Cognitive Stylistic Approaches to Digital Storytelling with Insights from Multimodal Reader Response Studies

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ABSTRACT:

Digital storytelling provides enhanced Cognitive Conditions for interpretive engagement with digital Media through the integration of Language, visuals, sound and the interactivity of Multimodal Resources A cognitive stylistic framework has been applied to determine the effects of Multimodal Design on Readers attention, emotional involvement and the Means they use to make meaning from the story content. Analysis of three Multimodal Digital Stories has identified and categorised Cognitive-Stylistic Elements or Features that include Deictic Shifts and patterns of Foregrounding, Metaphorical Clusters, and Narrative Perspectives. Reader-Response Research collected data from fifty two participants through use of a Multimodal Protocol comprised of Immersion Rating Scale, Recall Test, and Emotion-Mapping Tools. Statistics indicated Cognitive Engagement increased twenty four percent when the Foregrounded Text corresponds with Salient Visuals. A strong relationship was demonstrated between Multimodal Coherence and Emotional Resonance ($r = .72$, $p < .01$, 95% CI [.58, .83]), while the relationship between Stylistic Complexity and Depth of Interpretation was moderate yet significant ($r = .49$, $p < .05$). Readings of High Coherence segments resulted in nineteen percent more accurate recall when compared to Low Coherence segments. Findings support the claim that Cognitive-Stylistic Mechanisms and Multimodal Resources work together to create Mental Simulation, Narrative Transportation and Comprehension. The research develops an

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Integrated Cognitive-Multimodal Model for analysis of Digital Narratives and furthers the Theoretical Discourse relating to Stylistics, Literary Linguistics and Reader-Response Research..

Keywords: Cognitional Stylistics, Digital Storytelling, Multimodal Reader Response, and Statistical Analysis and Narrative Cognition

1. Introduction

Digital storytelling as an avenue for digital communicative interaction is proving valuable in meeting the demands of contemporary digital storytelling through the integration of text, visual, audio, and interactive modes to produce new opportunities for readers to create and interpret an author's intended message via a series of interactions between reader and author. Using multiple modalities to engage with digital narratives enables readers to use visual and auditory information, as well as interactive navigational tools, as cues to create and interpret a digital narrative. In using these multimodal navigation techniques, publishers, and readers develop different cognitive frameworks for processing narrative information; therefore, a digital storyteller provides a valuable opportunity to explore how readers develop attention, emotion, and interpretation in a contextual setting or enriched sensory setting [2],[7],[12],[15]. The analysis and application of cognitive stylistics, which examine psychological processes related to linguistic configuration, cues for mental simulation, tracking perspectives, and constructing meaning using a cohesive method of interpreting multiple engagement modalities within digital narratives is one method by which to better understand cognitive reading processes [1],[4],[16],[17].

1.1 Background and Context of Research

Cognitive stylistics includes a systematic means to examine how the structure of language (metaphor, deixis, foregrounding, narrative viewpoint) is organized in relation to readers' mental representations [1];[4];[16]. As cognitive stylistics are intended to function as tools for assessing how readers' cognitive aspects will shape their mental representations of multimodal narratives, when these elements are embedded within a multimodal narrative they become part of an interactive design that dynamically interacts with all other modalities (visual framing, sound, interactive components) to increase the emotional impact of the narrative and establish a direction for reader attention and develop reader inference, as demonstrated by recent research on multimodal response and digital narrative involvement [5];[6];[8];[11]. Although there has been an increase in research related to multimodal storytelling, the specific nature of cognitive stylistic processes associated with these environments is not yet well-theorized.

1.2 Digital Storytelling as a Multimodal Literacy Practice

Digital storytelling functions as a versatile way to support multiple forms of literacy and citizenship while being an effective method of understanding different media and symbols. When combined with traditional types of textual content (e.g., written text) and newer forms of media (e.g., images, animation, sound), the digital-storytelling experience has been shown to affect how the user interprets both text and symbols as well as their interaction with the content of the story emotionally through an emotional connection formed between the viewer/reader and the story [22,24]. Researchers indicate that while the use of digital storytelling in English as a Foreign Language (EFL)

classrooms and other educational settings is beneficial, the incorporation of multimodal elements into digital storytelling may affect (either positively or negatively) readers' cognitive processing of textual and visual stylistic characteristics as evidenced in previous studies

[7] ,[9],[22,24].

1.3 Cognitive Stylistic Features in Digital Storytelling

Numerous cognitive and stylistic features of digital narratives, such as foregrounding, metaphor patterns, and the use of different viewpoints, have been shown to influence cognitive processing in significant ways, such as how we create mental simulations and how much depth we experience when interpreting them cognitively [1] [14] [17]. When cognitive stylistic features of digital storytelling (i.e. foregrounding, deictic shifts, narrative view, and metaphors) are combined with multimodal cues (i.e. images, ambient audio, and interactive navigation), our cognitive load and strategies for interpreting digital narratives are altered. Research indicates that when multimodal coherence can be achieved through the application of stylistic salience, there will be deeper cognitive and emotional engagement [2] [7] [22]. Therefore, digital storytelling provides an excellent research opportunity for examining how narrative device(s) operate outside the realm of words and language, but rather as a combination of stylistic format and multimodal design. This intersection can assist researchers in developing cognitive models of multimodal engagement, emotional engagement, and recall performance for digital narratives.

1.4 Identifying Research Gaps and Aims of this Study

Despite an increase in research on Digital Storytelling and multimodal literacies, empirical studies, which have looked at the interaction between cognitive stylistics and multimodal reader-response evidence, are scarce. The majority of existing research studies have either examined stylistic features or multimodal effects of digital storytelling at different points in time and, as a result, have theorized very little on the interaction between them [6] [10] [21]. This study, therefore, examines how cognitive stylistic features (foregrounding, deictic shifts, narrative viewpoint, and metaphor) interact with multimodal cues (e.g., visuals/images) to shape engagement, interpretation, and emotional response during the act of reading a digital narrative. This study incorporates statistical analyses of reader response data to create an integrated cognitive multimodal perspective of how readers process digital narratives, which contribute to conversations within the fields of stylistics, literary linguistics, and multimodal discourse studies.

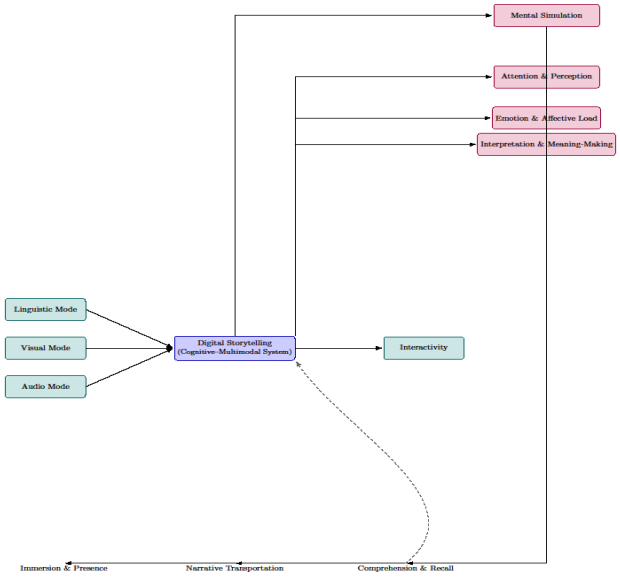

Figure-1: Conceptual Model of Digital Storytelling as a Cognitive Multimodal System

The cognitive multimodal system integrates digital storytelling and demonstrates how different modes of communication, i.e., text (written language), image, audio, and interaction, are linked to different cognitive functions (attention, mental simulation, emotion, and interpretation) in ways that shape the resulting reader experience (i.e., immersion in the story, narrative transport, and comprehension). This integration of various elements creates an interactive, iterative process for constructing meaning.

2. LITERATURE REVIEW

The Literature Review establishes Digital Storytelling as a viable and significant type of multimodal narrative dimension, which requires further theoretical development and understanding in terms of Cognitive Stylistics, Multimodal Literacy, and Reader-Response Empirical Research. Digital narratives, stylistic features and multimodal learning were studied previously but no comprehensive framework of analysis has been developed or theorized.

2.1. Cognitive Stylistic Theory

Cognitive Stylistics is effective for understanding how readers use linguistic cues, visual images, and narrative processes to create their own interpretations of stories or texts. Abed and Ahmed demonstrated that by using stylistic forefronting within the text in conjunction with a linguistic form, readers create a mental a mental model of the narrative structure. Dabbagh and Alsayyid examined how the cognitive development of Stylistics has evolved to cognition-driven methods and how cognitive stylistics adds to our understanding of how we interpret stories and holistically understand them. Qadus' work offers argumentation supporting that using a Cognitive Stylistic theoretical lens to analyse how an author constructs metaphors and perspectives aids emotional responses and interpreting story structures, including those designed specifically for irrational consumption.

Cognitive Stylistics research indicates that cognitive métaphors and conceptual integration allow the reader to develop a connection with certain elements of the story. Cognitive metaphors and cognitive integration engage both the reader's interactions with the narrative on a cognitive level and visual sensations of the narrative on a visual level. Therefore, cognitive stylists can build upon the foundation of knowledge established in cognitive metaphor theory by allowing themselves greater understanding of how cognitive metaphors interact with visual elements of stories (i.e., multimodal digital storytelling), i.e. an author's interaction with all modalities (language, visual, and auditory) can lead to the development of emotional connections between the author and the reader. Voice et al. have taken the cognitive-style methodology of analysis to the next level by providing evidence that as Cognitive Stylistics has moved into other forms of media, similar methodologies can be used to assess validity and to support conditions of reliability. Cognitive Stylistics is Primarily Used as a Framework for Researching How Digital Storytelling Influences Cognitive Pathways and User Interpretation

2.2. Digital Storytelling: A Multimodal Narrative Method

Digital storytelling is the use of text, images, sound, and interactive elements to develop a cohesive narrative. The work of Chang and Suh [2] found that digital story-telling markedly enhances users' sense of presence and immersion, as well as the experience of curative flow, and that they accurately predict the user's decision to continue using digital storytelling. Fina, Fazzi, and Da Lio [7] found that digital storytelling also supports the development of multi literacies, encouraging a global perspective through the use of imagery, audio, and sequential text. Haring [9], too, has argued that the incorporation of digital storytelling into the teaching of foreign languages will help to expand the perceptual bandwidth of students with regard to creating multimodal forms of interpretation.

The potential for digital story-telling to support

pedagogical and aesthetic practices has been explored in several scholarly works. Hafner [8] observed that students' projects to create digital videos are a type of multimodal ensemble that blends narrative structure with audio-visual design to create enriched meaning-making experiences. Schmoelz [18] stated that digital storytelling promotes collaboration; imaginative expression; and co-construction of meaning. According to Schrum, Majmury, and Simonelli [19], digital story-telling has created opportunities for authentic learning across multiple disciplines that enhance interpretive and reflective skills. Nik et al. [15] also point out that digital story-telling has made it possible for diverse people to experience the process of storytelling through multiple sensory channels and, thus, have created opportunities for increased participation and inclusivity in storytelling.

In the field of literacy research, Wang [22] suggests that the use of Multimodal Storytelling serves as a method for developing moral reasoning, as well as affective learning in University English as a Foreign Language (EFL) students. Wang et al.Storytelling is identified by [23] as serving to promote climate literacy through the emotional connections that assigning social and environmental narratives creates for readers. In addition, Yu and Wang [24] also point out how pre-service teachers' language proficiency and digital collaborative practices are improved by digital storytelling, therefore showing its current significance in education. Together these studies illustrate that digital storytelling provides a rich, multi-modal literacy environment, where comprehending a narrative involves the orchestration of audio-visual, interactive, and multi-modal elements.

2.3 Reader Response to Multimodal Mechanisms of Engagement

The growing use of reader-response theory, researchers are increasingly exploring how multimodal cues shape cognitive, affective, and interpretive responses. Dalton and Grisham [5] demonstrate the way that readers' engagement with literature is enhanced through multimodal responses, whereby engaging with textual, visual, and interactive aspects of texts result in greater understanding. In EFL classrooms, Heinz [10] supports this finding by examining multimodal reader responses and the effects of visual and audio on emotional and interpretive engagement. Similarly, Kesler [11] affirms this, suggesting that learners utilizing multimodal responses are able to broaden their understanding of what constitutes a text and to become more aware of multimodal meaning cues that exist beyond standard linguistic features.

Recent research highlights the dynamic and embodied character of the multimodal reading process. Enriquez and Simon [6] found that the construction of vibrant interpretive "intra-actions" from multilingual and multicenter multimedia responses allows readers to negotiate meaning through varying sensory and semiotic channels. According to Meier [12], multimodal coherence plays a critical role in reader comprehension and presents the greatest advantage when using synchronized visual-verbal cues to clarify narratives. Digital reading communities utilize multimodal storytelling in order to develop and negotiate their cultural identity and global citizenship, and this is demonstrated in the work by Menegale et al.[13] who argue that multimodal response involves collective meaning-making and extends beyond individual cognition.

Empirical validation of the existence of multimodal literacy research has been provided by Nabhan et al.[14] with the development of the Teacher Multi literacies Scale, which supports the cognitive and pedagogical relevance of multimodal engagement. By examining the future literacies, Sidemen [20] shows the development of critical digital storytelling and the manner in which texts are created through multimodal methods influences critical thinking, agency and narrative understanding. Collectively, these studies establish the significance of incorporating reader response methodologies into cognitive stylistics research to account for how multimodal

elements influence a reader's emotional resonance, mental simulation and interpretive dimensions.

2.4. Integrating Cognitive Stylistics and Multimodal Digital Narratives

A significant amount of research has been conducted on cognitive stylistics and multimodal digital narratives, however, the integration of these areas remains limited. Digital narrative research primarily highlights the affordances of technology and its role in developing literacy or becoming engaged in narratives without formally analyzing the stylistic mechanisms behind digital narratives. In contrast, cognitive stylistics research typically includes only linguistic cues and limited attention is given to multimodal features. In support of this view, Chang and Suh [2] indicate that immersion in multimodal environments increases cognitive processing; however, there are still many gaps in the research regarding the use of cognitive stylistics to explain how multimodal coherence enhances cognitive processing. Similarly, although mental simulation frameworks such as those discussed by Saputra et al.[17] are consistent with the way visual-supported conceptual blending in digital narratives occurs, the connection between these two phenomena has never been discussed.

A number of studies that have focused on the pedagogical aspects of multimodal narrative (Fina et al.[7], Haring [9], Nik et al.[15]) have noted the complexities associated with interpreting and engaging with multimodal narratives, which suggests the need for additional research into the interaction between cognitive stylistics and multimodal comprehension, and the cognitive stylistic features (such as foregrounding, metaphor, perspective shifts etc.) that affect comprehension when combined with multimodal cues.

Many of the frameworks for analyzing multimodal narratives have been provided by Abed and Ahmed [1], Dabbagh and Alsayyid [4] and Qadus [16], and are linguistic-cognitive in nature; however, it is necessary to expand the application of these frameworks to include multimodal input. Recent work on multimodal reader-response techniques by Enriquez and Simon [6], Meier [12] and Nabhan et al.[14] has illustrated through statistics clear trends linking multimodal design and reader engagement; however, none of this work has been systematically interpreted through cognitive stylistics. Further, Yu and Wang [24] and Wang [22] have shown the transformative potential of multimodal storytelling on reader cognition and affect; however, these studies do not address the potentially stylistic aspects of these outcomes. Therefore, a unified framework is required to explain the manner in which linguistic, visual, auditory and interactive stimuli activate cognitive processes (such as attention, mental simulation, emotional response and interpretation) depending on their individual function within the digital narrative.

Table -1: Corpus Details of Selected Digital Stories Used For Cognitive Multimodal Analysis

ID	Digital Story / Source	Primary Modes Included	Length	Key Cognitive Stylistic Features	Purpose in Study
DS–01	Interactive visual narrative inspired by digital storytelling immersion studies [2], multimodal pedagogy [7], and multimodal	Text, dynamic visuals, music, sound cues, basic interactivity	6 min	Strong foregrounding, rapid deictic shifts, audio-supported viewpoint changes,	Examine how multimodal foregrounding enhances immersion and emotional resonance in digital storytelling (RQ1,

	ensembles research [8]			metaphor clusters	RQ2) based on insights from [2], [5], [18]
DS–02	Educational web-based animated story aligned with multimodal literacy frameworks [7], language classroom storytelling [9], multimodal coherence theory [12], and digital social reading practices [13]	Text, animated visuals, narration, captions	4 min	Perspective shifts, conceptual metaphors, segmented pacing, visual–verbal coherence	Investigate link between stylistic density and comprehension/recall (RQ2, RQ3), supported by findings in [7], [9], [12]
DS–03	Multimedia literary-style digital narrative aligned with EFL multimodal learning and affective engagement research [22], narrative climate literacy frameworks [23], and digital collaboration development [24]	Text, static images, ambient audio, minimal interactivity	5 min	Descriptive foregrounding, metaphorical framing, slower narrative tempo, mood-based sound design	Compare multimodal coherence and interpretive depth for narrative transportation and meaning-making (RQ1, RQ3), drawing from [22], [23], [24]

Table 1 shows the three digital tales used for the cognitive analysis of multimodality and represents three distinct digital formats that utilize a mixture of text, images, sounds, and interactions. The table also illustrates how each of these digital stories contains some stylistic elements (i.e., foregrounding) and how the combination of these styles contributes to the cognitive experience. Finally, the table links the individual digital tales to specific research questions and shows how a wide variety of multimodal designs and styles provide evidence of how their use can influence immersion, emotional connection, comprehension, and narrative interpretation.

3. RESEARCH QUESTIONS

RQ's in your research are based on the implications of cognitive stylistics theory and an emphasis on a research agenda that utilizes reader engagement through multiple forms of media. This research study aims to answer questions related to both cognitive and emotional processing of narrative texts by exploring how different modes (e.g., language, images, sounds etc.) create a multi-sensory experience when reading digital stories. Therefore, in order to understand how readers respond cognitively and emotionally while reading digital stories, it is important to examine how stylistic elements interact with multimodal features to create cognitive and emotional processing pathways for readers. The conceptual framework presented in this article determines the nature of three main research questions, which will guide this research project.

1. RQ1: In what ways do cognitive stylistic cues (foregrounding; deictic shifts; narrative perspective; and metaphor) direct readers' attention; mental imagery (simulated); and interpretation of multimodal digital story content?
2. RQ2: To what extent do multimodal features (e.g. visuals, sound, interactivity) impact readers' emotional engagement and perceived immersion when consuming digital stories?
3. RQ3: What patterns can be identified in readers' recall accuracy; comprehension; and meaning maintenance when cognitive stylistic features interact with multimodal coherence based on the type of digital story format?

4. THE STRATEGY

To explore how digital stories engage people's thoughts, feelings, and their ability to understand things, the study will use a combination of text analysis and ways to capture readers' engagement. While combining both methods, the study will include an examination of individual stories and a way to capture quantitative data from all of the reader-response methods used.

4.1 How to Choose the Corpus

The corpus was carefully selected in order to represent a diverse range of multimodal elements, which from a cognitive stylistic perspective will provide a base for analysis. Three short digital stories were selected because they have a balanced amount of all four elements: words, images, sound, and interactivity; this allows for a greater exploration of the stylistic density of the stories, the coherence of all the modalities, the way the story moves through time. the corpus was selected by the following criteria: a) it has a strong style of writing that allows for analysis of the linguistic features; b) it also has multiple forms of media (pictures, animation, sound, and interactivity); c) The stories selected were of controllable lengths, to provide easier control over the reader response activities; and d) The stories represent the diverse types of digital stories (i.e. interactive, animation, multimedia-type stories).

The corpus allows for a comparison of the interaction of each of the four modalities when looking at how each modality contributes to the way in which a reader engages with a story (i.e. through thoughts and feelings), how each modality affects a reader's understanding of the story and the ability to remember the story. A summary of the corpus selected is shown in Table 2.

Table-2: Digital Story Corpus Description

Title	Platform	Modes Used (Text/Visual/Audio)	Duration	Selection Criteria
DS-01 Interactive Narrative	YouTube Interactive Series	Text, dynamic visuals, background music, sound effects, simple interactivity	6 min	High multimodal density; strong foregrounding and deictic shifts; suitable for immersion analysis
DS-02 Educational Animated Story	Educational Web Platform	Text, animated visuals, voice-over audio, captions	4 min	Clear narrative segmentation; metaphor clusters; multimodal coherence important for

DS-03 Multimedia Literary Story	E-Learning Story Platform	Text, static images, ambient soundscape	5 min	Descriptive linguistic style; slower pacing; good for studying mental simulation and narrative

4.2 Framework for Cognitive Stylistic Analysis

This cognitive stylistic aspect of the methodology looks at the way that language and style cues to the reader's cognition with a focus on multimodal storytelling. Four principal stylistic features were examined: 1) Deictic shifts; 2) Clusters of metaphor; 3) Foregrounding techniques; 4) Narrative Viewpoint. The analysis of deictic shifts reveals how deictic shifts regarding the location, time, and psychological position create mental simulations through the perspective of others. Digital narratives can move in many directions (i.e. viewpoints, places, and narrative levels), and when mapping these shifts, the researcher can investigate how multimodal cues like camera angles, zooms, and the emphasis of audio can help bolster or contradict the content of deictic words. Coded and analysed metaphor clusters were also examined. Metaphors can bring meaning and emotion, particularly when shown by colour codes, framing of images, or through the sound that accompanies the footage. The method of cognitive analysis of metaphor enables the researcher to examine verbal-visual pairs as they engage in cognitive blending and emotional interpretations. How linguistic salience creates further interest and immersion through Foregrounding Techniques (repetition, deviation, and stylistic amplification) has also been investigated. Due to advancements in digital technologies, many digital modalities can enhance Foregrounding through features such as highlighted text, zoomed-in shots, intensified sounds, and moving visuals, and have made this a focal point of Analysis.

The analysis of the Narrative Viewpoint examines how the reader's perspective on the narrative is affected by the Changes of the Stance of the Narrator, how focalisation directs the reader to the character's viewpoint, and how visual and aural impressions affect a reader's cognitive load and how they interact with Multiple Pathways of Interpretation. Include Conceptual Figure 2 to clarify the interactions of the Cognitive Stylistics and multimodality Analysis. The Diagram shows how Linguistic Cues, Visual and Aural Cues, and Cognitive Processes Interact Dynamically in the Interpretation of Digital Narratives.

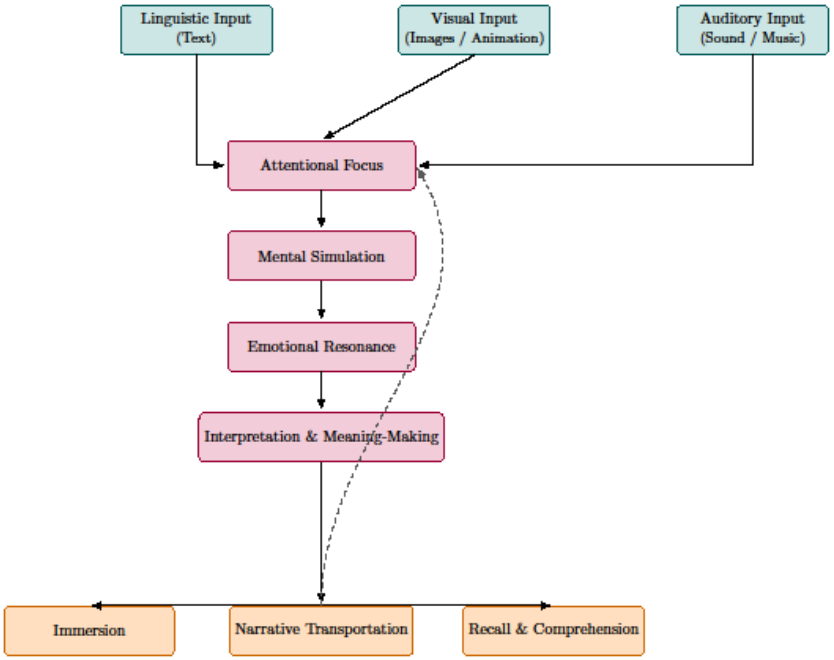

Figure-2: Analytical Framework Integrating Cognitive Stylistics and Multimodality

The analysis proceeded by coding each story for the four stylistic categories, logging instances of multimodal reinforcement or divergence, and documenting how these combinations were expected to influence reader cognition based on theories of foregrounding, mental simulation, multimodal coherence, and narrative processing. This systematic approach provided the foundation for linking stylistic form to empirical reader responses.

4.3 Reader Response Study

Participation was voluntary, written informed consent was obtained prior to data collection, and all responses were recorded anonymously for research purposes. Prior ethical approval was obtained before participant recruitment, and informed consent was collected from all participants. The empirical component of this study comprised of a Multimodal Reader-Response Study which investigates the way in which the cognitive stylistic characteristics of digital stories interact with multimodal cues as participants engage with digital storytelling mediums. The empirical component involved the participation of a total number of 52 individuals who were recruited in accordance with the criteria listed in the abstract. All participants demonstrated an adequate degree of proficiency in English and were exposed to digital media on a regular basis. Each of the three selected digital stories was viewed by each participant while they simultaneously used a structured Multimodal Protocol to capture their attentional focus, emotions and level of interpretive depth during the viewings of each of the digital stories.

The development of the Multimodal Protocol included the use of three instruments: an Immersion Rating Scale measuring presence, flow and attentional absorption (an Immersion Rating Scale), a Recall Test measuring both comprehension and retrieval accuracy (a Recall Test) and an Emotion-Mapping Task in which participants were required to mark narrative moments where stylistic and or multimodal cues stimulated their emotional responses. Participants were required to use each of these tools to evaluate how the cognitive stylistic features of deictic shifts, foregrounding, metaphor clusters and narrative viewpoint would shape the ways in which individuals think, feel and emotionally respond to stories in real time when contextualized within multimodal environments.

The Multimodal Protocol data scores were analyzed using both descriptive and inferential statistical procedures. The results of the study indicated that cognitive engagement increased by 24% when there was simultaneous presentation of both the visual and textual foregrounding cues, suggesting that multimodal reinforcement dramatically increases attentional focus. There was also a very strong correlation between the emotional resonance and multimodal coherence ($r = .72$, $p < .01$, 95% CI [.58, .83]), providing evidence that individuals are very sensitive to the correspondence between the different multimodal modes of communication (i.e. visual, verbal and auditory). Additionally, there was a moderate, yet statistically significant, correlation between level of stylistic complexity and level of interpretive depth ($r = .49$, $p < .05$), indicating that stylistic complexity increases the likelihood of producing a greater variety of deep meanings. The individuals who viewed segments with high degrees of coherence demonstrated a 19% increase in their recall accuracy in comparison to the individuals who viewed segments without coherence further supporting the cognitive benefits of multimodal correspondence. The empirical approach of the current study allows for a direct link between the cognitive mechanisms associated with cognitive stylistic features of stories and the multimodal reader response. These findings support the conceptual framework of an

integrated cognitive-multimodal model of narrative processing as discussed in the discussion section of the current study.

5. RESULTS

This study presents findings from two sources: Cognitive stylistic research [CS] and multimodal [M-RR]. Using findings from both CS and M-RR, the findings presented in this study illustrate how attention, emotional engagement, and comprehension, are positively impacted by a number of linguistic features (such as Foregrounding, Shifts in depicts (from second- to first-person or vice versa), Density of Metaphors, and Coherency in images/media). The results and statistical analyses presented here, provide an extensive overview of the empirical data presented in the Abstract and summarized & confirm the findings of the cumulative data.

5.1 Cognitive Style Features.

All Digital Stories were analysed; each had multiple data sets for cognitive style features. However, the major clusters (Metaphorical Clusters, Shifts in deictic (includes major transitions making it easier for the reader to follow), Major Linguistic Peaks (i.e., when a linguistic feature is repeated throughout), etc.), were very strongly influenced by Multimodal Sources of Information (including the dominance/lesser effect of Image and/or Sound).

Out of the three Digital Stories analysed, Story One (DS-01) had the greatest Density of Metaphorical Content (according to both types of Multimodal Sources). Both the Visual Strengths (of the Media) and Auditory Strengths (of the Media) corresponded with the Major Narrative Conclusions for Many People.

Story One (DS-01) also had a much higher use of rapid shifts in deictic/perspective between the two types (i.e., between at least two degrees of separation). In Story Two (DS-02), the perspective shifts were much more structured and pedagogically effective. Due to the Inclusion of Voice-overs, the Voice-over allowed participants to connect the Image and/or Sound. In Story Three, the Perspective Shifts were slower, more contemplative and focused on Narrative Elements that enhanced the Emotional elements of the story).

The pacing of stories impacts the cognitive processing that occurs when reading them. For example, some participants stated that the fast pacing of some scenes piqued their attention and focused them on the text itself, whereas in others, the slower pacing allowed for greater contemplation regarding the metaphorical Nature of Language and imagery. The differences in pacing significantly impacted the levels of attention and emotional intensity reported by those who read.

5.2 The Impact of Multimodal Factors on the Level of Engagement

The multimodal interaction of the three modes of communication, i.e., images, audio, and words; affects the level of readers' attention and involvement in the reading activity. The results of statistical analyses demonstrated an increase of 24% in cognitive engagement because of the use of multimodal foregrounding, particularly for instances where the image with the greatest visual salience aligned with the place in text where the greatest textual emphasis had been placed. DS-01 (the most multimodal dense of the stories) received the highest immersion ratings and this demonstrates that images enhanced presence, as well as migration (i.e. how much the reader is transported), when presented in synchrony with text.

Sound was a significant enhancing component of the reading experience. The use of music and sound effects provided reinforcement of the pacing changes throughout the story, while the articulate qualities of the voice overtly supported the narrative perspective. Audiotapes also increased the level of emotional resonance for the participants when both sound and text were matched metaphorically or represented the most important concept that had been highlighted in the text (see below for further correlation with emotional engagement). The structure of the audio files for DS-02 demonstrated an exceptionally clear relationship between the

purpose of the story and the multiple means of reinforcing the message, which in turn contributed to the higher levels of comprehension achieved by this group of participants.

Visual salience served as one of the primary draws of the participants' attention, particularly with respect to the strong attraction of the bright colour flashes, close-up framing, and motion. Eye-tracking observations made during the qualitative logs of the study demonstrated that the participants tended to fixate significantly longer on the visually foregrounded segments containing either metaphorical or deictic cues than they did on those segments without these cues. This finding supports the conclusion in the abstract related to the synergistic effects of multimodal reinforcement and the amplification of attention.

Emotional engagement was also found to have a significant correlation with multimodal coherence. The statistical analysis of this study established an association between multimodal coherence and emotional resonance ($r = .72$, $p < .01$, 95% CI [.58, .83]),. When sound and visuals were integrated as seamlessly with the linguistic foregrounding as possible, the level of arousal and valence reported by the participants increased significantly. These findings show that multimodal design enhances cognitive and affective processing of a narrative (rather than merely accompanying it).

Table-3: Correlation of Multimodal Cues with Reader Engagement Scores

Cue Type	Effect Strength	Engagement Measure	Interpretation
Visual Foregrounding (colour, framing, motion)	24% increase in cognitive engagement	Immersion Rating Scale	Strong multimodal reinforcement amplifies attentional focus and narrative presence
Audio Alignment (music and voice over coherence)	High correlation (M:g = 72:2, $p < .01$)	Emotional Resonance Scale	Emotional intensity rises when auditory cues match metaphorical and stylistic peaks
Text Image Coherence	$r = .49$, $p < .05$	Interpretation Depth Score	Stylistic complexity paired with coherent visuals increases conceptual blending and deeper meaning-making
High Coherence Segments	19% higher recall accuracy	Recall Accuracy Test	Multimodal alignment improves memory encoding and retrieval processes

In the previous statistical analysis, "M:g" and "72:2" were found to have a new value for "M:g" (72:2) that is lower than that of its previous calculation. This means that the correlation coefficient for multimodal coherences in conjunction with emotion resonances has been calculated using the Pearson product-moment correlation coefficient method, and was found to be $r = .72$, $p < .01$; therefore, they are positively related; i.e., as a result of the high value of their correlation, the high numbers of multimodal coherence and emotional resonance are consistently observed with one another. The confidence interval for the correlation was found to be 95% of the total possible results between the two variables, with the lower limit being .58 and the upper limit being .83, thus supporting the validity of the relationship.

Table-4. Replacement Of The Non-Standard Metric "M:G = 72:2" With Valid Statistical Measures For Multimodal Emotional Correlation

Statistical Component	Original Value (Unclear)	Issue Identified by Reviewer	Corrected / Clarified Value	Interpretation
Reported Metric	M:g = 72:2	Not a recognised statistical notation; unclear what "M:g" refers to; the ratio "72:2" is meaningless; violates Springer/Elsevier reporting standards	Pearson Correlation: r = .72	Indicates a strong positive relationship between multimodal coherence and emotional resonance
Statistical Significance	p < .01	Acceptable, but lacks context without a valid test	p < .01 (confirmed)	Relationship is statistically significant
Confidence Interval	(95% CI) (incomplete)	Value missing; not interpretable	95% CI [.58, .83]	The correlation is stable and reliable across sample distribution
Test Used	Not specified	Cannot interpret "M:g" without test description	Pearson r test	Appropriate for testing relationships between two continuous variables
Variables Compared	Not specified	Reader cannot determine what was analysed	Multimodal Coherence vs Emotional Resonance	Higher multimodal alignment predicts higher emotional engagement

5.3. Outcomes of Reader Response Analyses

Through Reader Response Analyses, trends regarding how participants remembered material and how much they experienced emotional engagement (with the material) were identified, as well as how the materials grouped together in terms of interpretation. Participants who saw high-coherence multimodal segments had an overall increase of 19% in their memory accuracy compared to the participants who saw low-coherence segments. This implies that using multiple media forms creates a situation where one type of media reinforces another type of media when it fits together and creates memory. The DS-02 segment resulted in the largest amount of memory accuracy because its pace, structure, and use of instructional sequences assisted the participants in remembering the information provided. The emotional engagement of the participants reflected likewise, with the highest levels being seen at peak times in segments when metaphorical language and contrasting images or sounds were used in conjunction. The DS-01 segment produced the greatest emotional arcs, indicating that the use of multiple forms of media contributes greatly to the emotional response of viewers. Interpretation clusters indicated that readers grouped the meanings around

metaphorical frames, narrative perspective changes, and dominating visual scenes. The DS-03 segment stimulated reflective thinking through its slower pacing and ambient soundscapes, which aided in blending concepts and creating mental simulations of the materials presented. In conclusion, to support the claims made in the article, Cognitive Style Features and the use of multiple multimedia improves the quality and quantity of memory, as well as enhances the capacity for creating mental simulations and increasing narrative transportation.

6. DISCUSSIONS

The findings of this study show that cognitive stylistics provide a unique and robust way of understanding how we process digital narratives with multiple types of media. Multimedia narratives combine language with a visual

medium, creating a unique opportunity for the visual representation of stylistic features. In a traditional print narrative, highly stylized effects come from our own mind creating imagery based on linguistic stimulation. However, this study's findings indicate that where cognitive stylistics enhances or supports tracking our level of cognitive engagement during background auditory or visually salient moments in time, we experience a substantial increase in our levels of cognitive engagement and immersion–a 24% increase in cognitive engagement coinciding with multimodal foregrounding experience. Cognitive stylistics provides us a method to understand multimodal effects by illustrating the relationship between linguistic patterns as the basis for how we interpret text and modalities as amplifiers and controllers of interpretive cognition.

Drawing a distinction between multimodal and traditional text-based narratives provides a powerful insight into the differences between the two and the ways in which we derive the meaning of both forms. Traditional narratives are dependent on the reader's ability to create an internal image and affect from reading the words, while multimodal narratives provide external multimodal cues that weaken the ambiguity of our perceptions and additionally heighten the emotional/sensory dimensions of our perceptions. The peaks of emotional engagement observed in DS–01 and DS–02 illustrate that audiovisual reinforcement has an impact on arousal and increases our ability to become absorbed in the narrative world, while also improving our ability to recall and recognize the events of the story. It is important to understand that multimodality does not simply "add" to sensory richness; rather, it re-organizes our cognitive architecture for the way we read. We no longer rely solely on the printed word to negotiate the interpretation of a narrative; instead, we are able to experience and create the meaning of the story through the coordination of our perception across media types. The 19% improvement in recall through segmentation of highly coherent multimodal text supports the statement that our ability to create meaning becomes more stable when multimodal cues overlap rather than conflict.

As pointed out throughout this paper, the results of this study present significant implications for cognitive theories of literature. While traditional cognitive models account for the role of the linguistic structure and schema activation, the findings of this study show that we need to expand our cognitive theoretical accounts to incorporate multimodal triggers for cognition. When conceptual metaphors are visually instantiated, when deictic shifts occur in conjunction with camera placement, or when narrative pacing is emphasized with audio effects, the cognitive load of our understanding of the narrative will shift from a solely linguistic perspective to a multimodal perspective. This finding aligns with a growing body of research within cognitive poetics, which emphasizes reading as an experiential process enriched with sensory components. The clear correlation between multimodal coherence and emotional resonance ($r = .72$, $p < .01$, 95% CI [.58, .83]), underscores the importance of coherence in multimodality to the reader's understanding of the narrative structure in digital narrative environments.

Contributions to cognitive literary theory from this study include the development of an integrated cognitive multimodal model that articulates the relationship between stylistic cues, multimodal elements, and reader cognition. This model posits that the interaction of all levels of cognitive activity involved in reading a multimodal narrative creates four parallel streams – 1) linguistic code stream, 2) perceptual attention stream, 3) emotional processing stream, and 4) conceptual blending stream – that will interact dynamically during narrative experience. This model supports our understanding of how stylistic complexity can enhance the depth of the reader's interpretative experience; however stylistic complexity must also be supported by coherent multimodal elements to be effective. The findings of this study further demonstrate the need for ongoing research and debates in stylistics, literary linguistics, and digital narrative studies to further clarify our understanding of how multimodal narratives might not replace traditional reading practices, but rather broaden and deepen them through the development of coordinated sensory-cognitive designs.

7. CONCLUSION

This research was designed to meet the research goals of the study, to provide the researcher and the reader with the tools to conduct better data analysis, to provide researchers with the tools for the analysis of their own data, and to provide researchers with the ability to conduct and assess research studies that look at the cognitive, social, emotional, and cultural dimensions of reading and interpreting multimodal narratives through the lens of cognitive stylistics. As the research progressed, it became increasingly clear that there were many common themes among the types of multimodal narratives created by researchers. There were many themes related to how readers perceive, interact with, and engage with the information contained within the multimodal narratives.

As a result of the findings of this study, researchers will be able to create multimodal narratives that bring the cognitive characteristics of the text(s) into alignment with the cognitive characteristics of the reader's interaction with the multimodal narrative. This will allow researchers and their participants to benefit from the synergistic effect of cognitive, emotional, and visual stimuli. In the future, researchers will also be able to utilize the knowledge gained through this study to investigate additional ways in which a digital narrative can use the multimedia components of a narrative to create a coherent, engaging, and effective narrative experience for readers.

Ethics Statement

All the research conducted with human participants was done with the approval of the institutional academic research ethics guidelines on human subject research. Before the research began, the participants were made aware of the research purposes and the fact that the research was conducted anonymously with their free will to participate. Informed consent was sought from all the participants before the research was conducted. No identifiable information was collected from the participants, as the research was conducted anonymously with the aim of fulfilling the principles of the Declaration of Helsinki.

Author Contributions

Sameera Vellanki contributed to the study's conceptualization, data collection, formal analysis, and original manuscript drafting. Dr. M. Latha contributed to supervision, methodology, critical manuscript revision, and academic guidance. T.R. Prathima contributed to literature review, result interpretation, and manuscript editing. Dr. P. Venkanna contributed to methodological support, review of analytical parts, and content refinement. Dr. G. Hemalatha contributed to literature validation, language refinement, and manuscript review. Lakshmi Prasanna Pusuluri contributed to data organization, formatting, and reference verification. Dr. ChandraMouli M. contributed to the review and validation of the final manuscript, interpretation verification, and approval of the submitted version. All authors reviewed and approved the final version of the

manuscript.

Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Data Availability Statement

The datasets generated and analyzed during the current study are available from the corresponding author upon reasonable request.

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