the song (Tolentino, 2023). Eventually, the song was taken down from all platforms by the music label UMG, but there is still a variety of reuploads of the song on YouTube and other platforms for the public to listen to whenever they please.

There is a small amount of scholarship and research that exists on this specific case due to this song being officially released very recently on streaming platforms on April 4th (Barlas, 2023). However, this research mainly focuses on the legal landscape of the artificial intelligence situation and how the technology stands with current legislation. The research has minimal regard for ethical implications other than what is present in the law. With the specifics in terms of morality, this research does not talk about how the traction this rap song has gained can set a precedent for artificial intelligence with its relationship with music and its influence. The millions and millions of views that this song has gained using replicated artist vocals are proof that the concept of artificial intelligence holding influence over society in the form of music is a reality. Without proper analysis of how this combination of rap music and artificial intelligence

has had this massive effect, people will not be aware of how it will continue to manipulate people's mindsets and emotions.

With this case of the song "Heart on My Sleeve," I will use a technological momentum framework to argue that artificial intelligence was once influenced and created by people for a specific purpose, and over time, artificial intelligence has increasingly influenced society's emotions and mindsets in the form of rap music. A technological momentum framework is a theory by historian Thomas P. Hughes that discusses the relationship between technology and society and how it changes over time. I will analyze this unintended effect and show a timeline of influence; across my timeline, I will utilize backstory for the conception of artificial intelligence and music, the evolution of artificial technology in regards to rap music, the first artificial intelligence rapper that was created, and finally ends with the song "Heart on My Sleeve" as the culmination of influence.

BACKGROUND

As it currently stands, "artificial intelligence, or AI, refers to the simulation of human intelligence by software-coded heuristics. This code is prevalent in everything from cloud-based enterprise applications to consumer apps and even embedded firmware (The Investopedia Team, 2023). It is currently used in many everyday aspects of life that many people are not aware of, with prominent examples of technological applications such as GPS systems such as Google Maps and Apple Maps utilizing artificial intelligence to map out the best routes to take on a road for cars. There are also applications in the financial industry where artificial intelligence is used to flag unusual activity with people's bank accounts. Generally, this technology is being utilized to make many systems in life easier and more streamlined.

As far as how artificial intelligence and music work together, there is much modern technology that allows machines to create art, known as generative art. “By using deep learning techniques, an autonomous system like AI can produce images, melodies, and other forms of art based on inputs and prompts (Pal, 2024).” Artificial intelligence music is created by training machine learning algorithms on existing music that exists. The algorithms examine the patterns, structures, and melodies of the music, and then, with the information gathered, they can create music and vocals that are very similar to what was used for training. There are models of various very famous music artists that exist online to be taken and used for their vocal effects, inflections, and styles. The song “Heart on My Sleeve” was made by using these trained models on the creator’s voice recording of the song over the beat he had created. With the trained models, he was able to make his voice sound extremely similar to the artists “Drake” and “The Weeknd,” to the point that numerous people online could not tell the difference.

Rap music specifically has a long and detailed history that stems back to African American communities in New York City during the 1970s (Rhodes, 2002). The music emerged as a form of expression, storytelling, and cultural commentary, which is accompanied by rhythmic beats and spoken word poetry. The genre's origins can be traced back to the Bronx, where DJs such as Kool Herc and Afrika Bambaataa organized block parties and experimented with mixing and blending records to create extended dance breaks, known as "breakbeats." These early DJ techniques laid the foundation for what would become rap music. Over time, MCs (Masters of Ceremonies) began to accompany DJs, improvising rhymes and verses over the beats, creating a dynamic interplay between the music and lyrical delivery. Rap has evolved into a global phenomenon, encompassing various subgenres, styles, and cultural influences while remaining a powerful platform for social commentary, self-expression, and artistic innovation. It

is important to note that rap music has always prided itself on authenticity in the beats and the performers. There has always been a sense of wanting to be the best rapper, which ties back to pride in African American culture (Williams, 1995). This trait will come back later when artificial intelligence technology is used to do what humans did previously.

LITERATURE REVIEW

There have been a few pieces of scholarship work done on the topic of the song "Heart on My Sleeve" due to this situation happening quite recently in April 2023. All of this research heavily focuses on how this song and situation are affected by the current laws in place regarding artificial intelligence and using mimicked vocals on the song. One study done by Harnoovir Singh Josan is called "AI and Deepfake Voice Cloning: Innovation, Copyright, and Artists' Rights." In this study, Josan mainly talks about current copyright laws and how they relate to voice bots created to mimic artist voices. He also talks about who should own these types of songs, whether it be the original creator, the artist, the creator of the artificial intelligence technology, or more. He says that ultimately, artificial intelligence systems are not something that the public needs to worry about and that new laws should be put in place to benefit the original artist. Josan fails to consider how this technology has evolved and how an example such as "Heart in My Sleeve" can be used to manipulate people in ways never seen before.

Another piece of research that exists on the song "Heart on My Sleeve" is written by Andrae Alexander. In this paper, he details the copyright laws and how intellectual property works. He then details the role of artificial intelligence in the music industry and how the artists' fandom plays a role in this. Alexander is much closer to talking about the influence of this technology on people and what this could imply for manipulating people with technology. However, most of his paper is spent on the legal implications, and he just slightly talks about the

societal part. He does not go in-depth on how people's mental and daily lives will be affected and simply states that it does happen.

Overall, both of these articles provide research on the song "Heart on My Sleeve" by providing the current legal landscape and a shallow look at the societal implications. These perspectives are important to discuss but are limited in providing the effects of this song on society and how people are influenced by this technology. My analysis will provide a new perspective on this case that is based on a thorough study of the intersection between technology and society rather than what is stated in law.

CONCEPTUAL FRAMEWORK

One framework that can effectively be used to analyze the case of the song "Heart on My Sleeve" is a technological momentum framework. This framework was developed by Thomas Hughes, who was a historian of technology and was famous for utilizing two models of how technology and society intersect, technological determinism and social determinism, and using elements of both to create his theory. Technological determinism is the idea that technology has an important effect on our lives and that media technology shapes how we as a society think, feel, act, and change as we move from one revolution to another (Singh, 2024). One example of technological determinism that can be demonstrated is how the introduction of automobiles in society has influenced how American cities are designed prominently on the East Coast of the United States. The other model, social determinism, has an opposing mindset to technological determinism as it is based on the ideology that society controls how technology is used and developed (Markman, 2011). One example that showcases social determinism is how the United States rejected nuclear power technology after a nuclear meltdown happened on Three Mile Island.

Thomas Hughes was dissatisfied with both of these models and decided to create a new model that takes time into account. His new theory proposes that in a technology's infancy, its use and influence are determined by society and the people who create and use it, and the people are influential in the technology's design, purpose, meaning, and role. However, as technology evolves and matures, it becomes more integrated into society, and its power begins to take hold and achieve technological momentum (Hughes, 1987). This leads to much later in the technology's lifetime, where it begins to influence and determine societal structures and people. This technology has more power in terms of society's practices, values, powers, relations, and more. With these factors, there is a timeline of influence and the different factors where the influence is transferred from people to technology.

The key parts of this framework that are important to highlight are the ideas of influence. In my analysis, I will provide a timeline of influence that will include a history of music and artificial intelligence and how they have evolved. The idea that technology, originally influenced by people, grows to influence people themselves is perfect for this situation. I will start at the beginning of the technology's conception and analyze how people influence artificial intelligence with its original purpose. This will continue until the modern day when the song "Heart on My Sleeve" serves as a big warning for the unintended influence that technology holds.

ANALYSIS

The case of the song "Heart on My Sleeve" can be analyzed using a timeline of the relationship between artificial intelligence and music and how it has changed over time. This will provide a new perspective to this case on how this shift in influence happened and why it should be taken seriously. There will be different points in time that will provide examples of how

potent the technology was and how the influence relationship was at the time. Beforehand, this analysis will give a background on research on people's emotional connection to music. This will be used to provide further proof to my claims due to influence involving tapping into the emotions of human beings.

Human Beings and Their Emotional Connection to Art and Music

To develop my claim, it is important to discuss how human beings connect to music in society. There has always been an instinctual affinity to music that humans have. For generations of people, humans have used music for comfort and stimulation. According to studies, listening to music increases blood flow to the parts of the brain that generate and control emotions (Jäncke, 2008). The system that processes emotions and controls memory known as the limbic system is stimulated when music is being consumed (Jäncke, 2008). In addition, when people listen to music that is enjoyable to their being, a neurotransmitter known as dopamine is released. Dopamine is defined as the neurotransmitter that triggers one's sensations of pleasure. When people hear familiar music, dopamine is released in the brain which causes enjoyment with these familiar sounds (Habibi & Damasio, 2014). Even people who are affected by brain injuries can still recognize the emotions that music distills in our minds. Researchers did a study on patients who suffered brain injuries to their temporal lobes, which is the part of the brain responsible for comprehending melody. Even with this part of the brain damaged and their ability to detect the melodies impacted, the patients still felt the emotional impact of listening to the songs (Peretz et al., 1998). With all of this knowledge in mind, the emotional connection humans have to art and music can be understood which will be used to provide adequate support for my argument of the song "Heart on My Sleeve" and its influence on the people.

Early Life of Artificial Intelligence and Music

To understand the early influence that people had over artificial technology and music there must be some background and history explained for the conception of artificial intelligence with music and how it started. During the 1950s artificial intelligence began to have dedicated work and research done on its ideas. Alan Turing recorded the first computer-generated music using a machine in the Computing Machine Laboratory in Manchester (Copeland & Proudfoot, 2017). Taking from Turing's ideas, John McCarthy organized a group to clarify the developing ideas of thinking machines. His team proposed "A Proposal for Dartmouth Summer Research Project on Artificial Intelligence" where they would outline the original ideas for artificial intelligence as a concept. He stated that "An attempt will be made to find how machines use language, form abstractions and concepts, solve kinds of problems now reserved for humans, and improve themselves (McCarthy et al., 1995)" as the main intentions behind the advancement of this technology.

The Dartmouth conference served as the first official discussion on artificial intelligence and the original ideas and intentions for the technology were laid out clearly. These intentions will serve as a point of reference later in the timeline for when artificial intelligence improves on all fronts and people start using it for purposes not originally stated. At its conception, artificial intelligence was meant to serve as an experiment in seeing what machines are capable of and how far they could go. This can be evidenced by additional wording in the proposal that says that "the basis of the conjecture that every aspect of learning or any other feature of intelligence can in principle be so precisely described that a machine can be made to simulate it (McCarthy, 1995)." It is important to take notice of the words "simulate," "every aspect," and "any other feature of intelligence." As stated by the proposal, it is evident that these machines are thought to be capable of doing anything a human can. This specifies that every part of what the human brain

is capable of thinking despite how complex it is can be replicated. This plants very early seeds of what was to come in terms of the technology in the future.

A few years later, the first computer composer, the ILLIAC (Illinois Automatic Computer) was created by Lejaren Hiller. This machine was programmed to create the "Illiac Suite for String Quartet in 1957," which was a set of four musical compositions created by the technology using a series of algorithmic probabilities that were programmed into it (Hiller, 1959). Unlike the melodies of Turing's machine, the ILLIAC created original music pieces and melodies. Using one of the pieces created, this type of music had its first public view at a student concert at the University of Illinois Urbana-Champaign. As described by a wire story published by the United Press, the piece was referred to as "a suite composed by an electric brain" that was "sponsored" by Hiller; the article also stated that "Some people didn't dig the beat," citing an anonymous audience member who said that "it does away with the need for human composers (Gage, 2021)." It is important to take notice of the words "electric brain," "dig the beat," and "does away." These words display a combination of fear and distrust for technology doing what humans have done solely until this point. People acknowledged what artificial intelligence was capable of but were resistant to its abilities.

With the information provided with the earliest stages of artificial intelligence and music, we can gather that the general public was not very fond of this breakthrough in technology. The people who went to the concert could tell that the music was not composed by a person and validly had concerns for replacement. As stated in the conceptual framework according to Thomas Hughes, the relationship between society and technology always starts with a social determinism model which claims that society itself controls how technology is used and developed (Markman, 2011). According to a paper on social influence and technology by Donald

MacKenzie and Judy Wajcman, humans are responsible for "judging whether a technology 'works' (MacKenzie & Wajcman, 1999)" in regards to accepting it into the modern culture. The most important word to acknowledge is "judging." This means that humans serve as the final say for technology and how it integrates into society. With this in mind in regards to the Illiac Suite, the people experienced the artificial intelligence-directed pieces and had their reactions, but there was no significant change in the people's lives in terms of the technology. At this point, the concert is the only recorded case of artificial intelligence music and the public interacting and people deem the technology not worthy of integrating into society.

Hiller published a book on his research called "Experimental Music: Composition with an Electronic Computer" in 1959 which was met with continued great skepticism from the general public. The people's thoughts consisted of whether a computer "can create music of lasting value or is an intriguing sidelight on the fascinating and fast-growing science of automation (Gage, 2021)."In this phrase, it is important to note the words "intriguing sidelight" and "lasting value." These terms relate to whether this type of music had any lasting value in the public eye. Therefore, it can be concluded that the public evaluated the technology and deemed it incomparable and not worthwhile in terms of music, which further supports the fact that they were not influenced by the specific technology at this time.

Revolution of Artificial Intelligence and Rap Music

To analyze the technological momentum accurately and further develop my claim there must be a discussion of how artificial intelligence evolved and how the sphere of influence evolved. Around the 2000s artificial intelligence generation tools like Google AI, AIVA, and Google Magenta began to emerge for public use, and it was possible to make rap instrumentals using this software (Tigre Moura, 2023). Further in the 2010s, more advanced artificial

intelligence tools like Rap Maker and Jukebox became available and were able to create beats, suggest rhymes, and inspire freestyles (Nieuwenhuijen, 2023). Finally, in 2017, an online tool named DeepBeat was created which allowed users to generate rap lyrics using machine-learning techniques from already existing rap lyrics. The results of an experiment using DeepBeat resulted in a prediction model that could identify the next true rap line with an accuracy of 17% which was more than fifty times more likely than random. The results also showed that in terms of quantitative rhyme density, the technology outperformed human rappers by 21% (Malmi et al., 2016).

As shown, the advancement of technology in all fields also saw the advancement of artificial intelligence technology. Programs that allow one to generate new songs and instrumentals in minutes emerged and even programs that created lyrics for users were created. As stated earlier in the background, one of the core aspects of rap music itself is the ability to be authentic in either the instrumental process, lyrics, or performance. Being a competitive genre of music, artists would pride themselves on being the best rapper which was understood to involve doing crucial parts of the art craft theirself. According to the paper on the relationship between technology, society, and influence by Hamilton Viorel Niculsescu, technology has the "power to structure or restructure how human beings pursue their activities (Niculsescu, 2016)" as a form of influence. With this sentence, if one focuses on the words "restructure" and "pursue their activities" it can be known that for humans to be influenced they must change how they previously went about an activity in life. This directly correlates with the art form of rapping as people have changed and restructured how they would like to pursue this art form by using artificial intelligence as a shortcut in certain processes. Even popular artists and music have started to adopt this trend, with rappers like "Lil Uzi Vert" creating songs "dominated by not

only AI-informed music production and streaming platforms but AI artistry itself (Phillips, 2021).” With the words “AI-informed music” it can be seen that music itself now has a subset of it where it is directly influenced by artificial intelligence. With these examples, the sphere of influence at this point can be proven to have grown since artificial intelligence was coined as a term.

At this point, I have claimed that artificial intelligence is influencing rap music and in turn, influencing people themselves. However, some may argue that this is a good thing due to artificial intelligence providing ease to creating rap music with software and other techniques. My counterpoint to this mindset stems back to the origins of rap music itself. As stated in the background, rap music has always been prided on its competitive aspect to be the best. In addition, according to a paper by Melbourne S. Cummings & Abhik Roy on the manifestations of Afrocentricity in rap music, “particular rap songs reveal the rhetorical dimensions of Afrocentricity…rap artists often identify their concerns with African American history and traditions while, at the same time, emphasizing the importance of their own immediate experiences (Cummings & Roy, 2010).” If one identifies the key words “history,” “traditions,” it can be displayed how culturally important rap music is to African American people and their traditions. With this in mind, changing these traditions with technology is culturally insensitive and shifts the focus away from that personal experience that so many rap songs are based on. This act is a great disrespect to rappers who take the art craft as seriously as its roots and is also disrespectful to African American culture itself.

The First Artificial Intelligence Rapper

When the timeline fast forwards to around 2020 there have been many significant changes and improvements to artificial intelligence technology. In addition, a new phenomenon

known as virtual characters began to emerge. Virtual characters are fictional characters with a persona created by humans and they are meant to attract a fanbase similar to actual music artists. These virtual characters, while new to the United States, had existed for years. Examples of this phenomenon include the Japanese Vocaloid and virtual star Hatsune Mike, a hologram performance of the deceased artist Tupac Shakur, and a concert on the popular video game Fortnite by superstar Travis Scott (Alexander & Zhao, 2024).

With the combination of virtual character technology with the deep learning techniques explained earlier, the first artificial intelligence rapper was created with the name "FN Meka." This artificial intelligence rapper was created by Anthony Martini and Brandon Le with a virtual persona meant to imitate other popular rappers and deep learning-generated lyrics. The voice of the rapper was rapped by an anonymous person who played into the character. This artificial intelligence rapper FN Meka signed to the music label Capitol Records and gained over ten million followers on TikTok. Eventually, due to public backlash in perpetuating African American stereotypes with the virtual character, the character was fired from the music label, and the FN Meka project was shut down by Anthony Martini (Alexander & Zhao, 2024).

This interesting phenomenon is unlike anything seen up to this point in history. Previously, artists had used artificial intelligence but never before had an artist had their whole basis be on using the technology. In terms of how this phenomenon relates to the technological momentum framework, the sphere of influence has continually increased and comes from the concept of the virtual character itself. A paper discussing the rise and fall of FN Meka by Andrae Alexander and Ziyin Zhao has tracked the reasons for the influential nature of the technology. According to the paper, there was a study on audience retention with virtual characters, and the results of the study "propounds the idea that humans unquestionably apply the same social rules,

e.g., politeness, ethnic and gender stereotypes, and effects of flattery, to computers as they would a human…Adding to the knowledge of consumer behavior, research has shown that most consumers do not care if the entity is human or not (Alexander & Zhao, 2024).” It is important to highlight the keywords “same social rules” and “most consumers.” Based on these words, we know that most of the people who partake in watching virtual characters do not care that the people they are interacting with are not real and treat them with the same social cues that they would with a real person. According to the same paper, “over 10 million followers on TikTok in August of 2022 (Alexander & Zhao, 2024).” It is important to highlight the number 10 million as a very large number of people. The concept of an influencer is a recent phenomenon having to do with social media. According to a paper on influencer marketing by Francisco J. Martinez-Lopez, influencer marketing is “defined as the use of influential opinion leaders (influencers), celebrity or non-celebrity, with many followers on social platforms, to foster positive attitudinal and behavioral responses in their followers (consumers) regarding the brand’s interests (Martinez-Lopez, 2023).” The words “influential,” “many followers,” and “behavioral responses” are used to drive the point that characters whether real or virtual can provide more influence on their follower’s behaviors to their large amount of followers. Therefore, due to FN Meka serving as a celebrity influencer persona with millions of followers, it is directly influencing people to serve the creator’s interests. This circles back to the technological momentum framework as it can be seen that artificial intelligence’s sphere of influence has grown to proportions that had never been done before.

The artificial intelligence song “Heart on My Sleeve”

Finally, we transition to the modern day with the case study of the song “Heart on My Sleeve.” As described in the introduction the song Heart on My Sleeve was created by the

TikTok user “ghostwriter997” and using machine learning algorithms the song has vocals that mimic international superstars “Drake” and “The Weeknd.” Using trained models on both artists' vocals, the user was able to layer their vocals on his own and replicate the musical style to an accurate degree. It was also mentioned in the introduction that this song managed to gain 600,000 streams on Spotify, 275,000 views on YouTube, fifteen million streams on TikTok, and even 6.9 million views on an unofficial Twitter upload of the song. According to a paper on music and popularity, “Popularity of a song can be measured as its total sales or exposure to the public and is often summarized in a music chart. (Lee & Lee, 2023)” The keyword “popularity” can be directly linked to social influence. People or objects that are popular can hold more social influence and power over people due to changes in behavior being linked to what people gravitate towards (Cillessen et al., 2011). With this in mind, the very large amount of streams that the song “Heart on My Sleeve” was able to accumulate on not just one but multiple platforms only multiplied the amount of influence that the song holds.

The song has even more layers in terms of influence and why the song got so popular in the first place. With the machine techniques described in the background section, the ability to use a large variety of vocal samples of public figures allows an algorithm to be trained in the voice tone, mannerisms, and more when replicating the voice of the artist. Therefore, by replicating superstars “The Weeknd” and “Drake” the technology can copy the artists and sound almost exactly like them. These two artists are some of the most popular artists in the world with “The Weeknd” having 112.85 million listeners on Spotify and “Drake” having 81.14 million followers on Spotify (Spotify, 2024). This makes them the artists with the most monthly listeners and the third most monthly listeners respectively (Spotify, 2024).

With this in mind, one must be aware of the concept of a parasocial relationship that music listeners have with rap artists and music. According to a study on the relationships between music artists and followers by Syrine Bougatef, "Parasocial relationships are virtual bonds between artists and their followers that exist…which happen as a result of parasocial interactions…followers feel an increased level of intimacy, and this level of increased intimacy allows for parasocial interactions to turn into parasocial relationships. (Bougatef, 2021)" Notice the words "virtual bonds," "increased intimacy," and "parasocial relationships." From this information, it can be seen that followers of music artists get attached to the music artists through the avenue of the music itself. The followers form bonds that feel personal to the followers even if they do not know the music artist personally.

From the information gathered, it can be known that "Drake" and "The Weeknd" have some of the largest fan bases on planet Earth. Therefore, their voice is very recognizable to a large variety of people. This concept in combination with machine learning artificial intelligence allows for a song to gain appeal that it wouldn't have otherwise. If the original creator were to leave his original voice, the song wouldn't receive any traction as it would be a normal song. However, by layering the vocals of "Drake" and "The Weeknd" on top of the vocals, the parasocial relationship that listeners of those two artists have with them would attract them to the familiar vocals displayed. This can be combined with the popularity concept that was discussed earlier to show how big the influence has become at this point. There had never been an artificial intelligence song that had gained as much traction and popularity as "Heart on My Sleeve" due to all of the factors listed which makes it the culmination and the current endpoint of the technological momentum framework. Artificial intelligence technology which was once

completely influenced by people has continually evolved and slowly influenced people by replacing parts of the rap music-making process.

CONCLUSION

The song “Heart on My Sleeve” was able to influence people on a wide scale using artificial technology with reach and techniques that had never been achieved before. Using a timeline of influence, it was able to be shown how the evolution of the technology in turn led to the evolution of influence itself. There had been research done on this song before, but the scholarship work mainly consisted of the laws that currently exist what legal implications say for artists, and what rights they have for their vocals being utilized without permission. The sphere and timeline of influence as shown by the technological momentum of artificial intelligence shows a new way of thinking about the ethical implications of the technology in regards to society. This song shows the current peak of this type of technology and how it has managed to connect with people emotionally and manipulate their brains with familiar sounds. As for what the future holds, the song “Heart on My Sleeve” has started a new wave of artificial intelligence rap songs for purposes similar to it. There has been a trend in YouTube videos where using machine learning technology, artists' vocals within a song are replaced by another popular artist (Josan, 2024). This is only the beginning of what is capable as of right now, and this technological momentum will only continue to evolve. The implications of how far technology can influence people are something to think about and be cautious of.

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