



## Communicating about a social interaction: Effects on memory for protagonists' statements and nonverbal behaviors<sup>☆</sup>

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### Abstract

People's communications about a social interaction they have observed can often decrease their memory for the protagonists' statements and behaviors. The nature of this decrement depends on both the type of communication and the type of item to be remembered. Participants in three experiments observed a movie of an interaction with the objective of merely comprehending it. Later, they wrote their impressions of the characters involved or alternately described the sequence of events that occurred. Communicating impressions of the protagonists decreased recognition of the statements that protagonists made but had little effect on the recognition of nonverbal behaviors. However, describing the sequence of events that occurred decreased recognition of both statements and nonverbal behaviors. A visual reminder of protagonists' behaviors increased recognition of both these behaviors and the statements that accompanied them, whereas an auditory reminder of protagonists' statements decreased recognition of nonverbal behaviors. Results were conceptualized in terms of the different mental representations that people use as a basis for judgment and the processes that underlie their construction.

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### Introduction

Our memory is like a shop in the window of which is exposed now one, now another photograph of the same person. And as a rule, the most recent exhibit remains for some time the only one to be seen. Proust, 1918/1932

Our memories of the past are rarely carved in stone. Previous experiences are often recalled for a reason, and a reconsideration of these experiences can change the way we remember them at some later point in time. Consider a social interaction of the sort we often en-

counter in daily life. At the time we witness the interaction, our only objective may be to understand what the protagonists said and did. Later, however, we may be called upon to use the information we have acquired for a reason we did not anticipate. For example, we might be asked to convey our general impressions of the people involved in it. Alternatively, we might wish to describe the interaction to someone else. To attain this objective, we presumably retrieve a mental representation of the interaction that we had formed at the time we first observed it and construe its implications for the communication we intend to deliver. In the process of generating this communication, however, we are likely to construct a new representation of the experience whose content and implications differ in several respects from the one we had formed earlier (Higgins, 1996; Wyer & Srull, 1989). Once this new representation is formed, it can be used as a basis for reconstructing the initial events we had observed. Our reliance on the new representation can sometimes distort our memory for the original events and in some cases, can lead to memory errors.

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The present research identified the nature of these memory errors and the conditions in which they occur. Specifically, we considered people's memory for the statements and behaviors that occurred in the course of a social interaction. Research in information processing has rarely investigated the mental representations that are formed in the course of observing a complex, social interaction where information is conveyed in multiple modalities (e.g., visual and auditory) and consists of both verbal behaviors (statements the protagonists make to one another) and nonverbal ones (actions the individuals perform). In person memory research, for example (for a review, see Srull & Wyer, 1989), the information presented usually consists of context-free verbal descriptions of a person's traits or behavior (e.g., "reads bedtime stories to his neighbor's children," "gets confused by television sitcoms," etc.). Although memory for sequences of events has sometimes been investigated, these events have typically been described verbally (cf. Colcombe & Wyer, 2002; Graesser, 1981; Read & Miller, 1995; Schank & Abelson, 1977; for a review, see Wyer, Adaval, & Colcombe, 2002). A few attempts have been made to examine the memory representations that are formed from videotaped sequences of a single individual's behavior (Allen & Ebbesen, 1981; Cohen & Ebbesen, 1979; Newton, 1976). In these instances, however, the behavior has not been accompanied by the protagonist's verbal utterances. None of this research has addressed how information about interactions conveyed in both auditory and visual modalities is remembered.

An additional limitation of previous research has been its consideration of processing objectives that people have at the time they receive and interpret information (cf. Hamilton, Katz, & Leirer, 1980; for a review, see Wyer & Carlston, 1994). Only a few studies (e.g., Anderson & Pichert, 1978; Loftus & Palmer, 1974; Schooler, 2002; Wyer, Srull, Gordon, & Hartwick, 1982) have explored the way in which people's memory for information is affected by goals that did not arise until after the information was presented.

In investigating these matters, we considered two communication objectives that people often have in daily life; namely, describing the events that occurred in an interaction one has witnessed, and conveying a general impression of the protagonists. Participants watched a 12-min segment of a movie in which a husband and wife engage in an animated conversation after returning home from a party. Their objective at the time they saw the movie was merely to understand what was going on. Following Wyer and Radvansky (1999), we assumed that in the course of comprehending the movie, participants spontaneously form a detailed mental representation of the sequence of events that is coded both visually and acoustically. After watching the movie, however, some participants were asked to write down

their impressions of the characters, whereas others were asked to describe the sequence of events that had occurred. We assumed that in the course of generating their communication, participants would form an additional, linguistically coded representation that was relevant to the particular goal they were pursuing, and that they would sometimes use this new representation as a basis for verifying the occurrence of protagonists' statements and behaviors. As a result, their verifications might often be inaccurate. Our experiments provided insight into the content of the mental representations that participants form both at the time they observe a social interaction and later. In addition, they circumscribed the conditions in which people use these communication-related representations to verify aspects of the interaction they originally observed.

### Theoretical background

The adverse effects of communicating about a stimulus on later memory for it has been recognized elsewhere (Krauss & Chiu, 1998). However, previous research has not examined whether these effects are likely to depend on the purpose for which the communication is written or on the usefulness of the communication for identifying the features to be remembered. Nevertheless, research on the effects of verbal overshadowing (for summaries, see Meissner & Brigham, 2001; Meissner & Memon, 2002) is potentially relevant. In this research (e.g., Schooler & Engstler-Schooler, 1990), some participants are typically shown a human face and then, after seeing it, are asked to write a detailed description of it. These participants are later less able to recognize the face than participants who did not perform this writing task. Two general explanations of this memory decrement have been proposed.

#### *Effects of processing shift*

Schooler (2002; Schooler, Fiore, & Brandimonte, 1997) noted that people often respond to a visual stimulus (e.g., a human face) holistically or schematically without performing a detailed analysis of its features. When they are shown another face at a later point in time, they determine if it is the same one they saw earlier by comparing a visual representation of the new face to their previously formed representation of the old one, using the same type of schematic processing. However, describing the first stimulus verbally activates a different, linguistic process that requires attention to individual features. (For a discussion of differences in linguistic and visual information processing, see Kosslyn, 1980, 1987.) The activation of this linguistic process interferes with the ability to perform the schematic comparison process that is typically involved in recognizing the original

stimulus and, therefore, results in poor recognition performance. Dodson, Johnson, and Schooler (1997) found that people who had verbally described one of several faces were later less able to identify not only the specific face they had written about but also other faces they had not verbally described. The writing task apparently activated a disposition to engage in linguistic, feature-based processing that generalized to stimuli other than the one to which the task directly pertained, and the use of this processing strategy interfered with the recognition of these visually-coded stimuli as well.

The applicability of this account of verbal overshadowing to the conditions of concern in the present research is somewhat unclear, however. In most research on this phenomenon, the information presented has consisted of a single visual stimulus configuration (i.e., a face). In contrast, the information conveyed in a social interaction is dynamic, pertaining to the behavior of two or more individuals over a period of time. Moreover, research on verbal overshadowing has investigated people's ability to identify a visual stimulus as a whole after describing its individual features. In contrast, the present research investigated people's identification of individual features of a complex stimulus after they have described it fairly globally. Although processing shifts undoubtedly occur in these conditions. However, their influence is hard to predict.

#### *Recoding-interference*

A different conceptualization of verbal overshadowing, originally proposed by Schooler and Engstler-Schooler (1990), has clearer implications for the phenomena of concern in this article. That is, when people verbally describe a stimulus they have previously encoded visually, they presumably form a new linguistically coded representation of the stimulus and store it in memory separately from the original. This new representation could interfere with the retrieval and use of the earlier one and, therefore, could decrease identification accuracy when the content of the two representations differ. In Schooler and Engstler-Schooler's (1990) research, for example, the verbal description of a face cannot convey all of the details of the original stimulus. Consequently, the use of this representation rather than the original, visually coded representation is likely to decrease recognition performance.

The recoding-interference conceptualization is consistent with many other theories of memory (cf. Hintzman, 1986; Ratcliff, 1978; Wyer & Srull, 1989). According to Wyer and Srull's (1989) "bin" conceptualization of social memory, for example, different representations of a referent are formed at different points in time. The content and structure of these representations depends on the purpose for which they are constructed and once formed, maybe stored independently

in memory in a "bin" pertaining to their referent. Representations are stored in the order in which they are constructed, with the more recently formed representations on top. Consequently, these latter representations are relatively more accessible in memory and are more likely to be retrieved later for use in attaining goals to which they are applicable.

Similar dual-representation conceptualizations have been proposed by Carlston (1980), Higgins and Rholes (1978) and Lingle and Ostrom (1979) and the results of several other studies are consistent with them (cf. Radvansky, Wyer, Curiel, & Lutz, 1997; Srull & Brand, 1983; Wyer & Bodenhausen, 1985). Higgins and Rholes' (1978) study is particularly noteworthy. Participants read accounts of a target person's behavior for the purpose of describing the target to someone who either liked or disliked him. Not surprisingly, they tailored their written descriptions of the target to the attitude of the intended recipient. Having done so, they later recalled the original information in a way that was evaluatively biased toward the favorableness of the description they had written. When participants expected to write a description of the target but did not actually do so, this bias was not apparent. This contingency confirms the assumption that people's recall of the information was based on a mental representation they had formed in the course of communicating their description of the target rather than a representation they formed at the time the information was received.

Higgins and Rholes' (1978) findings are consistent with the notion that different representations are formed of stimuli and that the more recently formed representation is most likely to be retrieved and used. However, there may be contingencies in the conditions in which this occurs. Chaiken (1987; Chaiken, Liberman, & Eagly, 1989) postulates that when people are called upon to make a judgment, they retrieve a knowledge representation that comes to mind most easily and assess the likelihood that it will be useful. If their confidence in its utility is above some minimal threshold, they base their judgment on its implications. If their confidence is below threshold, however, they search for additional criteria. Thus, people do not *always* use the most recently formed representation of information to attain the goal they are pursuing. Rather, they only use it if they perceive the representation to be potentially useful (see also Higgins, 1996). When this is not the case, participants presumably ignore its implications and seek other goal-relevant criteria instead.

#### *A conceptual integration*

Our conceptualization of the phenomena of concern in this article combines aspects of the recoding-interference account of verbal overshadowing with the considerations raised by Chaiken (1987). The

conceptualization takes into account the possibility that different communication objectives lead to different types of linguistic representations of a social interaction, and that the utility of these representations for verifying specific features of the interaction can differ. First, suppose that people witness a social interaction with no specific objective in mind. Wyer and Radvansky (1999; see also Wyer, 2003) assume that in the course of observing and comprehending such an interaction, participants spontaneously construct a mental simulation, or *episode model*, of the sequence of events that occur (for more detailed discussions of the construction and use of such models, see Johnson-Laird, 1983; Kintsch, 1998; Radvansky et al., 1997). This representation is coded in terms that correspond to those in which the information is transmitted (e.g., both visually and acoustically). If people are later asked to communicate about the interaction to others, they presumably retrieve the episode model they formed earlier and use it to construct a second representation whose content and structure are relevant to the communication goal they are pursuing. In the course of describing the interaction, for example, they may construct a generalized *event representation* (Wyer, 2003); that is, a linguistically coded description of the sequence of events that took place. In the course of conveying an impression, they may construct a generalized *person representation* similar to that suggested by research on person memory (Srull & Wyer, 1989); that is, a configuration of traits with which behaviors that exemplify the traits are associatively linked. Once formed, the new representation is stored in memory, becoming more accessible in memory than the episode model on which it was based.

Suppose participants are later called upon to verify a feature of the original interaction. They should first retrieve the generalized person or event representation they formed in the course of communicating about the interaction and construe its potential usefulness for making this verification (Chaiken, 1987; see also Higgins, 1996). If they do not consider the representation to be useful, they should reject it in favor of the episode model they had formed earlier. In this case, their recognition accuracy should not be appreciably affected by the communication they have generated. If they deem the generalized representation to be useful, however, participants should base their judgment on its implications without considering their episode model of the interaction. This generalized representation is less likely than the episode model to contain the details that are necessary to make a clear identification of the features they are asked to verify. Therefore, participants should be less accurate in verifying these features than they would be if their episode model had been consulted. This means, somewhat ironically, that participants are less likely to recognize an item if it was relevant to the communication they had generated previously than if it was not!

An evaluation of this possibility requires a consideration of conditions in which the content of participants' generalized representations of an interaction are likely to depend on the communication goal they pursue. To identify such conditions, we showed participants a movie segment in which both things the protagonists said to one another (e.g., "There isn't an abomination award going that you haven't won,") and their nonverbal behaviors (e.g., cleaning up the living room, fixing a drink, eating a piece of chicken, etc.) were important in describing the sequence of events that occurred, but in which only protagonists' statements to one another were particularly relevant to impressions of their traits and personality.<sup>1</sup> To see the implications of this difference, first assume that participants after watching the movie are asked to describe the sequence of events that occurred. They should consider both protagonists' statements and their nonverbal behaviors to be relevant to this description and should include the implications of both types of events in the generalized event representation they form in the course of generating it. Consequently, if they are later asked to verify things that occurred in the interaction, they should consider the content of this representation (which is more accessible in memory than their episode model of the interaction) to be useful in verifying both protagonists' statements and their nonverbal behaviors. If this is so, their accuracy in verifying both types of items should be less than it would be if the generalized event representation had not been applied.

However, now suppose participants are asked to communicate their impressions of the protagonists. The generalized person representations they form in this condition should be based primarily on protagonists' statements, which have implications for their traits and personality. Consequently, if these participants are later asked to verify specific features of the interaction, they should consider this representation to be useful for verifying things that protagonists said but should default to their episode model of the interaction to verify the protagonists' nonverbal behaviors. Consequently, their recognition of protagonists' statements should decrease relative to conditions in which the communication had not been generated, but their recognition of protagonists' nonverbal behaviors should not be appreciably affected.

To summarize, the aforementioned considerations imply that describing the events that occur in an interaction of the sort we considered in this research will decrease the accuracy of recognizing both protagonists'

<sup>1</sup> The validity of this assumption is obviously not universal. In some situations (e.g., during physical combat), people's actions could have a major influence on the impressions that are formed of them. In these situations, the effects of communication impressions would differ from those to be described here.

statements and their nonverbal behaviors. However, communicating impressions of the protagonists will only decrease the accuracy of verifying protagonists' statements.

We were primarily concerned with the effects of communicating about an interaction when people do not anticipate having to generate this communication until after the interaction occurs. In some cases, however, these effects may be similar to those that occur when people observe the interaction with a communication objective in mind. For example, the events that people consider important enough to communicate to others should be a subset of the ones they consider of sufficient interest to represent in their episode model of the interaction that they form spontaneously in the course of comprehending it. To this extent, the content of the generalized event representation they construct in the course of describing the interaction should not depend appreciably on whether they identify the events to be communicated at the time they observe the interaction or later, on the basis of the episode model they have formed. If this is so, the effect of using this representation as a basis for recognition memory should likewise not depend on the point at which this communication objective was introduced.

Different considerations arise, however, when participants know at the outset that they will communicate their impressions. In these cases, they may become sensitive to impression-relevant statements that they might not normally think about if they were simply trying to understand what was going on, and might encode these statements verbally at the time they encounter them. Consequently, the generalized person representation they later construct in the course of communicating their impressions might include these additional statements as well as the ones they would normally represent in their episode model of the interaction. If this is so, their later verification of these statements should be more accurate than that of participants who did not anticipate describing their impressions until after they saw the movie. This possibility was considered in the experiments to be reported.

## Experiment 1

### *Method*

Ninety-six introductory marketing students participated in the study to fulfill a course requirement. Of these, 19 or 20 participants were assigned to each of four combinations of task objective (impression description vs. interaction description) and the point at which this objective was induced (before vs. after watching the movie). An additional 20 participants were assigned to the fifth, comprehension-only condition.

### *Specific-objective-after conditions*

Participants who were not given a specific objective until after they watched the movie were introduced to the experiment with instructions that we were interested in people's reactions to events of the sort they encounter in daily life, either through direct experience, in movies, or on television. On this pretense, they were told they would be shown part of a film that had been made several years earlier and to watch it much as they would if they were seeing it on television or in a theater. Participants were then shown the first 12 min of Edward Albee's *Who's Afraid of Virginia Woolf* (for a transcript of this segment, see Albee, 1991, pp. 1–21). The movie shows a conversation between a husband and wife after returning home from a party. The conversation contains a number of hostile and sarcastic interchanges interspersed with expressions of affection, thus leaving the couple's feelings toward one another somewhat ambiguous. In the course of the interaction, the protagonists engage in a number of different nonverbal behaviors as they have a drink, eat a snack and prepare for some late-night guests. However, these behaviors are largely incidental to the interaction itself. The segment begins as the couple returns home and ends with the arrival of the guests, thus making a reasonably complete episode. The episode was particularly desirable for our purposes because (a) only two protagonists were involved and (b) their personalities were conveyed largely through their statements to one another rather than their nonverbal behaviors.

After viewing the movie, participants who were given an *impression-description* objective were told that while viewing a movie, people often form impressions of the people involved, and that because we were interested in understanding how this was done, we would like them to describe in their own words their impressions of George and Martha (the two characters in the movie). They were told that they would be given 7 min to perform this task, and that they should describe each person's general personality and characteristics in as much detail as possible. In contrast, the participants who were given an *interaction-description* objective were told that people who watch a movie often wish to describe the movie to others, and that to understand how this is done, we would like them to spend 7 min writing a description of the events that occurred in the movie, much as they would if they were telling a friend about what went on.

### *Specific-objective-before conditions*

The instructions to participants under specific-objective-before conditions were identical to those under specific-objective-after conditions except that the objectives were imposed at the outset. To induce an *impression-description* objective, we told participants that (a) we were interested in how people form impressions of persons on the basis of social interactions that occur in

daily life or that are seen in movies or on television, (b) we wanted them to watch a movie and to form impressions of the characters, and (c) we would later ask them about the impressions they had formed. In interaction-description conditions, we reminded participants that when people see an interaction, they often want to describe it to someone else. We indicated that (a) we were interested in how this was done, (b) as they watched the movie, they should think about how they would describe what occurred to another person, and (c) we would later ask them to report these descriptions. In each condition, participants after watching the movie were given 7 min to write their communication.

#### *Comprehension-only conditions*

Control participants did not receive specific processing objectives either before or after the movie. They were introduced to the experiment with instructions similar to those conveyed in specific-objectives-after conditions. Then, after watching the movie, we told them that “people’s reactions to information are often better understood after the information has had time to settle,” and on this pretense, we asked them to spend 7 min describing the things they had done from the time they woke up that day until the time of the experiment. We assumed that this interpolated task, which was performed for 7 min, would require about the same amount of cognitive effort as the tasks performed by participants in other conditions and, therefore, was likely to control for any more general effects of post-information cognitive activity that might occur.

#### *Recognition measure*

After 7 min had elapsed, participants’ responses to the writing task were collected. They were then told that to understand people’s reactions to a movie, it is often helpful to know how well they can remember what went on. On this pretense, they were given a 96-item questionnaire describing statements, behaviors and situational features that were presented in the movie and those that were not.

The recognition items were selected to be representative of the types of statements, nonverbal behaviors and situational features that occurred throughout the 12-min movie segment. To do this, we partitioned the movie into three subsegments of roughly equal length. Then, in each subsegment, we selected 6 events pertaining to each protagonist. Of these, 4 were statements the protagonist made (e.g., “Don’t you know *anything*?” “There isn’t an abomination award going that you haven’t won,” etc.) and 2 were nonverbal behaviors (e.g., “does a crossword puzzle,” “clears dishes from the table,” etc.). An additional 36 items (24 statements and 12 nonverbal behaviors) that were not conveyed in the movie were selected as distracters. (Half of these distracters were semantically similar to those that were

actually uttered in the movie segment that participants saw, whereas the others were taken from other parts of the movie.) Finally, 24 items in the questionnaire described aspects of the physical situation that were either conveyed or not (e.g., “The TV set was to the left of the bedroom closet.”). Responses to these latter items were not germane to the issues of concern in this study and were therefore ignored.

Recognition items were distributed randomly throughout the recognition questionnaire with the restriction that the mean serial position of each type of item (and also the mean serial position of items drawn from each of the three subsegments) was approximately the same. In each case, participants indicated whether the statement or behavior described was made by George, by Martha, or by neither, and whether each situational feature described was conveyed or not. Participants were urged to pay attention to the exact wording of the verbal items and not to report statements as having been made unless they matched the exact wording of something the protagonists had said.

Upon completion of the recognition measure, participants were asked whether they had seen the film before and if they could identify the actor and actress. None could.

## *Results*

#### *Content of goal-specific representations*

The representations that participants formed in the course of describing the interaction were expected to contain descriptions of both statements and nonverbal behaviors, whereas the representations they formed when conveying their impressions of the protagonists were expected to consist largely of trait descriptions and abstract characterizations of the protagonists’ statements. Results of a content analysis of participants’ written protocols under each task-objective condition were clearly consistent with expectations.

Specifically, participants with an interaction-description objective employed an average of only 2.1 trait descriptors, in contrast to 6.6 descriptions of protagonists’ statements and 5.4 descriptions of their nonverbal behaviors. These tendencies were virtually identical regardless of whether participants were given the objective before watching the movie (2.1, 6.5, and 5.2, respectively) or afterwards (2.0, 6.6, and 5.6, respectively). However, the descriptions of things that protagonists said and did were typically abstract rather than verbatim. For example:

The couple came home from what seemed to be a night out drinking. The woman seemed a bit intoxicated while the man had complete control of himself. They proceeded to the kitchen where the man was reading a newspaper. The wife had a piece of chicken and was making a mess... a few minutes later, the wife informed her husband that she had invited guests over-

...the husband did not understand why...The wife explained that...her father had advised her to. The couple headed upstairs where the wife tried to clean up the bedroom by throwing the dirty clothes underneath the covers of the bed...The husband lay down as if he were going to fall asleep, and the woman annoyingly kept him awake...

In contrast, participants who communicated their impressions mentioned an average of 7.1 traits, 2.1 statements and 0.8 nonverbal behaviors. Thus, these participants employed substantially more trait descriptors than participants with an interaction-description objective but used very few descriptions of things that protagonists said and even fewer descriptions of their nonverbal behaviors. To give a representative example of participants' impression descriptions:

Martha appears to be a very selfish, inconsiderate and rude individual. She doesn't appear to have many, if any, manners at all. She also seems to be very forgetful, although much of her forgetfulness is primarily due to repeated alcohol abuse...She also appears to be a bit of a slut...George, on the other hand, is much more polite and civilized...He seems to put up with a great deal of Martha's temper tantrums and annoyances. He seems to keep much more to himself...He is kind, somewhat sly in the way he gets out of things...

The use of each type of descriptor differed significantly in the two communication conditions (in each case,  $F(1, 71) > 45.57$ ,  $p < .01$ ). Interestingly, participants used more trait descriptions if they were given an impression-description objective before watching the movie ( $M = 10.8$ ) than if they were not given this objective until afterwards ( $M = 5.4$ ),  $F(1, 36) = 29.20$ ,  $p < .01$ , but used fewer descriptions of what protagonists said in the former condition than the latter (1.6 vs. 2.7),  $F(1, 36) = 5.59$ ,  $p < .05$ . This suggests that participants who had an impression-description objective before they watched the movie attended to a wider variety of statements that protagonists made, and were able to extract a larger number of traits from these statements. Consequently, they did not refer to the statements in their written protocols. However, this difference was less evident in Experiment 2.

#### *Recognition memory*

Our account of recognition memory implies that participants with an impression-description objective should only use the generalized person representation they had formed to verify protagonists' statements to one another. In contrast, participants with an interaction-description objective should use the generalized event representation they formed to verify both statements and nonverbal behaviors, and so their accuracy in responding to items describing both types of features should be adversely affected.

The proportion of correct responses to statements and behaviors was computed for each participant separately. The influence of writing communications on the

recognition of statements and behaviors was inferred from the difference between the proportion of correct responses observed under each type of communication condition and the proportion observed under comprehension-only conditions (.596 and .616, for statements and nonverbal behaviors, respectively). Thus, positive differences reflect better recognition when a specific objective was induced than when it was not, whereas negative differences indicate poorer recognition in the former case. A preliminary analysis was performed on these difference scores ( $M_{diff}$ ) as a function of communication objectives (impression-description vs. interaction-description), the point at which these objectives were induced (before vs. after watching the movie), item type (statement vs. nonverbal behavior) and whether the item did or did not describe something that occurred in the movie. This analysis yielded a main effect of task objectives,  $F(1, 73) = 9.88$ ,  $p < .01$ , and a higher order interaction of all four variables,  $F(1, 73) = 3.59$ ,  $p < .06$ .<sup>2</sup> Direct comparisons of memory for different types of items (i.e., statements vs. behaviors) are hard to interpret. However, the effects implied by our hypotheses can be evaluated in separate analyses of each type of item separately.

*Recognition of protagonists' statements.* Describing the interaction should decrease memory for protagonists' statements regardless of when participants were told they would perform this task. In contrast, we speculated that describing impressions of the protagonists would only decrease memory for these statements when participants were informed of this task after watching the movie. The proportions of statements that participants correctly recognized (relative to control conditions), summarized in the top section of Table 1, are directionally consistent with these expectations. Describing the interaction decreased the proportion of statements that participants correctly identified, and this was true regardless of whether they were told before or after watching the movie that they would be asked to communicate this description ( $M_{diff} = -.056$  vs.  $-.043$ , respectively). Communicating impressions also decreased the likelihood of recognizing protagonists' statements when participants were not told to generate these communications until after they watched the movie ( $M_{diff} = -.032$ ). In contrast, informing participants at the outset that they would perform this task slightly increased this likelihood ( $M_{diff} = .023$ ). These differences

<sup>2</sup> Note that all main and interaction effects involving task objectives and point of induction are identical, regardless of whether difference scores are analyzed or raw proportions of correctly identified items are analyzed. Difference scores provide an indication of whether task objectives increased or decreased recognition relative to comprehension-only conditions. Therefore, they will typically be reported in the analyses to follow.

Table 1

Proportion of correct responses to statements and nonverbal behaviors as a function of task objectives and the point at which these objectives were induced—Experiments 1 and 2

	Statements/Verbal utterances		Behaviors/Pictures	
	Impression description	Interaction description	Impression description	Interaction description
Proportion of correct responses, Experiment 1				
Objectives induced after the movie	-.032	-.043	-.014	-.030
Objectives induced before the movie	.023	-.056	.009	-.044
Proportion of correct responses, Experiment 2				
Objectives induced after the movie	-.022	-.044	.046	-.095
Objectives induced before the movie	.045	-.070	.046	-.046
Response time (seconds), Experiment 2				
Objectives induced after the movie	0.198	0.480	0.511	0.597
Objectives induced before the movie	-0.067	0.158	-0.134	0.239

*Note.* Statements and behaviors in Experiment 1 were conveyed verbally. Statements and behaviors in Experiment 2 were conveyed acoustically and pictorially, respectively. Cell entries refer to the difference between the proportion of correct responses to recognition items (or discrimination accuracy) in the task-objective condition indicated and the proportion (accuracy) that was observed under comprehension-only conditions.

are confirmed by an interaction of task objectives and the point at which the objectives were introduced,  $F(1, 73) = 4.29, p < .04$ .<sup>3</sup> This difference is attributable to the fact that participants were more accurate when they were given an impression-description goal at the outset ( $M_{\text{diff}} = .023$ ) than they were in the other three combinations of task objectives and point of induction combined ( $M_{\text{diff}} = -.044$ ),  $t(73) = 1.91, p < .03$ , one-tailed, which did not differ from one another ( $p > .10$ ).

*Recognition of nonverbal behaviors.* We hypothesized that writing a description of the interaction would decrease recognition of protagonists' nonverbal behaviors, whereas communicating their impressions of the protagonists would not. The mean proportion of correct responses to items describing nonverbal behaviors (rel-

ative to comprehension-only conditions) is shown in the top section of Table 1 as a function of task objectives and the point at which these objectives were induced. As expected, performing the interaction-description task decreased the likelihood of correctly recognizing behaviors ( $M_{\text{diff}} = -.037$ ), and this was true regardless of when participants were told they would be asked to perform the task. In contrast, the impression-description task had little effect on the recognition of nonverbal behaviors ( $M_{\text{diff}} = -.002$ ), and this was also true regardless of when the task objective was induced. This pattern of results is confirmed by a main effect of task objectives,  $F(1, 73) = 5.88, p < .05$ , that is independent of the point at which the objectives were induced,  $F < 1$ .<sup>4</sup>

*Summary.* To summarize, asking participants to describe the sequence of events that occurred in the movie decreased their recognition of both things the protagonists said and things they did, and this was true regardless of when participants were told they would perform this task. In contrast, describing impressions of the protagonists had little effect on the recognition of protagonists' behaviors, and only decreased the recognition of protagonists' statements when participants did not anticipate having to convey their impressions until after they had watched the movie. Considered in isolation, these directional differences should be treated with

<sup>3</sup> These conclusions were confirmed in a supplementary analysis of recognition accuracy, computed on the basis of a measure proposed by Hilgard (1951) that corrects for guessing bias. According to this index, accuracy (Acc) is given by

$$\text{Acc} = \frac{P(\text{hit}) - P(\text{false alarm})}{1 - P(\text{false alarm})},$$

where  $P(\text{hit})$  and  $P(\text{false alarm})$  are the probabilities of reporting a feature as presented when it was and was not, respectively. This index was applied to responses of each participant separately, with different indices being computed for statements and behaviors. Analyses of differences between the value of this index in each experimental condition and the value observed under comprehension-only conditions ( $M_{\text{diff}} = .371$ ) yielded an interaction of task objectives and the point of induction analogous to that observed in the main analysis,  $F(1, 73) = 3.33, p < .07$ . That is, inducing an interaction-description objective decreased the accuracy of identifying protagonists' statements regardless of whether the objective was induced after seeing the movie ( $M_{\text{diff}} = -.065$ ) or beforehand ( $M_{\text{diff}} = -.199$ ). In contrast, the impression-description task decreased discrimination accuracy when the task objective was not induced until after watching the movie ( $M_{\text{diff}} = -.108$ ), but increased accuracy when the task objective was induced beforehand ( $M_{\text{diff}} = .130$ ).

<sup>4</sup> Similar conclusions are drawn from the index of discrimination accuracy defined in Footnote 3. The impression-description task had little effect on discrimination accuracy relative to comprehension-only conditions ( $M_{\text{diff}} = .011$ ), whereas the interaction-description task substantially decreased it ( $M_{\text{diff}} = -.328$ ). The effect of task objectives was marginally significant,  $F(1, 73) = 3.55, p < .06$ , and did not depend on whether these objectives involved were induced after watching the movie (.021 vs. -.297) or beforehand (.000 vs. -.360),  $p > .10$ .

caution, as direct comparisons between results under experimental conditions and those under control conditions were generally not reliable ( $p > .10$ ). However, a very similar pattern of differences was observed in Experiment 2, as will be noted presently.

### *Source identification*

To the extent persons' representation of a statement or behavior consists in part of a mental image of the conditions in which the event occurred, its features should permit the source of the statement to be identified as well. Therefore, experimental variables should have few if any effects on the accuracy of identifying the source of statement or behavior, given that the statement or behavior was correctly identified as having occurred. This was in fact the case. Source-identification accuracy was inferred from the proportion of times that the source of a behavior was identified given that the behavior had been correctly reported as having occurred. Under comprehension-only conditions, participants identified the source of statements less often ( $M = .485$ ) than nonverbal behaviors ( $M = .617$ ). Relative to these baseline probabilities, inducing a specific task objective increased the accuracy of identifying the source of statements to a greater extent ( $M_{\text{diff}} = .038$ ) than it increased the accuracy of identifying behavior ( $M_{\text{diff}} = -.016$ ). Although this difference was reliable,  $F(1, 73) = 5.56, p < .01$ , it did not depend on either the particular task objective involved or when it was induced (in each case,  $F < 1$ ). Thus, task objectives primarily influenced whether protagonists' behavior was recognized at all rather than which protagonist performed them.

## **Experiment 2**

Although the results of Experiment 1 are consistent with expectations, certain ambiguities surround their interpretation. In particular, the recognition items that participants were asked to verify were written descriptions of protagonists' statements and behaviors. (That is, participants judged the written statement, "Don't you know anything?" rather than an acoustic representation of the utterance, and judged the behavioral description "cleared dishes from the table" rather than a picture of the action itself.) As such, the items were clearly more abstract than the acoustically- and visually-coded events that participants actually witnessed. These factors could combine to increase participants' tendency to use the linguistically based representations they had generated in the course of writing about the interaction to verify recognition items rather than the episode models they had formed while watching the movie. It therefore seemed desirable to verify the pattern of results observed in Experiment 1 using recognition items that were ac-

tually taken from the movie that participants watched (that is, static pictures of protagonists' behavior and acoustically-coded statements that the protagonists had made).

The change in the nature of the recognition items provided a clearer indication of the role of processing shifts of the sort suggested by Schooler (2002). To reiterate, the linguistic process involved in verbal communication differs from the nonverbal process that was used to encode the visual features at the time they were first encountered (Kosslyn, 1987), and the activation of this linguistic process interferes with the holistic comparisons that would normally be made to verify these features. In Experiment 1, the recognition items were conveyed in writing and, like the interpolated communication task, required linguistic processing. By presenting recognition items in the same modality as the original information, the interference effects of performing the interpolated linguistic processing task and, therefore, the impact of a processing shift, could be more clearly assessed.

### *Method*

Ninety-six introductory psychology students participated to fulfill a course requirement. Of these, 23 were assigned to control (comprehension-only) conditions, and the others were distributed evenly over the remaining four combinations of task objectives (impression-description vs. interaction-description) and the point at which the objectives were induced (before vs. after the movie). Except for the recognition task we administered, the experiment was identical in design and procedure to Experiment 1.

### *Selection of recognition items*

A set of 38 recognition items was shown to each participant. These items included 12 pictures and 12 utterances that were taken from the 12-min movie segment that participants saw, and 14 other stimuli (7 utterances and 7 pictures) that were drawn from other, unseen parts of the movie.<sup>5</sup> Four items, (one picture and one utterance that participants had witnessed, and one picture and one utterance that they had not) were used as warm-up stimuli at the beginning of the stimulus sequence. To evaluate the possibility that presenting an item of one type might cue the retrieval of others that occurred in temporal proximity to it, six pictures and six

<sup>5</sup> The relatively small number of distracters was necessitated by the requirement that the distracters could plausibly have occurred in the segment that participants actually saw. Many events in the later parts of the movie occurred in physically different surroundings and involved other persons who were not in the initial segment, making them easy to distinguish from presented items for these reasons alone. Distracters depicting these latter events could not be used.

utterances that participants had witnessed were selected as targets. Two target pictures were preceded in the sequence by an utterance that occurred at about the same point in the movie; two others were preceded by an utterance that occurred at some other point in the 12-min segment that participants saw, and the remaining two were preceded by an utterance that was not contained in the segment at all. Correspondingly, two target utterances were preceded by a picture of the event in which the utterance occurred, two by a different picture from the movie segment that participants saw, and two by a picture from a different part of the movie altogether. The remaining items (distracters) were interspersed throughout the stimulus sequence.

Six different sets of 38 recognition items were constructed according to these criteria. The stimulus sets varied in the particular pictures and utterances that were selected for use as targets. Target items occupied the same serial position in each set. However, the type of “context” item that preceded the targets varied over sets in a latin square design, so that pooled over sets, each target was preceded by each of the three types of context items the same proportion of times. An equal number of participants were exposed to each set.

#### *Presentation procedure*

Participants were introduced to the recognition task with instructions similar to those used in Experiment 1. They were then seated in front of a computer equipped with headphones. They were told that a number of pictures and statements would be presented (either on the computer screen or through head phones), and that some of these items were taken from the movie they had seen and others were not. They were asked to position their hands over the computer keyboard so that their right and left index fingers were over the keys labeled “yes” and “no,” respectively, and that when each stimulus was presented, they should press the “yes” key if they had seen or heard it before and the “no” key if they had not. (The “?” and “Z” keys were used for these purposes.)

The stimulus sequence was then presented. Picture stimuli were removed from the screen as soon as participants responded. An interval of 4s was interpolated between each response and presentation of the next stimulus in the sequence. Both responses (correct vs. incorrect) and the time required to make them were recorded and analyzed in a manner to be indicated.

#### *Results*

##### *Content of goal-specific communications*

The content of the descriptions that participants wrote in each instructional condition was generally similar to that observed in Experiment 1. The passages written by participants with an interaction-description

objective contained an average of 1.2 trait descriptions, 5.3 descriptions of protagonists’ statements and 3.1 descriptions of nonverbal behaviors. In contrast, participants with an impression-description objective reported an average of 7.1 trait descriptions but only 2.9 descriptions of things the protagonists said and 0.8 descriptions of nonverbal behavior. The numbers of descriptions generated of each sort differed in the two task-objective conditions (in each case,  $F(1, 71) > 6.50$ ,  $p < .01$ ).

These differences did not depend appreciably on whether communication objectives were induced before or after participants saw the movie. Although this null finding is consistent with the results obtained under interaction-description conditions of the first experiment, it contrasts with the results obtained under impression-description conditions. As noted earlier, participants with an impression-description objective in Experiment 1 used more trait descriptors when this objective was induced before the memory task than when it was induced afterwards (10.8 vs. 5.4), but used fewer descriptions of protagonists’ statements in the former condition (1.6 vs. 2.7). Although the relative use of these descriptors was similar (7.6 vs. 6.6 in the case of traits; 2.6 vs. 3.2, in the case of statements), these differences were not reliable ( $p > .10$ ).

##### *Proportion of correct responses*

Each participant was exposed to three target utterances and three target pictures. Preliminary analyses indicated that responses to these stimuli did not depend significantly on the type of item that preceded them in the stimulus series. Therefore, responses to the three targets of each type were averaged to produce a single estimate of the proportion of correct responses. As in Experiment 1, the effect of task objectives was inferred from the difference between the proportion of correct responses observed under each objective condition and the proportion observed under comprehension-only conditions ( $M = .761$  and  $.804$  for pictures and utterances, respectively). An overall analyses of these differences as a function of experimental variables yielded a significant effect of task objectives,  $F(1, 65) = 7.36$ ,  $p < .01$ , indicating that describing impressions of the protagonists generally increased recognition memory ( $M_{\text{diff}} = .028$ ) whereas describing the interaction decreased it ( $M_{\text{diff}} = -.059$ ). The contingency of these differences on item type and the point at which task objectives were induced, summarized in the middle section of Table 1, are virtually identical to those observed under comparable conditions of Experiment 1.

*Verbal utterances.* Inducing an interaction-description objective decreased the likelihood of correctly identifying utterances, regardless of whether these objectives were induced after watching the movie or before. In

contrast, writing down impressions of the protagonists only decreased the likelihood of verifying utterances when participants were informed of this objective after having watched the movie. When they were aware of this objective at the outset, the proportion of correct responses increased slightly. Although the interaction of task objectives and point of induction was not significant ( $p > .10$ ), a planned comparison indicated that participants' recognition memory was more accurate in the latter condition ( $M_{\text{diff}} = .045$ ) than in the other three conditions combined ( $M_{\text{diff}} = -.045$ ),  $F(1, 65) = 3.64$ ,  $p < .06$ , which did not differ from one another ( $F < 1$ ). Moreover, the decrease in accuracy under the latter three conditions combined was significantly different from 0,  $t(65) = 1.89$ ,  $p < .05$ , one-tailed, consistent with the results of Experiment 1.<sup>6</sup>

*Pictures.* Responses to pictures in this study also paralleled the recognition of nonverbal behaviors in the first experiment. As Table 1 shows, inducing an interaction-description objective decreased recognition of pictures relative to control conditions ( $M_{\text{diff}} = -.070$ ), and this was true regardless of when participants were made aware of these objectives. The decrease in accuracy under these conditions was significantly different from 0,  $t(65) = 2.27$ ,  $p < .02$ , one-tailed. In contrast, inducing an impression-description objective nonsignificantly increased the accuracy of recognizing pictures ( $M_{\text{diff}} = .046$ ), and this was also true regardless of the point at which the objective was induced. These conclusions are confirmed by an effect of task objectives,  $F(1, 65) = 7.64$ ,  $p < .01$ , that is independent of the point of induction ( $F < 1$ ).

In summary, describing what occurred in the interaction generally decreased participants' recognition of both pictures of the protagonists' nonverbal behavior and audio recordings of their utterances, and this was true regardless of when this objective was induced. In contrast, describing impressions of the protagonists only decreased their recognition of protagonists' utterances when these objectives were imposed after seeing the movie, and did not significantly affect their recognition of pictures in any condition.

#### *Response times*

Response times to target items, like proportions of correct responses, did not depend on the type of item that preceded them and, therefore were averaged over the three targets to which each participant was exposed. Mean response times, relative to control conditions, are shown in the bottom third of Table 1. Specific task objectives increased response times to a greater extent when these objectives were induced after watching the

movie than when they were induced beforehand,  $F(1, 65) = 4.08$ ,  $p < .05$ , and this was true for both utterances ( $M_{\text{diff}} = 0.339$  s vs. 0.046 s, respectively) and pictures ( $M_{\text{diff}} = 0.554$  s vs. 0.052 s, respectively). These response time differences did not depend significantly on the specific task objectives that participants were given ( $p > .10$ ). However, the time to verify items was less when an impression-description objective was induced at the outset ( $M_{\text{diff}} = -.100$  s) than it was under the other three combinations of task objectives and point of induction (pooled over conditions,  $M_{\text{diff}} = .363$  s). This difference was significant,  $F(1, 71) = 4.45$ ,  $p < .05$ , and did not depend on the type of recognition item being evaluated,  $F < 1$ .

In general, participants took longer to respond under conditions in which they were less accurate. This suggests that the effects of experimental variables on response times were largely mediated by participants' uncertainty about the correctness of their judgments. An exception occurred, however, under impression-description conditions. Although participants in these conditions were equally accurate in identifying pictures when they were informed of their communication objective before or after watching the movie (in each case,  $M_{\text{diff}} = .046$ ), they took substantially longer to respond when the communication objective was induced afterwards (0.546 s) than when it was induced beforehand (-0.134 s),  $F(1, 71) = 7.67$ ,  $p < .05$ . In retrospect, this difference is not surprising. In impression-description-after conditions, participants theoretically verified pictures on the basis of the episode models they had constructed while watching the movie. However, these models were relatively inaccessible in memory and, therefore, they may have taken more time to retrieve. Consequently, although these participants may identify the pictures accurately, they may take a relatively long time to do so. This difference in response times may have overridden the effects of uncertainty that were evident under other conditions.

### **Experiment 3**

Experiment 2 confirmed the results of the first experiment using recognition items that were drawn directly from the movie that participants saw. Thus, the results occur even when the modality of the recognition items is similar to that of the original stimuli. Although these findings can be interpreted easily in terms of recoding interference, they are harder to interpret in terms of processing shifts (Schooler, 2002). That is, the activation of a linguistic processing strategy as a result of generating a communication should have a negative impact on the recognition of all types of items. Therefore, the contingency of these effects on both the type of communication that participant generated and the type

<sup>6</sup> An application of the index of discrimination accuracy suggested by Hilgard (1951; see Footnote 3).

of item to be recognized is hard to explain on the basis of a processing shift conceptualization alone.

It nevertheless seemed desirable to examine further implications of this contingency within the theoretical framework we have proposed. To reiterate, communication objectives theoretically lead to the formation of different linguistically coded generalized representations, and the content of these representations depends on the objective being pursued. Participants' later use of these representations to verify recognition items depends on the extent to which they perceive the representations to be useful. Thus, interference effects do not always occur. This contingency is most evident when participants communicate their impressions of the protagonists. Because participants in these conditions use the generalized person representation they have formed to verify protagonists' statements, their accuracy in recognizing these statements is often decreased. However, this is true only because this representation is relatively more accessible in memory than their episode model of the movie. If their episode model were relatively more accessible, participants would use it in all conditions, and so their recognition memory would not be affected. This implies that if participants engage in post-communication activity that increases the accessibility of the episode model they constructed, or leads to the formation of a new representation that conveys similar implications as the episode model, the interfering effects of the communication task would be decreased or eliminated. In contrast, engaging in activity that increases the use of the generalized person representation should not have this facilitating effect.

To evaluate this possibility, participants in Experiment 3 were shown the movie, and then asked either to describe their impressions of the protagonists or to perform an unrelated task. Participants were then dismissed and asked to return for a session 48 h later. When they returned, some of them were reexposed to either the video or the audio portion of a 4-min fragment of the movie segment they had seen earlier whereas others were not given this reminder. We assumed that the processes involved in comprehending these reminders would be similar to those involved in the comprehension and verification of recognition items. That is, participants should comprehend the auditory reminder (which consists only of statements) with reference to the linguistically coded generalized person representation they have formed, because it is generally sufficient for understanding the reminder's implications. On the other hand, they should comprehend the visual reminder (which consists largely of nonverbal behaviors) with reference to their episode model of the movie that contains not only protagonists' nonverbal behaviors but also the statements that accompanied them. In each case, however, participants in the course of comprehending the reminder should form a third representation whose

content is based on both the content of the reminder and the representation that they use to comprehend it. Thus, the new representation that they form in the course of comprehending an auditory reminder is likely to be an abstraction of the person representation they had formed in communicating their impressions. In contrast, the representation they form in the course of comprehending a visual reminder should reflect the content of their episode model of the movie and, therefore, to contain depictions of both statements and nonverbal behaviors. In each case, the new representation is presumably stored in memory, and is more accessible in memory than the representations that were used to construct it.

Therefore, suppose participants who receive a visual reminder are later asked to verify protagonists' statements and behaviors in a recognition task. They should consider the new representation they have formed to be useful for verifying both types of items. Moreover, because the content of this representation is similar to their episode model of the movie, their recognition of these items should be more accurate than it would be if the representation had not been formed. However, participants who received an auditory reminder may use the new representation they formed to verify protagonists' statements, and so their use of this reminder should not increase recognition accuracy relative to conditions in which the reminder was not presented. Furthermore, the existence of the new representation, which is presumably stored in memory on top of the previously constructed ones (Wyer & Srull, 1989), should decrease the accessibility of participants' episode model of the movie. To this extent, it might decrease their accuracy of verifying nonverbal behaviors, which are presumably based on this model. (For evidence that factors that increase the accuracy of one representation in memory can correspondingly decrease the accessibility and use of other representations, see Macrae, Bodenhausen, & Milne, 1995.)<sup>7</sup>

In summary, these considerations suggest that if participants have previously described their impressions of the protagonists, a visual reminder should increase their later recognition of not only protagonists' nonverbal behaviors but also the statements that accompanied them, even though these statements are not

<sup>7</sup> If participants had previously been given a post-information interaction-description objective, the goal-specific representation they would form should theoretically contain both statements and nonverbal behaviors, and so this representation should be used to verify both auditory and visual reminders. To this extent, however, neither type of reminder should increase the relative accessibility of the episode models that participants formed and, therefore, neither reminder should appreciably influence the likelihood of using them. Consequently, because of the nondiagnosticity of this task-objective condition, only-impression formation objectives were considered in the present research.

contained in the reminder. In contrast, an auditory reminder should not appreciably influence participants' later recognition of protagonists' statements and might even decrease their recognition of nonverbal behaviors.

### Method

Eighty-eight introductory marketing students participated in the study for extra course credit. They were randomly assigned to 10 experimental conditions. Eight of these conditions composed a 3-factor design involving task objectives (impression-description vs. comprehension-only), the type of reminder (audio vs. video) and the segment to which the reminder pertained (first vs. last). In two other, control conditions, participants participated in each task-objective condition without receiving any reminder at all.

This experiment was conducted in two sessions, 48 h apart. Participants in Session 1 watched the movie with instructions to comprehend it, after which they spent 7 min either describing their impressions of the protagonist (*impression-description* conditions) or performing an irrelevant task (*comprehension-only* conditions). Then, after responding to some questions pertaining to the task they had performed (e.g., how easy it was to form an impression of the characters or to understand what went on, how enjoyable the film was, etc.), they were told that the experiment was over, but were asked to return 48 h later for an ostensibly unrelated study.

When participants arrived for Session 2, however, we indicated that we wanted to know how people's reactions to movies changed over time, and we would therefore like to ask them some more questions about the film they had seen earlier. Then, participants in control conditions completed the same recognition measure we administered in Experiment 1. The other participants, however, were informed that before proceeding, we would like to refresh their memory by showing some parts of the movie again. On this pretense, participants under *auditory-reminder* conditions listened to the audio portion of either the first 4 min of the movie or the last 4 min. Correspondingly, participants under *visual-reminder* conditions watched the video portion of either the first or last segment with the sound turned off. Then, after reviewing the reminders, these participants also completed the recognition measure administered in Experiment 1.

### Results

To evaluate the effects of reminders in impression-description conditions, we computed the difference between (a) the proportion of correct recognition responses by participants who received each type of reminder and (b) the mean proportion of correct responses by participants in these same conditions who

had described their impressions but did not receive a reminder. A similar procedure was used under comprehension-only conditions. An overall analysis of these differences yielded interactions involving (a) task objectives, reminder modality, and feature type,  $F(1, 58) = 6.68$ ,  $p < .02$ , and (b) these three variables and the fragment of the movie to which the reminder pertained (first vs. last),  $F(1, 58) = 5.83$ ,  $p < .02$ . The more specific comparisons to be reported were restricted to statements and behavior that occurred in the same segment as the reminder that participants were given. These comparisons were evaluated using pooled error terms from the overall analysis.

To reiterate, we expected that giving a visual reminder to participants who had previously described their impressions of the protagonists would increase their recognition of both protagonists' statements and their nonverbal behaviors. However, giving these participants an auditory reminder may not influence their memory for protagonists' statements and might decrease their memory for nonverbal behaviors. These possibilities were confirmed. Under impression-description conditions, a visual reminder increased the likelihood of recognizing not only the behaviors contained in it ( $M_{\text{diff}} = .110$ ) but protagonists' statements as well ( $M_{\text{diff}} = .056$ ). Moreover, the facilitating effects of these reminders on recognition of the two types of items did not significantly differ ( $p > .10$ ). In contrast, giving participants an auditory reminder slightly increased their recognition of protagonists' statements ( $M_{\text{diff}} = .035$ ) and substantially decreased their recognition of behaviors ( $M_{\text{diff}} = -.126$ ). Although these difference were not significantly different from 0 ( $p > .10$ ), they differed from one another,  $F(1, 56) = 5.18$ ,  $p < .05$ . The interaction of reminder modality and feature type in this reminder condition was quite reliable,  $F(1, 58) = 4.58$ ,  $p < .04$ . In combination, the results indicate that a visual reminder of protagonists' nonverbal behavior increased recognition of the statements they made. However, an auditory reminder of protagonists' statements actually decreased recognition of their nonverbal behaviors.

The small increase in recognition of statements when participants received an auditory reminder may be due in part to the fact that a trace of the reminder containing these statements was still in working memory at the time the recognition task was performed (Wyer & Srull, 1989). This possibility is strengthened by results obtained in comprehension-only conditions. Episode models were presumably the only representations of the movie that participants had formed under these conditions. Therefore, reminders should not appreciably change their accessibility in long-term memory. However, if features of the reminder are still in working memory at the time the recognition task is performed, and if participants consult this source of information

before retrieving information from long term memory (Wyer & Srull, 1989), these features may be particularly easy to verify. This was in fact the case. In comprehension-only conditions, reminders facilitated recognition of only the specific features that were contained in them ( $M_{\text{diff}} = .082$ , averaged over the two reminder conditions). However, they had minimal effects on the recognition of features that were not contained in the reminders ( $M_{\text{diff}} = .008$ ). This difference, which is reflected in the interaction of reminder modality (visual vs. auditory) and feature type (behavior vs. statement) in an analyses of data under comprehension-only conditions alone, was marginally significant,  $F(1, 58) = 3.65$ ,  $p < .07$ .

### General discussion

When people write about a social interaction for a purpose they did not anticipate, their generation of this post-information communication can often decrease their later memory for the events they had originally observed. This decrease cannot be attributed simply to the adverse effects of interpolated cognitive activity on memory. All participants engaged in post-information processing for the same amount of time before they performed the recognition task. Yet, somewhat ironically, this processing often had a more detrimental effect on memory for events that were involved in this processing than on memory for events that were not!

Considered in combination, our findings provide a reasonably coherent picture of the processes that underlie these effects. We assumed that when people comprehend an interaction without a specific goal in mind, they construct a mental representation of the interaction (i.e., an episode model) that contains both visually- and acoustically-coded mental images. If they are later called upon to communicate about the interaction to others, they retrieve and use this representation as a basis for their communication, elaborating the implications of those features that are particularly relevant to their communication objective. In the course of this communication-related activity, they form a new, generalized representation whose features are typically coded linguistically and refer to fewer specific statements and behaviors than do the episode models on which this representation is based. Consequently, if the individuals use this generalized representation later to verify the events that occurred rather than the episode model they had formed of the interaction at the time they observed it, their accuracy in verifying the features of the interaction is likely to decrease.

This conceptualization is consistent with the recoding-interference conceptualization of visual overshadowing proposed by Schooler and Engstler-Schooler (1990; see also Krauss & Chiu, 1998, for a similar in-

terpretation). Although process shifts of the sort postulated by Schooler (2002) could also play a role, these shifts are unlikely to be sufficient to account for the results we obtained. For one thing, similar effects were evident regardless of whether the recognition items were coded in the same modality in which they were first encountered (Experiment 2) or were coded verbally (as in Experiment 1). In other words, the effects did not depend on whether the linguistic coding process that was activated by the communication task was similar to or different from the process that was required at the time of recognition.

On the other hand, recoding-interference effects are contingent on the particular post-information communication objective that persons pursue. People who describe the interaction to others may construct a generalized event representation that has implications for both protagonists' statements and their nonverbal behaviors. Consequently, they are likely to use this representation to verify both things the protagonists said and things they did, and this has an adverse effect on their recognition of both types of items. In contrast, persons with the goal of reporting their impressions of the protagonists may focus on aspects that have clear implications for the protagonists' personality and general likeableness (i.e., protagonist's statements to one another), and may include only these features in the generalized person representation they form. These persons may later use this generalized representation they have formed to verify protagonist's statements, but may resort to their episode model of the interaction to verify protagonists' nonverbal behaviors. Thus, as results of Experiments 1 and 2 suggest, inducing a post-information impression-formation objective had a more detrimental effect on recognition of things that protagonists said than on things they did.

This conclusion is strengthened by the results of Experiment 3. When participants who had constructed a generalized person representation of the protagonists were given a visual reminder of things the protagonists did, the new representation they formed in the course of comprehending it was presumably based on the initial episode models they had constructed of the movie while watching it. They later used this new representation as a basis for their recognition responses. As a result, the relatively high incidence of episode model-related features in this representation increased their ability to verify both protagonists' behaviors and the statements they made. When these participants were reminded of things the protagonists said, however, they formed a new representation that was based on the generalized person representation they had constructed. They later used this new representation to verify the statements they encountered in the recognition task. As a result, their accuracy in verifying these statements was not appreciably influenced by the reminder. Furthermore,

their recognition of the protagonists' behaviors was even poorer than it would have been if the reminder had not been provided.

#### *Pre- vs. post-information communication objectives*

The effects of inducing a communication objective after people have observed an interaction should be distinguished from the effects that occur when people observe the interaction with this goal in mind. In the latter case, people may attend to goal-relevant features that they would not normally retain when their only objective is to understand what is going on. To this extent, inducing this objective may increase the likelihood of recognizing these goal-relevant features later. (For evidence of similar increases in research on verbal information processing, see Anderson & Pichert, 1978; Wyer et al., 1982.) When participants were told to form an impression of the protagonists before they watched the movie, this appeared to be the case. That is, participants were somewhat better able to verify things the protagonists said if they expected to communicate their impressions of the protagonists at the time they watched the movie than if they did not. On the other hand, describing the interaction decreased recognition accuracy regardless of when participants were informed of this communication objective. As noted earlier, the content of the abstract event representation that participants construct for the purpose of describing the interaction is likely to be similar regardless of whether this representation is constructed at the time participants watched the movie or later. The detrimental effects of using the representation to verify the movie's specific features may likewise be similar.

An alternative interpretation of the effects of pre-communication impression formation objectives is suggested by the fact that in Experiment 1, participants used a very large number of trait descriptions in the communications they generated but few descriptions of protagonists' statements. It is conceivable that the representation they formed in this condition was so abstract and trait-based that participants did not consider it useful for verify statements and, therefore, defaulted to the episode models they had formed, just as they did when they were asked to verify a nonverbal behavior. Although the failure for participants to use a disproportionate number of trait descriptions under comparable conditions of Experiment 2 renders this interpretation somewhat suspect, it is worth considering in future research.

#### *Final comment*

Our results have implications for a large number of situations outside the laboratory in which people observe a conversation between individuals and later have

reason to convey their impressions of these individuals or, alternatively, to communicate what went on to others. Although the stimulus materials consisted of a single 12-min segment of a movie, the total amount of information conveyed in the segment was far greater than is usually presented in research on social information processing, and the statements and behaviors we used as recognition items were representative of the entire segment. Nonetheless, some caution should obviously be taken in overgeneralizing our results. We intentionally selected a movie involving only two protagonists whose interaction consisted largely of statements they made to one another rather than their nonverbal behaviors. An interaction sequence in which impressions are likely to be based on what participants do rather than on what they say would undoubtedly be useful in understanding more fully the interplay of verbal and nonverbal components of the representations that participants form under different task-objective conditions. (For further discussion of the interactive effects of visual and verbal components of social information on memory and judgments, see Wyer, 2003; Wyer et al., 2002.)

However, the failure to consider these possibilities in the present research does not compromise its contribution. Quite apart from its specific implications, our studies call attention to a number of factors that require consideration in understanding the processing of information in actual social situations, the interactive effect of both spontaneous and goal-specific representations on memory, and the interplay of verbal and nonverbal aspects of these representations. As such, it paves the way for additional work that may ultimately attain the goals toward which social information processing research is directed.

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