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Maintaining stereotypes in communication: Investigating memory biases and coherence-seeking in storytelling

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When communicating, a general tendency exists for people to transmit more stereotype consistent (SC) than inconsistent (SI) information. Although some communicative factors have been shown to play a role, it is still not yet known the extent to which general memory biases (i.e. independent of communicative context) contribute to this phenomenon. To examine this issue, and to explore further mechanisms of the bias, the present paper presents quantitative and qualitative data of an experiment involving the transmission of a stereotype-relevant story through 20 four-person chains using the method of serial reproduction. An SC bias emerged when participants had an intention to communicate but not when they reproduced the story from memory with no such intention. Results also suggest that trying to tell a coherent story may be one further factor that contributes to the bias. These and other findings were discussed in terms of the role of communicative processes in maintaining stereotypes.

Key words: communication, memory, narratives, serial reproduction, stereotype maintenance.

Introduction

It is well recognized that people tend to maintain their stereotypes of particular groups, even when confronted by evidence that disconfirms the stereotypes (Hamilton & Sherman, 1994; von Hippel *et al.*, 1995; Hilton & von Hippel, 1996; Fiske, 1998). Although people often communicate stereotype-relevant information to one another, it is only recently that researchers have begun to examine how interpersonal communication plays a role in stereotype maintenance (Harasty, 1997; Ruscher, 1998; Schaller & Conway, 1999; Thompson *et al.*, 2000; Brauer *et al.*, 2001). One important finding is that people display a general tendency to communicate more stereotype-consistent (SC) than stereotype-inconsistent (SI) information. A large proportion of this research has focused on storytelling. Ranging from simple to complex structures, stories are a very common form of communication and are frequently transmitted from one person to another across many individuals (e.g. children's stories, folk stories, gossip, news, reports of experiences). When a story is transmitted through such communication chains (e.g. rumors), it tends to undergo a rapid transformation that results in much of the SI information omitted but SC information retained (Lyons & Kashima, 2001; 2003).

Given that chains and other networks of communication are extremely prevalent in any community, the members of such communities are often likely to receive stories (and possibly other information) that are modified in ways that generally confirm their stereotypes. With the resulting lack of exposure to SI information, little basis may exist for people to change their stereotypes. Thus, the extent to which stereotypes can be changed may depend on people telling stories in ways that do not lead to SC biases. However, the research so far has been unable to find instances in which people tell stories that emphasize SI over SC information. Given that people often display memory biases when recalling stereotype-relevant information (Fyock & Stangor, 1994), one possible reason for the failure to find SI biases in storytelling is that people are unable to remember SC and SI information equally when reproducing stories in chains. If this is the case, then it may not be possible to find situations in which people transmit more SI than SC information unless memory processes are directly targeted.

Although considerable research has been conducted on general memory biases (i.e. independent of communicative context) for stereotype-relevant information, virtually none has examined how people reproduce stories that contain SC and SI information. This is especially the case for the recall of stories within communication chains. Can people remember SC and SI information equally when recalling stories in chains? Unfortunately, the present literature is unable to answer this question because past research has generally focused on the memory for SC and SI

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information presented in non-narrative formats. The amount and type of information in stories tends to be recalled differently to other ways of presenting information (Yussen *et al.*, 1988). Apart from this, the present literature on general memory biases actually has little consensus as to whether memory favors SC or SI information. For instance, Fyock and Stangor (1994) conducted a meta-analysis and found a small SC bias in the recall of stereotypes of some groups (mainly ethnic and gender groups). However, other studies and meta-analyses have shown that when people are asked to think carefully about stereotype-relevant and other trait-relevant information in order to resolve inconsistencies, recall is better for inconsistent than consistent information (Srull & Wyer, 1989; Macrae *et al.*, 1993; for meta-analytic reviews, see Rojahn & Pettigrew, 1992; Stangor & McMillan, 1992).

Although not exploring stereotype-relevant information *per se*, Bartlett (1932) examined how various folk and other stories are reproduced from memory within chains. In his now classic studies, participants followed the method of serial reproduction. For this, one participant read and then reproduced a story from memory in writing. The reproduction was read by a second participant who made their own reproduction from memory, which was given to a third participant, who did the same, and so on. Typically, participants were unaware that another participant would read their reproduction. Bartlett found a tendency for the reproductions to become increasingly consistent with the participant's cultural expectancies (i.e. conventionalization) further along the chain. Unfortunately, however, it is not clear whether participants were instructed to remember the story exactly as they read it. If not, some kind of communicative element (e.g. modifying story content and structure to suit an audience) may have been involved because stories are usually reproduced for communication. Nevertheless, given that Bartlett did not examine the reproduction of stereotype-relevant information, the question of the extent to which general memory biases contribute to rendering stories more stereotypical in communication chains remains unanswered.

The research presented in the present paper uses serial reproduction and a story with SC and SI information to shed some light on this question. Although previous work has shown that a story becomes more stereotypical along a chain when reproduced by those with a communicative intention, it is not known whether this occurs when people do not have a communicative intention and are therefore focused solely on remembering the story. If a story fails to become more or less stereotypical in the absence of communicative intent, then this would suggest the absence of a general memory bias (i.e. a bias that is independent of communicative context). In contrast, if the absence of a communicative intent, where people focus purely on remembering a story, still results in the story becoming

more stereotypical along a chain, then this may point to a general underlying memory bias that would certainly need to be taken into account when trying to formulate methods or conditions intended to encourage people to retain more SI information in storytelling.

Nevertheless, communicative intent has so far been shown to at least affect the relative size of SC biases in communication chains from one context to another (Lyons & Kashima, 2001; 2003). One potential way in which communicative intent may contribute to this bias (in addition to other factors: see Lyons & Kashima, 2003) is through a motivation to tell a coherent story. The presence of an audience typically results in communicators trying to make a story as coherent as possible so that it is relatively easy for the audience to understand and draws out the main point or moral of the story (Grice, 1975; Leudar & Browning, 1988). One way of making a story (or other information) seem coherent to an audience is to make it consistent with their beliefs. Given the fact that stereotypes are generally shared (Katz & Braly, 1933; Haslam *et al.*, 1998), communicators may expect their audience to believe the stereotypes and therefore find SI information unexpected and perhaps difficult to understand within the context of the stereotypes. So, when reproducing a story, those with a communicative intent may not only produce a more coherent story, but also a more stereotypical story than those who do not have this intent. Whether or not this is the case remains to be seen. However, conducting a preliminary investigation into this forms a secondary aim for the present paper.

Present study

An experiment is presented that uses written serial reproduction of a story that contains a mixture of SC and SI information, based on the stereotypes of a politician. The story was reproduced in two main conditions: (i) a 'communication' condition in which participants memorized and reproduced a story with the intention to communicate to the next person in the chain; and (ii) a 'memory' condition in which participants memorized and reproduced a story but without an intention to communicate (i.e. having no awareness that their reproduction would be read by the next person in the chain). Given the lack of previous research on the memory of stereotype-relevant stories and the general disagreement in the literature as to whether people remember more SC or SI information, it is difficult to predict how the story will transform in the memory condition. Nevertheless, it is expected that, consistent with previous studies (Lyons & Kashima, 2001; 2003), an SC bias will emerge along the chains in the communication condition. This bias is also expected to be larger than any tendency in the memory condition given the likely

motivation to make the story as coherent as possible for an audience (and thereby reduce more SI information) in the communication condition.

It is worth noting that although Lyons and Kashima (2001) attempted to examine the reproduction of SC and SI information in similar conditions, these were not sufficiently manipulated. Participants were instructed to do their best to remember the story accurately but the necessity of this task was not emphasized to the extent that communicative intentions could not be ruled out. This is important because stories are typically reproduced for communication, and even when an audience is not specified, communicators may still construct a story as if they had an audience (Singer, 1990). It is therefore essential to have participants focus heavily on memorizing a story as their sole task in order to suppress communicative intent as much as possible. Otherwise, various motivations that are typically involved in storytelling, which usually relate to having a communicative intent (e.g. being entertaining), may surface.

An additional feature of the present study is the examination of the frequency of stereotype-relevant information reproduced in the story as a function of the story structure. The story contained both central (i.e. story clauses that are part of the main causal and/or temporal chain of the plot) and peripheral zones (i.e. story clauses that are not part of the main causal and/or temporal chain, functioning more as background information). Although previous research shows that SC biases generally tend to predominate in the central zone (Kashima, 2000), this does not always appear to be the case (Lyons & Kashima, 2003). It is therefore important to examine the areas of a story that are most likely to be biased as this may provide clues about how to structure stories in ways that encourage people to retain particular types of information when communicating.

The present study also involves an analysis of the level of coherence of the reproductions between the communication and memory conditions. This mainly focuses on a qualitative analysis of reproductions of the story but also incorporates some quantitative analyses. The SC bias is likely to be exacerbated by attempting to make the story more coherent for an audience, so it is expected that the reproductions will become more coherent by the end of the chains in the communication condition than in the memory condition. The analyses also serve a second purpose. Fine and Elsbach (2000) argued that qualitative analyses can provide a useful supplement to quantitative analyses. When published in addition to quantitative results, such analyses can provide the basis for additional generation of research questions and hypotheses that may not stem solely from quantitative data. Combining the two types of analyses in this paper will hopefully provide readers with a greater pool of information for generating insight into the communication processes of stereotype-relevant information.

In all, the main aim of the present study is to examine the extent to which general memory biases (i.e. independent of communication context) play a role in the SC bias in communication chains. An additional aim is to examine the extent to which reproductions in the communication condition become more coherent compared to the memory condition. The first aim is examined quantitatively. The second aim is examined using mostly qualitative, but also some quantitative, analyses.

Method

Participants

Eighty psychology students from La Trobe University, Victoria, Australia (72 females and 8 males) volunteered to participate in exchange for course credit. Participants had a mean age of 19.2 years and were randomly assigned to 20 four-person serial reproduction chains. They all spoke English as their first language.

Construction of the story

The story focused on one main character, identified as a politician in the Federal Parliament of Australia, and was based on the cultural stereotypes of this occupational group. The story has 456 words and was written using relatively simple language with short sentences. Embedded in the story were 10 SC clauses and 10 SI clauses that each described the main character's behaviors and mental/emotional states. In order to prevent confounds between the reproduction of SC and SI information and preferential memory for particular areas of the typical story structure (see, e.g. Mandler & Johnson, 1977; Nezworski *et al.*, 1982; Trabasso & van den Broek, 1985; Yussen *et al.*, 1988), SC and SI information were distributed evenly through two predominant structural elements. These included an even distribution through the various components of the typical story schema (setting, initiating event or main dilemma, internal response by characters to the initiating event, attempt to resolve initiating event, consequence or result of the attempt, and conclusion to the story) and through the central versus peripheral zones (see the Appendix for the distribution of story content within the various structural areas). Also see Lyons and Kashima (2001; 2003) for further discussion on constructing stereotype-relevant stories to eliminate potential confounds in the reproduction of story content.

Pilot testing. A pilot study was conducted to determine whether the 20 stereotype-relevant items were perceived to be consistent and inconsistent with stereotypes of a politician. Fifteen undergraduate students (10 females and 5

males) read the story before being presented with a randomized list of the stereotype-relevant items. They were asked to rate their level of agreement (0 = completely disagree to 10 = completely agree) that each item contained information typical of a politician. Items with a mean score of less than 3.5 or greater than 6.5 were treated as SI or SC, respectively. All but three items had a mean score in the expected areas of the scale. The three ambiguous items were discarded and new items were added to the story. In a second identical pilot study, involving 18 undergraduate students (11 females and 7 males), all stereotype-relevant items obtained a mean rating in the expected areas of the scale.

The SC and SI items were also examined for whether they were perceived to be central or peripheral information. Three expert judges, who all had prior experience in constructing and evaluating the type of stories used here, identified the causal and temporal links between all of the story clauses. Items judged to be part of the main plot were treated as central to the story. All other items were treated as either peripheral to the story. The judges agreed on the causal relationship of all but two clauses. Disagreements were resolved by discussion and, where required, adjustments were made to the story on their advice.

Procedure

None of the participants from the pilot studies were involved in the main study. Participants were tested in small groups. Upon arrival, they were given a set of instructions before reading the story. To emphasize the conditions, instructions were delivered both in writing and orally. Half of the participants were assigned to a 'communication' condition where they were told to read the story twice with the intention of communicating it to another student. They were made aware of their involvement in a serial reproduction chain. The experimenter memorized and orally presented a set of instructions. Part of this involved the condition manipulation: 'You will be retelling the story in writing. This will then be read by another student, who will retell the story in writing to another student, who will do the same for yet another student. But it is important to know that the student who will read your story won't be reading the original story; they will only read your story and retell it to another student.'

Upon starting the task, participants then received a written instruction: 'Often in life, people tell us stories about all kinds of people and events. Sometimes, we retell these stories to other people, perhaps at a party or in conversation with a friend. This task involves reading a story and then retelling the story in writing to another student. In fact, your story will be read by another student. That student will only read your story and will never know what the original story was like. They will then tell your story to a third student,

who will do the same, and so on. This means that everyone will be reading each other's stories and retelling them to other students.'

The remaining participants were assigned to the 'memory' condition. They also read the story twice and were instructed to reproduce the story exactly as read. Participants in this condition were not aware of their involvement in a serial reproduction chain. They were also given a set of oral instructions that specified the condition: 'You will be writing a copy of the story from memory. However, this is a test of how well you can remember the story, so you will need to write an exact copy of the story, word-for-word.' As with the communication condition, participants in the memory condition read another set of instructions before reading the story: 'Often in life, we are required to remember various kinds of information. Sometimes it is necessary to remember this information in a very precise and accurate way, whether it is for work or some other activity. The following task is a test of how accurately you can remember a story. After memorizing the story, you will be required to write an exact copy from memory, word-for-word.'

To prevent rehearsal of the story, each participant completed a 5-minute distracter task after reading the story, in which they drew a floor plan of their home. Following this, participants again read the written instruction (either memory or communication) before writing the story. No time limits were imposed for this task. To form the reproduction chains, a typed copy of each reproduction was given to participants in a later testing session. These copies were made by the experimenter to avoid problems for participants reading illegible writing. However, no alterations were made, including spelling and grammatical errors.

Results

Two coders independently coded the reproductions. One coder was the first author of the present paper who was aware of the experimental conditions when coding, but the second coder was blind to these and was also naive to the aims and hypotheses. Reproductions were divided into clauses, each identified as either reproduced or new to the story. A clause was judged as reproduced if the general gist was present, that is, the clause had to contain the original content but did not have to be reproduced verbatim. Clauses were further divided between the various parts of the story structure and categorized as either SC, SI, or stereotype-neutral. Modifications to the story involving stereotype-relevant information (e.g. adding new SC or SI information, transferring SI information from the central to the peripheral zone) were also noted, and the stereotype-relevant clauses from the original story were coded as either present

or absent in each reproduction. An agreement rate of 92% was found for classifying clauses into the stereotype-relevant categories and the various parts of the story structure, and 85% was found for classifying the modified clauses. All disagreements were resolved by discussion.

The main analysis compared the proportion of SC and SI clauses reproduced from the original story over four reproductions and between the central and peripheral zones. There was an insufficient number of stereotype-relevant items in the various story schema components to treat the schema as a separate factor. Two of the components, the setting and the conclusion, cannot be divided into central and peripheral information, and were therefore excluded from analyses. In the setting, there were only five reproductions where stereotype-relevant information was incorporated. This was confined to the communication condition and all cases involved SC information. The conclusion had approximately equal proportions of SC and SI information reproduced in each position of the chain in both the communication (SC: $M = 0.65, 0.30, 0.15, 0.15$, for positions 1–4, respectively; SI: $M = 0.40, 0.20, 0.10, 0.10$, for positions 1–4, respectively) and memory conditions (SC: $M = 0.45, 0.30, 0.15, 0.10$, for positions 1–4, respectively; SI: $M = 0.45, 0.25, 0.15, 0.05$, for positions 1–4, respectively), but little stereotype-relevant information was left by the end of the chain.

In all, 16 stereotype-relevant clauses were involved in the first analysis. A four-way factorial analysis of variance (ANOVA) was conducted with stereotypicality (SC vs SI clauses), centrality (central vs peripheral), and position (first to fourth reproduction position) as within-subjects factors, and condition (communication vs memory) as a between-subjects factor.

Proportion of stereotype-relevant information (SC vs SI)

As expected, a significant main effect was found for stereotype, $F_{1,18} = 14.36, p < 0.01$. In general, more SC than SI information was reproduced (SC: $M = 0.46$; SI: $M = 0.35$), but this was qualified by a significant two-way interaction with condition, $F_{1,18} = 15.22, p < 0.01$. More SC than SI information was reproduced in the communication condition (SC: $M = 0.56$; SI: $M = 0.34$) but no such differences occurred in the memory condition (SC: $M = 0.37$; SI: $M = 0.37$). There was also a significant main effect for centrality, $F_{2,36} = 42.69, p < 0.001$ (Central: $M = 0.56$; Peripheral: $M = 0.28$) but all of these main and interaction effects were subsumed under a significant stereotype \times centrality \times condition interaction effect, $F_{1,18} = 9.83, p < 0.01$. According to Table 1, the greatest bias in the reproduction of SC over SI information occurred in the central zone of the communication condition, which repli-

Table 1 Mean proportion of stereotype-consistent (SC) and stereotype-inconsistent (SI) clauses reproduced in the central and peripheral zones of the communication and memory conditions

| | Communication condition | | Memory condition | |
|----|-------------------------|------------|------------------|------------|
| | Central | Peripheral | Central | Peripheral |
| SC | 0.87 | 0.25 | 0.51 | 0.23 |
| SI | 0.34 | 0.35 | 0.44 | 0.29 |

cates the findings of Lyons and Kashima (2001; 2003). Only slight differences can be observed between SC and SI information in the central zone of the memory condition and the peripheral zone of both conditions; however, these were not significant, $t_9 = 1.67, ns$ for the central zone in the memory condition, and $t_9 = 1.15, ns$ and $t_9 = 1.26, ns$, for the peripheral zones of the communication and memory conditions, respectively.

There was also a main effect for position, $F_{3,54} = 41.78, p < 0.001$, with generally less stereotype-relevant information reproduced along the chain. However, this was qualified by a significant three-way interaction effect with stereotypicality and centrality, $F_{3,54} = 4.80, p < 0.01$. Regardless of condition, a tendency towards reproducing more SC than SI information in the central zone increased along the chain (Fig. 1).

Modifications of stereotype-relevant information

The reproductions were also analyzed for any additions of new stereotype-relevant information, modifications of information from either SC to SI, and vice versa, and any transfers of stereotype-relevant information from the central to peripheral zones, and vice versa. The total frequency of these was relatively low. In the communication condition, from a total of 328 stereotype-relevant clauses, there were six new SC and two new SI items, seven cases where an item was transformed from SI to SC, no cases of an item being transformed from SI to SC, and 11 cases where SC or SI information was transferred from one zone to another. Modifications were less frequent in the memory condition. From a total of 273 stereotype-relevant clauses, there was one new SC and one new SI item, no cases where an item was transformed from either SC to SI or vice versa, and nine cases where SC or SI information was transferred from one zone to another. Due to the general low frequencies, these modifications were not included in further analyses.

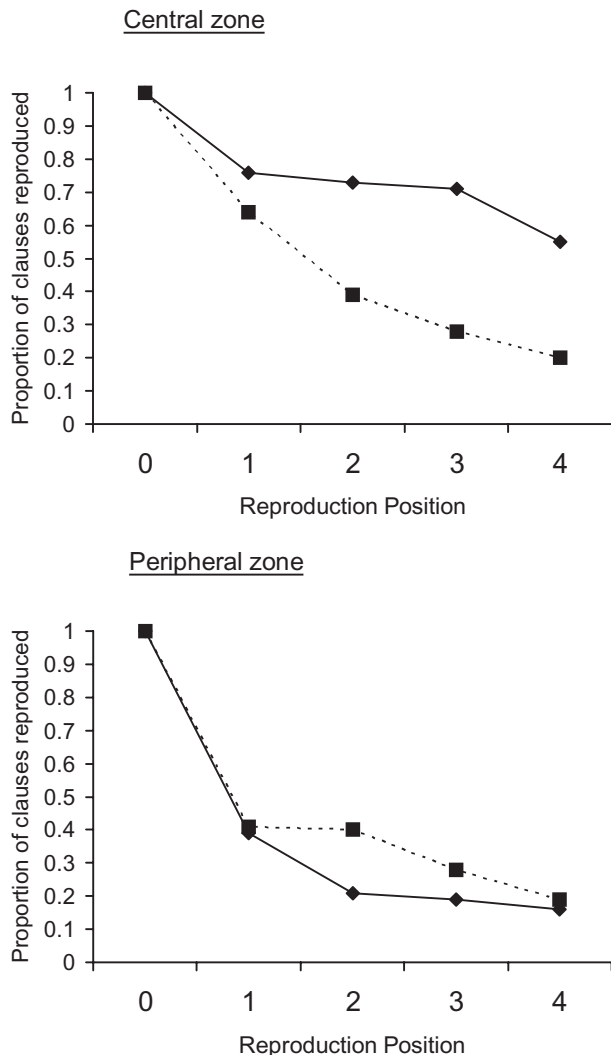


Figure 1 Mean proportion of stereotype-consistent (SC) and stereotype-inconsistent (SI) clauses reproduced in the central and peripheral zones across four reproductions (reproduction position 0 = proportion of clauses in original story). SC, —◆—; SI, ---■---

Qualitative analysis of story coherence

The main focus of this section is a qualitative analysis of the reproductions, although some minor quantitative analyses are also reported. This analysis is mainly constructed around, but not limited to, the most frequently occurring clauses in the final reproductions. All story clauses were included (see Appendix). A clause was judged to be frequently occurring if it appeared in a majority of chains (i.e. six or more chains). For each of the two conditions, Table 2 presents these clauses in their most common sequence and as simple propositions, but they were often embedded in sentences.

Table 2 Reproduced clauses in each of the final chain positions that were present in six or more chains of the communication and memory conditions, and the number of chains in which each clause was reproduced

| | Number of chains where clause is present |
|--|--|
| Communication condition | |
| Kevin is a politician. | 8 |
| Kevin wanted publicity. | 10 |
| So he entered a fun run. | 10 |
| Kevin met a political opponent. | 9 |
| The opponent was also in the race. | 7 |
| Kevin decided to cheat. | 9 |
| Kevin decided to catch a bus. | 8 |
| Kevin waited at the bus stop. | 7 |
| Kevin saw a dog caught in a fence. | 10 |
| Kevin helped the dog. | 8 |
| Kevin missed the bus. | 7 |
| Kevin's photo was taken when saving the dog. | 8 |
| Kevin obtained publicity. | 7 |
| Memory condition | |
| Kevin is a politician. | 9 |
| Kevin has been a politician for 15 years. | 6 |
| Kevin entered a fun run. | 9 |
| Kevin decided to catch a bus. | 8 |
| Kevin saw a dog caught in a fence. | 7 |
| Kevin paged an advisor to help the dog. | 6 |
| Kevin missed the bus. | 7 |

The analysis is structured around Agar and Hobbs' (1982) distinctions between levels of coherence in a narrative. Two levels of most relevance to the present study are themal coherence and local coherence. These levels are addressed separately. Themal coherence is gained by structuring the story around a main theme, which is commonly indicated by either an explicit or implicit repetition of particular subject matter (e.g. honesty, being independent) throughout a story. Local coherence is achieved by structuring the story so that the various clauses are clearly connected to other clauses, either causally or temporally. Maximizing both levels of coherence helps to unify the story for easy understanding.

Themal coherence. Reproductions were first examined for whether a theme emerged during the course of reproduction, and then the extent to which story events were structured around the emerging theme. The development of a theme was most evident in the communication condition where obtaining publicity became associated with a number of story items in the majority of chains, despite such associations being absent in the original story. This was despite the fact that there were equal proportions of central

SC and SI information in the original story. In the memory condition, there were two chains in which a central theme emerged, but no theme could be identified in the majority of chains.

Turning first to the communication condition, all reproductions at every position opened the central zone with a report about the protagonist's desire or goal for publicity, and either closed the central zone or ended the reproduction with a report about whether the protagonist achieved this goal (see Table 3 for evidence of this in the final reproduction of the chains). In addition, information that was mostly relevant to whether or not the protagonist was achieving his goal were retained over the positions in the communication condition. In general, the basic plot structure of the final reproductions was somewhat modified from the original story. In most cases, the plot by the end of the chains began with the protagonist's desire for publicity, leading to the decision to join a fun run. When he finds a political opponent also in the run, the protagonist decides that he needs to win in order to have a publicity edge over his opponent and, to do this, he decides to cheat. Thus, the protagonist progresses towards his goal for publicity. This is thwarted when he encounters a stranded dog and decides to save it, but the publicity theme is not lost because the protagonist is rewarded with good publicity for rescuing the dog (see Table 2 for the most frequently reproduced clauses).

In several reproductions, a central modification of the original story facilitated this structure. In the original, the protagonist decided to cheat in the race because he was afraid to compete directly with his opponent. However, this was quickly omitted and taking its place was a statement reporting the protagonist wanting to win the race when discovering that the opponent was also in the race (e.g. '... he then realized that his opposition was also in the fun run. He then realized that he would have to win the fun run'). The emergence of a strong theme was also indicated by a tendency to modify some originally theme-irrelevant information to the extent that it linked in with the pursuit for publicity (e.g. 'He decided that to improve his popularity, he will donate his watch and a sum of money'; 'At the end of the race was the media, who were awaiting the winner. Therefore, Kevin decided to donate his watch'; 'He purchased some roller blades in order to have an edge over the other participants'). Such modifications occurred in at least half of the final reproductions.

In the memory condition, clear themes could not be identified in all but one of the final reproductions (i.e. M8 in Table 3). The latter reproduction was structured along a publicity theme similar to those of the communication condition. There were some reproductions that opened with the protagonist's desire for publicity, but not all of these ended with a report about whether he obtained it or made any further mention of it (i.e. M6 and M10). Moreover, final reproductions were just as likely to open with a statement

other than the protagonist's desire for publicity (i.e. M1, M2, M3, M4, M5, M7, M9), most of which ended with a statement involving different content.

There were, however, two reproductions where the protagonist was reported to desire winning the race at some point in the story with the ending reporting whether or not he won the race. However, even in these reproductions, not all story events were structured around a 'winning the race' theme. For instance, in both of these reproductions, the dog rescue became peripheral to the outcome of the race, being reported as an episode during the race but having no consequences. Other peripheral information was also retained, such as picking up rubbish and purchasing inline skates for spare time use and, unlike the communication condition, no links were drawn between such items and the protagonist's main goals. In addition, some items relevant to a 'winning the race' theme were omitted, even from the third to final reproduction (e.g. 'The man at the stand was also a politician. He thought he could beat Kevin'; 'He challenged Kevin, saying that he would beat him'). In all, however, the communication condition had a level of themal coherence that was much less developed in most of the reproductions in the memory condition. As the story was communicated along a chain of people, it developed a clear theme (i.e. obtaining publicity), which happened to be stereotypical, around which story events were structured.

Local coherence. Assessing the degree of local coherence involved examining whether story events were explicitly or implicitly linked through a causal or temporal relationship. When forming a main causal or temporal chain, such structures constitute the central zone. In general, the reproductions of both conditions had a central zone, with a number of story events linked in some form. However, two main differences were identified between the conditions. First, there were cases where links were lost between story events, despite events being retained within a reproduction, but these were primarily in the memory condition. Second, links between events were more often made explicit in the communication but less so in the memory condition.

In the communication condition, there were only a few cases where an original link between two story events was lost. Each of these cases involved the two events where the protagonist donated money to charity and was served by a political opponent. Donating money tended to become less central to the plot, and discovering the political opponent became a separate event (e.g. 'He also donated some money and goods to charity. Another politician entered himself into the fun run as well'). In the memory condition, several of the final reproductions involved story events becoming unrelated to other events. A common example was the dog rescue. Although in the communication condition, the dog rescue remained integral to the final outcome of the story, in the memory condition, it was often reported as a sideline

Table 3 First sentence of the central zone and the last sentence of the reproduced story in the final chain positions of the communication and memory conditions (C1 to C10 = the final reproduction of each chain in the communication condition; M1 to M10 = the final reproduction of each chain in the memory condition)

| | | First sentence of central zone | Last sentence of story |
|-------------------------|-----|---|---|
| Communication condition | C1 | He decided that to win the next election, he would need some publicity. | In the end, Kevin got his publicity because he saved the dog. |
| | C2 | To gain some positive publicity, he decides to take place in a fun run. | However, while Kevin was freeing the dog from the fence, a photographer took pictures which resulted in good publicity for Kevin. |
| | C3 | He decided that he required some publicity so he entered a fun run. | Although he didn't win the race, a bystander saw him rescue the dog and took a photo so he still achieved the publicity he was after anyway. |
| | C4 | He wanted to receive some good publicity therefore he entered himself in for a fun run. | But he did receive good publicity after all because he stopped to help the dog. |
| | C5 | He decided to increase his publicity by joining a fun run. | Kevin ended up getting his publicity because he asked a photographer to take photos of him rescuing the dog. |
| | C6 | He decides to compete in a fun run hoping that this will improve his publicity. | There is no way he can win the race now so he decides the best thing he can do is to get his photo taken with the dog, for being a hero and saving it. |
| | C7 | (Setting: Kevin loves publicity). One day, he decided to compete in a fun run. | He decided to rescue the dog and take a photo of the event for publicity. |
| | C8 | To gain publicity, Kevin organized a fun run. | So Kevin sacrificed winning in order to save the dog, and as a consequence, he gained more media appraisal for saving the dog than did his political opponent who won the race. |
| | C9 | Kevin decided to participate in a fun run to generate good publicity. | Kevin decided not to cheat in the fun run after all, because someone had taken a photo of him rescuing the dog. |
| | C10 | For publicity, Kevin decided to take part in a fun run. | Kevin was thinking of ways he could not get caught cheating and a photographer photographed him with the dog. |
| Memory condition | M1 | Kevin donated a lot of money to a charity auction. | After the race, he sat down and wrote a speech about how he almost cheated. |
| | M2 | Kevin decided to run a fair fun run for charity. | He then explained to the public that he had cheated. |
| | M3 | One day, he decided to go in a roller skating race. | But Kevin knew that he was still a good politician. |
| | M4 | He decided to enter a fun run. | He didn't win the race but he got his picture in the paper with the dog. |
| | M5 | He decided to go in a fun run. | He owned up to cheating but got a lot of publicity out of it. |
| | M6 | He decided he needed some publicity. | Kevin lost the race. |
| | M7 | He decided that he would enter a fun run, but before he entered he gave money to charity. | He gave up and it was found out that he cheated but he was happy because there was a photo of him helping the dog. |
| | M8 | He needed some publicity. | Kevin still got good publicity because there were photos of him stopping to help the dog. |
| | M9 | One day, he decided to participate in a fun run for charity. | But then he told them he had cheated. |
| | M10 | He decides to enter a fun run for publicity. | When he realized he would not win the race, he rang a colleague to come and help the dog. |

to the race with no consequences for the main events in the story (e.g. 'He helped a dog and talked to the media. But then he told them he cheated [end of reproduction]'; 'He picked up a piece of rubbish and missed the bus. He saw a dog caught but let his representatives help it. He owned up to cheating [end of reproduction]'). There were other reproductions where the protagonist was reported only to see the dog but still without connections to other events in the story (e.g. 'He saw some rubbish and a dog stuck in a fence. The bus left without him'). While some of these instances maintain the temporal ordering that was present between events in the original story, their relevance and causal relationship within the story line was reduced, contributing to a general decline in coherence.

In the communication condition, apart from having only a small number of links lost between story events, local coherence was also more evident by increasing the proportion of explicit links between events, either through creating new links between story events or making original implicit links more explicit. In general, connectives, including both conjunctions (e.g. 'so', 'therefore') and disjunctions (e.g. 'but', 'however'), occurred significantly more often relative to the number of clauses in the last reproductions of the communication than in the memory condition, $t_{18} = 4.67, p < 0.001$. In the communication condition, 59% of clauses began with a connective, contrasting with only 29% in the memory condition. This compares to 28% in the original story. It was not uncommon for a part or whole of a memory reproduction to contain short sentences that read more like a list of events. For example:

He entered a fun run. The man at the stand. Kevin decided to cheat. He knew that there was a bus. He saw a dog trapped in the fence. Kevin saved the dog. He missed the bus. Kevin lost the race [end of reproduction].

In this example, the connection between events is generally implied due to their ordering (except 'The man at the stand'). For instance, it can be inferred that Kevin missed the bus due to saving the dog, but this link is not made explicit and therefore has the potential for ambiguity, that is, the reader may not be entirely sure as to whether the dog rescue caused the protagonist to miss the bus or some other factor. In contrast, communication condition reproductions rarely contained a section of the story where a succession of two or more clauses was not related through a conjunction or disjunction. For example:

At the end of the race was the media, who were awaiting the winner. Therefore, Kevin decided to donate his watch. In order to come in first, Kevin decided he would have to cheat his way through as a means to gain more media attention and hence public support. So he decided to catch the bus. Kevin was supposedly meant to catch the first bus at stop 1, however, he missed it. So Kevin decided to walk to the next stop, where Kevin noticed a dog caught in the fence. So Kevin sacrificed winning in order to save the dog

and, as a consequence, he gained more media appraisal for saving the dog than did his political opponent who won the race [end of reproduction].

Thus, in this example, the causal or temporal nexus is made explicit between a number of clauses, which may provide less potential ambiguity and a more coherent story. In all, the memory condition reproductions do not lack local coherence completely, but those of the communication condition tend to be somewhat more coherent.

Discussion

In all, when participants lack a communicative intention, thereby focusing purely on reproducing the story from memory, no SC (or SI) biases emerge. However, when participants reproduce a story from memory but expect to have an audience (i.e. the next person in the chain), a clear SC bias emerges. At least when it comes to reproducing stories in serial reproduction, it appears that people have the ability to remember SC and SI information equally. Clearly, a communicative context is required for the SC bias in the reproduction of stories to occur. Thus, the lack of success in uncovering SI biases in communication chains is not likely to be due to people having a general inability to remember SI as much as SC information, but simply because the optimal communicative conditions (e.g. type of audience, communication goal) have not yet been found in which SI biases occur. Further research on the role of the communicative context in producing SC biases in communication chains is therefore required. In particular, by uncovering the conditions that lead to SI biases, much greater insight will be gained into the processes through which stereotypes can be changed.

It is also worth noting that the relative size of the SC bias in the present study, particularly in the central zone, is to such an extent that very little SI information remains after just four reproductions. This not only replicates the findings of Lyons and Kashima (2001; 2003), but is one of the largest SC biases to be recorded in serial reproduction experiments. It points to the robustness of the bias but also provides a demonstration of just how rapidly a story can undergo transformation in collective communication such that the recipients of communication are left with very limited exposure to stereotype-disconfirming information. Given the prevalence with which stories are reproduced from one person to another in any community, this phenomenon represents a potentially powerful contributor to stereotype maintenance.

In order to further understand the stereotype maintenance process and how stereotypes might be changed, it is therefore important to uncover the potential factors or mechanisms that drive the SC bias in communication. As a further contribution to this area, the various quantitative and

qualitative analyses reported in this paper suggest a tendency for participants to make the story more coherent with shared stereotypes, particularly when people have a communicative intention. Although a number of factors are likely to contribute to the SC bias (Lyons & Kashima, 2003), communicating more SC than SI information may serve to enhance the coherence of what is being communicated. In other words, the audience may have difficulty understanding SI information given the group membership of the story character. Communicating coherently is often a major goal for communicators (Grice, 1975; Higgins 1981), and if this goal is best achieved with an SC bias, then it might further explain why this bias has so far proven to be very robust in communication chains (Kashima, 2000; Lyons & Kashima, 2001; 2003).

Further support for the notion that coherence-seeking plays a role in the SC bias in communication chains was found in analyses of the story structure and story content between chains. For the story structure, the only part of the story to exhibit an SC bias was the central zone and only in the communication condition, albeit an emerging tendency towards reproducing more SC than SI information that occurred as the chain progressed in the memory condition. People generally judge the central zone to be the most important in a story (Trabasso & Sperry, 1985). Thus, making the central zone coherent would be a main priority for a communicator. And part of doing so may involve reducing SI information in order to increase the level of coherence. Concentrating on the central zone might also account for much of the peripheral zones in both conditions being omitted. Given this, if we wish to structure a story in such a way as to encourage stereotype change, SI information would need to be made central to the story and probably to such an extent that communicators would have difficulty removing it without rendering the story incomprehensible.

Turning briefly again to the memory condition, the apparent lack of clear stereotype-relevant bias is in contrast with many social cognition experiments, which have shown some kind of bias when memorizing stereotype- or trait-relevant information (Rojahn & Pettigrew, 1992; Stangor & McMillan, 1992; Fyock & Stangor, 1994). Although these experiments have revealed conflicting findings in terms of the direction of the bias (i.e. SC or SI), a possible reason for the more neutral findings in the present experiment may lie in having used a story as a stimulus. This mostly involved behaviors as opposed to traits, while stereotype-relevant memory biases have been shown to be strongest for traits and less marked for behaviors (Fyock & Stangor, 1994). In addition, memory is also affected by the causal and temporal structure between the various events in a story (Yussen *et al.*, 1988), generally highlighting the need to examine stories as stimuli, especially given that stories are a common form of receiving and communicating information.

However, it is worth pointing out that stories are more frequently told in face-to-face conversation as opposed to written communication. It is therefore important for future experiments to examine storytelling face-to-face as a story could transform differently in serial reproduction when audience feedback occurs (McIntyre *et al.*, 2004). It is possible that face-to-face communication would lead to a larger SC bias given past findings that audience feedback increases the motivation to reach mutual understanding efficiently (for a review, see Krauss & Chiu, 1998), in which case the goal for coherence may be made even more salient than in the written mode. Another potential limitation of the present research is that the participant sample consisted mostly of females. However, it is worth noting that Kashima (2000) found SC biases in communication chains with a more gender-balanced sample, so gender is unlikely to have played a major role in the results of the present study. Nevertheless, communication patterns do vary between males and females in a number of ways (Wardhaugh, 1992) and should be borne in mind in future work.

Other future directions stemming from the present research could involve further exploration of the role of coherence-seeking in the communication of stories. From the present analyses, it is apparent that communicators focus on increasing both themal and local coherence of a story. Constructing stories where SI themes predominate and SI information has greater local coherence than SC may be possible ways to inhibit the tendency to omit SI information when reproduced in communication chains. As suggested by Fine and Elsbach (2000), conducting and presenting a qualitative analysis of the reproductions can potentially inspire a number of research questions for future work on the communication of stereotypes, and may sometimes be the only way in which important research questions can be answered. For instance, although we could have measured participant's self-report about the degree of motivation towards telling a coherent story, it is difficult to imagine that anyone would retrospectively report being motivated to make the story less than coherent, even if they did or did not have this as a major motivation at the time.

In all, the findings of the present experiment suggest that having a communicative intention is a defining factor in producing the SC bias in communication chains. People have the ability to remember SC and SI information equally when it comes to reproducing stories in chains, which suggests that communicative contexts may exist, or be created, in which people transmit more SI than SC information and therefore lay the foundations for stereotype change. Although the exact features of the kinds of communication contexts that might lead to SI biases is still not known, the present research does suggest that tailoring communication to make a story coherent may play a role in the SC bias. With continued and much needed work on the contextual factors that drive stereotype-relevant biases, practical

strategies for encouraging people to communicate more SI information may one day be developed, and thereby help prevent the continued perpetuation of socially problematic stereotypes.

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Appendix

Story used in the present experiment

The story is separated into clauses, which are grouped into six main story components. From the initiating event to the consequence, clauses are also classified as either central or peripheral to the main causal chain. Stereotype-relevant clauses are further classified as either stereotype-consistent (SC) or stereotype-inconsistent (SI) information.

Story Title: Kevin the Politician

| Story component | Central/peripheral | SC/SI | Story clause |
|-------------------|--------------------|---|--|
| Setting | – | – | Kevin is a politician. |
| | – | – | He has been a politician for about 15 years. |
| | – | – | However, Kevin has been a member of his party since he was a teenager. |
| | – | – | Kevin is currently a minister in the Federal Parliament. |
| Initiating event | C | – | One day, Kevin decided to participate in the annual fun run. |
| | C | SC | He did this to gain some good publicity. |
| | C | – | Kevin was waiting for the race to start. |
| | P | – | He bought a pair of roller blades from a nearby shop, |
| | P | SI | to use on his days off from work. |
| | P | SC | He also rehearsed what he would say to the media at the finish line. |
| | C | – | He soon noticed a street stand that was collecting money and goods for charity. |
| | C | – | Kevin approached the stand |
| | C | SI | and donated his watch and a large sum of money. |
| | C | – | Kevin was served by a volunteer, |
| Internal response | C | – | who turned out to be a rival politician from the opposing political party. |
| | C | – | This politician had also entered the run. |
| | C | – | He challenged Kevin to beat him in the race. |
| | C | SC | Kevin was worried that his opponent might beat him. |
| | P | SC | Kevin had also been concerned about some criticisms of him in the newspapers. |
| | P | SI | But he didn't care if he never got a promotion. |
| Attempt | C | – | The race was about to start. |
| | C | SI | Kevin was feeling very shy about competing with his political opponent. |
| | C | SC | For this reason, he chose to cheat his way through the race. |
| | C | – | He knew that a bus was going to drive by soon, |
| | C | – | and decided to catch it |
| | C | – | and then get off closer to the finishing line. |
| | P | SC | Kevin congratulated himself on how clever he had been. |
| | C | – | It wasn't long before the race began, |
| | C | – | and Kevin had reached the bus stop. |
| | P | SI | While he waited, he picked up some litter that people had dropped on the pavement. |
| | C | – | The bus arrived, |
| | C | – | and Kevin boarded the bus. |
| C | – | Kevin was on the bus when he noticed a dog caught in a fence. | |
| C | – | Kevin got off the bus, | |
| C | SI | and ran to help the dog. | |

Appendix Continued

| Story component | Central/ peripheral | SC/SI | Story clause |
|-----------------|------------------------|-------|--|
| Consequence | C | – | However, this resulted in Kevin missing the bus. |
| | C | SC | He quickly paged one of his advisers to come and help the dog instead. |
| | C | – | When the adviser arrived, |
| | C | – | Kevin found a shortcut to the next bus stop. |
| | C | – | Unfortunately, the bus had already passed by. |
| | C | – | There was still time for Kevin to take a shortcut to another stop, |
| | C | SI | But he decided to give up and let his opponent beat him. |
| | C | – | He sat down |
| | P | SI | and listened to heavy rock music on his walkman. |
| | P | SC | On his pocket notepad, he wrote down a few ideas for excuses he could give for not finishing the race. |
| Conclusion | – | – | In the end, Kevin got good publicity |
| | – | SC | by persuading someone to take his photo while he appeared to help the dog. |
| | – | SI | But Kevin did admit that he tried to cheat. |
| | – | SI | Kevin does not like to compete with his opponents, |
| | – | SC | but he still believes that he is one of the greatest politicians. |