

Unveiling Information Through Narrative In Conversational Information Seeking

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ABSTRACT

Searching through conversational interactions has been emphasized as the next frontier. Nowadays, conversational agents can generate natural language responses, transforming how we search for information. A key challenge in conversational information-seeking is how these agents present information: should they only reflect facts, cater to human cognitive preferences, or strike a balance between them? These challenges raise questions about aligning conversational agents with human cognitive processes. Our position paper emphasizes the role of narrative in addressing these questions. We explore how narratives influence human comprehension and propose a framework for optimal conversational narratives. These narratives aim to enhance interaction between humans and conversational agents in explanatory information-seeking scenarios.

CCS CONCEPTS

• **Information systems** → Users and interactive retrieval; *Language models*; • **Human-centered computing** → Human computer interaction (HCI).

KEYWORDS

Conversational Information Seeking, Large Language Models, Narrative

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1 INTRODUCTION

Humans have the ability to create and communicate narratives [1, 32, 33]. Human storytelling's complexity, depth, and creativity are signs of cognitive and social intelligence, enabling us to share experiences and shape our understanding of the world [15, 18, 40, 51]. The human brain can process narratives engagingly, activating the same neural paths as if a person is directly experiencing the event [41, 60, 73]. As shown in Figure 1, the *factual approach* (i.e., a way of making decisions based on objective information) presents

information in a concise manner akin to a reference source [46], whereas the *narrative approach* (i.e., a way of invoking personal connection to illustrate the impact of policy changes on individuals' lives) conveys information through storytelling to contextualize facts within a broader setting.

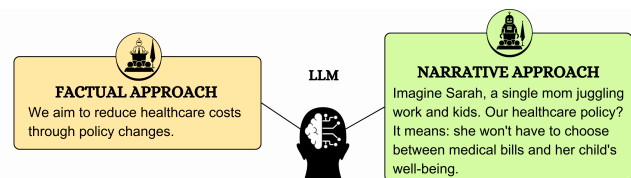


Figure 1: Contrasting approaches to information delivery: Factual vs. Narrative. Supposing that a conversational agent aims to play the role of a politician to address a healthcare policy.

Efforts have been made to align conversational agents with human comprehension needs to make the information more engaging and relatable [82, 92]. Additionally, researchers have explored personalization approaches that adapt the content and delivery based on individual user preferences and prior knowledge [57, 67, 89]. However, many of these efforts have been limited in scope or lack a comprehensive framework that systematically addresses the relationship between language models, neural information processing, and how humans comprehend and process natural language interactions with conversational agents. We aim to address these problems by asking two RQs:

- RQ1.** How can narrative help align conversational agents with the human brain's cognitive process to make them more understandable?
- RQ2.** How can integrating narrative techniques with conversational agents be systematically accomplished?

In this paper, we propose several steps that help answer our RQs: (i) We investigate the impact of narrative on neural activity within the human brain and discuss the role of narrative in conversational agents, specifically in information-seeking scenarios (Section 2), (ii) We explore the applicability of the novel conversational narrative system in alignment with human comprehension needs, demonstrating the potential of our approach (Section 3.1), and (iii) We formulate an optimal form of conversational narrative information-seeking system that enables successful linguistic communication between humans and agents (Section 3.2).

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2 BACKGROUND

In this section, we explore how the human brain processes narratives, the role of narrative in conversational agents, and the relationship between narrative and conversational information-seeking.

2.1 Human Brain and Narrative

Narrative as a noun refers to a story or a description of a series of events¹. In other words, it is a particular way of explaining events and plays a crucial role in human communication and cognition [38]. Researchers have used neuroimaging techniques like functional Magnetic Resonance Imaging (fMRI), Positron Emission Tomography (PET), and Magnetoencephalography (MEG) to study how the brain processes narratives, identifying active brain regions involved in narrative comprehension compared to factual processing [2, 3, 8, 26, 30, 50, 68, 69, 88]. Research into *narrative transportation* examines how individuals become cognitively and emotionally absorbed in stories. This immersive experience enhances emotional responses and alter attitudes and beliefs by aligning the listener's brain with the storyteller's [6, 14, 31, 36, 59].

Furthermore, research suggests that presenting information in narratives can enhance learning and memory, as well as promote engagement and motivation [22, 65, 86], which led to the development of narrative-based educational strategies [17, 39, 53, 58]. These studies highlight how narratives significantly influence human cognition, emotion, and learning, revealing the complex neural interactions involved in narrative comprehension.

2.2 Conversational Agents and Narrative

People engage in daily conversations to share knowledge, experience, values, and emotions. This natural human behavior has inspired the development of conversational agents that use dialogue to offer intuitive software services via text-based and speech-based interfaces [12, 28, 55, 76, 84, 91]. Conversational storytelling agents leverage narrative to create immersive experiences and encourage exploration. Using storytelling elements such as character, setting, and plot, these agents transform factual information into narratives to capture the user's attention [49]. This includes applications in language learning [90], communication skills [21], museum guides [75], and health consultations [47].

Furthermore, the use of narrative in conversational agents has the potential to structure the information and make abstract concepts more accessible to a wider audience [20, 56]. For example, by embedding data within stories, agents can help users imagine complex information, draw connections between facts, and enhance overall comprehension [64]. Conversational agents personalize information delivery by tailoring interactions to users' interests, knowledge, and learning styles, making the storytelling process dynamic and user-driven [45, 83].

2.3 Conversational Information Seeking and Narrative

In conversational search and question-answering systems, narrative can enhance naturalness and user satisfaction [48, 62]. Vakukenko et al. [81] suggest that structuring search results as coherent

narratives can improve user satisfaction and information recall in conversational exploratory search scenarios (i.e., presenting search results not just as a list of individual items, but connecting them into a logical flow or story). For instance, by breaking down information into smaller stories, conversational agents can guide users through a logical progression of ideas, building a comprehensive understanding of the subject matter [10, 78]. These interactions also assist in formulating information needs through interactive dialogue, capitalizing on the natural human ability for conversation, which requires minimal learning [78]. Furthermore, these systems are highly customizable, incorporating the user's context and specific information units to tailor the experience [91]. In scenarios where users' hands and eyes are otherwise engaged, voice-based systems provide a significant advantage by making information accessible. Overall, integrating narrative into conversational systems is complex, requiring advanced language understanding to produce relevant stories, and balancing stories with factual content.

3 RESEARCH AGENDA

In the following section, with respect to the findings in the previous section, we organize our research questions into two subtasks, namely exploring the potential benefits and use cases of incorporating narrative into conversational systems designed for information-seeking tasks (Section 3.1) and discussing the process of narrative generation for conversational information-seeking systems that cater to human cognitive needs and preferences (Section 3.2).

3.1 Applicability of Narrative in Conversational Information-Seeking Tasks

Narrative techniques in conversational systems can make information delivery engaging and tailored to user preferences. For complex topics like "cognitive regulation of ventromedial prefrontal activity," as shown in Figure 2, there are different approaches a conversational agent could take to present the information: a system could present information in (i) an *unprocessed form* by delivering summaries in plain language and segmenting the information into digestible parts, (ii) a *technical format* by providing detailed specialized descriptions alongside explanatory notes, or (iii) a *personalised presentation* to match the user's comprehension.

Narrative techniques can enhance conversational information-seeking across various domains, particularly where users appreciate examples, human experiences, and relatable contexts alongside facts. These techniques foster engaging, memorable, and persuasive interactions. Some key areas where narrative can be useful include:

- (1) **Exploratory information seeking:** When users try to understand a complex topic, narratives can provide context, real-world examples, and a structured way to present information [52, 85].
- (2) **Sense-making and knowledge integration:** Narratives can help users integrate and make sense of disparate pieces of information. By weaving different facts and data points into a cohesive story, users can better understand the relationships of the information [27, 44, 66].
- (3) **Problem-solving and decision-making:** Narratives can effectively present scenarios, or hypothetical situations that require decision-making or problem-solving [9, 29, 87].

¹<https://dictionary.cambridge.org/>

Table 1: Desired requirements for conversational information-seeking systems and respective narrative-driven solutions.

CIS System Requirement	Narrative Technique
1 Interacting through human intelligible dialogue-like conversations and mapping complex concepts to more relatable domains [23, 77, 79, 91].	<i>Analogy and Analogical Reasoning</i>
2 Applying real-world examples to illustrate concepts and make them more tangible [12, 34, 72].	<i>Anecdotes and Metaphors</i>
3 Interacting proactively through system participation and user Revealment using mixed-initiative (implies listening) including clarifying questions and keeping track of memory [4, 62, 77, 80].	<i>Branching</i>
4 Creating a relatable persona that guides the user through the conversation [13, 25, 54].	<i>Character Development</i>
5 Taping into users' emotions by sharing personal experiences, creating empathy, curiosity, and trust [61, 74].	<i>Emotional Connection</i>
6 Revealing information gradually, rather than showing it all at once [11, 43, 63].	<i>Progressive Disclosure</i>
7 Introducing a problem that the users can relate to and then guide them through the resolution process [35, 71].	<i>Conflict and Resolution</i>
8 Painting a picture in the user's mind through the conversation [7, 37].	<i>Imagery and Description</i>

- (4) **Persuasion:** If the goal is to advocate for a viewpoint, narratives can be used for presenting arguments and real-life evidence in a memorable way [5, 24, 36, 70].
- (5) **Personal experiences:** When users seek information based on personal experiences, narratives can be used to share stories and provide insights into the lived experiences [16, 19, 42].

3.2 Narrative Generation for Conversational Information-seeking Systems

Suppose we generate narrative-driven responses in a conversational exploratory information-seeking setting, as shown in Figure 2. By integrating narrative techniques such as analogies, metaphors, real-world examples, and imagery, we can generate a narrative around the information with a clear beginning, middle, and end to *humanize* information. Consequently, we paint a picture in the user's mind, making the information more tangible and immersive, thus enhancing the comprehension of abstract concepts. Ensuring that narratives remain relevant, concise, and aligned with the information seekers' goals is crucial.

By leveraging the findings from the research on the investigation of cognitive processing for narrative-based information highlighted in Sections 2.1–2.3 as well as considering the conversational information-seeking tasks and requirements discussed in Section 3.1, we suggest different components for an optimal form of a novel conversational narrative information-seeking system in Table 1 that facilitate effective interaction between humans and conversational agents during information-seeking conversations.

Depending on the domain and the task that a conversational information-seeking system aims to be designed for, by incorporating narrative techniques into the design of conversational information-seeking systems, conversational agents can create an engaging, understandable, and user-centered experience that aligns with the human brain's cognitive process.

4 SUMMARY

We proposed a framework for a conversational narrative information-seeking system by leveraging narrative techniques. We explored the role of narrative in aligning conversational agents with human cognitive processes to enhance communication and comprehension in exploratory information-seeking. Furthermore, we examined the applicability of the conversational narrative information-seeking system across various domains. We see our task in developing this

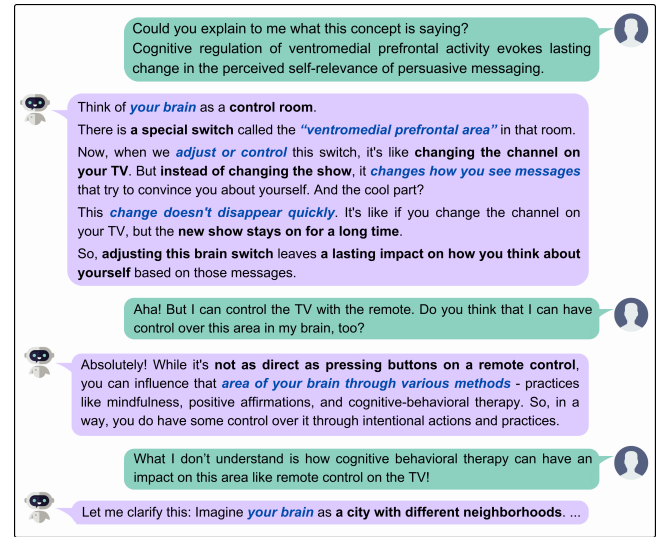


Figure 2: An example of a conversational narrative information-seeking system in an exploratory search scenario. Incorporating narrative techniques such as analogical reasoning, which identifies similarities between the target concept (information being conveyed) and a more familiar concept (analogy), highlighted in blue and black colors, respectively, and progressive disclosure which reveals information gradually throughout the narrative, rather than presenting it all at once, presented by line breaks. For more examples, see Appendix A.

idea further by designing evaluation techniques to strike a balance between accuracy, engagement, and understandability.

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A APPLICATION EXAMPLES OF CONVERSATIONAL NARRATIVE INFORMATION SEEKING IN DIFFERENT DOMAINS

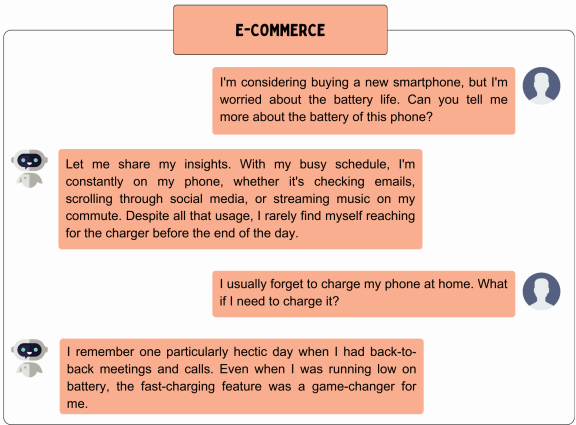


Figure 3: An example of a conversational narrative information-seeking system in e-commerce.

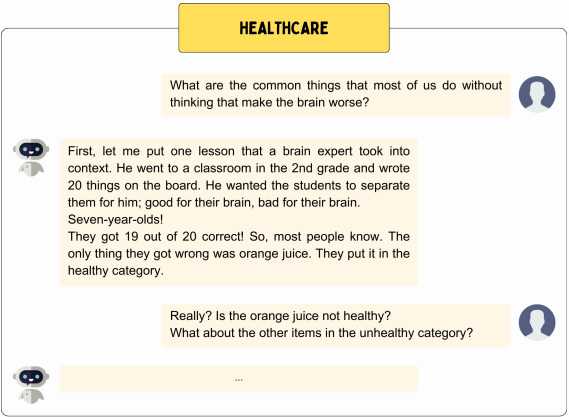


Figure 4: An example of a conversational narrative information-seeking system in healthcare.

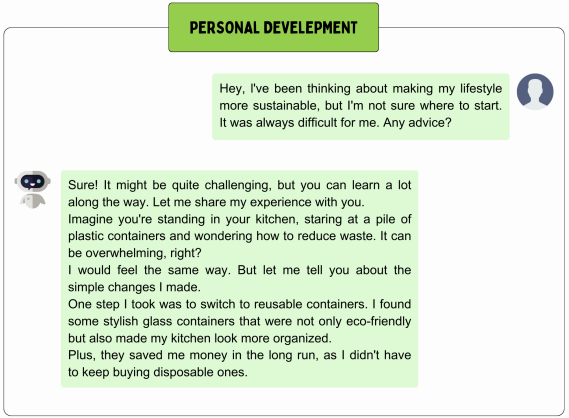


Figure 5: An example of a conversational narrative information-seeking system in personal development.