The Influence of Memory Dialogue and Identity Markers on Collective Memory

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Abstract

Previous psychological research on collective memory has emphasized understanding the mechanisms of collective memory while neglecting the roles of memory dialogue and identity variables. The present study progressively investigated the effects of dialogue and identity markers on collective memory, examining these effects using both individual memory and collective memory measures, by manipulating memory activation methods (dialogue vs. non-dialogue) in Experiment 1, manipulating information consistency (consistent vs. inconsistent) based on the memory dialogue condition in Experiment 2, and further manipulating identity markers (in-group vs. out-group) under inconsistent information conditions in Experiment 3. Results demonstrated that: (1) dialogue as an independent variable significantly reduced the collectively forgotten portion of collective memory; (2) on the basis of dialogue, consistent information significantly increased the collectively remembered portion of collective memory; (3) on the basis of dialogue, when inconsistent information originated from out-group members, it significantly increased the collectively remembered portion of collective memory, whereas inconsistent information from in-group members yielded no significant effect. These findings indicate that dialogue, as an independent variable, primarily influences collective memory by affecting the collectively forgotten portion, while information consistency and group identity markers in the dialogue process mainly influence collective memory by affecting the collectively remembered portion.

Full Text

Effects of Memory Conversation and Identity Markers on Collective Memory

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Abstract

Previous psychological research on collective memory has focused on understanding its mechanisms while neglecting the roles of memory conversation and identity variables. This study investigates the effects of dialogue and identity markers on collective memory through three experiments: Experiment 1 manipulates memory activation methods (conversation vs. non-conversation), Experiment 2 manipulates information consistency (consistent vs. inconsistent) based on the conversation condition from Experiment 1, and Experiment 3 further manipulates identity markers (ingroup vs. outgroup) under inconsistent information conditions. The effects are examined at both individual and collective memory levels. Results show: (1) Conversation as an independent variable significantly reduces the portion of collective memory that is commonly forgotten; (2) Based on conversation, consistent information significantly increases the portion of collective memory that is commonly remembered; (3) Based on conversation, when inconsistent information comes from outgroup members, it significantly increases the portion of collective memory that is commonly remembered, whereas inconsistent information from ingroup members has no significant effect. This suggests that conversation as an independent variable primarily influences collective memory by affecting the commonly forgotten portion, while information consistency and group identity markers during conversation mainly influence collective memory by affecting the commonly remembered portion.

Keywords: collective memory, memory conversation, group identity, items remembered in common, items forgotten in common

Differential individual memories merge through social interaction and dialogue, gradually forming collective memory and thereby establishing group identity (Brown et al., 2012). Both conversational interaction and group identity are indispensable variables in collective memory research. On the one hand, researchers outside the field of psychology have focused more on the role of group identity. For instance, Halbwachs noted in his work *On Collective Memory* that "although collective memory lives on in an aggregate of people and draws its strength from that base, it is only as individuals who are members of a group that people remember" (Halbwachs, 2002, p. 40). These scholars emphasize the group attributes of collective memory, tending to view it as the process and outcome of shared remembrance among members of specific social groups (Nicolas, 2006). On the other hand, psychological researchers typically operationalize collective memory as the number of overlapping items remembered or forgotten in individual memory after group collaboration (Congleton & Rajaram, 2014; Cue et al., 2006; Stone et al., 2010). Although this definition touches upon interactive modes of group cooperation, subsequent research has tended to explore the psychological mechanisms underlying collective memory development without delving deeper into the process of dialogic interaction. Consequently,

psychological research on collective memory has gradually divorced itself from the variable of group identity, failing to reflect the group attributes of collective memory.

1.1 Effects of Memory Conversation on Collective Memory

Previous theoretical research has proposed the necessity of adopting a social-interactionist approach to study collective memory (Vlasceanu et al., 2018), suggesting that collective memory should be viewed as an interactive behavior rather than a static memory representation (de Saint-Laurent, 2017). Current psychological research on collective memory frequently employs the classic socially-shared retrieval-induced forgetting paradigm (SS-RIF; Cuc et al., 2007; Koppel et al., 2014; Bai et al., 2016), which involves category-exemplar word pair learning, dividing participants into speakers and listeners during the selective retrieval practice phase, and finally administering memory tests. Such studies have found that all participants in a conversation experience similar selective forgetting, and the degree of memory overlap among conversation participants becomes greater than before the conversation (Coman & Hirst, 2012; Coman & Hirst, 2015). Memory conversation represents one important form of social interaction, yet the conversational format in these studies involves only one person unilaterally outputting memory content rather than genuine interactive memory dialogue. Notably, everyday memory conversations about public events are not simply reducible to category-exemplar word pairs but rather approximate a form of shared narrative representation. Therefore, using category-exemplar word pairs to study collective memory has limitations. For example, in a family, conversations between parents lead to the formation of shared narrative representations of "the past" among family members, resulting from children internalizing various aspects of parental autobiographical experiences and organizing them into a cohesive narrative whole (Nelson & Fivush, 2004; Wang & Fivush, 2005). Consequently, investigating how memory conversation influences collective memory is better served by using long-text materials that provide holistic narrative accounts.

Comprehensive research on the effects of memory conversation on collective memory has primarily examined retrieval processes, cognitive mechanisms, and memory content and structure. Some studies have focused on retrieval processes, finding that retrieval disruption during memory conversation is key to understanding how collective memory forms and that retrieval disruption mediates this formation process (Stone et al., 2010). Other research has examined cognitive mechanisms, suggesting that collective memory formation relates to the activation of cognitive mechanisms when participants jointly recall memories and specially organized information formed after initial discussion (Rajaram, 2011; Rajaram & Pereira-Pasarin, 2010). More recently, studies investigating the timing and frequency of memory conversation have found that participants under early collaboration, late collaboration, and multiple collaboration conditions all produced significantly better collective memory compared to control

groups (Congleton & Rajaram, 2014). Additionally, previous research on memory conversation effects has typically employed single speaker-listener models (Coman & Hirst, 2012; Coman & Hirst, 2015) or conducted memory conversations exclusively among acquaintances (Cuc et al., 2006). These studies have focused more on the cognitive structure and mechanisms of collective memory while neglecting the "social" attributes inherent in the concept—namely, that collective memory emerges from the intertwining of multiple processes including socially shared discourse, personal experiences, and sociocultural factors. This social attribute manifests in collective memory' s heavy reliance on dynamic social processes, which can be both shared among group members and appropriated by them.

Researcher Wertsch (1997, 2008) proposed the concept of collective remembering, advocating attention not only to static memory but also to the process of remembering. People actively reconstruct past events with the help of cultural schemas, treating memory as an important reconstructive process. Collective memory becomes an active mnemonic process when transformed from a static representation without agency, allowing group members to narrate the past within this process (de Saint-Laurent, 2017). Cuc et al. (2006) also found that conversation can fuse different versions of the past in people' s minds into more unified memory content. They proposed that conversation influences collective memory only when at least two conditions are met: (1) non-shared pre-conversation memories appear during dialogue, and (2) these non-shared pre-conversation memories "contaminate" other group members' post-conversation memories.

Experiment 1 therefore places participants in an online simulated memory conversation scenario where everyone serves as both speaker and listener and participants are strangers to one another, with an individual group serving as control (i.e., a group whose memory content is not "contaminated" by conversation) to preliminarily explore the effect of conversation on collective memory. Based on this, we propose Hypothesis 1: Compared to the non-conversation condition, the conversation group will retain more collective memory content.

Collective memory at the cognitive level resembles a dynamic shared information system that depends on communication and information exchange. Consequently, the characteristics of information content itself become important during memory conversation. Moores et al. (2003) found that information consistency can promote attention capture during memory processes, while other research has shown that information encoding consistent with culturally dominant reading direction affects daily interaction with environmental information and memory (McCrink & Shaki, 2016). Such studies suggest that information consistency influences performance on memory tasks. Similar to real-life discussions about shared memories of events, conversational exchanges often involve repeatedly presented information, which means consistent information is reinforced multiple times and more likely to be perceived as truthful, thereby consolidating such memories. During this process, collective memory becomes

more generalized, abstract, and symbolic. However, other research indicates that inconsistent information with atypical features is more memorable than information consistent with established scripts or schemas (Berthold et al., 2019). Yet long-term memory research also finds that memory retention depends more on established schematic knowledge structures (Schmidt & Sherman, 1984), suggesting that the initial mnemonic advantage of inconsistent information may diminish over time. Considering that collective memory is often associated with pre-existing cultural schemas and narrative templates, mnemonic advantage is more likely to depend on information consistent with established "scripts," leading us to believe that information consistency may have more significant effects. In summary, **Experiment 2** builds upon Experiment 1 to examine whether consistent information can serve as an important variable affecting collective memory outcomes under conversational conditions. Accordingly, we propose Hypothesis 2: Compared to the inconsistent information group, consistent information in conversation will lead to greater retention of collective memory.

1.2 Effects of Identity Features in Memory Conversation on Collective Memory

Currently, psychology researchers conducting experiment-based studies generally believe that collective memory operations are independent of identity and should focus on understanding the mechanisms underlying shared memory development (Barnier & Sutton, 2008; Brown et al., 2009; Cuc et al., 2006; Cuc et al., 2007; Stone et al., 2010). However, collective memory outcomes depend not only on whether information can be discussed and received in a communicative context but also on the identity markers of those narrating the collective memory. Wertsch and Roediger (2008) propose that group identity constitutes the core of collective memory definition—if a memory shared among collective members is unrelated to the members' own identity, it can only be considered shared memory. Collective memory helps group members construct their understanding of the past to inform members of who they are (e.g., group values, beliefs, and norms), where they come from (e.g., shared group history), and where they are going (e.g., shared destiny) (Hirst & Manier, 2008; Liu & Hilton, 2005; Wohl et al., 2012). Collective memory is not only personal memory that is shared and exists within a community but also a symbolic system accessible to social members (Guan & Guo, 2020). It serves as a resource to help and guide people' s current lives. People construct understandings of the past within groups, and as group members, they are constantly influenced by the group' s construction of memory. Therefore, memory at the group level must consider the role of group identity.

Previous research has shown that identity relationships between listeners and speakers during memory conversation affect the content transmitted in discourse (Brown et al., 2012). For example, Coman and Hirst (2015) had participants read about an overseas study program and found that when listeners and broadcasters belonged to the same university, socially-shared retrieval-induced for-

getting occurred, whereas when broadcasters were students from other schools, this phenomenon did not appear. Even simply asking listeners to assume they attended the same school as the broadcaster produced this effect. This demonstrates that identity markers influence collective memory not only at the level of superordinate groups (e.g., nations, ethnicities) but also at the level of subgroups and small groups (e.g., schools, clubs). This study argues that we should start from the most fundamental ingroup-outgroup distinction using a minimal group paradigm to examine the initial effects of ingroup-outgroup identity markers on collective memory. During memory conversation, is inconsistent information from outgroup members more expected and thus affects collective memory outcomes? Previous research has found that information consistent with expectations confirms those expectations, whereas information conflicting with expectations or prior knowledge may stimulate deeper cognitive processing and be more likely to be recalled later (Rojahn & Pettigrew, 1992). Considering people' s ingroup preference, inconsistent information from ingroup members is more unexpected, while inconsistent information from outgroup members is expected, and this conflict with expectations may lead to better collective memory outcomes. In summary, we propose Hypothesis 3: Participants whose inconsistent information in conversation comes from ingroup members will show higher collective memory levels than those receiving inconsistent information from outgroup members.

Collective memory formation depends on the malleability of memory, which enables individual memory to be transformed into shared memory and subsequently into collective memory. This malleability is inevitably related to the social attributes of memory and concerns how people transform isolated individual memories into collective memory. Some researchers view the transformation from individual to collective memory as an emergent circulatory system, where the mechanisms guiding memory convergence are themselves socially mediated. The porosity of memory helps individuals navigate a social world aggregated from autobiographical memories, during which individuals also generate collective memory (Brown et al., 2012). Domestic scholar Ma Guoqiu (2017) proposes that a core issue in memory research concerns how individual interpretations of the past are transformed into group collective memory. Collective memory formation depends on how conversation shapes individual memory. The degree of memory overlap among group members is influenced both by individual-level information processing phenomena and by social network structures emerging during conversation (Coman et al., 2016). This suggests that interactions between micro-level individual memory and macro-level collective memory cannot be ignored. Coman et al. (2016) summarized how individual memory metrics can be used to obtain collective memory outcomes (as shown in Table 1), providing a quantitative explanation of the relationship between individual and collective memory at the operational definition level. We therefore believe that using individual-level memory results as a reference can help examine how collective memory is influenced by memory conversation and identity markers.

In summary, this research employs long-text material learning and places par-

ticipants in more authentic conversational processes to verify how memory conversation and identity markers within conversation affect collective memory. Experiment 1 manipulates memory activation method (conversation vs. individual), Experiment 2 manipulates information consistency (consistent vs. inconsistent) based on the conversation condition from Experiment 1, and Experiment 3 further manipulates group identity markers (ingroup vs. outgroup) under inconsistent information conditions, progressively examining the effects of conversation and identity markers on collective memory at both individual and collective memory levels.

Table 1 Definitions and Calculation Formulas for Collective Memory Metrics

Metric	Formula	Description
Mnemonic Similarity (MS)	$MS_{i,j} = \frac{RR_{i,j}+FF_{i,j}}{N_{total}}$	The sum of items remembered in common and forgotten in common for participants i and j, divided by the total number of learned items. Each group can obtain pretest and posttest memory similarity scores.
Mnemonic Difference (MD)	$MD_i = Rec_{Ai}^{Post} - Rec_{Ai}^{Pre}$	The difference between pretest and posttest recall levels for participant i on item A. Each participant' s memory item score is separate.
Mnemonic Alignment (MA)	$MA_{i,j} = MS_{i,j}^{Post} - MS_{i,j}^{Pre}$	The difference in mnemonic similarity between pretest and posttest for participants i and j.
Mnemonic Convergence (MC)	$MC_{i:j} = \sum \frac{MS_{i:j}}{N_{i:j}}$	Memory convergence scores calculated by averaging pre-conversation and post-conversation memory similarity.

Note: Adapted from Coman et al., 2016; selected collective memory metrics and content from original tables are included as needed for this article.

Experiment 1: The Effect of Conversation on Collective Memory

2.1.1 Participants

Experiment 1 employed a single-factor (activation method: conversational recall vs. individual recall) pretest-posttest design. Sample size was estimated using G*Power 3.1 software (Faul et al., 2007) with statistical power of 1 - $\beta = 0.95$

and $\alpha = 0.05$. Based on effect sizes from previous research (Cohen' s f = 1.01, Congleton & Rajaram, 2014) and considering that prior experimental designs were not identical to the current study, we set f = 0.4 as the a priori effect size, which required a sample size of 16 participants. We recruited 42 university students (27 female) with a mean age of 22.93 years (range 19-29, SD = 2.57). Two participants reported after the experiment that they did not believe the online conversation involved real group members, and their data were excluded from subsequent analyses due to potential impacts on data quality. All participants received compensation after completing the experiment.

2.1.2 Materials and Apparatus

Through preliminary questionnaires, 44 university students (mean age 24.77, 11 male, 33 female) listed 10 important collective events in their lives, which could be local, national, or international and did not need to have occurred after their birth. Participants only needed to briefly list titles of public (non-private) events without detailed descriptions. Events mentioned only once were eliminated, yielding 34 events. Then 21 material evaluators (mean age 20.48, 15 male) rated the familiarity of these events on a 5-point scale. Six events with familiarity ratings within one standard deviation (SD = 0.36) of the mean (M = 4.34) were selected, and narrative texts of 219-229 words were compiled for each event as final experimental materials. Each text contained 20-22 memory points, which served as the number of memory items for subsequent assessment. The six events were: Brexit, the dissolution of the Soviet Union, China's accession to the WTO, the Shanghai World Expo, the Yushu earthquake in Qinghai, and the Australian bushfires. After each experiment, participants rated the familiarity, importance, and emotional valence (positive/negative) of the material content on 5-point scales. In Experiment 1, no significant differences were found between participants in familiarity (t(40) = 0.95, p = 0.347, 95% CI = [-0.21, 0.58]), emotion (t(40) = -0.55, p = 0.583, 95% CI = [-0.85, 0.48]), or importance (t(40) = -1.31, p = 0.197, 95% CI = [-0.75, 0.16]). Experimental materials also included an experimental manual providing detailed instructions for two experimental assistants on how to give verbal feedback to participants, thereby controlling for assistant-related errors.

The experimental procedure was controlled by E-Prime 2.0 software, and a specialized software platform called Chat Room was designed for this project to facilitate and record online interaction among participants. This anonymous online communication program, implemented in JavaFX, features a WeChat-like UI for anonymous chatting, with remote server control and message processing. It enables multi-user anonymous chat, timed messaging for specific users, and grouped anonymous messaging. Each user' s chat time is recorded with millisecond precision. The experimental program' s server was deployed on a remote server running Windows Server 2012 with an Intel Core Processor (Broadwell) at 2.39 GHz (2 processors). Chat room clients were deployed on four computers running Windows 10 64-bit Education Edition with Intel Core i3-6100 proces-

sors. The experiment balanced the number of participants (4 per group), the number of conversations each participant engaged in, and the order of conversation turns, with each turn limited to 150 seconds (Coman et al., 2016).

2.1.3 Procedure

Step 1: Encoding Phase. A fixation cue "+" was presented at the center of the screen for 1000 ms, followed by the learning material for 1 minute. Participants were instructed to remember the content and details of the material as thoroughly as possible. Each participant randomly studied one of the six texts.

Step 2: Interference Phase. Three-digit addition and subtraction problems were presented at the center of the screen, requiring participants to input calculation results. This phase lasted 3-5 minutes to prevent participants from rehearsing the learned content (the encoding and interference phase flow is shown in Figure 1 [Figure 1: see original paper]).

Step 3: Pre-Conversation Recall (Baseline Measurement). Participants were asked to recall the previously learned material in as much detail as possible on the computer within 2 minutes (writing time was evaluated in pilot experiments).

Step 4: Conversation Feedback Phase. Participants were randomly assigned to either the conversational recall group or the individual recall group. The conversational recall group consisted of 4 participants (including 2 real participants who read the same material and 2 experimental assistants posing as participants; the two real participants did not know each other). Previous research indicates that a collection of individuals is perceived as a single, unified group when the number is 5 ($\pm$1) people; within this range, a group is considered less like independent individuals and more like a unified whole (Stocks et al., 2019), hence the use of 4-person groups. Conversation content involved retelling the material learned in Step 1 to others, with speaking order balanced across all participants. During the conversational memory phase, participants were instructed to transmit as much of the originally learned material as possible to the other three group members, while the two assistants posing as group members conducted memory conversations with the two real participants according to the experimental manual. Participants in the non-conversational recall group were randomly paired into nominal groups and recalled individually during the same time period.

Step 5: Post-Conversation Recall. Participants were again asked to recall the previously learned material in as much detail as possible on the computer within 2 minutes. Before the formal experiment, one practice trial was conducted to help participants understand the procedure without memory demands (the overall flow of Experiment 1 is shown in Figure 2 [Figure 2: see original paper]).

Data analysis was conducted using SPSS 22.0 software. First, based on the six

text materials, the total number of memory items for each text was determined (20-22 items). Then, according to each participant' s pre-conversation and post-conversation recall texts, the number of memory items recalled was determined (pre-conversation denoted as "M-Pre," post-conversation as "M-Post"). The study adopted both individual-level and collective-level memory outcomes as dependent variables. Individual-level memory outcomes were measured as the number of free recall items. To quantify collective memory outcomes, we referenced existing research and used calculations of mnemonic convergence (MC-Pre, MC-Post), items remembered in common (RR-Pre, RR-Post), and items forgotten in common (FF-Pre, FF-Post) to represent collective memory scores (Stone et al., 2010; Coman et al., 2016).

2.2.1 Free Recall Results

Pre-conversation and post-conversation free recall scores were analyzed for conversational and non-conversational conditions. For the dependent variable of free recall items, the interaction between time and activation method was significant, $F(1, 40) = 5.01$, $p = 0.031$, $p^2 = 0.111$ (as shown in Figure 3 [Figure 3: see original paper]). Simple effects analysis revealed that in the conversational group, post-conversation free recall scores ($M = 8.14$, $SD = 2.10$) were significantly higher than pre-conversation scores ($M = 5.68$, $SD = 2.10$), $F(1, 40) = 20.56$, $p < 0.001$. In the non-conversational group, the difference between post-conversation ($M = 6.50$, $SD = 3.05$) and pre-conversation ($M = 5.80$, $SD = 3.11$) free recall items was not significant, $F(1, 40) = 1.52$, $p = 0.225$. These results preliminarily demonstrate the effect of conversation at the individual memory level.

2.2.2 Collective Memory Results

Mnemonic convergence was analyzed for conversational and non-conversational conditions across pre-conversation and post-conversation measures, with results shown in Table 2 . For the dependent variable of mnemonic convergence, the main effect of time was not significant, $F(1, 19) = 0.87$, $p = 0.363$, nor was the main effect of activation method, $F(1, 19) = 0.83$, $p = 0.375$, and the interaction between time and activation method was also not significant, $F(1, 19) = 1.13$, $p = 0.301$.

Table 2 Memory Convergence, Items Remembered in Common, and Items Forgotten in Common Scores (M ± SD) for Conversational and Individual Groups

Group	MC-Pre	MC-Post	RR-Pre	RR-Post	FF-Pre	FF-Post
Conversational	0.73 ± 0.07	0.72 ± 0.09	2.82 ± 1.54	5.18 ± 2.14	12.09 ± 2.74	9.55 ± 2.88
Individual	0.67 ± 0.11	0.72 ± 0.09	2.70 ± 1.25	3.40 ± 2.07	11.20 ± 3.68	11.50 ± 3.17

Since none of the collective memory indicators showed significant differences, we further examined whether conversation affected pre-conversation and post-conversation measures of items remembered in common and items forgotten in common, according to the operational definition of collective memory. Results are shown in Table 2. For the dependent variable of items remembered in common, the main effect of time was significant, $F(1, 19) = 9.28$, $p = 0.007$, $p^2 = 0.328$, while the main effect of activation method was not significant, $F(1, 19) = 2.51$, $p = 0.129$, and the interaction between time and activation method was not significant, $F(1, 19) = 2.74$, $p = 0.114$. For the dependent variable of items forgotten in common, the interaction between time and activation method was marginally significant, $F(1, 19) = 3.90$, $p = 0.063$, $p^2 = 0.170$ (as shown in Figure 4 [Figure 4: see original paper]). Simple effects analysis revealed that only in the conversational group did post-conversation items forgotten in common significantly decrease compared to pre-conversation, $F(1, 19) = 6.55$, $p = 0.019$; in the non-conversational group, the difference between pre-conversation and post-conversation items forgotten in common was not significant, $F(1, 19) = 0.08$, $p = 0.777$. These results partially confirm Hypothesis 1: Conversation as an independent variable significantly reduces the portion of collective memory that is commonly forgotten.

Experiment 2: The Effect of Information Consistency on Collective Memory

3.1.1 Participants

Experiment 2 employed a single-factor (information consistency: consistent vs. inconsistent) pretest-posttest design. Based on the effect size from Experiment 1' s collective memory task ($p^2 = 0.170$, converted to $f = 0.453$ using G*Power), sample size was estimated using G*Power with statistical power of $1 - \beta = 0.95$ and $\alpha = 0.05$, requiring 12 participants. Thirty university students were recruited (21 female) with a mean age of 22.93 years (range 19-28, SD = 1.96). In one group, a participant reported after the experiment that they did not believe the online conversation involved real group members, potentially affecting data quality; therefore, data from both participants in that group were excluded from subsequent analyses. All participants received compensation after completing the experiment.

3.1.2 Materials and Apparatus

Four events from Experiment 1 were selected as final experimental materials: the dissolution of the Soviet Union, China' s accession to the WTO, the Yushu earthquake in Qinghai, and the Australian bushfires (two domestic and two international events). Consistent and inconsistent versions of experimental manuals were generated corresponding to the four original stories. The consistent version matched Experiment 1' s conversational information, while the inconsistent version contained one sentence whose meaning contradicted the original material.

For example, if the original material included "the meeting passed this agenda," the inconsistent version stated "the meeting did not pass this agenda." In Experiment 2, participants again rated material familiarity, emotion, and importance on 5-point scales, with no significant differences found between participants in familiarity (t(28) = -0.95, p = 0.350, 95% CI = [-1.07, 0.39]), emotion (t(28) = 0.66, p = 0.516, 95% CI = [-0.42, 0.81]), or importance (t(28) = -1.36, p = 0.186, 95% CI = [-1.41, 0.29]). Experimental apparatus and equipment were identical to Experiment 1.

3.1.3 Procedure

The non-conversational recall group was eliminated, focusing specifically on how activated information consistency during conversation affects collective memory. In Step 4 of Experiment 2, participants were assigned to either the consistent conversation group or the inconsistent conversation group, with both experimental assistants providing consistent feedback in the consistent group and inconsistent feedback in the inconsistent group.

3.2.1 Free Recall Results

Pre-conversation and post-conversation free recall scores were analyzed for consistent and inconsistent conditions, with results shown in Table 3 . For the dependent variable of free recall items, the interaction between time and information matching was significant, F(1, 28) = 4.84, p = 0.036, p^2 = 0.147 (as shown in Figure 5 [Figure 5: see original paper]). Simple effects analysis indicated that in the inconsistent information condition, post-conversation recall items (M = 6.25, SD = 2.70) were significantly higher than pre-conversation free recall items (M = 4.94, SD = 2.44), F(1, 28) = 7.48, p = 0.011. In the consistent information condition, post-conversation recall items (M = 7.86, SD = 2.71) were also significantly higher than pre-conversation recall items (M = 5.00, SD = 2.32), F(1, 28) = 31.02, p < 0.001.

Table 3 Various Recall Scores (M ± SD) for Consistent and Inconsistent Conditions

Condition	MC-Pre	MC-Post	RR-Pre	RR-Post	FF-Pre	FF-Post
Inconsistent	0.73 ± 0.10	0.66 ± 0.12	2.25 ± 1.28	2.88 ± 1.55	13.50 ± 4.28	11.38 ± 3.54
Consistent	0.70 ± 0.06	0.70 ± 0.07	2.14 ± 2.12	4.86 ± 3.08	12.86 ± 2.27	10.14 ± 2.04

3.2.2 Collective Memory Results

For the dependent variable of mnemonic convergence, the main effect of time was not significant, F(1, 13) = 2.33, p = 0.151, nor was the main effect of information consistency, F(1, 13) = 0.04, p = 0.848, and the interaction between

time and information consistency was not significant, F(1, 13) = 2.10, p = 0.171. We further examined pre-conversation and post-conversation results for items remembered in common and items forgotten in common, as shown in Table 3.

For the dependent variable of items remembered in common, the interaction between time and information consistency was marginally significant, F(1, 13) = 8.15, p = 0.059, p^2 = 0.248 (as shown in Figure 6 [Figure 6: see original paper]). For the dependent variable of items forgotten in common, the interaction between time and information consistency was not significant, F(1, 13) = 0.29, p = 0.600. Simple effects analysis revealed that only in the consistent information condition did post-conversation items remembered in common significantly exceed pre-conversation levels, F(1, 13) = 13.60, p = 0.003; in the inconsistent information condition, the difference between pre-conversation and post-conversation items remembered in common was not significant, F(1, 13) = 0.82, p = 0.381. These results partially confirm Hypothesis 2: Based on conversation, consistent information can significantly increase the portion of collective memory that is commonly remembered.

Experiment 3: The Effect of Group Identity on Collective Memory

4.1.1 Participants

Based on the effect size from Experiment 2's collective memory task (p^2 = 0.248, converted to f = 0.574 using G*Power), sample size was estimated using G*Power with statistical power of 1 - β = 0.95 and α = 0.05, requiring 10 participants. Thirty university students were recruited (22 female) with a mean age of 22.87 years (range 19-28, SD = 2.26). All participants received compensation after completing the experiment.

4.1.2 Materials and Apparatus

Materials, apparatus, and equipment were identical to Experiment 2. In Experiment 3, participants again rated material familiarity, emotion, and importance on 5-point scales, with no significant differences found between participants in familiarity (t(28) = 0.37, p = 0.714, 95% CI = [-0.61, 0.87]), emotion (t(28) = -1.13, p = 0.266, 95% CI = [-0.94, 0.27]), or importance (t(28) = 0.79, p = 0.437, 95% CI = [-0.53, 1.20]).

4.1.3 Design

A single-factor (group identity: ingroup vs. outgroup) pretest-posttest design was adopted. The group identity variable referred to whether inconsistent information came from ingroup or outgroup members. Ingroup identity activation meant inconsistent information came from members grouped with the same color as the participant, while outgroup identity activation meant inconsistent information came from members grouped with a different color.

4.1.4 Procedure

The main procedure was consistent with Experiments 1 and 2 (experimental procedure shown in Figure 7 [Figure 7: see original paper]). After registering basic participant information, the experimenter randomly assigned participants to red or blue groups by having them flip a coin. During the memory conversation phase, participants were randomly assigned to group identity marker consistent or inconsistent conditions. For the two real participants in each group, if inconsistent information came from a member with the same identity for one participant, then for the other real participant, the inconsistent information came from a member with a different identity.

Since mnemonic convergence results from Experiments 1 and 2 were not ideal, Experiment 3 adopted only items remembered in common and items forgotten in common as collective memory indicators, according to the operational definition of collective memory.

4.2.1 Free Recall Results

Pre-conversation and post-conversation free recall scores were analyzed for ingroup and outgroup conditions. The interaction between time and group identity was marginally significant, $F(1, 28) = 3.69$, $p = 0.065$, $p^2 = 0.116$ (as shown in Figure 8 [Figure 8: see original paper]). Simple effects analysis indicated that in the ingroup condition, post-conversation free recall scores ($M = 5.40$, $SD = 1.60$) were marginally better than pre-conversation scores ($M = 4.47$, $SD = 2.50$), $F(1, 28) = 4.01$, $p = 0.055$. In the outgroup condition, post-conversation recall scores ($M = 7.73$, $SD = 3.06$) were significantly higher than pre-conversation free recall scores ($M = 5.53$, $SD = 2.45$), $F(1, 28) = 22.26$, $p < 0.001$.

4.2.2 Collective Memory Results (Items Remembered in Common and Forgotten in Common)

Pre-conversation and post-conversation items remembered in common and items forgotten in common were analyzed for conditions where inconsistent information came from ingroup versus outgroup members. For the dependent variable of items remembered in common, the interaction between time and group identity was significant, $F(1, 13) = 5.37$, $p = 0.037$, $p^2 = 0.292$ (as shown in Figure 9 [Figure 9: see original paper]). Further simple effects analysis revealed that in the ingroup condition, post-conversation items remembered in common ($M = 3.00$, $SD = 0.89$) did not significantly differ from pre-conversation items remembered in common ($M = 2.67$, $SD = 1.21$), $F(1, 13) = 1.26$, $p = 0.536$. In the outgroup condition, post-conversation items remembered in common ($M = 3.44$, $SD = 2.01$) were significantly higher than pre-conversation items remembered in common ($M = 2.22$, $SD = 1.39$), $F(1, 13) = 25.37$, $p < 0.001$. For the dependent variable of items forgotten in common, the main effect of time was significant, $F(1, 13) = 9.03$, $p = 0.010$, $p^2 = 0.410$; the main effect of group identity was

not significant, $F(1, 13) = 0.09$, $p = 0.771$; and the interaction between time and group identity was not significant, $F(1, 13) = 1.34$, $p = 0.269$. These results do not support Hypothesis 3 but instead confirm that based on conversation, when inconsistent information comes from outgroup members, it significantly increases the portion of collective memory that is commonly remembered, whereas inconsistent information from ingroup members has no significant effect.

General Discussion

Experiment 1 found that memory conversation as an independent variable significantly reduces the portion of collective memory that is commonly forgotten. Previous research indicates that collaborative inhibition can be eliminated when memory already has a fixed organization (Finlay et al., 2000), because the organizational framework provided to participants disrupts the organizational strategies of both nominal and collaborative group members, thereby eliminating collaborative inhibition (Barber et al., 2012). This represents one possible explanation for the current results: memory conversation provides participants with a complete memory organizational framework, offering a set of memory focus points about textual information for memory activation. For collective memory, people are exposed to a complex information pool and find it difficult to organize a complete memory strategy in a short time, so the content and framework provided in memory conversation easily gain prominence among participants' originally fragmented memory content, causing participants to remember more information than before the conversation. In other words, conversational interaction promotes the formation of shared representations. Researchers have noted that language is the most important tool for constructing social reality, and through dialogue, a socially meaningful world is formed and continues to function (Assmann, 2015). These results also suggest that during the baseline recall phase after initial learning, participants extracted very limited content through their own efforts, but after conversation, they supplemented and corrected originally vague impressions, confirming that memory conversation plays an important role in the construction of collective memory. The shift from an individualistic orientation to a social-interactionist discursive orientation in collective memory research represents a trend, with some researchers emphasizing the process of remembering and redefining collective memory as collective remembering (Wertsch, 2008). These findings also have implications for discursive approaches to collective memory research.

Experiment 2 found that consistent information feedback in conversation significantly increases the portion of collective memory that is commonly remembered. Two possible explanations exist: (1) Consistent information in memory conversation increases the accessibility of collective memory, making collective memory information easier to retrieve; (2) This supports Schmidt and Sherman' s (1984) view that over time, the initial advantage of novel inconsistent information disappears, while information more consistent with existing knowledge is better retained. Previous research has proposed that individuals typically rely

on cognitive prototypes and schemas as an information base to replace lost memory traces (Macrae & Bodenhausen, 2000, 2001). Therefore, when people cannot remember information content, they are likely to respond with thematically consistent content, and this reconstructive process increases compatibility among consistent information, making consistent information in memory conversation more easily retained. For collective memory, inconsistent information lacks this informational compatibility for forming common memory representations. Our daily lives revolve around the process of sharing memories with others, and these results also provide insights into the role of shared representations in collective memory formation.

Experiment 3 failed to support Hypothesis 3 but instead found that inconsistent information from outgroup members significantly increased the portion of collective memory that is commonly remembered. Ingroup identity markers did not better facilitate collective memory retention, which is inconsistent with previous findings that "information conflicting with expectations may stimulate deeper cognitive processing and be more likely to be recalled in the future" (Rojahn & Pettigrew, 1992). This suggests that in collective memory formation, people may not form common memory representations based on expectation consistency. Existing literature offers a possible explanation: because information itself receives more attention than its source, people easily confuse information sources (Schacter, 2001). Researchers have used these source confusions as a method for studying categorization processes and successfully demonstrated that source confusions occur more within social categories (ingroup) than between social categories (outgroup; Taylor et al., 1978). Inconsistent information from ingroup members creates greater confusion, and people may believe the misinformation from ingroup members, resulting in poorer recall. Inconsistent information from outgroup members does not create such effects. Inconsistent information from outgroup members represents a high-memory-valence information source for participants. Participants were not only activated to recall content by experimental assistants but also noticed the misinformation and corrected it during subsequent recall, thereby retaining more collective memory content. This also suggests that misinformation from ingroup members is easily accepted by other members, causing systematic false memories.

In fact, some researchers have proposed that outgroup members are no longer merely objects of evaluation but have become our interaction partners, and "we" and "they"constantly talk about various matters (Richeson & Trawalter, 2005; de Dreu, 2014). In most cases, these topics are not directly related to intragroup or intergroup relationships themselves, and we often try to avoid discussing identity-related topics with outgroup members (Johnson et al., 2009), instead talking more about everyday topics such as movies we' ve seen, how our new friends are doing, or what our colleagues are like. Memory tasks in real life are often more complex, and others may participate in all stages from information encoding to activation and retrieval. How people in vast social contexts can more efficiently acquire memory information and consolidate collective memory makes communication undoubtedly one of the most important means, which is

also why people spontaneously share collective memories with others.

Limitations and Future Directions

This research has several limitations. First, it treats memory conversation as a holistic process, focusing more on changes in collective memory outcomes rather than capturing realistic memory conversation processes. Future research could detail the communication process of collective memory within social networks, which would help clarify how micro-level memory phenomena lead to larger-scale collective memory outcomes. To control numerous factors, this study also only implemented a single transmission model where participants were both listeners and speakers, but this orderly conversational model represents only one pathway of memory conversation. Future research could further implement bidirectional or multidirectional interaction patterns where all four participants communicate with each other pairwise, gradually breaking through the binary interaction of listener and speaker to extend into dynamic social network interactions. Treating each individual in the network as a micro-node of collective memory may help reveal the effects of memory conversation processes on collective memory outcomes.

Second, approaching the "social" attributes of collective memory through memory conversation and identity markers still falls short of capturing the effects of real society, and future collective memory research needs to be based on larger-scale social networks. Recent identity-related memory research from a social network perspective has found that one person' s influence on another can propagate through networks and affect the degree of convergence of similar memories about experienced events across groups. For example, networks characterized by highly connected clusters form more convergent collective memory than networks composed of sparsely connected clusters, because connections between clusters allow information to propagate through the network, synchronizing memories across the entire community (Vlasceanu et al., 2018). Meanwhile, not all individual members have equal potential to influence the collective memory of larger networks; individuals responsible for connecting clusters play important roles in networks, promoting widespread convergence of memory across networks. Conversely, early memory conversations among individuals within each cluster reduce collective memory convergence (Momennejad et al., 2019).

Third, collective memory represents an act of reconstructing the past from both brain and external world, demonstrating that collective memory involves reconstructing rather than simply reproducing the past, which cannot be discussed without addressing culture' s role in collective memory. Although human memory, as a product of mind and brain, is essentially private and individual, it is also deeply collective and cultural, arising from organism-environment interactions during both phylogenetic and ontogenetic processes (Wang, 2021). In memory research, many scholars view memory as a personal internal psychological experience transcending social context and culture. Unlike sociology, which emphasizes memory as a collective attribute, psychology focuses more on the

characteristic of collective memory being shared by all individuals (Wang & Ai, 2009). Recent research has investigated cultural differences in stereotypes and attributions about aging and memory, finding cultural differences in attributions for memory improvement by comparing two subcultural groups within Italy (Bottiroli et al., 2013). Future research from a psychological perspective could still explore interaction mechanisms between micro and macro levels, focusing on transmission and functional mechanisms of collective memory across different generations amid social change. This would also help consider how the relationship between individual and collective memory can be integrated and differentiated.

Finally, collective memory is an active, continuous process occurring in social contexts and inevitably influenced by social environments. For society, collective memory is an important function that preserves and transfers social cultural capital, shapes and maintains social members' identities, and ensures social coherence (Stratigoula, 2009). For individuals, forming generational identity represents an important task during the psycho-social identity stage (Holmes & Conway, 1999; Sahdra & Ross, 2007), and many early memories correspond to the process of establishing external or generational identity with society (Conway & Haque, 1999; Conway & Pleydell-Pearce, 2000). Future collective memory research could continue to examine the role of group identity and its relationship with intergenerational memory and identity.

Conclusion

This research yields three main conclusions: (1) Conversation significantly affects collective memory levels, manifesting as conversation significantly reducing the content commonly forgotten in collective memory compared to non-conversational contexts; (2) Information consistency in conversation significantly affects collective memory, with consistent feedback significantly increasing the portion of collective memory commonly remembered compared to inconsistent information; (3) Inconsistent information from ingroup members in conversation does not significantly affect collective memory outcomes, but inconsistent information from outgroup members significantly increases the portion of collective memory commonly remembered among participants. Memory conversation and group identity markers influence collective memory through different aspects—commonly forgotten and commonly remembered content.

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Note: Figure translations are in progress. See original paper for figures.