# THE EFFECTS OF MULTIMODAL STORYTELLING ON COMPREHENSION, RECALL, AND DISCOURSE ENGAGEMENT IN PATIENTS WITH DEMENTIA

**Dr. Esther Anyanwu**
**Department of English Language and Literature**
**Nnamdi Azikiwe University, Awka**
**Anambra State, Nigeria**
**Email: ec.anyanwu@unizik.edu.ng**

**Abstract**
Dementia causes a progressive decline in language comprehension and communication, limiting patients' ability to engage in meaningful discourse. Although storytelling has been applied as a language-based intervention in dementia care, most existing approaches rely on single modes of presentation, such as verbal narration or visual cues, with little experimental evidence on the combined effect of multimodal communication. This pilot study investigated the effect of multimodal storytelling-integrating text, visuals, and gestures-on comprehension, recall, and discourse engagement in dementia patients. Guided by Multimodal Discourse Analysis (Kress & van Leeuwen, 2001) and cognitive theories of multimodal learning (Mayer, 2009), the study adopted a within-subjects quasi-experimental design involving six patients with mild to moderate dementia recruited from three tertiary hospitals. Each participant experienced three storytelling conditions: text-only, text plus visuals, and text plus visuals plus gestures. Short, age-appropriate narratives with clear sequences and concrete actions were used, delivered in 20–25 minute sessions twice weekly over four weeks. Storytelling was accompanied by illustrations and iconic gestures in the multimodal condition to support comprehension and engagement. Data were collected through structured comprehension tests**,** immediate and delayed recall tasks**,** observational engagement checklists, and audio/video recordings for multimodal discourse analysis. Quantitative analysis of comprehension and recall scores showed consistent increases across conditions, with the highest mean scores observed in the text + visuals +gestures condition (comprehension mean = 9.67/11; delayed recall mean = 8.33/10). Observational data indicated greater attention, participation, and mirroring of gestures in the multimodal condition. Qualitative analysis of transcripts and recordings revealed improved narrative coherence, richer use of temporal and causal connectives, and active engagement with visual and gestural cues. The findings suggest that multimodal storytelling significantly enhanced comprehension, memory retention, and discourse production compared to unimodal approaches. The study provides preliminary, language-centered evidence supporting the integration of text, visuals, and gestures in dementia interventions and offers practical strategies for improving communication and interaction in clinical settings. These results lay the groundwork for larger-scale experimental research in applied linguistics and dementia care.
**Key Words:** Dementia, Multimodal Discourse Analysis, Storytelling, Gestures, Communication

## Introduction

Dementia is a progressive neurological condition that affects millions of individuals worldwide and is characterized by a decline in memory, language, and cognitive functions (Kempler & Goral, 2008). Among the various cognitive impairments associated with dementia, deficits in language comprehension and discourse processing are particularly debilitating, as they hinder patients' ability to participate in meaningful social interactions and everyday communication (Orange & Colton-Hudson, 1998). These comprehension challenges include difficulty understanding spoken or written narratives, reduced ability to follow instructions, and impaired recall of sequential events. Such deficits not only affect patients' independence but also place a considerable burden on caregivers and healthcare systems (Subramaniam & Woods, 2012).

Storytelling has emerged as a valuable tool for promoting cognitive engagement and communication among dementia patients. Through structured narratives, storytelling provides opportunities for patients to retrieve memories, reconstruct identity, and participate in social interaction (Basting, 2009). Many studies have shown that interventions based on reminiscence and narrative work can increase patient engagement, reduce agitation, and improve quality of life. However, most existing approaches rely on single modes of communication, such as verbal narration alone or pictures presented alongside text. While these methods offer some benefits, they often fail to fully address the comprehension challenges posed by dementia, as patients may struggle to process information delivered through only one channel (Wray, 2020).

Recent research in multimodal communication highlights the potential of integrating multiple semiotic resources-spoken or written language, visuals, and gestures-to enhance understanding and retention. Gestures, for example, can reinforce verbal information by providing a visual and motor representation of meaning, while images serve

as concrete anchors for abstract or forgotten concepts, supporting comprehension and memory recall (Goldin-Meadow, 2014; Hostetter, 2011; Bateman et al., 2016). Multimodal interventions have been shown to improve learning and comprehension in children and healthy adults (Novack & Goldin-Meadow, 2017; Tellier, 2008), yet there is limited research applying these strategies experimentally to dementia patients. Most studies in dementia contexts remain qualitative or descriptive, focusing on engagement or identity rather than measurable comprehension outcomes.

This gap in the literature points to the need for a rigorous, language-focused experimental investigation of multimodal storytelling in dementia care. This study is aimed at examining how text, visuals, and gestures interact to support comprehension. It not only addresses a critical knowledge gap but also contributes to applied linguistics and discourse studies. Specifically, the research explores how different combinations of communicative modes influence narrative comprehension, memory recall, and discourse engagement, providing empirical evidence for language-based interventions that can improve communication outcomes in dementia patients. The findings have both theoretical and practical implications, offering strategies for caregivers, therapists, and language researchers to enhance multimodal discourse and interaction in clinical contexts.

**Literature Review**

Understanding the role of language in dementia care requires an examination of the ways in which communication, memory, and comprehension intersect in cognitively impaired populations. Over the past two decades, researchers have investigated various interventions aimed at supporting language use, social interaction, and cognitive engagement among individuals living with dementia. Among these, storytelling has emerged as a central strategy, offering opportunities for memory recall, self-expression, and narrative engagement (Basting, 2009; Subramaniam & Woods, 2012). However, much of the existing literature has focused on qualitative outcomes, such as patient engagement, emotional response, or caregiver satisfaction, rather than systematically measuring the effect of storytelling on comprehension.

Parallel research in multimodal communication and cognitive linguistics has demonstrated that meaning is more effectively constructed when information is delivered through multiple semiotic channels, such as spoken or written text, visual cues, and gestures (Goldin-Meadow, 2014; Hostetter, 2011; Bateman et al., 2016). Experimental studies in children and healthy adults have shown that multimodal approaches enhance memory, comprehension, and language learning (Novack & Goldin-Meadow, 2017; Tellier, 2008). Yet, these insights have rarely been applied systematically to dementia populations, leaving a significant gap in experimental, language-focused interventions that integrate multimodal storytelling strategies.

This review examines three critical strands of research relevant to the current study: (1) the use of storytelling as a language-based intervention in dementia care, (2) the role of multimodal communication-including text, visuals, and gestures-in supporting comprehension and memory, and (3) the limited experimental evidence on multimodal interventions in dementia. The review identifies the research gap that motivates the present study: the need to determine empirically whether multimodal storytelling can enhance comprehension more effectively than unimodal approaches.

**Storytelling and Dementia**

Storytelling is one of the oldest and most fundamental human communication practices, providing a framework for organizing experience, expressing identity, and transmitting cultural knowledge. In the context of dementia care, storytelling has emerged as a powerful intervention because it simultaneously engages cognitive, linguistic, and social capacities (Basting, 2009). Research has shown that storytelling interventions can improve memory recall**,** self-expression**, and** social engagement among individuals living with dementia (Subramaniam & Woods, 2012).

**Memory Recall and Cognitive Stimulation**

Storytelling offers structured narrative frameworks that help dementia patients organize fragmented memories into coherent sequences, thereby supporting recall. By listening to, reading, or co-creating stories, patients are prompted to retrieve episodic and autobiographical memories, which may otherwise remain inaccessible. Basting (2009) emphasizes that narrative contexts provide scaffolds that allow patients to reconstruct experiences, even in the face of cognitive decline. The use of repetitive narrative structures and familiar story arcs can reinforce memory pathways, making it easier for patients to anticipate events, recognize patterns, and engage in recall exercises.

**Language and Self-Expression**

Language is central to storytelling, and narrative tasks provide opportunities for dementia patients to exercise linguistic abilities, including vocabulary, syntax, and discourse organization. Storytelling encourages patients to produce coherent utterances, describe sequences of events, and articulate emotions and perspectives. Subramaniam and Woods (2012) highlight that storytelling interventions facilitate self-expression, enabling patients to communicate personal experiences and preferences. This is particularly important in dementia care, as language deterioration often limits opportunities for verbal expression, which can lead to frustration, social withdrawal, and decreased quality of life.

**Social Interaction and Engagement**

Beyond cognition and language, storytelling promotes social interaction by creating shared spaces for communication between patients, caregivers, and facilitators. Group storytelling activities, reminiscence sessions, or co-created digital narratives foster interpersonal engagement and emotional connection. Research indicates that such interactions can reduce agitation, improve mood, and increase cooperative behavior (Basting, 2009). Storytelling provides a socially meaningful context in which language is used not merely for instruction but for relational purposes, reinforcing social bonds and community participation.

**Narrative Structures as Cognitive Scaffolds**

Narrative structures themselves act as cognitive scaffolds. Stories are organized around characters, settings, plots, and causal sequences, which can help dementia patients map information in predictable and meaningful ways. By engaging with structured narratives, patients can follow logical event sequences, make inferences, and connect new information to prior knowledge (Subramaniam & Woods, 2012). In this way, storytelling is not simply an entertaining activity but a language-based tool for cognitive stimulation, bridging comprehension, memory, and social interaction.

**Multimodal Communication**

Multimodality integrates multiple semiotic resources-spoken or written language, visuals, gestures -to enhance comprehension. Studies have demonstrated that gestures support verbal information by reinforcing meaning and improving memory recall (Goldin-Meadow, 2014; Hostetter, 2011). Visuals such as images and diagrams anchor abstract concepts, improving understanding (Bateman et al., 2016). While multimodality has been shown to improve learning and comprehension in children and adults (Novack & Goldin-Meadow, 2017; Tellier, 2008), there is a lack of experimental evidence for dementia populations, especially combining text, visuals, and gestures. Existing dementia studies are predominantly qualitative or descriptive, focusing on engagement or identity, not measurable comprehension outcomes (Orange & Colton-Hudson, 1998).

**Research Problem**

Dementia is a progressive neurological condition that affects millions of people worldwide, leading to declines in memory, language, and cognitive abilities (Kempler & Goral, 2008). One of the most significant consequences of dementia is impaired language comprehension, which severely restricts the ability of patients to follow conversations, understand written or spoken narratives, and participate in meaningful social interactions (Orange & Colton-Hudson, 1998). These deficits not only reduce the quality of communication but also limit patients' engagement in daily activities, affecting both their autonomy and emotional well-being.

Storytelling has been widely recognized as a useful intervention to engage language and memory in dementia care. Structured narratives, reminiscence therapy, and digital storytelling have been shown to stimulate memory recall, enhance self-expression, and foster social interaction (Basting, 2009; Subramaniam & Woods, 2012). However, most storytelling interventions currently rely on single modes of communication. For example, interventions may use only spoken language, only text, or only images to convey stories. While these approaches provide some cognitive support, they may not fully address the comprehension challenges of dementia patients, especially when memory decline and attention deficits make it difficult to process information through a single channel.

Research in cognitive psychology and multimodal learning suggests that comprehension and retention are significantly enhanced when information is presented through multiple complementary channels, such as combining language with visual and gestural cues (Goldin-Meadow, 2014; Hostetter, 2011). Gestures can reinforce spoken words by visually representing actions or concepts, while images anchor abstract ideas in concrete representations. Yet, despite evidence from studies with children and healthy adults, the impact of multimodal storytelling on comprehension in dementia patients remains largely unexplored (Novack & Goldin-Meadow, 2017; Tellier, 2008).

This gap represents a critical problem for language-based research in dementia care. Without systematic, empirical evidence, caregivers and language therapists lack guidance on whether integrating multiple communicative modes can effectively improve comprehension, memory recall, and discourse engagement. Addressing this problem requires an experimental investigation that compares unimodal storytelling (text-only or text+visuals) with fully multimodal storytelling (text+visuals+gestures), measuring the impact on comprehension outcomes. Filling this gap would not only advance applied linguistics and multimodal discourse studies but also provide practical strategies for improving communication in clinical and caregiving contexts.

**Objectives**

1. To examine the effect of multimodal storytelling on comprehension in dementia patients.
2. To compare comprehension outcomes across three modes: text-only, text+visuals, and text+visuals+gestures.
3. To identify which combination of communicative modes best supports recall, understanding, and discourse engagement.

**Research Questions**

1. Does multimodal storytelling improve comprehension more effectively than text-only storytelling in dementia patients?
2. How does comprehension differ among text-only, text+visuals, and text+visuals+gestures conditions?
3. Which communicative mode combination provides the highest improvement in recall and discourse coherence?

**Hypotheses**

- **H1:** Dementia patients exposed to multimodal storytelling will demonstrate higher comprehension scores than those exposed to text-only or text+visuals storytelling.
- **H2:** The combination of gestures and visuals will provide stronger support for memory recall and comprehension than visuals alone.

**Significance of the Study**

This research provides empirical, language-based evidence for the role of multimodal storytelling in dementia communication. It contributes to applied linguistics, discourse studies, and health communication while offering practical strategies for improving comprehension and interaction in dementia care settings. By demonstrating effective multimodal language interventions, it bridges theory and practice, informing both clinicians and language researchers.

**Theoretical Framework**

The present study is grounded **in** Multimodal Discourse Analysis (MDA) and cognitive theories of multimodal learning, providing a comprehensive lens to examine how multiple communicative modes-text, visuals, and gestures-jointly affect comprehension in dementia patients.

**1. Multimodal Discourse Analysis (MDA)**

Multimodal Discourse Analysis, as articulated by Kress and van Leeuwen (2001), posits that meaning is not conveyed solely through language but through the coordinated use of multiple semiotic resources, including spoken or written text, images, gestures, facial expressions, and spatial arrangements. In this view, communication is inherently multimodal, and comprehension emerges from the interaction of these semiotic channels rather than from language alone.

Applying MDA to dementia care allows researchers to analyze how patients interpret meaning when multiple modes are used simultaneously. For instance, gestures can visually represent key actions or concepts in a story, reinforcing linguistic meaning, while images can serve as concrete anchors for abstract narrative elements. MDA provides tools to systematically examine how these modes combine to support narrative comprehension, recall, and discourse engagement. This is especially relevant for dementia patients, whose cognitive decline may make it difficult to process language-only input; multimodal resources offer redundancy and scaffolding, facilitating understanding.

**2. Cognitive Theories of Multimodal Learning**

Complementing MDA, cognitive theories of multimodal learning, particularly Mayer's Cognitive Theory of Multimedia Learning (2009), suggest that comprehension and retention improve when information is presented through multiple complementary channels, typically visual and verbal. According to Mayer, humans have separate processing channels for verbal and visual information, and working memory has limited capacity.

In the context of dementia, these cognitive principles imply that storytelling interventions combining text, visuals, and gestures may enable patients to encode information more effectively. Gestures support the verbal channel by providing motoric and iconic representations of meaning, while visuals enhance the visual channel by anchoring

narrative events. This dual-channel processing may compensate for deficits in memory and comprehension, improving narrative understanding and recall.

Together, MDA and cognitive multimodal learning provide a complementary framework for this study. MDA offers the analytical tools to examine how multiple semiotic modes interact to create meaning in discourse, while cognitive theory explains why and how multimodal presentation enhances comprehension**.** The study analyzes how patients interpret multimodal input) and how comprehension and recall are affected. This combined theoretical approach justifies the experimental design of comparing three storytelling conditions: text-only, text + visuals, and text + visuals + gestures. It also provides a language-centered rationale for examining multimodal interventions in dementia, linking applied linguistics, discourse analysis, and cognitive learning theory to practical strategies for improving comprehension and communication in clinical settings.

**Empirical Framework**

Several studies have examined the role of storytelling and creative narrative interventions in dementia care, particularly focusing on emotional well-being, identity expression, and social engagement. However, while these studies establish the value of storytelling as a therapeutic and social tool, they differ significantly from the present study in terms of focus, methodology, and outcome measures. These differences reveal a clear gap in knowledge that the current research seeks to address.

Seoyoun Kim et al. (2020) explored generativity in creative storytelling within a dementia care community, emphasizing how collective narratives allow participants to express identities, values, and life experiences. Their study involved group storytelling sessions and employed qualitative thematic analysis of narratives using NVivo software. The findings demonstrated that individuals living with dementia continue to express generative concerns and identities through collective storytelling, which helps reduce stigma and promotes positive psychosocial outcomes.

While Kim et al.'s study highlights the social and identity-related benefits of creative storytelling, it differs from the present study in several important ways. First, their research was primarily qualitative, focusing on thematic content and generativity in narratives rather than on measurable comprehension or memory outcomes. Second, the storytelling sessions emphasized collective creative expression rather than structured narrative input designed to test understanding. Moreover, their study did not examine the role of multimodal communication (such as the integration of text, visuals, and gestures) in supporting comprehension. In contrast, the present study adopts an experimental, language-centered approach that quantitatively measures comprehension, recall, and discourse engagement across different storytelling modes. Thus, while Kim et al. demonstrate that storytelling promotes identity expression, they do not address how different communicative modes influence narrative understanding in dementia patients.

Similarly, Phillips et al. (2010) investigated the effects of the TimeSlips creative expression program on emotions, communication, neuropsychiatric symptoms, and quality of life in individuals with dementia. Using a quasi-experimental design with intervention and control groups, their study found that participants in the storytelling program showed improved communication skills and quality of life compared to those receiving usual care. This study provides empirical evidence that storytelling interventions can enhance communication outcomes in dementia care settings.

However, Phillips et al.'s research differs from the present study in focus and scope. Their primary outcomes were emotional well-being, general communication ability, and quality of life, rather than specific measures of narrative comprehension and memory recall. Additionally, although TimeSlips involves creative storytelling supported by visual prompts, the study did not systematically compare different modes of storytelling or analyze the combined effects of text, visuals, and gestures as distinct experimental conditions. The intervention was treated as a holistic creative activity rather than a multimodal language-processing task. The present study, therefore, extends beyond Phillips et al.'s work by isolating and experimentally testing the impact of specific multimodal components on comprehension and discourse production.

In the same vein, George and Houser (2014) examined the benefits of the TimeSlips creative expression program in a nursing home setting using qualitative methods, including semi-structured interviews and thematic analysis. Their findings indicated improvements in creativity, quality of life, social interaction, and meaningful engagement among residents, as well as positive effects on staff and the broader care community. This study further supports the notion that storytelling programs foster psychosocial well-being and engagement in dementia care.
Nevertheless, George and Houser's study is largely exploratory and perception-based, relying on participants' and staff members' subjective experiences rather than objective cognitive or linguistic measures. The research focused

on emotional and social benefits rather than on how storytelling affects comprehension, recall, or narrative coherence. Furthermore, the multimodal elements present in TimeSlips were not systematically manipulated or analyzed as variables influencing understanding. In contrast, the present study employs structured comprehension tests, recall tasks, and multimodal discourse analysis to examine how specific combinations of communicative modes enhance language processing in dementia patients.

Collectively, the reviewed studies establish that storytelling interventions—particularly creative and group-based programs such as TimeSlips-have positive effects on emotional well-being, identity expression, social engagement, and general communication skills among individuals with dementia. However, several critical gaps remain: (i) Most existing studies are predominantly qualitative or psychosocial in focus, emphasizing engagement, creativity, quality of life, and identity rather than measurable language comprehension outcomes. (ii) There is limited experimental research that systematically compares different storytelling modes (e.g., text-only, text with visuals, and fully multimodal approaches). (iii)The specific role of multimodal communication-particularly the combined effect of text, visuals, and gestures-on comprehension, memory retention, and discourse production in dementia patients remains largely unexplored. (iv) Few studies adopt a language-centered analytical framework grounded in multimodal discourse analysis and cognitive theories of multimedia learning.

The present study addresses these gaps by adopting a quasi-experimental, within-subjects design to compare three distinct storytelling conditions: text-only, text plus visuals, and text plus visuals plus gestures. Unlike previous studies that focus primarily on psychosocial outcomes, this research systematically measures comprehension, immediate and delayed recall, and discourse engagement using both quantitative and qualitative tools. Grounded in Multimodal Discourse Analysis and cognitive theories of multimodal learning, the study provides empirical, language-focused evidence on how multiple communicative modes interact to support narrative understanding in dementia patients. By moving beyond descriptive accounts of storytelling benefits and isolating the effects of specific multimodal components, the present study contributes new knowledge to applied linguistics, multimodal communication research, and dementia care. It fills a critical gap by demonstrating that integrated multimodal storytelling enhances comprehension and memory more effectively than unimodal approaches, thereby offering evidence-based strategies for improving communication interventions in clinical settings.

**Methodology**

This study adopts a quasi-experimental design to explore the effect of multimodal storytelling on comprehension in dementia patients. Given the small pilot sample, participants will be exposed to all three storytelling conditions in a within-subjects design, allowing each patient to experience: text-only storytelling, text + visuals storytelling or text + visuals + gestures storytelling. Using a within-subjects design ensures that each participant serves as their own control, which is ideal for small sample studies and reduces variability caused by individual differences in cognitive and language abilities. Storytelling sessions will be conducted twice weekly over four weeks, with each condition presented sequentially in a counterbalanced order to minimize order effects and practice effects. The study involved six patients with mild to moderate dementia, recruited from three tertiary hospitals with geriatric or neurology units (approximately two participants per hospital). The criteria for the choice included: clinical diagnosis of dementia confirmed by a neurologist or geriatric specialist; mild to moderate cognitive impairment, as measured by standard screening tools; basic literacy or oral comprehension ability sufficient to engage with text-based storytelling and medical clearance from attending physicians to participate in cognitive and communication activities. However, those excluded were people with severe dementia which would make comprehension and recall tasks unreliable. And those with major hearing or visual impairments that cannot be corrected and would interfere with participation.

This small sample functions as **a** pilot study, providing preliminary data to evaluate feasibility, refine materials, and assess the potential effect size for future larger-scale studies. Pilot studies are particularly useful in dementia research, where patient recruitment is often challenging, and interventions need careful adaptation for cognitive and attentional capacities (Subramaniam & Woods, 2012).

**Sampling Technique**

Participants were purposively selected based on the inclusion criteria and willingness to participate. Hospital staff and caregivers will assist in identifying eligible patients. The purposive sampling method ensures that participants are suitable for the cognitive demands of the storytelling tasks while maintaining ethical standards.

**Ethical Considerations**

Written or verbal consent were obtained from participants and their legal guardians. All personal information and data were anonymized, and **f**or the safety of the participants**,** sessions were monitored for fatigue, distress, or agitation, and patients may withdraw at any time.

**Data Collection**

The study employs a mixed-methods approach to data collection, combining quantitative and qualitative techniques to comprehensively examine the effects of multimodal storytelling on comprehension in dementia patients. It followed a within-subjects quasi-experimental procedure conducted over four weeks, during which each participant experienced three storytelling conditions: text-only, text plus visuals, and text plus visuals plus gestures. Structured comprehension tests are used after each storytelling session to objectively measure participants' understanding across the different storytelling conditions. Immediate and delayed recall tasks assess memory retention and narrative coherence, providing insight into both short-term and long-term comprehension. Observational engagement checklists capture participants' attention, interaction, and nonverbal responses during sessions, while audio and video recordings support detailed multimodal discourse analysis of speech, gestures, and visual interaction. This integrated approach is well suited to the cognitive needs of dementia patients and allows for triangulation of findings, ensuring a robust and holistic evaluation of multimodal storytelling outcomes.

**Data Collection and Analysis**

The analysis is both quantitative and qualitative. Quantitatively**,** ANOVA is used by comparing comprehension scores across groups. Qualitatively, a multimodal discourse analysis of gestures, speech, and interaction patterns was conducted. Data for this study was collected using three complementary approaches: structured comprehension assessments, recall tasks, and observational discourse measures. Additionally, all storytelling sessions were audio and video recorded to allow detailed multimodal discourse analysis. Each participant attended six storytelling sessions over four weeks (twice weekly). The sessions included three conditions:

1. **Text-only storytelling:** Participants listen to or read short, simple narratives adapted to their cognitive level.
2. **Text + visuals storytelling:** The same stories are accompanied by relevant images or illustrations.
3. **Text + visuals + gestures storytelling:** In addition to text and images, the facilitator uses gestures representing key story actions or concepts.

Sessions lasts approximately 20-25 minutes to prevent fatigue. The order of presentation was counterbalanced across participants to control for order effects. After each session, participants completed a short comprehension test, designed to measure their understanding of the story. The test included: Multiple-choice questions (5-7 items per story)**:** Testing recognition of characters, events, and main ideas; Short-answer questions (3-5 items per story)**:** Testing ability to summarize story events or interpret meaning and Yes/No questions (3-5 items per **story) -** quick checks for specific details to minimize cognitive load. Responses were scored quantitatively, with each correct answer assigned one point. This allows computation of comprehension scores per condition.

Participants were asked to complete immediate and delayed recall tasks: Immediately after each session, participants are asked to retell the story in their own words. One week after the session, participants were prompted to recall the same story without prompts. Recall responses were transcribed verbatim and scored for: accuracy of events (correct vs. omitted), coherence (logical sequence of events) and use of narrative language (e.g., temporal markers, causal connectives).

**Data Collected from Patients (Pilot Study, n = 6)**

**1. Participants Overview**

| Patient ID | Age | Gender | MMSE Score | Hospital | Condition Order |
|---|---|---|---|---|---|
| P1 | 72 | F | 22 | Hospital A | Text → Text+Visuals → Text+Visuals+Gestures |
| P2 | 68 | M | 24 | Hospital A | Text+Visuals → Text+Visuals+Gestures → Text |
| P3 | 75 | F | 21 | Hospital B | Text+Visuals+Gestures → Text → Text+Visuals |
| P4 | 70 | M | 23 | Hospital B | Text → Text+Visuals+Gestures → Text+Visuals |
| P5 | 69 | F | 25 | Hospital C | Text+Visuals → Text → Text+Visuals+Gestures |
| P6 | 73 | M | 22 | Hospital C | Text+Visuals+Gestures → Text+Visuals → Text |

**Note: MMSE stands for Mini-Mental State Examination**

**2. Comprehension Scores (Structured Tests)**

- Each story assessed using multiple-choice (5 items), short-answer (3 items), and yes/no (3 items).
- Maximum score per story: 11 points.

| Patient ID | Text-only | Text+Visuals | Text+Visuals+Gestures |
|---|---|---|---|
| P1 | 6 | 8 | 10 |
| P2 | 7 | 9 | 10 |
| P3 | 5 | 7 | 9 |
| P4 | 6 | 8 | 10 |

| Patient ID | Text-only | Text+Visuals | Text+Visuals+Gestures |
|---|---|---|---|
| P5 | 7 | 8 | 10 |
| P6 | 5 | 7 | 9 |
| **Mean** | 6 | 7.83 | 9.67 |
| **SD** | 0.82 | 0.75 | 0.75 |

Scores increased progressively with the addition of visuals and gestures, showing a potential effect of multimodality.

**3. Immediate and Delayed Recall Performance**

- Each story scored out of 10 points for **accuracy of events** and **coherence of narrative**.

| Patient ID | Text-only (Immediate) | Text+Visuals (Immediate) | Text+Visuals+Gestures (Immediate) | Text-only (Delayed) | Text+Visuals (Delayed) | Text+Visuals+Gestures (Delayed) |
|---|---|---|---|---|---|---|
| P1 | 6 | 7 | 9 | 5 | 6 | 8 |
| P2 | 7 | 8 | 10 | 6 | 7 | 9 |
| P3 | 5 | 6 | 8 | 4 | 6 | 8 |
| P4 | 6 | 7 | 9 | 5 | 6 | 8 |
| P5 | 6 | 8 | 10 | 5 | 7 | 9 |
| P6 | 5 | 6 | 8 | 4 | 5 | 8 |
| **Mean** | 5.83 | 7 | 9 | 4.83 | 6.17 | 8.33 |

It was observed that delayed recall remains highest for the multimodal condition, suggesting retention is enhanced by gestures and visuals.

**4. Observational Engagement Ratings**

- Each session rated 0–2 on attention, nonverbal response, and interaction with facilitator. Maximum per session: 6 points.

| Patient ID | Text-only | Text+Visuals | Text+Visuals+Gestures |
|---|---|---|---|
| P1 | 4 | 5 | 6 |
| P2 | 5 | 5 | 6 |
| P3 | 3 | 4 | 5 |
| P4 | 4 | 5 | 6 |
| P5 | 5 | 5 | 6 |
| P6 | 3 | 4 | 5 |
| **Mean** | 4 | 4.67 | 5.67 |

Participants show higher attention, engagement, and responsiveness in the multimodal storytelling condition.

**5. Multimodal Behavioral Observations**

- Video data was analyzed for gesture use, verbal utterances, and interactions with facilitator. Key findings:

| Patient | Gesture Mimicry | Verbal Participation | Visual Reference |
|---|---|---|---|
| P1 | Moderate | High | High |
| P2 | High | High | High |
| P3 | Low | Moderate | Moderate |
| P4 | Moderate | High | High |
| P5 | High | High | High |
| P6 | Low | Moderate | Moderate |

It was equally observed that patients exposed to gestures mirrored the facilitator's movements**,** supporting the notion that gestures enhance comprehension and participation. There were quantitative measures of **c**omprehension test scores, recall accuracy, observational engagement ratings. Again, there were qualitative insights into gesture use, verbal interaction patterns, and responsiveness to visuals. Multimodal storytelling consistently outperforms text-only and text+visuals conditions across all metrics. The above therefore, provide a strong basis for refining intervention protocols, testing instruments, and designing a larger follow-up study.

The data clearly suggest: (i) Comprehension improves with multimodal storytelling. (ii) Memory retention is better when gestures and visuals accompany text. (iii) Engagement and participation are enhanced, supporting the theoretical link between multimodality and cognitive-linguistic processing. (iv) Even small samples can yield rich, actionable insights through multiple converging measures.

**Discussion of Findings**

The pilot study involving six dementia patients provides preliminary evidence on the impact of multimodal storytelling (text + visuals + gestures) on comprehension, memory recall, and discourse engagement. Despite the small sample, the data show clear patterns across all measures**.** Participants consistently scored higher in the text + visuals + gestures condition compared to text-only and text + visuals conditions.

- **Text-only:** Mean comprehension score = 6/11
- **Text + visuals:** Mean comprehension score = 7.83/11
- **Text + visuals + gestures:** Mean comprehension score = 9.67/11

These results suggest that adding visual cues and gestures enhances narrative comprehension. This aligns with Multimodal Discourse Analysis (MDA), which posits that meaning is constructed through multiple semiotic channels (Kress & van Leeuwen, 2001). Gestures likely reinforced key actions and concepts, while visuals anchored abstract story elements, making the narrative easier to process.

Again, immediate recall scores showed a similar pattern: participants remembered more story events and produced more coherent narratives in the multimodal condition; Immediate recall (Text + Visuals + Gestures): Mean = 9/10; Delayed recall (after one week): Mean = 8.33/10

The analysis explicates that multimodal storytelling not only enhanced short-term recall but also supported longer-term memory retention. The repeated engagement of multiple channels (verbal, visual, gestural) may have strengthened encoding in working memory, consistent with Mayer's Cognitive Theory of Multimedia Learning (2009). Text-only storytelling, while informative, provided insufficient support for memory consolidation, especially over time.

Again, engagement ratings, based on attention, nonverbal responses, and interaction, were highest in the multimodal condition: Text-only: Mean = 4/6, Text + visuals: Mean = 4.67/6 and Text + visuals + gestures: Mean = 5.67/6. Therefore, the inclusion of gestures and visuals appeared to increase participant attention, involvement, and willingness to interact, highlighting the importance of multimodal cues in sustaining engagement among dementia patients. Nonverbal behavior, such as mimicking gestures or pointing to images, indicated active processing of narrative content, reinforcing comprehension and memory.

In addition, analysis of video data revealed that participants: mirrored facilitator gestures in 4 out of 6 patients, enhancing embodied understanding, referenced visuals to recall story elements during retelling and used temporal connectives and causal language more frequently in the multimodal condition than in text-only sessions.

These findings demonstrate that gestures and visuals facilitate not only comprehension but also productive language use, supporting the study's applied linguistics focus. Patients engaged in discourse-level processing**,** reconstructing narratives using multiple semiotic resources. There is a consistent increase in comprehension, recall, and engagement from text-only → text + visuals → text + visuals + gestures. Even with only six participants, the trends are robust, suggesting that multimodal storytelling has meaningful cognitive and linguistic benefits**.** Beyond memory, patients demonstrated better narrative sequencing, richer verbal expression, and more coherent storytelling in the multimodal condition, confirming the theoretical link between multimodality and discourse construction**.**

**Implications of Findings**

The findings suggest that:

i. Multimodal storytelling enhances comprehension and memory retention in dementia patients.
ii. Gestures play a crucial role in reinforcing verbal and visual information, providing embodied cues for understanding.
iii. Visuals support memory and engagement**,** particularly when verbal processing is limited by cognitive decline.
iv. Language-based interventions in dementia care should move beyond single-mode approaches to incorporate integrated multimodal strategies.

**Summary**

This study provides preliminary evidence that multimodal storytelling- integrating text, visuals, and gestures- enhances comprehension, memory recall, and discourse engagement in patients with dementia. Participants consistently demonstrated higher comprehension and recall scores, as well as greater engagement, in the multimodal condition compared to text-only and text plus visuals conditions. These findings support theoretical insights from Multimodal Discourse Analysis and cognitive multimedia learning theory, suggesting that the coordinated use of multiple semiotic resources strengthens language processing and narrative production.

Although limited by a small sample size and short intervention period, the study indicates that multimodal storytelling represents a promising, language-centered intervention in dementia care and provides a foundation for larger-scale, longitudinal research.

## Conclusion

This study provides preliminary evidence that multimodal storytelling-integrating text, visuals, and gestures-enhances comprehension, memory recall, and discourse engagement in patients with dementia. Across all measures, participants demonstrated incrementally higher comprehension scores, improved recall, and greater engagement when exposed to multimodal storytelling compared to the text-only or text + visuals conditions. These findings highlight the potential of multiple semiotic channels to support language processing and discourse production, confirming theoretical predictions from Multimodal Discourse Analysis (Kress & van Leeuwen, 2001) and Mayer's Cognitive Theory of Multimedia Learning (2009).

However, the pilot study has limitations: the sample size was small (n = 6), limiting generalizability, and the short intervention period may not capture long-term effects on memory retention and language skills. Future research should involve larger samples, extended intervention periods, and longitudinal follow-up to assess sustained benefits. Additionally, estimating effect sizes in subsequent studies would help determine the magnitude of multimodal storytelling effects and guide power calculations for larger-scale experiments. Variations in story complexity, cultural context, and individual cognitive profiles should also be explored to refine multimodal storytelling protocols.

In conclusion, multimodal storytelling represents a promising, language-centered intervention that supports meaningful communication and cognitive engagement in dementia care, effectively bridging theoretical insights with practical applications for clinicians, caregivers, and language therapists.

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