Memory Retention and Cultural Resonance: Exploring the Impact of Ephemeral Digital Narratives

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Abstract

The accelerating progress of the digital landscape has led to the rise of consumption of content that is short-lived and fast-paced. In this context, social media platforms such as Instagram and Snapchat have become predominant for their effective use of temporary digital content that lasts for a brief period (usually 24 hours) before disappearing. Ephemerality has become the zeitgeist of the 21st century. In a world where immediacy and instant gratification are highly valued, the pattern of consumption of digital media is also aligned to such quick snippets of information rather than watching a long video. This paradigm shift is redefining how people perceive time and memory in the digital age. This preliminary study analyses the effect of such ephemeral digital narratives on the memory retention of consumers and also explores the implications of such content on cultural and collective memory. A sample of 100 participants ranging from the age of 18-35 years, were exposed to curated ephemeral content from Instagram and Snapchat for seven days. Participants were exposed to different media types, presentation styles, and cognitive demands. Daily surveys examined their memory retention using various question formats. The study examined ten hypotheses using Analysis of Variance (ANOVA) to determine how media type (video, image, both), presentation style (visual, verbal/textual, both), cognitive processing demands (shallow, deep processing), and question format affect recall effectiveness.

Keywords: ephemera, digital narratives, memory, social media, collective memory

1. Introduction

The history and evolution of human communication demonstrate storytelling as a powerful medium for building communities, expressing emotions and preserving cultural practices. Narratives are the foundation for passing down experiences, historical events and moral values across generations. Stories enable "collective sensemaking" (Bietti, 2018) by sharing unique experiences, serving as a repository for collective memory. From cave paintings and carvings to virtual forms, the evolution of storytelling reflects the progress of humanity. From transmitting crucial survival techniques in the cave painting to sharing poetic, heroic and personal stories in oral storytelling, these narratives have captivated social, cultural and cognitive developments. Oral traditions such as folklore, legends and myths were crucial in preserving and propagating culture. As these were predominantly oral, they relied heavily on the memory of the audience and its propagation. These narratives were inherently ephemeral, existing only as long as they were remembered and passed down to others. They were mostly performed at communal gatherings, and the version of the story kept changing with each retelling. Wiessner talks about the role of firelit gatherings in human development, which transmit "the 'big picture' of cultural institutions that generate regularity of behaviour, cooperation, and trust" (2014). He says that the invention of fire marked a huge cultural shift in the evolution of human communication. The control of fire had given man the ability to extend day into night. The stories told at a fireside provided social bonding and passing down of knowledge. Similarly, with the invention of the internet and technology, human beings have surpassed the limitations of time and space. The advent of social media platforms mirrors a digital fireside, where anyone from any part of the world can gather and share their thoughts. The fireside conversation in ancient cultures had a great impact on remembering and understanding others in their external networks (Wiessner, 2014). Similarly, today the glow of mobile

screens fulfils the inherent human need to connect and tell stories. As humans transitioned from oral and written to digital forms of communication, ephemerality has become an intriguing feature associated with these narratives. This transition is very significant in understanding how narratives are consumed, remembered and valued. The ancient oral traditions were highly communal and provided general morals and values to communities, but the digital narratives are highly personal which shows individual perceptions of social, cultural and political matters. The ephemeral digital narratives in platforms like Instagram and Snapchat are designed to capture immediate attention and disappear within a stipulated time, which raises the question of its reception among the users, as human memory is also transient. Traditional approaches to cultural preservation were dependent on the longevity and consistency of the medium used. The transmission of traditions through repeated oral storytelling or the preservation of physical artefacts and written records, withstand the tests of time. The contemporary approach to cultural preservation leverages archives, virtual museums and exhibitions, online libraries, NFTs, Augmented and Virtual Reality, Geotags, etc. Through these techniques the cultural heritage is not only passed down to generations but also made accessible worldwide, increasing cultural awareness and inclusivity. These advancements also redefine how cultural and collective memory are shaped and perceived. On the other hand, the ephemeral digital narratives, due to their short-lived nature might contribute to a fragmented cultural and collective memory. This study attempts to identify the memory retention of ephemeral digital narratives on its consumers. Investigating the retention of such ephemeral digital narratives could provide potential insights into its long-term impact on the cultural and collective memory of the users.

The concept of 'ephemera' is rooted in the fleeting quality of certain encounters, interactions and experiences, which has evolved from the physical to digital and virtual realms. In the 18th century, the Greek term *ephēmeros* or ephemera gained traction, it meant something 'lasting only a day'. The short-lived interest in something has been a longstanding aspect of human experiences and expression, for example, pamphlets, tickets, brochures, advertisements and other items specifically created and designed only for temporary use became popular examples of ephemera. The innate urge to consume things that are quickly perishable reflects humans' desire for immediacy and novelty. An increase in fast-fashion trends, limited-time offers, and instant foods exemplify an inclination towards temporary and immediate gratification. As Guyard points out "We are 'wired up' for immediate reward" (Guyard et al., 2018), explains the psychological foundation behind the preference for such short-lived and fast-paced things. This preference also gave rise to the demand for such temporarily accessible products, even influencing sectors such as art and entertainment. There are features in almost every app to send messages that can be viewed only once. This also has an impact on personal experiences and social interactions. The excitement and instant reward from ephemera can be fleeting and often overshadow the importance of sustainability. With the emergence of digital media and social media, the concept of ephemera has been reimagined by social media platforms such as Instagram and Snapchat. The platforms provide the users with an option to post their content that is set to vanish within 24 hours. This transition to ephemeral digital narratives is a significant indicator of how information is consumed and remembered by people. Bayer et al. (2016) noted that these platforms not only alter communication patterns but also affect the nature of memory and the retention of knowledge. With the increase of such content in the digital realm, it is crucial to study and comprehend the influence of ephemeral narratives on human memory retention and cognitive processing. The objective of this research is to get an exploratory understanding of the effects of various media kinds and presentation styles on the content and its impact on memory retention. This study examines not just the ability to retain information immediately, but also the impact of that information on long-term memory and collective memory. In an era characterized by a surplus of digital content and a significant decrease in attention spans (Firth et al., 2020), this study is relevant in bringing out the effect it has on memory. This study attempts to determine whether the ephemeral nature of these contents reduces or improves the ability to remember them. The critical question is whether the mere quality of the content that it will vanish, prompt users to pay more attention or create a more passive kind of consumption among the users. This research has the potential to significantly impact educators, marketers, and app developers since they want to attract and maintain the shortening attention span of their target audiences. The study also attempts to provide insights into the dynamics of memory retention in digital media and analyses how it contributes to a passive consumption pattern that might undermine long-term memory and cultural preservation.

This research employs a mixed approach, combining a conceptual framework with empirical data collected through a 7-day survey. The findings of this research are significant to understanding how digital evolution affects memory which in turn could potentially impact collective memory and cultural memory. The study begins with the existing literature relevant to the theoretical underpinnings and cognitive impact of ephemeral digital narratives. The conceptual framework in the next section provides an outline of the theoretical constructs and the connections between permanent posts, ephemeral stories and their potential cognitive and cultural impact. The methods used to gather and analyse data are explained in the 'methodology' section. The 'findings and discussion' section presents a thorough analysis of the obtained results and their inferences. Aligning with the conceptual framework, the broader implications of the results in impacting collective and cultural memory is also discussed in this section along with the limitations of the study and the scope for further research.

2. Literature Review

2.1 Memory and Ephemeral Narratives

Chun (2008) highlights that the transient nature of internet could create a "digital dark age". He also talks about the paradox where abundance of digital media might result in cultural memory loss, and "without cultural artifacts, civilization has no memory and no mechanism to learn from its successes and failures" (Chun, 2008). This idea that a civilization needs stable cultural artifacts, opens up a new avenue for studying the impact of ephemeral narratives on cultural memory. As Bainotti et al., (2020) rightly points out "ephemerality has become a central component of many social media platforms, such as 4Chan, Snapchat and Instagram". However, there exists a complex interaction between the ephemeral nature of content and the ability to remember it. A recent study indicates a paradox in which memories shared on temporary platforms such as Snapchat and Instagram are remembered more effectively due to the platforms' fleeting character. This phenomenon is comparable to the way memories are recalled during in-person interactions (Johnson & Morley, 2021). According to Campbell et al. (2021), the consumers of social media platforms exhibit "superior recall" due to their awareness of the temporary nature of the content. This is because they put more cognitive effort into digesting the content when they understand that it will not be available later. The results challenge the concept of the "Google Effect", which suggests that memory is limited for content that is believed to be easily accessible via digital means (Sparrow et al., 2011).

2.2 User Behaviour and Changing Patterns of Digital Interactions

Narratives on Facebook and posts on Instagram (that are permanent and vanish only when deleted by the user) make use of likes, comments, tags, and shares which makes it a co-creating of the user and the viewer (Murphy-Hollies & Bortolotti, 2022). The difference between ephemeral and normal content highlights the specific storytelling possibilities created by each platform, recognizing the intricate process of continual storytelling by millions of people across several platforms (Mandel, 2019). Stories act as tools for people to comprehend their daily experiences within a wider context (Mandel, 2019). The need to translate real-life experiences into consumable formats in social media has increased after the emergence and popularisation of such ephemeral content. According to Cardell, Douglas, and Maguire (2017), ephemeral stories and snaps provide a sense of independence from the scrutiny of other regular content posted. However, the continual urge to participate and the fear of missing out (FOMO) emphasize the contrasting nature of these platforms. The ephemeral nature of the content on social media and its consumption has brought about notable changes in user behaviour. The lesser need to edit has encouraged users to be more authentic and spontaneous, as they view those snaps and stories to be a form of self-expression (Villaespesa & Wowkowych, 2020). Rettberg (2018) suggests that Snapchat's intimate setting, combined with its ephemerality, allows it to be a visual storytelling platform parallel to verbal storytelling. This sentiment is echoed by users, stating, "I don't have to think about any captions, tag and hashtag and all that. It's easier for me to just post it right away and not worry about any other long-term impact" (Villaespesa & Wowkowych, 2020).

The prevalence of ephemeral digital narratives has brought about a change in how information is created, comprehended and consumed by the users. As Bayer et al., (2016) aptly point out, these platforms enable "sharing mundane experiences with close ties and reduced self-presentational concerns," capturing moments in their natural, unfiltered essence. Villaespesa and Wowkowych (2020) further highlight that the ephemeral quality of such content encourages "minimal curation and editing", giving way to a digital experience that requires minimal effort to update their daily day events and experiences. The temporary presence of content on these platforms highlights the spontaneity of the digital experience. The feeling of immediacy and urgency has both positive and negative consequences. According to Cardell, Douglas, and Maguire (2017), one advantage is that it provides a feeling of liberation from constant scrutiny because as the content disappears in a stipulated time, the users tend to care less, than the posts that stay on their wall forever. However, it also creates a constant need to interact with the material before it disappears, making the users visit the app multiple times a day, which in turn influences the algorithm.

2.3 Ephemerality and Everyday Politics

Crane (2015) describes ephemeral quality of certain media as "a conjectural space, a space of projective anticipation that is necessarily fleeting". Before the advent of internet there were popular ephemera like graffiti, billboards and banners (Guillaume and Huysmans, 2019), which served as mediums of protest and political communication. Due to their presence in everyday spaces, un-conventional form and fleeting nature they could be "dismissed as either irrelevant or insignificant" (Guillaume and Huysmans, 2019). However, they captured the cultural and political essence of the day, contributing to the social discourse and encouraging public engagement. Similarly, digital ephemera holds the same potential to facilitate discussions on everyday realities and current issues. Bainotti et al., (2020) also observes that "scarce attention has been paid so far to Instagram and its Stories feature, characterised not only by ephemerality but also by multimodality and everydayness". Even though their presence is fleeting, they play a substantial role in

shaping and reflecting "everydayness" (Bainotti et al., 2020) of life and society at large. Ephemeral media is also used to influence public opinion, Towner and Muñoz (2024) analysed how "Gubernatorial candidates employ the Instagram Story feature in campaigning". Their findings revealed that "over half of the candidates employed the Story feature over the two-week period" (Towner and Muñoz, 2024), which shows the growing preference for ephemeral content among politicians.

2.4 Ephemeral Narratives and Identity

Handyside and Ringrose (2017) analysed the influence of Snapchat on the formation of memory, sexuality and identity in young people. They studied how these ephemeral digital platforms can reinforce Bergerson's concept that "memory is a productive force, ensuring that the past is never experienced as it was but as difference" (Handyside and Ringrose, 2017), underlining the dynamic nature of memory mediated by digital platforms. "Digital media images and social media processes like posting, tagging and sending of course interfere into this memory-image selection process in significant ways" (Handyside and Ringrose, 2017), which reiterates the need for this research on the process of memory retention in ephemeral digital narratives. The transience of these digital narratives gives the users "quick exchanges of 'excitement, curiosity, or boredom' that can feel like a 'secret'" (Velez, 2014). Furthermore, they create a new form of digital intimacy, which alters how memory, sexuality, gender and identity are "performed, negotiated and remembered" (Handyside and Ringrose, 2017). With permanent posts, users are more conscious of how they project themselves, but with these ephemeral stories and snaps, they are free from the "fear of leaving an unflattering or incriminating digital footprint" (Douglas, 2018). In fact, the prevalence of such ephemeral media has promoted these platforms as "means for constructing a life narrative" (Douglas, 2018). Cardell et al., (2017) discuss how such ephemeral narratives can serve as memoirs, with the "emergence of sparse or blank public profiles as a kind of reticent self-presentation, with the real action occurring among smaller peer networks in the more private spaces of mobile apps". Ephemeral narratives have redefined personal and digital identity facilitating "a self that is not responsible to an archive of past selves" (Cardell et al., 2017). On the other hand, these stories and snap also create social anxiety in its users that they might be "excluded from an online post or posts not getting the peer feedback expected, which can have effects on self-esteem and self-descriptions that are more profound and lasting." (Radmore, 2023)

2.5 Impact of Ephemeral narratives on Journalism and Business

Karlsson (2018) talks about the "increasingly unpredictable nature of journalism in the digital era". He uses the term "liquid" to describe the ephemeral nature of the digital content, as they keep changing and adapting to new contexts and audience preference. "As users spend less time watching these stories and their attention is brief, partial, and fragmented" (Vázquez-Herrero et al., 2019). This aspect of ephemeral narratives has made a significant impact in redefining almost all aspect of digitality as well as reality. Various aspects such as "increased user-participation and audience interaction, platform convergence, complex "external" connectivity through hyperlinks, and textual ephemerality" (Karlsson, 2018), which complicates the way in which a piece of information reaches the audience. On the other hand, Vázquez-Herrero (2019) calls this kind of transaction of information through Instagram stories and social media as "ephemeral journalism". The relationship between ephemerality of media, and user interactions has become a "legitimate area of cultural inquiry" (Meyers, 2021). Ephemeral content is also used by various small business owners "to increase sales, promote limited-time specials, attract crowds, and attract the attention of their target audience" (Dange et al., 2021). As (Chen and Cheung, 2019) rightly points out that "understanding the power of ephemeral content also provides managerial insights for practitioners in the marketplace". Kircova et al., (2020) examined the transformation in social media marketing due to the growing popularity of ephemeral content on social media platforms. As "ephemerality may counterbalance privacy concerns" (Kircova et al., 2020), it becomes a potent area for advertising and promoting. In this evolving digital landscape, the users of social media platforms take dual identities as "interactive producers and consumers of culture" (Kircova et al., 2020), making ephemeral media a crucial interest for consumer behaviour research and marketing techniques.

2.6 Research Challenges and Methodological Considerations

According to Bainotti et al., (2020) "there is a shortage of research about the methods and challenges that concern researching ephemeral digital content". The constant evolution of digital platforms is reshaping the perception of narrative and memory, resulting in an environment of interaction that navigates between the ephemeral and the permanent. This continuous process prompts more investigation into how the ephemeral nature of digital content influences not just individual mental processes but also shared cultural behaviours and collective memory, possibly resulting in a more profound understanding of the societal impact of the digital era. This literature review examines a significant change in the digital paradigm that consistently shapes current social interaction and cultural memory. The significance of this study lies in its potential to explore the impacts of digital content's ephemerality, which could pave the way for future research into the long-term effects of such media consumption patterns on historical consciousness

and collective memory. This could be crucial for ensuring that despite the fleeting nature of much of today's digital content, important cultural and historical knowledge is retained and cherished by future generations.
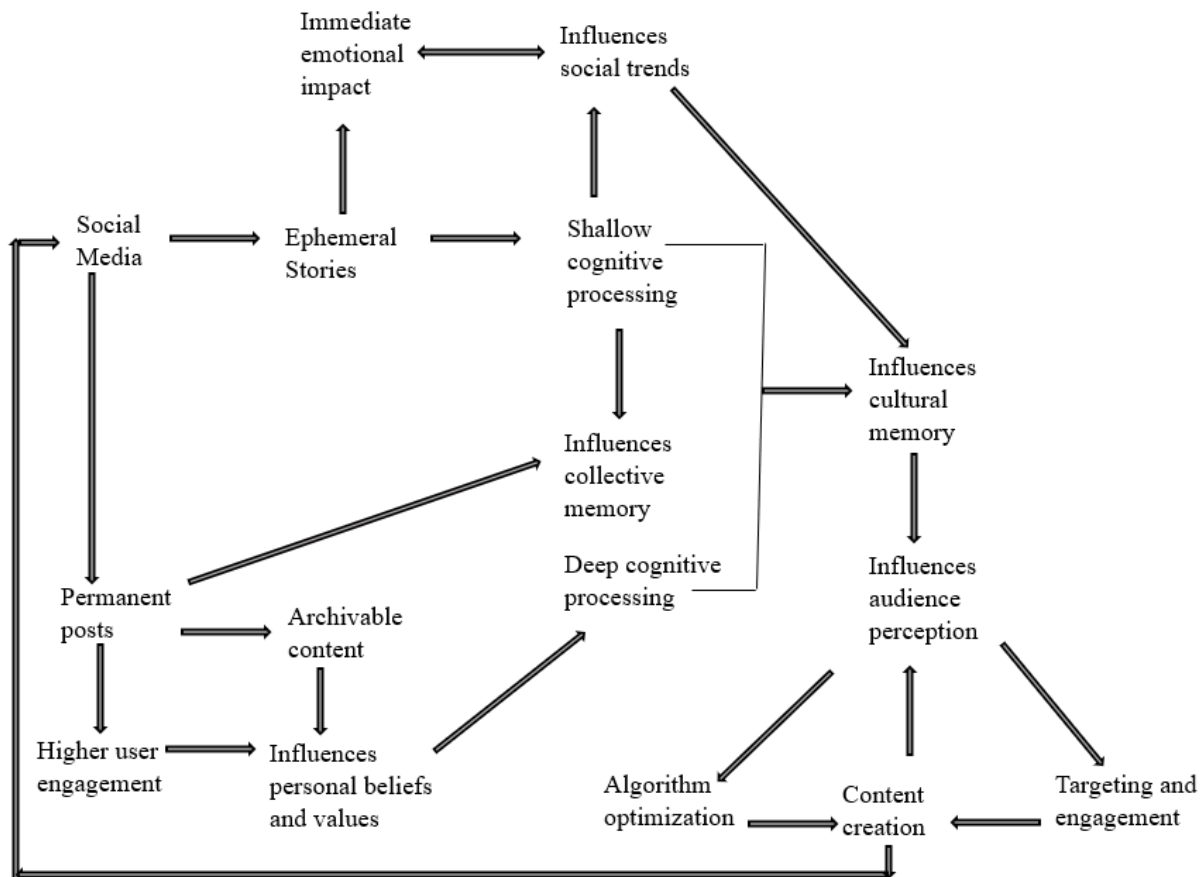
3. Conceptual Framework

Figure 1. Conceptual Framework

Figure. 1 shows the conceptual framework that shows a dynamic interaction between various constructs with a specific focus on ephemeral stories and permanent posts in social media. This conceptual framework aids in understanding the subtle impacts of these two kinds of social media narratives on individual cognitive processing as well as the broader spectrum of collective and cultural memory. This conceptual framework is formulated to explore how ephemeral digital narratives despite their fleeting nature may still leave an impact on individuals as well as on the societal level. It also takes into consideration the ever-evolving digital landscape which influences the user's perception and in turn influenced by the algorithm. The framework starts with social media being split into ephemeral stories and permanent posts. Ephemeral stories are designed to capture the immediate attention of the users and to deliver a strong emotional impact. The bi-directional arrow between *immediate emotional impact* and *influences social trends* shows a reciprocal relationship where the stories can elicit strong emotional reactions among a larger group of people making it a trend. This also underscores the influence of such ephemeral content on public sentiment and the reflection of public sentiment back into the content created. As these stories are visible only for a short period, they may engage the audience only on a surface level, where they quickly interact with the content and possibly forget it. So, the users only engage in *shallow cognitive processing* that only creates a superficial understanding of the content and without giving much thought they follow the viral trends. This level of cognitive processing doesn't encourage detailed encoding of memories rather it focuses on instant engagement and immediate reaction. The viral trends despite being short-lived could potentially influence the cultural memory through the short-term, widespread exposure to numerous similar narratives centered around these trends. This in turn reinforces the trend's themes, emotions, and messages within the collective consciousness of the audience. Although such ephemeral content doesn't demand deep cognitive processing to consume any content, they can still exert their influence and shape the perception of the audience which in turn is reflected in their behaviour both virtual and social.

On the other hand, there are permanent posts, which the users can access as long as the post is not deleted. Unlike ephemeral stories, they remain accessible and can be edited and revisited. As they give more time for the users to process and think about the content, they allow for a deeper engagement. Even old posts can be archived and made available, promoting longevity and easy accessibility. Through hashtags, these posts can be easily searched and grouped. As ephemeral stories cannot accommodate videos larger than 15 seconds or 30 seconds, larger videos are posted as permanent posts. So, the duration of the content allows for deep cognitive processing compared to ephemeral stories that are much shorter and simpler. The major advantages of the permanent posts are the user interactions and the options to like, comment, share and save the content, creating a sense of community. Even though the ephemeral stories also have options to interact (like, comment and react) they are superficial and don't have an accessible thread of interaction like the permanent posts. These interactions not only build a network of shared interests but also influence personal beliefs and values. The users are not only consuming the content but actively becoming co-creators of the content by interpreting and relating it with their personal, social and cultural contexts. Their lasting online presence and active engagement encourage a deep cognitive process, fostering a more enduring memory and creating a lasting impact. While ephemeral stories add to the cultural memory by capturing the trends, moods and momentum of various topics, permanent posts aid in the continuation of dialogue and preserve information. Both types of content influence collective and cultural memory in unique ways depending on the way they are consumed. Although the individual stories are fleeting and short-lived, with repeated exposure can form an impactful layer in shaping short-term cultural trends, fashion trends, consumer behaviour and social norms. With their enduring quality, permanent posts act as a catalyst for ongoing discussions and exchange of shared experiences. Over the course of time, these interactions and communities become an influential part of digital culture and social standards. So, both ephemeral and permanent content on social media influences audience perception, by resonating with the users on different cognitive levels. Social media algorithms are specifically designed to cater to user preferences and engagement. Through this strategy, the content they consume aligns with the similar content they prefer and interact with. For instance, if a user engages with specific content (fashion/food/lifestyle), the algorithm will give high priority to showing them similar content. This could offer insights to content creators, who create content based on the demands of the audience as well as the platform's algorithm. From the responses of the audience based on their content preferences, content creators potentially target their future content strategies to enhance engagement and relevance. This strategic targeting may result in a self-reinforcing cycle where content that connects with the audience leads to more interactions and engagement, which then influences the content creation process, ensuring that the audience remains engaged and entertained. The feedback loop from content creation to social media shows that this is a perpetual dynamic interplay of producing, reacting to and refining content that closely aligns with cultural and societal trends. This process could iterate certain behaviours, ideologies and beliefs into the ever-evolving cultural memory. This shows that social media platforms are not passive repositories of information and entertainment but have an active influence in shaping cultural and collective memories. This conceptual framework provides a fundamental understanding of the psychological and socio-cultural dynamics in digital media interactions

4. Method

With the insights from the conceptual framework, this study aims to find the specific impact of ephemeral content on memory retention. This study adopts a quantitative approach using a structured survey to empirically evaluate the influence of various media types and presentation styles on memory recall after participants are exposed to curated ephemeral content.

A total of 100 participants, aged between 18 to 35 years were exposed to various forms of curated ephemeral content spanning over 7 days. After the participants viewed the curated content for the day, structured surveys were sent to monitor participants' memory retention. The survey incorporated questions addressing the five main variables of the study.

Variables Tested:

1. Media type (e.g., video, image, both)
2. Question format (yes/no, multiple choice, descriptive, true/false, delayed recall, inferential questions)
3. Presentation styles (visual, verbal/textual, both)
4. Depth of cognitive processing (shallow versus deep)
5. Memory retention – fundamental variable of the study

Each of these variables pertains to a certain aspect of how ephemeral narratives are consumed and processed. Ephemeral content uses different types of media, this variable is used to test which type produces higher memory retention. As this quantitative study uses survey questions to evaluate memory retention, the format of the question can

influence whether memory retention is recall-based, recognition-based, analytical or inferential. Using different question formats can also help in finding the impact of ephemeral content across various cognitive levels. The effect of how different combinations of visual and textual information can affect memory is measured through the variable – presentation styles. Evaluating the memory retention of participants is crucial to understanding the long-term effect of how cultural trends and societal norms are established and shaped through ephemeral content on social media.

Over seven consecutive days, the participant's ability to remember information from the ephemeral content is tested. Their delayed memory is also tested by asking them questions about the content they were shown in the previous days. Analysis of Variance (ANOVA) was used as the primary statistical test, due to the testing of multiple variables. Based on the 5 variables, 10 hypotheses were formulated. Each hypothesis and variable targets a specific aspect of how information is presented and processed on social media platforms- Instagram and Snapchat.Figure 2. maps the interconnection between the variables and how it leads to the formulation of hypotheses in Table 1. Following the conceptual analysis, the quantitative analysis focuses on the immediate cognitive reaction to ephemeral digital narratives. After the participants were exposed to the content for the day, they were given a set of questions to test their memory retention. The questions set for the everyday survey are related to the mechanics of the conceptual framework. For instance, when the participants were asked to "Describe any one landscape or scenery that you saw in the content" on day 1, they just gave one-word answers like waterfalls, sunset, and meadows, instead of describing the scenery. As ephemeral content operates on shallow cognitive processing, they were able to recognise but not fully encode the content. And to test their immediate emotional response questions like "There were some pictures of meme templates, can you describe at least two." Their answers showed to which content they were able to relate immediately. And in the post-test around 61% of the participants positively responded that their ability to remember was influenced by their emotional responses to content. When certain content that could challenge its authenticity is shown, the participants are questioned to see whether their perception can help them choose the right answer. For example, when asked whether the content was "real or staged" and "AI-generated or real" can show whether they can spot the subtle cues in the content that is manipulated. There was also content that had ad/ promotional elements, and questions were asked to check whether the participants could spot the difference. This could influence how the audience interprets the credibility and authenticity of the content, shaping cultural attitudes towards media. To check the influence of the algorithm, the participants were shown sequential segments of a short comic story for seven days. Only 42% of the participants were able to remember the bits of the story, this could indicate the level of engagement with the content influences memory retention. This comprehensive approach and the data collected over 7 days, provide crucial insights into how ephemeral digital content affects memory retention and cognitive processing.

Table 1. Hypotheses

| Hypothesis	Hypothesis Description
H1	Question format influences memory retention.
H2	Presentation style influences question format
H3	Media type influences question format
H4	Media type influences presentation style.
H5	Media type influences memory retention.
H6	Presentation style influences memory retention
H7	Cognitive processing (deep/shallow processing) influences memory retention
H8	Question format influences cognitive processing
H9	Presentation style influences cognitive processing
H10	Media type influences cognitive processing
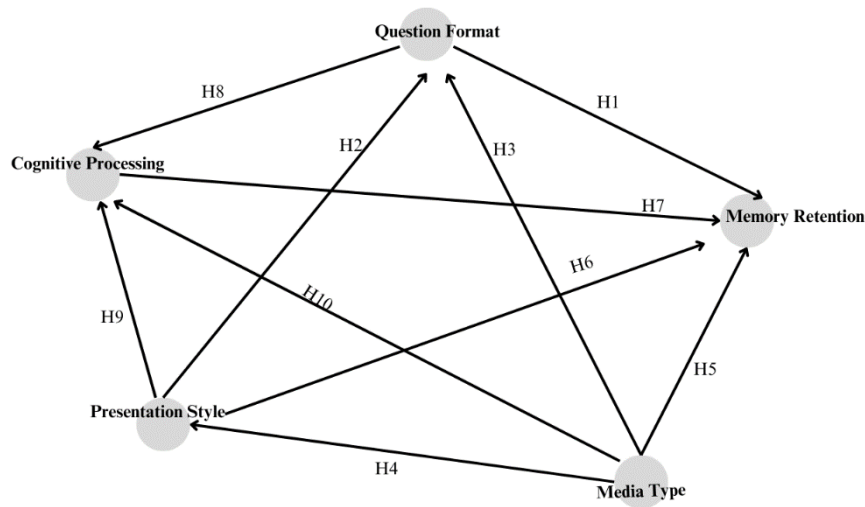
Figure 2. Mapping of Interconnections Between Variables and Formulation of the Hypotheses
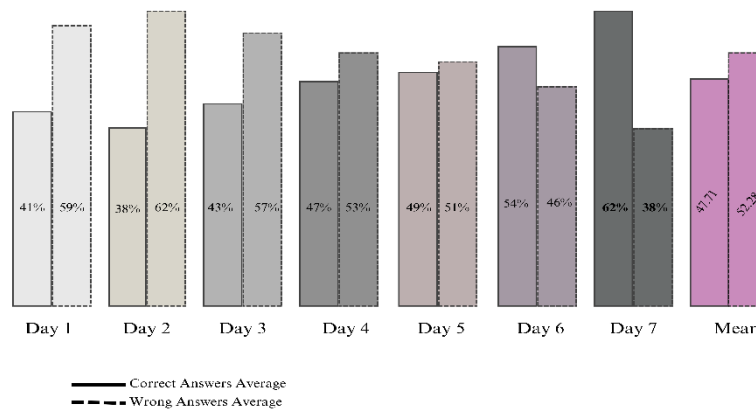
5. Results

Figure 3. Comparison of Overall Correct and Wrong Answers Over a 7-Day Period

The memory retention of the participants tested through daily surveys, revealed interesting findings. Figure 3. shows a comparison of daily analysis of right and wrong answers for 7 consecutive days and it also shows the overall mean for right and wrong answers. The initial observation is that day 7 has the highest correct answer count, showing participants became more familiar with the type of content shown and their memory retention has improved (H5). This may be attributed to several reasons, such as the familiarity with repeated exposure to the activity or an enhanced skill in managing both the question format (H8) and the content type (H10). It might also indicate a combined impact of the cognitive strategies formed during the week as participants adjust to the requirements of the survey (H7). The slight dip in right answers on Day 2 can be attributed to the introduction of delayed recall questions, combined with a slightly higher number of both inferential and descriptive questions compared to other days. This increased complexity and the unexpectedness of the question format might have influenced the retention, resulting in only 38% accuracy (H1). However, as the week progressed, participants adapted to these challenges, leading to improved accuracy rates. The middle of the week, comprising Days 4 through 6, displayed accuracy levels that were around the weekly average, indicating consistent response patterns and how participants are getting used to the format of questions and accessing the type of cognitive effort they need to put to get the answers right (H8). The overall mean indicates that there is a very slight difference between the right and wrong answers.

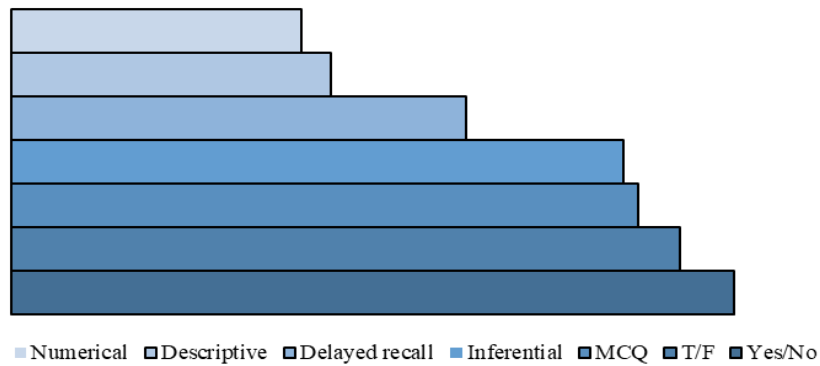Numerical Descriptive Delayed recall Inferential MCQ T/F Yes/No

Figure 4. Question Formats and Their Correct Answers Average

From Figure 4. Multiple Choice Questions (MCQs) appear to be the most preferable format for many respondents, possibly due to familiarity or the ability to guess from available options (H1). Descriptive and inferential questions seem to pose a higher level of challenge, due to the requirement of deeper cognitive processing (H8). Even in the post-survey, over 64% of participants responded that descriptive questions were the hardest to answer. Binary choices like T/F and Yes/No, even though they appear simple have comparatively the highest number of correct answers, indicating that the nature of the questions or the way they're framed could be tricky for respondents and it also depends on the nature of the content (H2, H3). Inferential questions, which demand higher-order thinking to draw conclusions, show moderate performance (H7). Descriptive and Numerical questions show a lower count of correct answers, indicating that these questions require a higher cognitive load. These differences indicate that the variables- memory retention and question format influence each other. (H1)

Day 1 Day 2 Day 3 Day 4
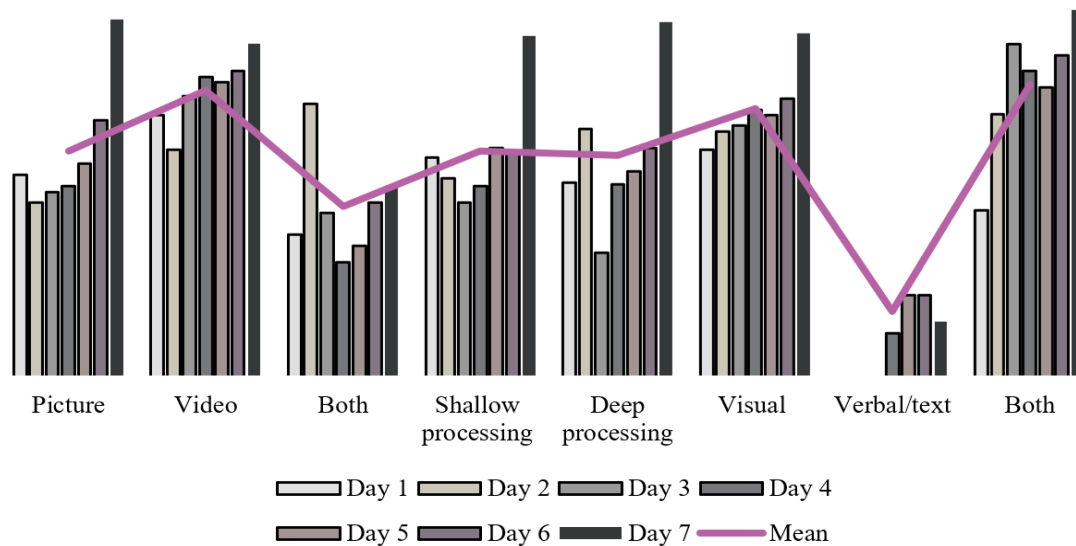Day 5 Day 6 Day 7 Mean

Figure 5. Content Delivery Modalities and Their Correct Answers Average

Figure 5. presents daily performance across various media types, levels of cognitive processing, and presentation styles (H4, H5). Videos seem to consistently lead to higher correct answers than pictures or a mix. This could be due to their dynamic, fast-paced and engaging nature. Another reason could be the longer duration of videos which can aid memory retention and understanding of the content (H5). As far as cognitive processing of information is concerned, questions that require less cognitive effort had the highest number of correct answers. It challenges the traditional paradigms of cognitive engagement, suggesting that despite the ephemeral nature, shallow processing has aided memory retention. When participants are faced with a large volume of information in a short span (as is common with digital narratives), they might resort to focusing on standout features or visuals. These elements can sometimes be enough to answer questions accurately (H7). It also reflects that most of the content on social media might also encourage shallow processing (H10). According to Annisette et al., prolonged engagement with social media encourages fast-paced and surface-level thinking. This is further linked to a reduction in cognitive depth with decreased engagement in reflective and deep thought (Annisette, 2017). As far as the presentation style of the content is concerned, the combination of visual and verbal/textual information generally leads to higher correct answers across the days (H6, H9). This aligns with the multimedia principle where dual coding (Sadoski, 2013) of information can enhance learning and recall.

Table 2. Hypothesis Testing with P Value

Hypothesis	Source	DF	Sum of Square	Mean Square	F Statistic	P-value (<0.05)	Decision
H1- Question Format influences Memory Retention.	Groups (between groups)	6	6139.1714	1023.1952	2.6153	0.03249	Reject H_0
	Error (within groups)	37	14475.5559	391.2312			Therefore, Question format
	Total	43	20614.7273	479.4123			affects memory retention
H2- Presentation Style influences Question Format	Groups (between groups)	3	5782.7084	1927.5695	18.1281	0.000003	Reject H_0
	Error (within groups)	22	2339.2683	106.3304			Therefore, Presentation Style
	Total	25	8121.9767	324.8791			affects Question Format
H3- Media Type influences Question Format	Groups (between groups)	3	1595.5458	531.8486	4.5693	0.01142	Reject H_0
	Error (within groups)	24	2793.4964	116.3957			Therefore, Media Type affects
	Total	27	4389.0422	162.5571			Question Format
H4- Media Type influences Presentation Style.	Groups (between groups)	5	6477.8036	1295.5607	15.4555	0.00000007	Reject H_0
	Error (within groups)	33	2766.2288	83.8251			Therefore, Media Type affects
	Total	38	9244.0325	243.264			Presentation style
H5- Media Type influences Memory Retention.	Groups (between groups)	2	1588.921	794.4605	8.8809	0.002073	Reject H_0
	Error (within groups)	18	1610.2285	89.4571			Therefore, Media Type affects
	Total	20	3199.1494	159.9575			Memory Retention
H6- Presentation Style influences memory retention	Groups (between groups)	2	4880.2025	2440.1012	31.6622	0.000004	Reject H_0
	Error (within groups)	15	1156.0004	77.0667			Therefore, Presentation style
	Total	17	6036.2028	355.0708			affects memory retention
H7- Cognitive processing influences memory retention	Groups (between groups)	7	7228.7808	1032.683	2.4741	0.03861	Reject H_0
	Error (within groups)	31	12939.1166	417.3909			Therefore, Cognitive
	Total	38	20167.8975	530.7341			processing affects memory retention
H8- Question format influences cognitive processing	Groups (between groups)	8	7230.3894	903.7987	2.3679	0.03615	Reject H_0
	Error (within groups)	37	14122.3846	381.6861			Therefore, Question Format
	Total	45	21352.774	474.5061			affects Cognitive processing
H9- Presentation style influences Cognitive processing	Groups (between groups)	9	11236.9114	1248.5457	3.7672	0.00166	Reject H_0
	Error (within groups)	40	13256.9299	331.4232			Therefore, Presentation style
	Total	49	24493.8413	499.8743			affects Cognitive processing
H10- Media type influences Cognitive processing	Groups (between groups)	9	7794.9108	866.1012	2.6608	0.01507	Reject H_0
	Error (within groups)	43	13996.488	325.4997			Therefore, Media type affects
	Total	52	21791.3988	419.0654			Cognitive processing

Table 2. shows the testing of hypotheses 1- 10, using ANOVA. Based on the test and the obtained p-value, for almost all hypotheses the p-value is < 0.05, so the null hypothesis is rejected for all, indicating that there is a significant relation between the variables tested. Thus, all hypotheses are valid and it affirms that factors such as question format, media type, presentation style, and cognitive processing are all integral to how memory retention is influenced within the context of ephemeral digital content. But in Table 2, the p values of H7 and H8 are very close to the margin (0.03) which requires more attention. This could suggest that the prevalence of shallow processing in such ephemeral narratives aligns with the concept of "compression" detailed by Karam & Eissa (2023). They discuss how compression in micronarratives especially digital narratives doesn't simply shrink content, but rather efficiently packs complex information into a more compact and manageable form. This could explain the better memory retention observed in shallow processing (H7). When the information is succinct and focused, it may enhance memory retention by reducing cognitive load and highlighting the important aspect of the content that appeals to short-term memory. But it also requires the audience to unpack and interpret dense information quickly. The relationship between question format and

cognitive processing in the context of compressed information is complex (H8). Shallow Processing is best suitable for compressed content where key facts or ideas need to be recalled without deep understanding. MCQs and True/False formats support this by enhancing recognition over recall. This could potentially become a challenge as the users might not have enough context to fully engage in deep processing for content that demands critical analysis. While participants have shown to adapt to the formats, the adaptation might not be the same. This adaptation process could be influenced by several factors including the frequency of exposure to various question types, the complexity of the content, and individual differences in cognitive capacity and learning styles. To address this limitation, it would be suggested to conduct the study with different sample sizes with diverse educational and social backgrounds. Additionally, to gain more insights from the user about their experience, it would be beneficial to use qualitative study.

6. Discussion

In the pilot survey, around 60% of the participants agreed that they checked their social media app multiple times a day. However, around 87% of the participants reported that they would not intentionally revisit a story they have already viewed. This behaviour suggests that the ephemeral narratives are consumed only once and then they are often disregarded, which challenges the formation of lasting memories, as frequent exposure is an important factor in retaining memory. 45% of the participants have positively responded that they don't give much thought to snaps and stories that they post because they'll anyway disappear in 24 hours. This attitude significantly influences the quality of the content posted and in turn, influences the memorability of the content. The pilot survey provided insights and set the context for the study, revealing how users interact with ephemeral digital content.

6.1 Contextualising the Hypotheses

6.1.1 Hypothesis 1: Question Format Influences Memory Retention

Even though it is common for users to not remember "content when reading or listening to it only once" (Greving et al., 2018), but according to the "testing effect", answering questions on content proved to improve retention. Greving et al., (2018) studied the influence of question format in such testing and emphasized "the role of cognitive effort during retrieval". It is commonly accepted that "questions that prompt effortful retrieval are likely to elicit stronger testing effects." (Greving et al., 2018), however the study's finding shows that yes/no questions had the highest percentage of correct answers. This could indicate the underlying role of cognitive load in memory retention which could benefit from simple cognitive processing. There is a mutual influence between question format, cognitive processing and memory retention. As far as memory retention in ephemeral narratives is concerned, question formats like yes/no, true or false and MCQs reduce cognitive load as the participants can just choose from one of the options rather than recalling from scratch, which could be the reason for their higher accuracy rate.

6.1.2 Hypothesis 2: Presentation Style Influences Question Format

The presentation style of the content affects how questions were framed and understood. As there are limitations, for instance, text-based content is not as dynamic as a visual content, potentially leading to less comprehensive questions. On the other hand, question on a visual content focuses on user interpretation, testing their evaluation of visual cues. More inferential questions can be asked for content that has both text and visuals, because there will be a lot of input, requiring the participants to integrate information from different sources and formats. For example, in day-3 survey, a question was asked "In one of the images, there was a discrepancy between the text shown and the picture in it. Explain the discrepancy.". This question emphasizes how a presentation style that combines text and visual can result in inquiries that test participants' capacity to identify and explain inconsistency. The use of mixed media presentation style, which combines images with text, requires the use of an evaluative question format.

6.1.3 Hypothesis 3: Media Type Influences Question Format

Similar to the presentation style, media type also influences question format. Static images direct the attention of the participants towards the spatial details whereas the dynamic nature of videos facilitates more inferential and descriptive questions. Content that has a combination of both, facilitates layered questions that challenges the interpretation and memory retention of the participants. For example, in day-1 survey, there was a question "I think there were AI generated images in the content shown. Yes / No", which shows how static images calls for direct questions yet they can test the interpretation of the participants.

6.1.4 Hypothesis 4: Media Type Influences Presentation Style

The relationship between media type and presentation style is pivotal in shaping how information is conveyed, presented and interpreted. The information density and accessibility of the content are closely associated with presentation style. Even though both variables appear to be similar on the surface level, the differentiation between them is crucial to understand its impact on ephemeral narratives. Media type is the channel through which a content is delivered, whereas presentation style reflects the approach used to present the content within a chosen media type. For

example, in day-3 survey, there was a question "In the interview, actor Tamannaah Bhatia was talking about the entire South film industry but the subtitle said it was about a. Kollywood, b. Tollywood, c. Sandalwood, d. I don't remember. This question shows the media type (video) with subtitle/ text (presentation style). If the content just had an image of the actor with her opinion in a text box, it would have a different reception from the participants. This variation can impact how participants receive and recall the information, highlighting the importance of considering both media type and presentation style when analyzing ephemeral narratives.

6.1.5 Hypothesis 5: Media Type Influences Memory Retention

From the results, videos emerged as the preferable media type that had highest number of correct answers. As videos combine both visual and auditory cues, they communicate more contextual and emotional aspects. According to the multimedia principle (Mayer & Moreno, 2003), the immersive sensory experience of dynamic media such as videos, enhance memory retention. This also aligns with dual coding theory (Paivio, 1986), which posits that information is stored in memory twice, once visually and once auditorily, improving recall and retention. And also, the increasing trend of consuming content in 30 secs or less, has also made "video contents widely preferred over photo content" (Penni, 2017).

6.1.6 Hypothesis 6: Presentation Style Influences Memory Retention

Content with both visual and textual components can make recall of information easier because of the "multiple forms of information input and representation" (Sweller, 2011). This result aligns with Sweller's (2011) theory that "dual-modality presentation…automatically reduce working memory load leading to an advantage". This emphasizes the necessity of incorporating different sensory modalities in content creation to enhance cognitive processing and improve memory retention.

6.1.7 Hypothesis 7: Cognitive Processing Influences Memory Retention

It is true that deep processing yields superior retention (Craik and Lockhart, 1972), however the results indicated higher number of correct answers for shallow processing. Peng et al., (2024) differentiate the process as "deep processing (e.g., conceptual, semantic or associative involvement) triggers a richer and more elaborate memory trace or neural network than shallow coding (e.g., perceptual, structural or phonological analysis)". This shows how ephemeral narratives are only structurally processed, which has a short-term memory retention. Sweller (1988) also talks about how individuals when faced with cognitive load, try to simplify the task. The same can be applied to ephemeral media, where there is a high cognitive load, which prompts the users to only superficially consume the content. Taylor (1981) calls humans as "cognitive misers" because they tend to "spend as little mental energy as possible" (Kool et al., 2010), which could be the reason why users find an easy way to consume the content in very less time, even when bombarded with cognitive overload.

6.1.8 Hypothesis 8: Question Format Influences Cognitive Processing

Cognitive processing of questions in a survey is influenced by "question wording, format, and context" (Schwarz, 1999). After the participants are exposed to the curated ephemeral content, they "interpret the question, retrieve the requested information, evaluate the information for the purposes of reporting it, and finally map his or her answer" (Schaeffer, 2005). As far as ephemeral narratives are concerned, cognitively less demanding question formats such as yes/no, true/false and MCQs showed efficiency than descriptive or inferential question format. This shows that choice-based question format has lessened the cognitive load of the participants, facilitating easier retrieval of information.

6.1.9 Hypothesis 9: Presentation Style Influences Cognitive Processing

Shen and Pritchard (2022) found that "visual and textual signals affect both shallow and deep cognitive engagement". This aligns with the result of this research that mixed presentation style that has both visual and textual presentation style had higher recall rate. Mayer (2001) also believed that usage of multimedia enhances understanding. Ephemeral narratives are mostly accompanied by texts such as captions, hashtags and visual cues such as emoticons, stickers, whether it is an image or a video. As, multimodality is an inherent quality of ephemeral stories and snaps, the participants are likely to perform better with these multimodal type of content because of their frequent consumption of such content.

6.1.10 Hypothesis 10: Media Type Influences Cognitive Processing

The cognitive theory of multimedia learning (Mayer, 2021) posits that "working memory capacity is limited" and it involves three types of cognitive processing: "extraneous, essential, and generative". Images and videos in Instagram or Snapchat tend to involve essential cognitive processing, because of the short display time of the content and the decreased attention span of the users. "The amount of extraneous processing depends on the degree of poor instructional design, such as presenting extraneous verbal or pictorial information" (Mayer, 2024). Sometimes, too much insertion of texts in a post or filters or background audio can cause cognitive overload and distract the user from properly processing the content. The distinct features of videos and images have a direct influence on how the content is processed utilizing different aspects of working memory.

Looking at the broader influence of ephemeral digital narratives on society and its memory offers a convincing idea of how

society remembers and recalls significant events. From the findings of the study, it is evident that videos were found to enhance memory retention than images, so videos might become the dominant and preferred medium for sharing experiences. This may result in a shared memory that is dominated by quick and engaging video format, and less reliant on text. Over a period of time, this could cause society's collective memory to be biased towards visually memorable instances and only the 'highlights' of any socially significant event. If society engages predominantly with ephemeral media that encourages shallow processing, the depth of collective memory could be compromised. The democratisation of content creation and consumption has both advantages and disadvantages. There is a shift of authority from traditional institutions like archives, libraries, and museums to individual content creators in historical record-keeping. This shift can affect the accuracy, neutrality, and comprehensiveness of the historical records being created and preserved, which could lead to a fragmented collective consciousness. Different groups may have entirely different recollections and understandings of events, based on the algorithms that determine what content they see. As digital platforms continue to shape collective memory, the strategies to manage this memory must evolve by providing tools and systems for archiving content that is deemed significant for cultural and historical preservation. The limitations of the study include the small sample size as well as the study's exclusive focus on ephemeral content. The study's reliance on self-reported data might introduce biases, as participants' responses could be impacted by their subjective interpretations. The study's timeframe was restricted to a span of seven days, the lasting impact of ephemeral digital content on memory retention is not studied. Further research can be done to compare memory retention in permanent and ephemeral content on social media. Other ephemeral means of communication, like disappearing messages, can also be taken up for further research, exploring how these interactions might affect privacy and the spontaneity of communication. Prolonged impact of ephemeral narratives on cultural and individual memory can be studied by extending the duration of the study.

7. Conclusion

This study provided significant findings on the impact of ephemeral digital narratives on memory retention. Through the conceptual framework the study also provided insights into how modern digital consumption patterns could affect cognitive process, cultural memory and collective memory. The findings, supported by ANOVA, confirmed that question format, media type, presentation style, and cognitive processing significantly influence how information is retained. The study also revealed that video content and mixed presentation styles enhance memory retention more effectively than static images or textual content alone. This study not only bridges the gap between ephemeral consumption and long-term cultural impact but also sets the stage for future research to explore ways in which human communication has changed with ephemerality. By understanding the impact of ephemeral content on the users, strategies can be formulated to enhance user engagement and cultural preservation. The implications of this study extend beyond mere content consumption, providing insights into broader socio-cultural dynamics. This study can act as a foundation for future academic investigation and practical implementation in digital content consumption and preservation strategies.

Authors contributions

Aishwarya Maran and Dr. J. Michael Raj were responsible for study design and revising. Aishwarya Maran was responsible for data collection and drafted the manuscript. Dr. J. Michael Raj revised it. All authors read and approved the final manuscript. All authors contributed equally to this study.

Competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Obtained.

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No additional data are available.

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