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Higher Social Intelligence Can Impair Source Memory

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Source monitoring is made difficult when the similarity between candidate sources increases. The current work examines how individual differences in social intelligence and perspective-taking abilities serve to increase source similarity and thus negatively impact source memory. Strangers first engaged in a cooperative storytelling task. On each trial, a single word was shown to both participants, but only 1 participant was designated to add a story sentence, using this assigned word. As predicted, social intelligence negatively predicted performance in a subsequent source-monitoring task. In a 2nd study, preventing participants from being able to anticipate their partner's next contribution to the story eliminated the effect.

Keywords: dyads, source monitoring, memory, individual differences, perspective taking

Cooperative activities typically benefit from people's ability to infer their partner's mental state (Knoblich & Sebanz, 2006), largely because this ability promotes communication and closer coordination of action. But within such a cooperative context, it is often important to remember whether it was oneself or one's partner who had made a particular contribution to the joint effort. For example, making a source error by mistakenly taking credit for a collaborator's work can lead to hurt feelings, mistrust, and a damaged reputation.

Source errors are remarkably easy to produce in the laboratory (e.g., Durso, Reardon, & Jolly, 1985; Foley, Foley, Durley, & Maitner, 2006; Mashek, Aron, & Boncimino, 2003). Memories typically are not explicitly "tagged" with source identity (Johnson, Hashtroudi, & Lindsay, 1993), and so source attributions stem largely from inferences drawn from features of the remembered event. Sources tend to have consistent profiles of features (e.g., memories for perceived events typically have more perceptual, temporal, and spatial information than memories for imagined events), and by capitalizing on these average characteristic qualities, people are able to attribute memories to the most likely sources. These same judgment processes presumably underlie all source decisions, regardless of the set of candidate sources (e.g., imagined vs. perceived, Person A vs. Person B, left side vs. right side of computer screen). However, in the current study we focus specifically on situations in which the two sources are the self and another person.

Discriminating between the self versus another as the source of information in memory has been well investigated in both children and adults. For example, in Baker-Ward, Hess, and Flannagan (1990), triads of children engaged in various turn-taking tasks (e.g., playing a xylophone and bouncing tennis balls into a trash can) and later identified the source of the component actions (e.g., "Who bounced the tennis ball into the trash can?"). The children tended to remember more "self" than "other" actions and tended to take credit for their partner's actions (see also Foley & Ratner, 1998; Foley, Ratner, & House, 2002; Foley, Ratner, & Passalacqua, 1993; Ratner, Foley, & Gimpert, 2002). These self-attribution source errors may have resulted from anticipation (Foley et al., 2006; Foley & Ratner, 1998; Foley et al., 2002; Greenwald, 1980; Marsh & Bower, 1993). That is, the child generated possible responses that the partner might make while waiting for the partner's contribution. Later, during the source test, the retrieval of misleading memory cues signaling oneself as the source (e.g., the cognitive operations involved in planning the action) created memory confusions.

Other studies, using adults, have produced further evidence for the role of anticipation in increasing self–other source errors. For example, Foley et al. (2006) gave pairs of participants anagrams, assigning the task of solving each anagram to one or the other pair member. In one condition, the anagram was presented to both participants and then was immediately assigned to one of them, at which point the other participant was diverted to an alternate task. Other conditions introduced a delay between the presentation and assignment of the anagram, allowing the unassigned pair member an opportunity to generate an anticipated answer before being diverted to the alternate task. In addition, the anagrams were either easy (making successful anticipation before beginning the alternate task likely) or hard (making it unlikely). As predicted, incorrectly remembering an anagram as having been assigned to oneself was more frequent for conditions that had facilitated anticipation (i.e., easy anagram with delay).

Similarly, in Landau and Marsh (1997), participants took turns with a "computer partner" finding words within a 4 × 4 Boggle-type letter array. Whereas half the participants were shown the partner's words in their entirety, the other half were shown the partner's words one letter at a time and asked to anticipate or guess the word. Although both groups later produced appreciable levels

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of unintentional plagiarism, anticipation of the partner's response increased its rate of occurrence.

In light of the finding that anticipation of other people's actions can negatively influence later source decisions, it follows that individuals who tend to anticipate their partner's responses should have poorer source memory than individuals who do not frequently engage in this process. *Social intelligence* involves such a tendency to anticipate a partner's response across a broad range of circumstances and sources (Kihlstrom & Cantor, 2000). Because this tendency to spontaneously anticipate a partner's next action would produce similar consequences as making two sources overtly more similar (e.g., Ferguson, Hashtroudi, & Johnson, 1992), we predict that higher levels of social intelligence should lead to greater source confusion between oneself and others. This prediction is in line with previous research showing that processing information from another person's perspective leads to similar neural activity in the ventromedial prefrontal cortex as processing information from one's own perspective (Ames, Jenkins, Banaji, & Mitchell, 2008). To the extent that the people use the quality of the cognitive operations associated with memories as diagnostic of source information (Johnson et al., 1993), an increase in anticipation may result in a decrease in source accuracy.

The category of intelligences that includes social intelligence has proven relatively difficult to characterize, both theoretically (Gardner, 1983; Mayer & Salovey, 1993, 1997; Weis & Süß, 2007) and empirically (Cronbach, 1960). But researchers generally agree that it is separable from more cognitively oriented intelligences (e.g., Gardner, 1983), is likely complex (e.g., Weis & Süß, 2007), and appears to have its own neurological substrate (Bar-On, Tranel, Denburg, & Bechara, 2003). Social intelligence is generally associated with the ability to recognize others' motivations, to anticipate future behavior, to empathize, to manipulate, and to take another person's perspective (Galinsky, Maddux, Gilin, & White, 2008; Kosmitzki & John, 1993; Wright, 2002). Important to our work here, this is thought to arise from social-cognitive processes that allow for the reduction of differences between the model of oneself and that of another. We predict that although these processes may lead to social advantages, they will also lead to disadvantages for subsequently discriminating source.

In the current study we focus on whether social intelligence can negatively affect source memory. We were interested in studying social intelligence for two reasons: (a) Such effects would in principle extend broadly across social situations, and (b) it would allow us to begin to study stable characteristics of the rememberer, a relatively unexplored area of inquiry in source judgments. To foreshadow our results, we found that social intelligence did indeed negatively predict source accuracy (Experiment 1) and that this occurred only for tasks that allowed anticipation of the other person's contributions at encoding (Experiment 2).

Experiment 1: Social Intelligence Produces Source Errors

We first investigated whether social intelligence predicts source accuracy. Pairs of strangers engaged in a collaborative storytelling task in which they took turns adding sentences to an ongoing story. On each turn, a critical word was presented to both participants that had to be incorporated into the following sentence of the story. Later, participants completed a surprise source memory test in which they saw each of the critical words again (along with new words) and attempted to identify who had been assigned to use it in the story. Finally, participants completed the Tromsø Social Intelligence Scale (Silvera, Martinussen, & Dahl, 2001), a self-report measure of social intelligence.

Method

Participants. Participants were 116 psychology students at Stony Brook University who completed the experiment in partial fulfillment of a course requirement.

Materials. One hundred and twenty words were generated through the MRC Psycholinguistic Database (M. Wilson, 1988). Each word had a unique first three letters, was four to seven letters long, and had a Kučera–Francis (1967) frequency value in the range of 100–300. No concrete nouns were included in an effort to avoid repetition of the words throughout the created stories (see Procedure section). We randomly split the 120 words into three lists of 40 words. One set of 40 words was assigned to each of the two sources (self and partner), and one set was used as lures during the source memory test (see Appendix A).

Procedure. Two individuals participated in each experimental session. The two participants, who were always strangers, were seated together at a single computer. Participants were told that the experiment examined how people create fictional stories with strangers. During the first phase, participants took turns adding sentences to a story that they were jointly creating. While completing this task, participants were given one important restriction: During each turn they were required to incorporate the word presented on the computer screen into their sentence. For example, Participant A could have been instructed to begin the story using the word *middle* and could have said, "A little girl was lost in the middle of the forest." After Participant A added this sentence, a new word was presented on the computer screen (e.g., *cold*), and Participant B continued the story (e.g., by saying, "It was getting late and she was cold"). Participants were instructed to speak only when adding their sentences to the story. Each participant was provided with 40 words to incorporate into the story for a total of 80 sentences (for an example, see Appendix B).

After completing the story creation task, participants moved to separate cubicles and completed a 15-min numeric filler task before completing a surprise source memory test. During this test, participants were presented with the previous words from encoding (40 of which they themselves had been assigned to use and 40 of which their partner had been assigned to use) along with 40 new words. Items were presented in random order, and participants were asked to indicate whether each word was seen earlier and assigned to them, seen earlier and assigned to their partner, or was not seen earlier.

Finally, after completing the memory test, all participants completed the Tromsø Social Intelligence Scale. This 21-item self-report scale defines social intelligence as "the ability to understand other people and how they will react to different social situations" (Silvera et al., 2001, p. 314). Participants responded to 21 questions, such as "I can predict other people's behavior," on a 7-point Likert scale. In the following analyses we focus specifically on the seven items composing the Social Information Processing subscale, as it focuses on the cognitive operations associated with understanding and predicting other people's behavior and feelings.

The Social Information Processing subscale is internally reliable with Cronbach's alpha values of .79–.81 across experiments (Gini, 2006; Silvera et al., 2001).

Results

For the following analyses, we calculated source accuracy as the number of old items attributed to the correct source divided by the number of old items correctly identified as old. We also calculated overall recognition memory in the form of d' (Brophy, 1986). We excluded participants who knew one another (10 participants) or who failed to follow instructions (four participants), leaving a total of 106 participants. An alpha level of .05 was used for all analyses.

As social intelligence increases, people should become more prone to source errors. We first tested this prediction by analyzing the correlations between the Social Information Processing subscale of the Tromsø Social Intelligence Scale and source accuracy scores. As predicted, as social information processing score increased, source accuracy significantly decreased ($r = -.24$; see Figure 1). However, there was no significant relationship between social information processing and d' scores ($r = -.08$, $p = .43$). Thus, increases in social information processing abilities are negatively related to source accuracy but not to overall recognition discriminability.

We next tested whether the negative relationship between social information processing abilities and source errors would hold after controlling for overall recognition. We conducted a multiple regression analysis in which source accuracy ($M = 0.82$) was the criterion variable and social information processing abilities ($M = 34.22$) and d' scores ($M = 1.92$) were the predictor variables. The overall correlation ($R^2 = .27$) was significant, $F(2, 103) = 49.48$, $MSE = .01$. The standardized regression coefficients (betas) were $-.19$ for social information processing abilities and .66 for d' scores. The coefficients for social information processing scores and for d' scores were both significant, $t(103) = -2.71$ and $t(103) = 9.34$, respectively. Of particular interest to the current investigation, the unique association between social information processing scores and source accuracy (partial $r = -.26$) was numerically very similar to its bivariate correlation ($r = -.24$). This suggests that the relationship between social information processing abilities and source accuracy is virtually unaffected by overall memory abilities.

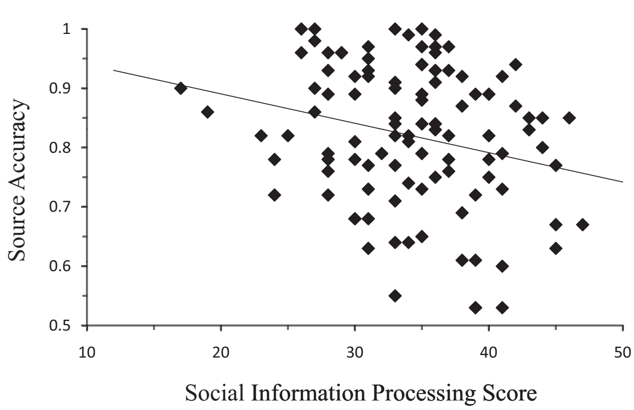

Figure 1. Source accuracy as a function of scores on the Social Information Processing subscale of the Tromsø Social Intelligence Scale in Experiment 1.

Discussion

As predicted, source accuracy was negatively associated with social intelligence; people with higher social information processing abilities were worse at discriminating items that had been contributed by themselves versus their partner in the storytelling task. We conclude from this that the greater tendency to anticipate their partner's contribution, a skill normally valued in social interaction, put the more socially intelligent participants at a disadvantage by reducing source-discriminating cues available to them. To be clear, participants almost certainly could not anticipate their partner's precise sentence. Given that participants' only constraint was to include a specific word in their next sentence, the degrees of freedom in what the participant added to the story were quite high, even on a sentence-by-sentence basis (see, e.g., Appendix B). Rather, we posit that participants with higher social intelligence tended to anticipate potential sentences that their partner could generate, including the sentences that they themselves might have generated if it had been their turn.

Experiment 2: Comparing a Task That Allows Anticipation With One That Does Not

Experiment 1 showed that people with higher social intelligence process information in a way that impairs source discrimination. We interpret this as an effect of anticipation rather than a tendency to recode memory for the story sentence after it is uttered by one's partner. Although the latter would also constitute a product of perspective taking, we focus particularly on anticipation because anticipation is more closely associated with the generative cognitive operations that would implicate oneself as the source of an utterance. Experiment 2 was designed to test between these alternatives.

In one condition of Experiment 2 (the computer condition), subjects performed the storytelling task under the same circumstances as in Experiment 1. In the other (the card condition), participants were not able to anticipate their partner's contribution prior to actually hearing it; only the person assigned to a word initially saw it, and the partner could see the assigned word only after hearing the sentence generated by the partner. Drawing on experimental results showing that tasks that allow anticipation increase source errors compared with those that do not (e.g., Foley et al., 2006; Landau & Marsh, 1997), we predicted that social intelligence would once again vary inversely with source accuracy, but only for the computer condition, where it is possible to anticipate one's partner's contribution.

In addition, we measured verbal intelligence in Experiment 2 and included scores on this measure as a predictor in subsequent analyses. Some researchers have found correlations between social–emotional intelligence and more traditional cognitive aptitudes (e.g., Mayer & Geher, 1996; Riggio, Messamer, & Throckmorton, 1991). Regardless of whether the two classes of intelligence are correlated, it is important in a task like ours, which relies heavily on verbal skills, to partial out the potential contributions of other classes of intelligence to task performance.

Method

Participants. Participants were 58 psychology students at Stony Brook University who completed the experiment in partial fulfillment of a course requirement. Participants completed the study in pairs of strangers.

Materials. We divided the 80 words that were used during the story creation task in Experiment 1 into four lists of 20 words. The lists were assigned to each of the two sources (self and partner) for each of the two tasks (computer condition and card condition). The same 40 items used in Experiment 1 were used as lures during the source memory test.

Procedure. The procedure paralleled that of Experiment 1, with one key change: At the beginning of the experiment, the participants completed two story tasks: one that allowed for anticipation while the partner was adding his or her contribution and one that did not. The former (the computer condition) was identical to the story task used in Experiment 1 except that each participant was provided with 20 words to incorporate into the story (rather than 40) for a total of 40 sentences. During this task the words were presented on the computer screen and were visible to both participants. This should allow the participants to anticipate their partner's contribution to the story.

The card condition, in contrast, precluded anticipation of the partner's contributions. Rather than appearing on the computer screen, each word was printed on an index card. On each turn, participants were instructed to pick up the next card and keep the card hidden from their partner. Once they had added a sentence to the story (using the word on the card), they turned it face up on the table so that their partner could see it. This allowed each participant to know the partner's words but not to anticipate the partner's contribution to the story. Each participant was provided with 20 words to incorporate into the story for a total of 40 sentences. Order of the two story tasks was counterbalanced across participant pairs.

After completing the two story creation tasks, participants individually completed a 15-min filler task and then a surprise source memory test. During this test, participants were presented with the 80 old words and 40 new words, in random order. Participants were to indicate whether each had been assigned to them, had been assigned to their partner, or had not been seen in either storytelling task.

Finally, all participants completed the Tromsø Social Intelligence Scale and a measure of verbal aptitude. To assess verbal aptitude, participants answered 32 verbal Graduate Record Examination–style questions that involved sentence completion, analogies, and choosing a word's antonym. Participants were instructed to choose an answer for each question, and verbal aptitude was scored as the number of correct answers.

Results

As in Experiment 1, we calculated source accuracy as the number of items attributed to the correct source divided by the number of items correctly recognized as old. We also calculated overall recognition memory in the form of d' (Brophy, 1986) separately for each of the two tasks. We excluded participants who failed to follow instructions (four participants), leaving a total of 54 participants. An alpha level of .05 was used for all analyses.

Computer condition. We analyzed source accuracy scores for the computer task, which allowed for perspective taking. This task was virtually identical to the one used in Experiment 1, and we therefore predicted that the social information processing component of social intelligence should correlate negatively with source accuracy.

To test this prediction, we conducted a multiple regression analysis in which source accuracy was the criterion variable ($M = 0.79$) and social information processing score ($M = 35.61$), d' score ($M = 2.02$), verbal aptitude ($M = 15.91$), and task order were the predictor variables. The overall correlation ($R^2 = .41$) was statistically significant, $F(4, 49) = 8.52$, $MSE = .01$. The standardized regression coefficients (betas) were $-.28$ for social information processing scores, .57 for d' scores, .14 for verbal aptitude, and .09 for task order. As in Experiment 1, the coefficients for social information processing scores and for d' scores were both significant, $t(49) = -2.38$ and $t(49) = 5.07$, respectively. Finally, the partial correlation between social information processing and source accuracy (partial $r = -.32$) was numerically much larger than the bivariate correlation ($r = -.18$). This suggests that the combined positive relationships between recognition memory and verbal aptitude with source accuracy may act to suppress the negative relationship between social information processing and source accuracy for these words. Thus, social information processing ability accounts for more unique variance in source accuracy than it does in terms of total variance.

Card condition. We next analyzed source accuracy scores for the card condition task, which precluded anticipation. Because subsequent source confusions should depend on the opportunity to anticipate the partner's responses, social intelligence should not be related to source accuracy on this task.

We examined source accuracy ($M = 0.81$) using a multiple regression analysis with the predictor variables of social information processing scores ($M = 35.61$), d' scores ($M = 1.96$), verbal aptitude ($M = 15.91$), and task order. The overall correlation ($R^2 = .45$) was statistically significant, $F(4, 49) = 9.92$, $MSE = .01$. The standardized coefficients (betas) were $-.01$ for social information processing scores, .66 for d' scores, .07 for verbal aptitude, and $-.05$ for task order. In contrast to the computer condition, only the coefficient for d' scores was significant, $t(49) = 6.09$. As predicted, social information processing scores were unrelated to source accuracy in the card condition, $t(49) = -0.12$, $p = .90$.

Discussion

Experiment 2 used two versions of the story creation task that differed in an important way. The computer condition allowed both participants to see the critical word before the assigned participant generated the sentence. In contrast, in the card condition, one participant did not see the word until after hearing the generated sentence. Although both conditions allowed for perspective taking (e.g., guessing why one's partner had chosen to create that utterance rather than another), only the computer condition allowed for the generative processes associated with anticipation.

As predicted, only the condition that allowed for anticipation led to the negative relationship between social intelligence and source accuracy. The cognitive operations associated with anticipating a partner's response resemble those produced when the individuals themselves have taken the action (Ames et al., 2008). This in turn leads to source confusions, but only for individuals who are inclined to engage in anticipatory processing under conditions that allow for it.

General Discussion

A large literature on memory for source has identified factors associated with the content, task, and sources themselves that impact source memory performance. The current work begins to investigate how enduring characteristics of the person making the source decision may also impact performance, and we investigated this as a function of individual differences.

In two experiments, dyads of strangers completed a storytelling task. Participants alternated turns, each adding a sentence to a story they were jointly creating. During each person's turn, he or she had to incorporate a word into the story that was provided to both partners on the computer screen. Participants later took an unexpected source test. Both experiments provided evidence for a negative relationship between social intelligence and source accuracy, at least for participants engaged in a task that allowed anticipation of the partner's next contribution.

One might have thought that intelligence of any sort, including social intelligence, could only help in a cooperative cognitive task. Certainly social intelligence is beneficial in social domains, facilitating empathy, communication, and coordination of action. However, social intelligence appears to have negative memorial consequences. Participants high in social intelligence tend to engage in anticipatory processing, which effectively creates similar cognitive operations for words they themselves added to the story and for words their partner added. Later, participants are less able to use characteristics of the cognitive operations associated with the memory to distinguish heard from generated items. In support of this hypothesis, the relationship between social intelligence and source accuracy is absent when the task precludes anticipation (Experiment 2).

These results expand on prior studies showing that source confusions increase as the (usually perceptual) similarity between sources increases. For example, source discrimination is more difficult when the two candidate sources are the same sex rather than opposite sexes (see Johnson et al., 1993, for a review). Other studies have examined how social relationships are associated with source similarity and are thus a predictor of source memory. For example, friends and close others are likely more similar than two strangers. Because of this similarity, people make more self–other confusions between themselves and a friend or close other than between themselves and a stranger (Baker-Ward et al., 1990; Mashek et al., 2003). Our results expand on this by revealing an individual characteristic that increases the similarity of the self and a stranger. The current studies suggest that people with a greater tendency to anticipate others' actions will consequently generate cognitive operations that can undermine their subsequent ability to remember who had said what.

The current findings generate several additional questions worth pursuing. First, one limitation of the current experiments is their reliance on a self-report measure of social intelligence. Although self-report has long been the norm in personality psychology, people's intuitions about their behavior do not always match their actual behavior (e.g., T. D. Wilson & Gilbert, 2003). Future research would benefit from the inclusion of an ability measure of social intelligence. Second, future research may explore whether there are groups that are particularly sensitive to the effects we have observed. For example, as access to memory details becomes less likely, older adults rely more on inferential and reconstructive processes than young adults to identify a memory's source. Thus, they are more vulnerable to factors affecting the accuracy of this reconstruction. Furthermore, older adults rely more heavily on cognitive (in contrast to perceptual) cues than younger adults during source monitoring, and their source accuracy is particularly impaired when cognitive operations become more similar among candidate sources (Johnson, De Leonardis, Hashtroudi, & Ferguson, 1995). Thus, the negative relationship between social intelligence and source accuracy may be particularly pronounced in this population.

Because source identity is rarely explicitly encoded with memories, source attribution relies largely on inferential processes. A large literature has shown how people can make use of aspects of the situation, task, and candidate sources, as well as their own cognitive processes at encoding, to judge source. The current work expands the literature into new territory, examining enduring characteristics of the rememberers themselves. We find that higher social intelligence may come at a cost.

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Appendix A

Words Assigned to Be Incorporated Into the Stories Across Experiments 1 and 2 (40 Words per Participant) and the Critical Lures (40 Words)

able	cannot	dropped	including	natural	short
above	cause	easily	influence	near	simple
according	center	effective	inside	necessary	sometimes
across	chance	eight	involved	none	special
actual	clear	entire	justice	normal	square
addition	closed	exactly	kept	original	stopped
alone	cold	feeling	late	outside	strong
already	common	finally	learned	paid	taken
anyone	continued	firm	length	personal	together
applied	corner	following	likely	physical	total
available	covered	free	limited	poor	training
average	current	full	lived	pretty	tried
basic	dark	gave	local	private	true
beautiful	decided	generally	married	provided	unless
beginning	deep	gone	material	purpose	usually
behind	degree	greater	maybe	raised	various
black	despite	growing	meaning	ready	volume
blue	difficult	hard	meeting	returned	wide
brought	directly	heavy	middle	section	written
built	distance	held	modern	serious	wrong

Appendix B

Excerpt of a Story Created by Participants (Assigned Words Are Italicized)

A: Most people said that our house was ugly, but I think they were *wrong*.
B: We had very *hard* floors.
A: I was *able* to tap dance on them.
B: I had a *chance* of going to a tap dancing school.
A: But my mom said it was too *difficult* to get me there every week.
B: So I went *directly* to the public high school.
A: And there, there were *various* types of sports and activities that I could take part in.
B: I made a very *original club*, called the tap dancing club.
A: It included all the *local* children, boys and girls.
B: They could have taken *various* other activities but they chose to take my tap dancing club.

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