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Research Article

Dual-Pathway Mechanism of Socially Shared Retrieval-Induced Forgetting: Shared Attention Theory Perspective and Applications in the Intelligent Era

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Abstract

At a time when artificial intelligence (AI) is profoundly reshaping the socioeconomic landscape, intelligent education platforms, social media recommendation algorithms, and multi-agent systems are increasingly intervening in human information processing and memory construction processes. While these technologies enhance cognitive efficiency, they may also trigger systematic social forgetting, profoundly affecting the formation and evolution of collective memory. Socially Shared Retrieval-Induced Forgetting (SS-RIF) refers to the forgetting effect that listeners exhibit toward related but unmentioned information due to monitoring speakers' selective retrieval during social interactions. Although this effect has been repeatedly confirmed across diverse material types and group situations, existing research has long relied on individual cognitive co-retrieval mechanisms to explain it, failing to fully account for its significant social situational dependence. Based on shared attention theory, this paper proposes a dual-pathway model to systematically elaborate the mechanisms underlying SS-RIF: the cognitive resource redistribution pathway and the social motivation regulation pathway. Through theoretical analysis and systematic literature review, this study distinguishes between cognitive-level shared attention and motivation-level shared reality, and analyzes the integrated roles of inhibitory and blocking mechanisms in this process. Furthermore, aligning with the conference theme of AI empowerment for economy, management and social sciences, this paper explores the application prospects of SS-RIF in intelligent education, smart justice, and multi-agent interaction. The findings suggest that SS-RIF is not merely a cognitive byproduct but a social cognitive strategy with shared attention at its core, providing a theoretical framework for understanding collective memory formation and social cognitive coordination in the intelligent era.

Keywords

Socially Shared Retrieval-Induced Forgetting, Shared Attention, Co-retrieval, Artificial Intelligence, Collective Memory

1. Introduction

At a time when artificial intelligence (AI) is profoundly reshaping the socioeconomic landscape, machine learning interpretability, multi-agent systems, and intelligent decision support systems are increasingly intervening in human information processing and memory construction processes [1]. Intelligent education platforms selectively present teaching content through personalized recommendation algorithms, social media

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platforms shape group information environments through collaborative filtering technologies [2], and multi-agent systems achieve distributed cognitive coordination through selective information sharing [3]. While these technologies enhance cognitive efficiency, they may also trigger systematic social forgetting, profoundly affecting the formation and evolution of collective memory [4].

2. Social Situational Effects of SS-RIF and Theoretical Explanation Dilemmas

Socially Shared Retrieval-Induced Forgetting (SS-RIF) [5], as an important phenomenon revealing memory transmission mechanisms in social interaction, provides a unique theoretical perspective for understanding collective memory formation in the intelligent era. SS-RIF refers to the forgetting effect that listeners exhibit toward related but unmentioned information during the process of monitoring speakers' selective retrieval. The groundbreaking study by Cuc et al. (2007) revealed that speakers' selective retrieval not only causes forgetting of related information in themselves but also spreads to listeners through social cognitive mechanisms [5]. Although this effect has been repeatedly confirmed in studies with different material types and group situations [6, 7], explanations of its mechanism have long relied on a single "co-retrieval" hypothesis [8], failing to account for why this effect is significantly modulated by social factors such as group identity, physical presence, and emotional state [6, 9].

Shared Attention theory [10] provides a new perspective for breaking through this theoretical dilemma. This theory posits that when individuals perceive mutual attention from a "first-person plural perspective," it triggers cognitive resource redistribution and social motivation activation [11-13]. Introducing this theory into SS-RIF research can construct a dual-pathway model integrating cognitive and social factors. Against the backdrop of rapid AI development, deeply understanding this mechanism holds important theoretical value and practical significance for optimizing intelligent education design, ensuring testimony reliability in the process of judicial intelligence, and enhancing cognitive coordination capabilities of multi-agent systems.

After more than a decade of development, SS-RIF research has accumulated substantial evidence regarding social situational modulation effects, posing serious challenges to the single co-retrieval mechanism. Coman and Hirst (2015) systematically examined the moderating role of group identity, finding that listeners exhibited significant SS-RIF when speakers were in-group members, while the effect disappeared when speakers were out-group members [6]. A more important finding was that SS-RIF could also be induced toward out-group speakers by activating a superordinate shared identity (such as "student" identity) [6]. This indicates that group identity, as a social motivation variable, can significantly modulate the strength of SS-RIF. Speakers' professional identity and credibility also significantly affect the occurrence of SS-RIF. Mao et al. (2021) found that non-expert speakers were more likely to induce SS-RIF than expert speakers, because listeners invest more cognitive resources in accuracy monitoring when facing non-experts. However, the effect of expert identity is complexly moderated by topic self-relevance: when the topic is highly relevant to listeners and attitudes are consistent, SS-RIF occurs even when facing experts; but when attitudes are inconsistent, the effect disappears [7]. Furthermore, Coman et al. (2014) found that when content threatens group identity, listeners may engage in counterargument retrieval, offsetting the inhibitory effect [14].

Physical presence and real-time interaction constitute another important boundary condition. Zhang et al. (2020) found that the physical presence of another person is a necessary condition for SS-RIF to occur, and the effect disappears when only listening to audio recordings [15]. Zhu and Zhang (2021) found that both real-time interaction and pre-recorded video can produce SS-RIF with no significant difference in strength, but both are stronger than pure text conditions [16]. Emotional state also significantly modulates this effect: high-approach-motivation positive emotions enhance SS-RIF, while negative emotions inhibit it [17]. These boundary conditions suggest that SS-RIF is not merely a cognitive byproduct but a social cognitive strategy—listeners save cognitive resources by synchronizing with speakers' selective forgetting, shifting limited attentional resources from information verification to relationship maintenance. Therefore, it is necessary to introduce shared attention theory and regard SS-RIF as a social cognitive process with shared attention at its core [12, 18].

3. Dual-Pathway Mechanism of Shared Attention-Driven SS-RIF

Based on shared attention theory, this paper proposes a dual-pathway model for SS-RIF formation: the cognitive resource redistribution pathway and the social motivation regulation pathway. Shared attention is defined as the psychological state in which an individual perceives from a first-person plural perspective that "we are jointly attending to a certain object" [12], and its strength is modulated by relational closeness, synchrony, and group size.

3.1. Cognitive Resource Redistribution Pathway

According to Shteynberg's (2015) theory, when individuals enter a state of shared attention, they automatically allocate more cognitive resources to jointly attended objects [12]. In SS-RIF situations, when listeners perceive synchronized co-retrieval with speakers, they invest more cognitive resources in memory monitoring and retrieval verification than when listening alone [7]. This resource redistribution produces dual effects: on the one hand, enhanced resource investment deep-

ens processing of target items, promoting memory enhancement; on the other hand, according to memory inhibition theory [19], deeper target retrieval implies stronger suppression demands for competing items. Mulligan et al.'s (2022) research on attention and retrieval-induced forgetting provides indirect support for this mechanism: divided attention eliminates the retrieval-induced forgetting effect, while focused attention enhances it [20]. In SS-RIF situations, when listeners are in a high shared attention state (e.g., real-time interaction with in-group members), cognitive resources are sufficient and concentrated, allowing inhibition processes to proceed fully; whereas in low shared attention states (e.g., listening to recordings or facing out-group members), insufficient cognitive resource investment prevents effective inhibition processes [15].

Chu et al. (2024) found that SS-RIF only occurs with high-frequency or high-familiarity items, consistent with the "interference-dependence" principle of inhibition theory—only items with sufficient competitive strength are activated during retrieval and require inhibition [21]. Zhang et al. (2024) found that high-approach-motivation positive emotions enhance SS-RIF, possibly because they improve resource allocation efficiency and attentional focus in shared attention states [17]. This pathway operates primarily at the cognitive level, explaining why SS-RIF can still reliably occur under basic experimental conditions (e.g., real-time interaction between strangers) [7]. However, cognitive resource investment alone is insufficient to explain the full social situational dependence of SS-RIF; the activation of relational motivation and the construction of shared reality are also important mechanisms determining effect strength.

3.2. Shared Reality Construction Pathway

The shared reality construction mechanism emphasizes that shared attention promotes the establishment of shared reality through activating relational motivation, thereby affecting SS-RIF [11, 13]. According to shared reality theory, people have a fundamental motivation to establish a common understanding of the world with others, stemming from the needs for belonging and certainty [11, 13]. Shared attention serves as a prerequisite for shared reality, and its activation triggers listeners' relational motivation—the desire to establish social connections and maintain group harmony [11].

In SS-RIF contexts, the activation of relational motivation significantly changes listeners' cognitive strategies and processing depth [7]. When listeners perceive shared group identity with speakers, relational motivation is enhanced, making them more inclined to engage in deep co-retrieval to establish shared memory representations [6]. Coman and Hirst's (2015) research provides direct evidence for this mechanism: in-group identity activates the "we" framework, enhancing relational motivation and prompting listeners to engage in deep co-retrieval to establish shared reality; out-group identity maintains an "I-he" separation framework with weaker relational motivation, resulting in shallow or absent co-retrieval [6]. Mao et al. (2021) found that when topics are highly self-relevant and attitudes are consistent, SS-RIF occurs even when facing experts, because highly self-relevant topics enhance the motivation to establish shared reality, driving listeners to engage in deep co-retrieval [7]. This process is essentially a rehearsal of cognitive conformity—listeners prevent future cognitive conflicts in group interactions by forgetting in advance information that might cause disagreement. However, when content threatens group identity, identity protection motivation may override relational motivation, causing listeners to counter-retrieve information omitted by speakers, thereby inhibiting SS-RIF [14].

The group synchrony modulation mechanism focuses on how the interaction between group identity and synchrony modulates SS-RIF formation and transmission within group networks. Shteynberg (2018) noted that shared attention effects are strongest when people believe they are simultaneously attending with others and the co-attenders are group members [12]. In SS-RIF contexts, synchrony perception modulates the strength of group identity effects. Zhang et al. (2020) found that SS-RIF was significant under conditions of real others' presence but disappeared when only listening to audio recordings [15]. This is because real interaction provides synchrony cues (the other person is online and participating simultaneously with "me") and social cues (facial expressions, eye contact), jointly activating a high-intensity shared attention state. Zhu and Zhang's (2021) video interaction study found that pre-recorded video can also induce SS-RIF, possibly because video conditions partially activate shared attention through "pseudo-synchrony" cues [16]. Xiao et al. (2025) found that fixed-member groups showed stronger collective memory than regrouped members, because repeated interactions among fixed members establish stable shared attention patterns [22]. Group size also modulates the synchrony mechanism to some extent: synchrony is easily maintained in small groups with high shared attention intensity, while large groups may produce "social loafing," reducing motivation for co-retrieval [23]. This Matthew effect of memory suggests that SS-RIF has self-reinforcing characteristics at the group level, with initial small forgetting differences being rapidly amplified through the cumulative effect of shared attention.

4. Prospects for Applications in the Intelligent Era

Against the backdrop of rapid AI development, understanding the dual-pathway mechanism of SS-RIF holds important implications for multiple AI application scenarios. The following discussion explores three directions: intelligent education, smart justice, and multi-agent systems.

4.1. Memory Coordination in Intelligent Education

In the field of intelligent education, the dual-pathway mechanism of SS-RIF provides an important theoretical foundation for optimizing adaptive learning systems. Currently, intelligent tutoring systems selectively present teaching content through personalized recommendation algorithms [2], similar to speakers' selective retrieval in the SS-RIF paradigm. When student groups engage in collaborative learning on intelligent learning platforms, teachers' or AI tutors' selective knowledge emphasis may influence students' memory construction through the SS-RIF mechanism. Understanding shared attention mechanisms helps design more effective knowledge synchronization strategies: on the one hand, systems can promote beneficial knowledge integration by creating high shared attention environments (such as synchronous interaction and group identity), eliminating outdated or incorrect related information through moderate SS-RIF to form more cohesive collective knowledge structures; on the other hand, negative forgetting effects caused by excessive selective emphasis should be avoided. Specifically, intelligent education systems can adopt a "pulsed shared attention" strategy—periodically establishing high-intensity shared attention to promote core knowledge synchronization, then deliberately breaking the synchronous state to allow individuals to explore peripheral knowledge, and finally resynchronizing to integrate new information. For example, in intelligent tutoring scenarios based on large language models, collaborative retrieval exercises can be designed to have student groups engage in selective recall around specific knowledge points. Systems should monitor students' emotional states and synchrony levels, because high-approach-motivation emotions enhance SS-RIF [17], while negative emotions or distracted states weaken this effect [24]. Furthermore, virtual agent design should attend to the moderating role of digital embodiment, finding an optimal embodiment range that provides sufficient social cues to activate shared attention without triggering cognitive defenses due to excessive realism, avoiding the "uncanny valley effect" that weakens shared attention [25].

4.2. Testimony Reliability in Smart Justice

In the field of smart justice, the SS-RIF mechanism holds important value for understanding the reliability of group eyewitness testimony. When multiple witnesses discuss case details with each other, one witness's selective recall may cause other witnesses to forget related but unmentioned information, resulting in systematic bias in collective memory. This is particularly noteworthy in the aggregation and analysis of testimony in smart justice systems—if intelligent systems lack understanding of the SS-RIF mechanism, they may mistakenly regard "consensus" among witnesses as highly reliable evidence when it may actually be the result of memory contamination. Understanding the dual-pathway mechanism of SS-RIF helps design more scientific intelligent evidence collection processes: first, intelligent evidence collection systems should isolate witnesses at the initial stage to prevent the establishment of false "consensus" through shared attention; second, systems can use natural language processing technology to analyze selective retrieval patterns in testimony, identifying possible memory contamination paths, particularly detecting abnormally consistent patterns of content omission between testimonies [26]; third, when necessary, complete evidence reproduction opportunities should be provided, restoring suppressed but not distorted information through independent recall cues. Furthermore, systems should attend to the identity relationships and interaction contexts of witness groups, because discussions among in-group members are more likely to induce SS-RIF [6]. Intelligent assistance systems can detect abnormally consistent patterns between testimonies through algorithms, flagging possible memory contamination risks and assisting judicial personnel in improving accuracy judgments of group memory [26].

4.3. Cognitive Coordination in Multi-Agent Systems

In the field of Multi-Agent Systems (MAS), the dual-pathway mechanism of SS-RIF provides an important analogical framework for understanding distributed cognitive coordination. In multi-agent collaborative scenarios, each agent coordinates through selective information sharing, similar to the selective retrieval process in the human SS-RIF paradigm. Understanding human shared attention mechanisms helps design more effective multi-agent information synchronization strategies, particularly in intelligent supply chain management [27] and group decision support systems. Specifically, MAS can draw on shared attention's resource redistribution mechanism: when agents detect a "joint attention" state, they automatically adjust cognitive resource allocation strategies, prioritizing processing of shared information and suppressing redundant or conflicting information [2, 3]. Meanwhile, the shared reality construction mechanism suggests that "relational motivation" between agents (such as collaborative goal consistency and group identity) affects the depth and quality of information sharing. In designing recommendation systems and advertising placement systems, understanding the SS-RIF mechanism helps avoid group cognitive biases caused by algorithmic selective information presentation [2, 14]. For example, social media platforms' personalized recommendation algorithms may create information systematic forgetting similar to SS-RIF in user groups through selective presentation of specific content, exacerbating the information cocoon effect and group polarization. Future research should explore how to achieve dynamic regulation of "cognitive synchronization thresholds" in MAS, balancing the relationship between information sharing efficiency and cognitive diversity preservation, which holds important practical significance for building healthy, diverse intelligent information ecosystems [28].

5. Conclusion

SS-RIF is not merely a cognitive byproduct but a social cognitive process with shared attention at its core hub [12]. Through the dual pathways of cognitive resource redistribution and social motivation regulation, shared attention transforms social situational factors into concrete memory inhibition mechanisms and converts individual-level inhibition into group-level memory convergence [4]. This convergence not only leads to forgetting of specific information but also shapes the boundaries of collective memory and the foundation of group identity through cumulative effects. As intelligence deepens today, understanding the mechanisms of shared attention and SS-RIF has urgent practical significance [16, 25]. From optimizing intelligent education design to ensuring testimony reliability in the process of judicial intelligence, from promoting cognitive coordination in MAS to guarding against group cognitive biases caused by algorithmic recommendations, SS-RIF research provides an important theoretical foundation for multiple AI-empowered application scenarios in economy, management, and social sciences. Researchers should move beyond technical debates about inhibition and blocking to confront a more profound proposition: under conditions of limited cognitive resources and necessary social connection, forgetting may not be a failure of memory but the price of social success. Deep understanding of SS-RIF ultimately leads us to rethink the nature of human cognition—we do not think in order to remember, but to act and connect, and memory and forgetting are merely cognitive means in this process.

Abbreviations

SS-RIF	Socially Shared Retrieval-Induced Forgetting
AI	Artificial Intelligence
MAS	Multi-Agent Systems

Author Contributions

Jiatong Wu: Conceptualization, Writing – original draft, Writing – review & editing

Conflicts of Interest

The author declares no conflicts of interest.

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