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Collaborative false recall in the DRM procedure: Effects of group size and group pressure

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Basden, Basden, Thomas, and Souphasith (1998) demonstrated that false recall in collaborative trios is enhanced when group members feel under pressure to output items. In the present study, individuals, pairs, trios, and quartets were presented with lists of words drawn from the Deese-Roediger-McDermott paradigm. Memory was tested under high or low group pressure conditions. It was found that false recall increased in proportion to group size regardless of group pressure, but that groups experiencing the most pressure to output items made a greater number of errors. Furthermore, on a surprise later individual recall test, participants who experienced the most pressure during collaboration retained an equivalent level of critical lures. Collectively these findings demonstrate that group pressure can increase collaborative false recall, and that these false memories can be retained beyond group testing.

Studies investigating collaborative false recall typically require groups of individuals to encode stimuli together and then work in unison to recall this studied information. Levels of false recall are then measured and compared to those of equivalent sized nominal groups (e.g., Basden, Basden, Bryner, & Thomas, 1997; Basden, Basden, Thomas, & Souphasith, 1998; Weldon & Bellinger, 1997). Nominal groups are comprised of individual participants who work alone and whose nonredundant responses are then pooled together. Their data provides an indication of each collaborative group's potential maximum recall.

Weldon and Bellinger (1997) presented collaborative and nominal trios with a mixed list of pictures and words and found that they produced equivalent levels of false recall. In a later study, Basden et al. (1998, Exp. 1) presented collaborative and nominal trios with lists taken from Deese-

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Roediger-McDermott (DRM) paradigm (Deese, 1959; Roediger & McDermott, 1995). The typical DRM procedure involves presenting participants with lists of words that are semantically associated to a nonstudied critical lure. In later free recall tests, participants have been shown to remember the nonstudied critical lures at rates comparable to those for list items. Using a similar procedure, Basden et al. (1998, Exp. 1) found that collaborative and nominal trios falsely recalled an equivalent level of critical lures. In contrast to these findings, Basden et al. (1997, Exps 1–3) and Basden et al. (1998, Exp. 2) found that when participants were presented with categorised word lists, where the highest frequency category members were missing and acted as critical lures, collaborative trios falsely recalled more nonstudied lures than nominal equivalents.

Basden et al. (1998) suggested that two separate but complementary processes can explain why collaborative trios produce more false recall than nominal trios on some occasions but not others. The first relates to the stimuli used at encoding, whereas the second relates to the levels of pressure that members feel towards contributing to group recall. In reference to the former it can be seen that in the studies where collaborative and nominal groups produced equivalent levels of false recall the participants were presented with either unrelated lists of pictures and words, or lists of associated words that did not belong to an obvious category. In the studies in which collaborative groups produced more false recall than nominal groups, the stimuli consisted of word lists belonging to superordinate categories. Basden et al. suggested that when collaborative groups are presented with word lists they utilised strong superordinate-to-item cues to assist their recall. In their experiments these cues were in the form of category labels. False recall in collaborative trios was enhanced as participants incorrectly recalled high-frequency instances from those categories. As the DRM lists used by Basden et al. (Exp. 1) and the unrelated pictures and words used by Weldon and Bellinger (1997) do not have superordinate-to-item cues, this led participants to falsely recall fewer critical lures than nominal equivalents.

For retrieval cues to be effective in enhancing collaborative false recall beyond levels obtained by nominal equivalents, Basden et al. (1998) proposed that group members also need to feel under pressure to contribute to recall. Placing collaborative group members under pressure to output items been shown to increase false remembering in several studies (e.g., Alper, Buckhout, Chern, Harwood, & Slimovits, 1976; Reysen, 2003). In Basden et al. (1997, Exps 1–3) and Basden et al. (1998, Exp. 2), participants were asked to recall words in a turn taking fashion, whereby they all contributed one word each, in turn, until no more words were remembered. Basden et al. (1998) argued that this put participants under pressure to contribute to group recall and led them to utilise the strong retrieval cues that were available to generate incorrect, but typical, category exemplars. As

participants in nominal groups do not engage in social interaction they were under no such pressure to respond and therefore produce fewer false memories than collaborative groups. Basden et al. (1998) offered a similar explanation for Weldon and Bellinger's (1997) findings. In this study, collaborative groups recalled in a free for all manner, where group members could speak at will. It is argued that this lowered the levels of group pressure felt by members and resulted in collaborative and nominal groups recalling equivalent numbers of critical lures. To summarise, Basden et al. (1998) suggest that false recall in collaborative groups is enhanced to levels beyond that of nominal equivalents through a combination of strong superordinate-to-item cues and group pressure.

The primary aim of the present research was to compare the effects of group pressure and group size on the collaborative false recall of critical lures using the DRM lists as stimuli. Recall of nonstudied intrusions and studied words were also examined in additional analyses. Group pressure was manipulated by having participants engage in either high-pressure turn taking recall or low-pressure free for all and nominal recall. These three recall methods have never been directly compared, and the levels of group pressure associated with each were suggested by Basden et al. (1998) as a probable explanation for Weldon and Bellinger (1997) and Basden et al.'s (Exp. 2) contrasting findings. These experiments, however, also used different stimuli. It is important to establish whether the three recall methods also differ when the same stimuli is used. Group size was manipulated by comparing individuals, pairs, trios, and quartets. The aforementioned research only utilised collaborative trios.

Predictions can be made regarding each group's performance in relation to critical lures, nonstudied intrusions, and studied words. For critical lures, it is predicted that false recall will increase with group size across all recall conditions. This prediction is based upon earlier findings where false recall was found to be greater for collaborative pairs than individuals (e.g., Perlmutter, 1953; Stephenson, Bradstatter, & Wagner, 1983). Should group pressure be greater in the turn taking groups, it would be expected that they would recall more critical lures than free for all groups. However, given the findings of Basden et al. (1998, Exp. 1), turn taking groups should recall fewer critical lures than nominal equivalents when DRM lists are used.

It is also expected that false recall of nonstudied intrusions would increase in relation to group size across all recall methods. Moreover, if putting pressure on participants to recall items increases the likelihood of false remembering, it is expected that turn taking groups will generate the most intrusions. The lower pressure free for all and nominal groups should not vary in this respect. Intrusions in the present study are important as they provide an indication as to whether groups were having specific false

memories with regards to critical lures, or simply adopting a lower threshold for producing nonstudied items at test.

Finally, there is evidence to suggest that although correct recall increases during collaboration, groups do not perform to their maximum potential. Researchers have found that collaborative trios (Basden et al., 1998, Exp. 1) and quartets (Basden, Basden, & Henry, 2000) recall less presented information than equivalent sized nominal groups. This has been termed *collaborative inhibition*. Such inhibition has not been reliably found with pairs (Meudell, Hitch, & Boyle, 1995; Meudell, Hitch, & Kirby, 1992). Those studies involving pairs, however, utilised free for all recall, whereas those studies using trios and quartets utilised turn taking. If group-pressure to recall items can inhibit veridical recall, it was predicted that turn taking groups would recall fewer studied items, whereas nominal and free for all groups would recall equivalent levels.

A secondary aim of the present research was to determine whether group members retain words generated within collaborative groups during subsequent individual recall. Social contagion studies, where confederates introduce misinformation during collaboration, suggest that participants can retain nonstudied items on later individual tests (Basden, Reysen, & Basden, 2002; Meade & Roediger, 2002; Roediger, Meade, & Bergman, 2001). The above studies all utilised turn taking recall, raising the possibility that social pressure during collaboration may increase later social contagion. Based upon these findings, it was predicted that social contagion of critical lures and intrusions would be found in the high-pressure turn taking recall groups, but not in the lower pressure groups.

Correct recall of studied items was also examined on the later individual recognition test. Basden et al. (2000) found that prior turn taking collaboration in quartets and pairs can enhance later individual recall. In contrast to this, Finlay, Hitch, and Meudell (2000) found in an experiment involving pairs who engaged in free for all recall that prior collaboration did not benefit later individual recall. These contrasting findings again raise the possibility that group pressure can influence later individual recall. Based upon these findings it is predicted that individuals who worked in turn taking groups will benefit from prior collaboration, whereas individuals who worked in free for all groups will show no later benefits.

In sum, the experiment reported here aims to further explore the collaborative recall phenomenon by manipulating both group size and group pressure. The effects of collaboration on later individual recall shall also be examined.

METHOD

Participants

Two hundred and sixty four undergraduate students from Lancaster University participated in this study. Two hundred and sixteen of the participants were divided into pairs, trios, and quartets, with 12 groups of each size being placed in both the turn taking and free for all recall conditions. The remaining 48 participants were used as a noncollaborative population from which equivalent sized nominal group data could be drawn. Thirty-six of these were also randomly selected to provide comparative individual data for each of the three recall conditions (twelve participants for each). Participants were all native English speakers.

Stimuli and design

The stimuli used were the 20 word lists found to produce the highest incidence of false recall by Stadler, Roediger, and McDermott (1999). Each list contained 15 words that were associated to a nonstudied critical lure. The words within the lists were ranked from strongest to weakest in terms of their association to the critical lure. The 20 word lists were divided into two sets of 10 lists (Set A and Set B).

Half of the groups and individual participants studied the lists in Set A, whereas the remainder studied the lists in Set B. The lists selected to be in Set A were the first, third, fifth, seventh, ninth, eleventh, thirteenth, fifteenth, and seventeenth strongest producers of false memories, whereas the remaining lists were used in Set B. All words were recorded on an audiotape by a male speaker at a rate of approximately one word every 2 s. Prior to each list, the speaker identified the list number.

Procedure

All collaborative groups and individuals were tested separately. Participants were given an auditory presentation of 10 word lists during which they were instructed not to talk or write anything down. Following the presentation of all 10 lists, participants were given a 2 min mathematical distractor task to prevent recency effects during recall. The participants were then given a collaborative (or individual, for those working alone) recall test. Half the groups were asked to recall using a turn taking procedure whereby individuals within the group took turns in a sequential order to recall aloud one word at a time. The experimenter then recorded these responses on a sheet not visible to participants. If a participant did not respond for 10 s, the

next participant was prompted to recall a word. The recall test continued until all participants within the group failed to recall a word within their consecutive 10 s periods. The participants in this condition were asked only to recall words they were sure had been presented, not to repeat words other group members had recalled, and not to assist other group members during recall.

The remaining groups were asked to recall in a free for all method. This required participants to discuss which words they felt had appeared at encoding and verbally report these to the experimenter. The responses were then recorded on a sheet not visible to the participants. Participants were asked not to include erroneous guesses and no advice was given on how to resolve disagreements amongst group members. Individuals who were tested alone were asked to recall the words aloud in any order and these responses were recorded by the experimenter.

Following the initial recall test, all participants (whether previously tested alone or in a group) were given an additional surprise individual recall task in which they were asked to record their own responses on a sheet of paper. The task was participant paced. Again, all participants were instructed not to guess and it was emphasised that they should only report words they were confident had appeared during encoding. The test was participant paced. The entire experiment lasted approximately 35 min.

RESULTS

The number of critical lures, intrusions, and studied items recalled by individuals and collaborative groups were scored on all tests. Nominal group scores were obtained by randomly combining the responses of individuals who recalled alone and eliminating all redundant responses. Collaborative group members' recall scores on the later individual tests were averaged to provide single scores for studied items, critical lures, and intrusions. Nominal groups and their constituent members' performance on the later individual recall test were not compared as this is equivalent to comparing individuals tested alone on two occasions. As this was done in the turn taking and free for all conditions it would add nothing of interest to the results. The mean number of critical lures and overall intrusions falsely recalled can be found in Table 1. The mean number of presented words correctly recalled can be found in Table 2. Alpha was set at .05 for all statistical analyses.

Critical lures

The results from the collaborative recall test were examined in a series of 4 (group size: individuals, pairs, trios, and quartets) $\times$ 3 (recall method: turn

TABLE 1
Mean number of critical lures and overall intrusions falsely recalled by groups of four sizes across three recall methods during both collaborative and later individual testing. Overall intrusions were calculated by dividing the total number of intrusions by total recall. Standard deviations (SD) are shown in parentheses

	Group sizes			
Recall method	*Individuals*	*Pairs*	*Trios*	*Quartets*
Turn taking				
Collaborative				
Critical lures	.29 (.07)	.47 (.04)	.53 (.05)	.63 (.05)
Intrusions	.06 (.01)	.13 (.01)	.18 (.01)	.23 (.01)
Later individual recall				
Critical lures	.32 (.09)	.40 (.10)	.52 (.11)	.59 (.09)
Intrusions	.05 (.01)	.11 (.01)	.15 (.01)	.20 (.01)
Free for all				
Collaborative				
Critical lures	.31 (.07)	.41 (.04)	.47 (.04)	.52 (.04)
Intrusions	.05 (.01)	.08 (.01)	.15 (.01)	.20 (.01)
Later individual recall				
Critical lures	.32 (.09)	.33 (.08)	.37 (.09)	.42 (.08)
Intrusions	.03 (.01)	.04 (.01)	.05 (.01)	.06 (.01)
Nominal				
Critical lures	.28 (.07)	.37 (.05)	.45 (.05)	.54 (.05)
Intrusions	.06 (.01)	.09 (.01)	.13 (.01)	.16 (.01)

taking, free for all, and nominal groups) between-subjects ANOVAs. Post hoc tests were conducted using Tukey's HSD. As predicted, false recall of critical lures increases in proportion to group size across all recall methods, $F(3, 132) = 158.14$, $MSE = 0.30$. It was also expected that nominal groups would recall the most critical lures. Despite there being a difference between all three groups, $F(2, 132) = 22.43$, $MSE = 0.30$, post hoc analyses revealed that turn taking groups recalled more critical lures than the free for all and nominal groups. No other differences were significant. There was an interaction between group size and recall method, $F(6, 132) = 3.56$, $MSE = 0.30$. As anticipated, critical lure recall increased in proportion to the number of collaborators in the turn taking, $F(3, 44) = 87.02$, $MSE = 0.28$, free for all, $F(3, 44) = 41.32$, $MSE = 0.25$, and nominal conditions, $F(3, 44) = 39.92$, $MSE = 0.36$. Unexpectedly, critical lure recall by pairs was greatest in turn taking groups and least in the nominal groups, $F(2, 33) = 17.68$, $MSE = 0.19$. False recall was also greater in turn taking trios, $F(2, 33) = 9.17$, $MSE = 0.24$, and quartets, $F(2, 33) = 17.20$, $MSE = 0.24$, than free for all and nominal equivalents. No other differences were significant. These findings demonstrate that collaboration increases

TABLE 2
Mean number of presented words correctly recalled by groups of four sizes across three recall methods during both collaborative and later individual testing. Standard deviations (SD) are shown in parentheses

	Group sizes			
Recall method	*Individuals*	*Pairs*	*Trios*	*Quartets*
Turn taking				
Collaborative	.28 (.05)	.37 (.05)	.42 (.04)	.47 (.04)
Later individual recall	.31 (.05)	.35 (.05)	.39 (.03)	.44 (.04)
Free for all				
Collaborative	.29 (.06)	.35 (.05)	.41 (.04)	.46 (.05)
Later individual recall	.32 (.05)	.32 (.04)	.36 (.07)	.39 (.06)
Nominal				
Collaborative	.29 (.07)	.43 (.05)	.51 (.04)	.60 (.04)

false recall, and that false remembering is enhanced by both group size and group pressure to output items.

Participants' performance on the surprise individual recall test was examined in a series of 4 (group size: individuals, pairs, trios, quartets) $\times 2$ (recall type: collaborative recall and later individual recall) mixed-subjects ANOVAs. Tukey's HSD was again used for between-subjects post hoc tests. It was predicted that critical lures generated during turn taking collaboration would be retained on later individual testing. As expected, participants recalled an equivalent level of critical lures on both tests, $F(1, 44) = 3.18$, $MSE = 0.47$, $p = .08$, thus retaining an effect of overall group size, $F(3, 44) = 43.82$, $MSE = 0.92$. There was no interaction between group size and recall type, $F(3, 44) = 2.65$, $MSE = 0.47$, $p = .06$. These combined results therefore suggest social contagion of critical lures did occur in turn taking groups.

It was predicted that there would be no social contagion evident following free for all recall. In line with this, individuals recalled fewer critical lures than they did during collaboration, $F(1, 44) = 24.54$, $MSE = 0.41$. There was, however, still an overall effect of group size, $F(3, 44) = 14.58$, $MSE = 0.72$ with individuals recalling the least critical lures and quartets the most. There was no difference between pairs and trios, and trios and quartets. There was an interaction between group size and recall type, $F(3, 44) = 4.88$, $MSE = 0.41$. Participants recalled an equivalent number of critical lures on the later individual recall test regardless of prior collaborative group size, $F(3, 44) = 2.75$, $MSE = .68$, $p = .06$. Likewise, individuals who had previously collaborated in pairs, $F(1, 11) = 9.48$, $MSE = 0.44$, trios, $F(1, 11) = 11.00$, $MSE = 0.54$, and quartets, $F(1, 11) = 22.39$, $MSE = 0.31$, all recalled fewer critical lures than they had previously. No other differences were significant.

These combined results suggest that social contagion was not evident in the free for all recall groups.

Intrusions

Intrusions were calculated as in Basden et al. (1998) whereby the total number of intrusions (critical words and noncritical words) were divided by total recall (studied words and total intrusions). As anticipated recall of intrusions increased with group size, $F(3, 132) = 265.02$, $MSE = 0.01$, and these effects were greatest in the turn taking conditions, $F(2, 132) = 934.67$, $MSE = 0.01$. There was no difference between the free for all and nominal groups in this respect. There was an interaction between group size and recall method, $F(6, 132) = 30.20$, $MSE = 0.01$. As expected the number of intrusions increased in proportion to the number of contributors in the turn taking, $F(3, 44) = 500.12$, $MSE = 0.01$, free for all, $F(3, 44) = 216.28$, $MSE = 0.01$, and nominal conditions, $F(3, 44) = 231.10$, $MSE = 0.01$. Likewise, a greater number of intrusions were recalled by pairs, $F(2, 33) = 52.89$, $MSE = 0.01$, trios, $F(2, 33) = 131.85$, $MSE = 0.01$, and quartets, $F(2, 33) = 155.96$, $MSE = 0.01$ in the turn taking groups than their equivalents in the free for all and nominal conditions. No other differences were significant. These results demonstrate that, regardless of the recall method used, recall of intrusions increases with group size and that these increases are greatest in the high-pressure turn taking groups.

Social contagion of intrusions was also examined. As with the critical lures, it was predicted that only turn taking groups would demonstrate social contagion. Participants who previously collaborated in turn taking groups recalled fewer intrusions on the later individual test, $F(1, 44) = 55.62$, $MSE = 0.01$. Despite this, an increase in overall recall across both conditions remained, $F(3, 44) = 439.09$, $MSE = 0.01$. There was no interaction between recall method and group size, $F(3, 44) = .65$, $MSE = 0.01$, $p = .60$. These combined results therefore provide no evidence of social contagion for intrusions in turn taking groups.

Participants who previously collaborated in the free for all condition also recalled fewer intrusions on the later individual test, $F(1, 44) = 769.24$, $MSE = 0.01$. Once again, however, the number of overall intrusions falsely recalled on both tests increased with group size, $F(3, 44) = 150.51$, $MSE = 0.01$. There was an interaction between group size and recall type, $F(3, 44) = 62.23$, $MSE = 0.01$. As predicted, pairs, $F(1, 11) = 70.11$, $MSE = 0.01$, trios, $F(1, 11) = 244.28$, $MSE = 0.01$, and quartets, $F(1, 11) = 723.68$, $MSE = 0.01$, all recalled more critical intrusions on the initial collaborative recall test than on the later individual recall test. No other differences were significant. Moreover, during the later individual testing the

number of intrusions failed to increase as a function of prior collaborative group size, $F(3, 44) = 1.13$, $MSE = 0.01$, $p = .23$. These combined results suggest that social contagion did not occur for nonstudied intrusions in the free for all recall conditions.

Studied items

It was expected that veridical recall would increase with group size across all recall conditions, but that these increases would be greatest for nominal and free for all groups. In line with this, correct recall did increase in proportion to group size, $F(3, 132) = 86.53$, $MSE = 0.35$. There was also a main effect of recall method, $F(2, 132) = 31.58$, $MSE = 0.35$. Participants in the nominal groups recalled more presented words than those in the turn taking and free for all groups. No other differences were significant. There was an interaction between group size and recall method, $F(6, 132) = 2.27$, $MSE = 0.35$. Veridical recall increased in proportion to the number of contributors in the turn taking, $F(3, 44) = 35.61$, $MSE = 0.16$, free for all, $F(3, 44) = 21.24$, $MSE = 0.19$, and nominal, $F(3, 44) = 16.72$, $MSE = 0.18$, recall conditions. Nominal pairs, $F(2, 33) = 9.24$, $MSE = 0.20$, trios, $F(2, 33) = 27.84$, $MSE = 0.25$, and quartets, $F(2, 33) = 33.13$, $MSE = 0.22$, recalled more presented words than those in the turn taking and free for all groups. No other differences were significant. In sum, these findings demonstrate that veridical recall did increase with group size across all recall methods, but that collaborative inhibition was observed in the turn taking and free for all groups.

On the later individual recall test, it was anticipated that participants who had been in turn taking groups would benefit from prior collaboration. In line with this, there were no differences between collaborative and later individual recall of studied items in the turn taking condition, $F(1, 44) = 1.52$, $MSE = 0.24$, $p = .19$, resulting in a an overall effect of group size, $F(3, 44) = 32.83$, $MSE = 0.34$. There was no interaction between group size and recall type, $F(3, 44) = 1.94$, $MSE = 0.30$, $p = .19$. These results therefore suggest that prior collaboration enhanced later individual recall following turn taking collaboration.

It was also predicted that there would be no benefits of prior collaboration for participants who had been in free for all groups. As expected, participants recalled fewer correct words on the when later tested alone, $F(1, 44) = 9.13$, $MSE = 0.26$. There was an overall effect of overall group size, $F(3, 44) = 26.01$, $MSE = 0.26$. Tukey's HSD revealed no difference between individuals and pairs. All other differences were significant. There was an interaction between group size and recall type, $F(3, 44) = 4.91$, $MSE = 0.43$. The simple main effects revealed that participants who had previously

collaborated in trios, $F(1, 11) = 11.00$, $MSE = 0.14$, and quartets, $F(1, 11) = 8.80$, $MSE = 0.30$, all recalled fewer presented words when tested alone. No other differences were significant. There was therefore no evidence that prior collaboration in free for all groups can benefit later individual recall.

GENERAL DISCUSSION

The primary aim of the present research was to examine the effects of both group size and group pressure on collaborative false recall of nonstudied critical lures. It was found that false recall of critical lures increased in proportion to the number of collaborators regardless of group pressure. However, those participants who experienced the most group pressure to output items falsely recalled the most critical lures. The secondary aim of the present study was to determine whether false memories generated within collaborative groups are retained on later individual testing via a form of social contagion. Only individuals who experienced the most group pressure during collaboration retained critical lures at levels equivalent to those they recalled in their groups.

Basden et al. (1998) suggested that false remembering in collaborative groups exceeds that of nominal equivalents when group members feel under pressure to contribute to recall and when there are strong superordinate-to-item cues available to group members in the form of category labels. They proposed that turn taking recall enhances group pressure, and when presented with stimuli containing superordinate-to-item cues, participants in these groups incorrectly generate typical category exemplars (Basden et al., 1997, 1998, Exp. 2). Participants in free for all and nominal groups experience less pressure to recall and therefore generate fewer nonstudied words (Basden et al., 1997, 1998, Exp. 2; Weldon & Bellinger, 1997). Likewise, when DRM lists are used as stimuli, the strong item-to-item associations associated with them do not provide the necessary cues required to enhance collaborative false recall to levels beyond that of nominal equivalents (Basden et al., 1998, Exp. 1). In the present study, comparisons were made between the three recall methods using DRM lists as stimuli. Based upon previous research it was predicted that false recall of critical lures would increase with group size regardless of the recall method used. It was also expected that nominal groups would recall the most critical lures whereas turn taking and free for all groups would recall the least.

The present study found that false recall of critical lures increased with group size across all recall methods. It is proposed here that as the number of contributors within the groups increased, there was a greater likelihood that a member would recall a nonpresented critical lure and include this in the group output. The turn taking groups of all sizes, however, falsely

remembered more critical lures than their free for all and nominal equivalents. There was no difference between these latter two sets of groups. These findings contradict Basden et al's. (1998) suggestion that strong superordinate-to-item cues are essential for collaborative false recall to exceed nominal group false recall. The present study suggests that false recall of critical lures was greatest in the turn taking groups as a result of pressure to contribute to recall. In the process of attempting to generate more studied words during collaborative recall, participants in the turn taking groups also recalled more critical lures. As free for all and nominal group members are under less pressure to recall words, they generated fewer critical lures overall.

According to Basden et al. (1998), the use of DRM lists in the present experiment should have prevented false recall in the turn taking groups from exceeding that of nominal equivalents. As the procedures used by Basden et al. (1998, Exp. 1) were comparable to those used in the present study, the most likely explanation for these contradictory findings relates to the differences in the stimuli used. The present study, according to Stadler et al's. (1999) ranking system, utilised DRM lists that are more effective in inducing false recall than those used by Basden et al. (1998, Exp. 1). For illustrative purposes, the weakest list (king) was estimated to induce false recall of the critical lure on 10% of occasions, whilst the strongest list (window) was estimated to induce false recall of the critical lure on 65% of occasions. In Basden et al's. (1998, Exp. 1) study the lists they used had a mean likelihood of inducing false recall of critical lures on 44% of occasions (D. R. Basden, personal communication, 27 January 2006). The lists used in the present study had a mean likelihood of .53%, meaning that individual group members were more likely to recall them. This difference, in association with the group pressure experienced by the group members, can explain why turn taking groups in the present study recalled more critical lures than nominal equivalents.

The influence of group pressure in the present study can be further determined by examining the number of overall nonstudied intrusions made by groups across the three recall conditions. Recall of intrusions increased with group size across all recall methods. It is again suggested that this can be attributed to the cumulative errors of individuals who comprise each group. Participants in the turn taking groups made the most overall intrusions during collaboration across all group sizes. This is consistent with the findings of Basden et al. (1998). There was no difference between the nominal and free for all groups. More importantly, the greater levels of false recall observed for both critical lures and overall intrusions in the turn taking conditions are consistent with past research suggesting that group pressure can increase incorrect inferences to nonpresented information (Alper et al., 1976) and that these errors increase in proportion to group pressure (Reysen, 2003). If levels of group pressure were consistent across

recall methods it would be expected that all groups would recall similar levels of overall intrusions and critical lures. This was only found in the low-pressure free for all and nominal conditions. This further supports the suggestion that group members recall in the turn taking groups was influenced by group pressure and that participants made general errors when attempting to recall studied words.

Veridical recall was also examined across the three recall methods. There was an effect of collaborative group size with correct recall increasing in proportion to group size across all recall methods. Nominal groups recalled the most presented words, with the free for all and turn taking groups recalling equivalent levels. This is the standard collaborative inhibition effect, and is consistent with the collaborative remembering literature (Basden et al., 1998, 2000; Meudell et al., 1995, 1992). This finding also suggests that group pressure to output items did not influence veridical recall

The finding that group pressure to output items increased recall of all three dependent measures suggests that participants in the turn taking groups lowered their response criterion threshold during collaboration. Had the increases simply related to critical lures, this would have suggested that specific false recall was occurring. However, the increases also found in relation to intrusions demonstrate that participants were more likely to generate words in the turn taking groups regardless of whether they were correct or not. Participants in the nominal and free for all groups maintained a normal response criterion threshold as they were under less pressure to provide responses. The influence of group pressure on response thresholds is an issue we are currently investigating.

The present research also investigated whether critical lures and overall intrusions generated during collaboration can be retained on later individual testing. Previous research has demonstrated that when confederates introduce misinformation within collaborative groups, such social contagion can occur (Basden et al., 2002; Meade & Roediger, 2002; Roediger et al., 2001). As these studies all utilised high-pressure turn taking recall, it was predicted that a form of social contagion would be evident when group pressure was experienced during collaboration in the present study. Participants in the turn taking groups recalled comparable levels of critical lures but fewer intrusions on a later individual recall test. Those individuals who collaborated in the free for all condition later recalled both fewer critical lures and overall intrusions. Likewise, there was also no influence of prior collaborative group size following free for all recall. This suggests that group pressure to contribute to recall can lead to a subsequent form of social contagion for critical lures only. This finding is important as it demonstrates that prior collaboration in a turn taking group can enhance later individual recall of specific items and not just overall recall intrusions. It is suggested that participants in turn taking groups recalibrated their response criterion

threshold during later individual testing so that they were at normal levels (having been lowered during collaboration), but the DRM critical lures remained as false memories, whereas the noncritical intrusions did not.

Veridical recall on later individual testing was also expected to be influenced by the levels of group pressure experienced during prior collaboration. Basden et al. (2000) found that later individual recall was enhanced following turn taking in pairs and quartets. Conversely, Finlay et al. (2000) found that prior free for all collaboration in pairs did not benefit later individual recall. Participants in the turn taking condition retained inflated levels of correct recall when later tested alone. Those in the free for all condition recalled fewer correct words overall when later tested alone, and only those initially tested in quartets showed a benefit of prior collaboration. These results are consistent with past research and suggest that engaging in a high-pressure turn taking recall prior to individual recall is beneficial to remembering studied words. This does not apply when participants initially engage in a free for all recall procedure.

In conclusion, the present study has demonstrated that collaborative false recall is enhanced to levels beyond that of nominal groups when group pressure to recall words is applied. Collaborative false recall increases in proportion to group size regardless of group pressure, but those groups that do experience group pressure have greater levels of false recall. Moreover, their group members are more likely to retain the critical lures on a later individual recall test.

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