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SOURCE MEMORY IN SOCIAL CONTEXTS

by

Bianca Basten

A dissertation presented to the  
Graduate School of Arts and Sciences  
of Washington University in  
partial fulfillment of the  
requirements for the degree  
of Doctor of Philosophy

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Für Oma

Ohne deine Unterstützung hätte ich es nie so weit gebracht.  
Danke dass du immer für mich da bist.

## Abstract

Source memory is memory for where, when, how, and from whom information was received. Current source memory literature focuses mainly on memory for incidental information (i.e., where, when, how) rather than source identity (i.e., who). This dissertation addressed the role of source memory in social contexts and memory for source identity. Four experiments were designed to investigate the effects of information valence, target familiarity, and source congruence. 120 participants viewed a series of negative and positive statements about two targets provided by four sources and were later asked to identify the source of the information. Targets were considered positive and negative figures. Thus, statements were considered either congruent or incongruent with participants' expectations. The type of source as well as participants' connection with the targets were manipulated. Results revealed better source memory for incongruent sources than congruent sources only when participants' connection with the targets was strong (i.e., best friend). Similarly, results showed better source memory for incongruent sources than congruent sources only for first-order sources (i.e., actual individuals), but not for second-order sources (i.e., personnel files). Subsequent indirect tests of source memory assessed participants' likelihood to believe trivia statements provided by the same sources that had provided statements about the two targets. Results showed lower veridicality ratings for trivia statements provided by incongruent sources than for those

provided by congruent sources. Findings suggest that source memory in social contexts has similar underlying principles as person memory. That is, expectancy congruence affects the encoding of source identity. The role of coalitional vigilance and epistemic vigilance in source encoding and subsequent interactions with sources are discussed.

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## CHAPTER 1

### Introduction

How do we remember who told us about the new restaurant that opened last week? And why should it matter that we remember who told us? We receive information from a variety of sources every day. While remembering the information *per se* is usually considered most vital, remembering the source of the information is equally important. We may be familiar with some sources and unfamiliar with others. We may trust some sources and may be suspicious of others. Once trusted sources may prove unreliable over time. Knowledge of the source can affect how we interpret the information we receive. For example, most people are much more likely to believe a headline in the *New York Times* than one in the *National Enquirer*. Similarly, most people are much more likely to trust information they receive from a friend than information they receive from a stranger on the street. Source memory, whether explicitly or implicitly, plays an important part in a variety of everyday situations. The experiments presented here seek to add to our understanding of the role of source memory in social contexts.

#### *What is Source Memory?*

Source memory, as the name suggests, refers to memory for sources of information. Over time, there have been several different definitions that range from very narrow interpretations of the term to rather broad, all-

encompassing interpretations. Narrowly defined, source memory refers to a simple “Who said it?” question. That is, an individual may remember receiving a piece of information and will then try to remember the identity of the source that provided the information. While this is a pertinent part of source memory, there seem to be very few studies in the existing literature addressing this particular aspect. A broader definition seems to be used more frequently in the literature. More broadly defined, source memory includes memory for incidental information, such as the location of an object, the color of a word, or the modality in which information was received, etc.

#### *How Do We Remember Sources?*

One might think that memories are stored with a tag that explains how and when the memory was produced. If that were the case, one might be able to simply read the label and attribute a memory to an event. The source monitoring framework (SMF) pioneered by Johnson and colleagues (Johnson, Hashtroudi, & Lindsay, 1993; Johnson & Raye, 1981), however, suggests that there are no such source tags. Instead, the premise of the SMF is that memory representations contain the qualities or properties of the cognitive operations involved at the time of encoding. These qualities are then used to identify the source of the memory at retrieval (Johnson & Raye, 1981). Specifically, the source of a memory is identified by referencing, at retrieval, the incidental features of the memory (i.e.,

temporal, social, spatial, contextual, and modal information) available to the individual at the time of encoding the information (Johnson, et al., 1993; Johnson & Raye, 1981).

According to the SMF, the process of source monitoring is performed either in a systematic or a heuristic manner. In a heuristic process, characteristics of the memory are compared to the expected characteristics of a certain source, and only a partial overlap of these characteristics may be necessary to identify the source (Johnson, 1988, 1992). Although heuristic source monitoring can be efficient, it has a higher likelihood of resulting in errors because it requires only a small degree of familiarity or match of qualities. In contrast, in systematic source monitoring, fulfilling the criteria for source identification involves a multi-level process where information about potential sources is subject to several comparisons to the memory's qualities and characteristics (Johnson et al., 1993). The decision to engage in heuristic or systematic source monitoring depends on the individual's motivation, social conditions, and purposes underlying the source monitoring behavior (Johnson, 1988; Johnson et al., 1993).

In the majority of experiments on the SMF, the identity of the source (i.e., who said it) is either not studied, or considered as only one out of the many incidental features that can be tested as part of source memory. Instead, researchers have tested memory for where (e.g., Macklin & McDaniel, 2005), when (e.g., Underwood & Malmi, 1978) and how (e.g.,

Kelley, Jacoby, & Hollingshead, 1989; Thierry, Goh, Pipe, & Murray, 2005) information was encountered. Stimuli are often word lists, objects, pictures, spoken words, or more unusual stimuli, such as odors (e.g., Gilbert, Pirogovsky, Ferdon, & Murphy, 2006; Pirogovsky, Gilbert, & Murphy, 2006) or actions that the participant performs, witnesses, or imagines (e.g., Hornstein & Mulligan, 2004).

In addition, in the majority of experiments source memory is tested explicitly using forced-choice recognition tests. Participants are presented with two or more choices and asked to identify the correct source (or incidental information, such as modality, location, etc). One of the few experiments addressing indirect tests of source memory was conducted by Kelley and colleagues (Kelley et al., 1989). Kelley compared direct and indirect tests of memory for the modality in which an item was presented. Results showed a positive correlation between direct and indirect tests. That is, participants relied on implicit information or “perceptual fluency” (as measured by the indirect tests) to make explicit source identifications.

In real-world situations, individuals might engage in more indirect source monitoring as well. For example, when presented with information from an unreliable source, individuals might not explicitly remember that the source was unreliable, but might avoid seeking out the source’s advice in the future. Thus, it might be useful to explore indirect tests of source memory for social information.

Regardless of what type of stimulus is used and what type of incidental information is tested, or whether it is tested directly or indirectly, source memory, by definition, can never be tested in isolation. Thus, we also need to consider how research on item memory can add to our understanding of source memory processes.

*What is the Link Between Item Memory and Source Memory?*

There is an extensive body of research investigating the connection between item and source memory (Cook, Marsh, & Hicks, 2006; Cycowicz, Friedman, Snodgrass, & Duff, 2001; Glisky, Polster, & Routhieaux, 1995; Pirogovsky, et al., 2006; Trott, Friedman, Ritter, & Fabiani, 1997; Weis, et al., 2004). Researchers seem to agree that different neural circuits are responsible for item and source memory, thus making it possible to have double dissociations between item and source memory (e.g., Glisky et al., 1995; Pirogovsky et al., 2006). While there is evidence to suggest that increases in item memory may lead to increased source memory as well (e.g., Koehler, Moscovitch, & Melo, 2001), there is also evidence to suggest that other factors might increase item memory while decreasing source memory (Jurica & Shimamura, 1999). This double dissociation is supported by findings suggesting different, often stronger, age effects for source memory than for item memory (e.g., McIntyre & Craik, 1987; Siedlecki, Salthouse, & Berish, 2005; Trott, et al., 1997).

One way to assess the link between source and item memory is to assess whether well-established item memory effects can be extended to source memory (e.g., Jurica & Shimamura, 1999; Macklin & McDaniel, 2005). Emotional words tend to be remembered better than neutral words (Kensinger & Corkin, 2003b). There is evidence to suggest that this effect does extend to better source memory for emotional information than for neutral information (Doerksen & Shimamura, 2001; Kensinger & Corkin, 2003). Another well-documented item memory effect is the distinctiveness or bizarreness effect, which refers to better memory for distinct items than for neutral items (e.g., McDaniel & Einstein, 1986). When asked about the source of bizarre or distinctive information, however, participants did not seem to have better memory than for sources of neutral information (Macklin & McDaniel, 2005).

Thus, it seems that source and item memory are linked under certain circumstances, but operate independently under other circumstances. Some item memory effects extend to source memory, while others do not. Again, however, the link between item and source memory has mainly been tested with source memory for incidental information and there is little research on source memory in social contexts, or source identity in particular. Why, then, should source memory in social contexts be different from source memory for incidental information? As discussed earlier, social information is usually linked to a specific target and presented by a specific



source. A look at research outside of the immediate memory domain might provide some answers.

### *Social Cognition and Impression Formation*

The concept of cognitive schema (Bartlett, 1932) has contributed significantly to the understanding of social memory. Schema models of impression formation postulate that an individual's social expectations are represented in the form of generic knowledge structures (i.e., schemas) that direct the processing of social information (e.g., Alba & Hasher, 1983).

One such schema might be the valence of the information. Research on impression formation suggests that negative information not only receives more attention, but also affects how a person is evaluated more so than positive information (Ito, Larsen, Smith, & Cacioppo, 1998; Pratto & John, 1991). Along the same lines, researchers often distinguish between other-relevant traits and possessor-relevant traits (e.g., Wentura, Rothermund, & Bak, 2000). That is, certain traits are more important (i.e., adaptive or maladaptive) for the person interacting with the possessor of the traits, whereas others are more important for the possessor him/herself. As with negative information, participants pay more attention to other-relevant traits than to possessor-relevant traits (Wentura, et al., 2000). In addition, research suggests that information linked to a motive is remembered better than information without an attached motive (Owens, Bower, & Black, 1979). In social contexts, positive and negative

information, as well as information linked to a motive, might be processed differently depending on the target and the receiver of the information.

*Congruence effects.* If the receiver of the information is familiar with the target and has certain expectations, the information might either be considered expectancy-congruent or expectancy-incongruent. Hastie (1980; Hastie & Kumar, 1979) developed the associative network (AN) model of social memory that has been used to investigate the effect of social expectations on the processing of and memory for social information. The AN model proposes that, under certain circumstances, expectancy-incongruent information is processed more extensively than expectancy-congruent information. Specifically, whereas congruent information is easily incorporated into an existing schema, in the case of incongruent information, the perceiver's need to engage in incongruence-resolution processes leads to more elaborative encoding of the information (e.g., Srull & Wyer, 1989). During this elaborative encoding process cognitive associations are formed between the incongruent information and other incidental information. These connections then serve as retrieval cues, thus making incongruent information more memorable.

#### *Source Memory for Social Information*

If individuals' expectations affect the processing of social information, how does that apply to the processing of the sources or incidental features of that social information? We know there are certain

factors that influence not only the encoding of social information but also memory for its sources and incidental features.

*Schemata.* Schemata affect source memory for incidental information. Bayen et al. (2000) presented participants with names of objects typically found in either a bedroom or a bathroom. Objects were paired with a “scene label” that was either expected (i.e., bathroom objects labeled as “bathroom”) or unexpected (i.e., bathroom objects labeled as “bedroom”). Similar to the results for source identity memory, participants were better at identifying which label an object was paired with for expected than for unexpected items. When participants were not certain which label was given to a particular object, they were more likely to choose the expected than the unexpected label.

This effect also applies to prior knowledge about the sources. Bayen and colleagues (Bayen, Nakamura, Dupuis, & Yang, 2000; Spaniol & Bayen, 2002) conducted a series of experiments in which participants were asked to determine the source of statements made by two different sources. Based on participants’ prior schematic knowledge about the two sources, statements were expected for one source and unexpected for the other. Contrary to what the AN framework might suggest, results showed that source accuracy was greater for expected than for unexpected statements. When participants were not certain which source presented the statement, they were more likely to choose the expected than the unexpected source.

Bayen and colleagues (2000) concluded that prior schematic knowledge aided source memory by allowing participants to guess which source might have presented the statement. Hicks and Cockman (2003) obtained similar results when participants had schematic knowledge about the source at retrieval (knowledge at encoding did not seem to have an effect on accuracy) and also showed an increase in confidence about the source decisions, suggesting that the effect goes beyond simple guessing.

Similarly, social information, such as stereotypes or other social expectancies can influence source memory (Ehrenberg & Klauer, 2005; Seta & Seta, 1990; Sherman & Bessenoff, 1999). For example, participants were presented with stereotypical and counter-stereotypical information about different targets and asked to attribute old and new statements to a particular target. Results indicate that when participants were unsure about the source, they were more likely to misattribute stereotypical information than counter-stereotypical information to the target, suggesting that stereotypical social information is used not only during encoding but also during retrieval of information (Ehrenberg & Klauer, 2005; Sherman & Bessenoff, 1999). While it seems that source memory is affected by social information, these studies did not technically test memory for source identity. Statements were not made by a particular source. Instead, statements were linked to a target and memory for the target was assessed,

making this a test of memory for incidental features rather than source identity.

*Type of information.* In addition to prior schematic knowledge about a source, the type of information presented has also been shown to affect source memory. For instance, there seems to be something special about source memory for emotional information (Cohen, Conway, & Maylor, 1994; P. Davidson & Glisky, 2002; P. S. R. Davidson, Cook, Glisky, Verfaellie, & Rapcsak, 2005; May, Rahhal, Berry, & Leighton, 2005). Emotional words are not only remembered better than neutral words, they are also remembered more vividly and with greater contextual detail (which, as mentioned earlier, is important for source monitoring decisions) than neutral memories (Kensinger & Corkin, 2003b).

However, this effect has only been established for incidental information, not source identity. For example, when presented with words in two different colors, participants were more likely to remember the color of an emotional word than of a neutral word (Doerksen & Shimamura, 2001). Results from several studies suggested that both arousal (i.e., level of arousal elicited by the item) and valence influenced memories, but arousal had a greater effect than valence (Doerksen & Shimamura, 2001; Kensinger & Corkin, 2003b).

As discussed earlier, in everyday social interaction, we do evaluate information dependent upon the source. The most salient consideration

when evaluating new statements is very often who made that statement – for instance relying on experts more than novices, and by extension on expert-like sources (encyclopedia, scientific journals) more than novice-like sources (popular press or Internet sites). Also, in many circumstances we attach great importance to the fact that a particular person made a particular statement even if we disregard the information conveyed. Malevolent gossip, for instance, might tell us a lot more about the source than about the target. Thus, it makes sense to examine to what extent source identity is remembered differently than other incidental features of an item.

Common sense would suggest that, under certain conditions, it is wise to monitor source identity. For example, it seems more important to remember *who* insulted/praised us than to remember where, when or how we were insulted/praised. In response to the insult/praise, it might be necessary to revise one's impressions of the source and avoid (or approach) the person in the future. Thus, memory for source identity should be a necessary element of social interactions and impression formation (Srull & Wyer, 1989; Wyer, Budesheim, Lambert, & Swan, 1994).

If the findings outlined above extended to memory for sources, the identity of sources of negative information (or information that is otherwise relevant to the participant) should be remembered better than sources of positive (or irrelevant) information. Social expectancy effects or congruence

effects should emerge in memory for source identity. Other than social expectations, what might drive these congruence effects? Again, a look at findings outside the immediate memory domain might provide some insight.

### *Evolutionary Psychology*

*Epistemic vigilance.* Research suggests that individuals encode details of an episode to assess whether the actor is likely to be reliable and credible in the future (Harris & Koenig, 2004; Koenig, Clement, & Harris, 2004; Wilson & Sperber, 2002). For example, young children may often show poor source memory, but determining which sources to trust, does not seem to be a problem for children (Harris & Koenig, 2004; Koenig, et al., 2004). When presented with two sources that label familiar items, 3-4-year-old children were able to monitor and identify sources based on whether they labeled items correctly or incorrectly. They were then able to use that information in later parts of the experiment when the two sources labeled novel items. Those children who accurately identified the reliable source, showed selective trust in the labels provided by the previously reliable source (Koenig et al., 2004).

This could be called *epistemic vigilance* – the listener is gauging the extent to which he/she can give credit to the information conveyed. Similar epistemic vigilance is displayed when adults encode information in social interactions (Birnbau, Wong, & Wong, 1976; Olson & Cal, 1984). When

told that frequent tooth-brushing was harmful by an expert (i.e., high credibility source), participants' attitudes toward tooth-brushing became less favorable and they judged the frequency of their tooth-brushing as lower than did participants who received the information from a misinformed speaker (i.e., low credibility source) (Olson & Cal, 1984). If individuals encode information that helps them decide whether to trust future information from sources, unreliable or incredible sources should be remembered better than reliable or credible sources.

*Coalitional vigilance.* In addition to epistemic vigilance, individuals certainly maintain some measure of *coalitional vigilance*. That is, they pay attention to what communication implies friendships, alliances, hostility and other valenced social relations. Coalitional vigilance may affect how source identity is encoded. Coalitional psychology is concerned with how individuals, who are not kin, interact and cooperate with each other (for a review, see Kurzban & Neuberg, 2005). That is, how do individuals construct mental representations of coalitional structures and triangulate themselves and others within these structures? How do individuals pursue behavioral strategies within coalitional contexts and how do their actions result from or create coalitional consequences?

Using a memory confusion paradigm, for example, Kurzban and colleagues found that (in addition to incidental information) when interacting with people, individuals encode information about coalitional



alliances (e.g., Cosmides, Tooby, & Kurzban, 2003; Kurzban, Tooby, & Cosmides, 2001). That is, individuals automatically categorize a person and their behaviors or statements to assess whether the actor might be a potential threat or help in possible future interactions. Similar to epistemic vigilance, coalitional information might be relevant in order to judge whether the actor can be trusted to give reliable information in the future.

### Summary

Source memory is an important aspect of everyday memory. It can be described as either memory for incidental features of an item, or, more specifically, as memory for the identity of a source of information. The current source memory literature focuses mainly on the broader definition of source memory and there is a large body of research on source memory for incidental information, such as where (e.g., Macklin & McDaniel, 2005), when (e.g., Underwood & Malmi, 1978) and how (e.g., Kelley, et al., 1989; Thierry, et al., 2005 2005) information was encountered. Despite the large body of research on source memory, there is a lack of research surrounding source memory in social contexts and memory for source identity in particular.

Social cognition research suggests that individuals use a set of social expectations or schemas to process social information and that schema-incongruent information is processed in a more elaborate manner and retrieved more easily (Hastie, 1980; Srull & Wyer, 1989; Wyer, et al., 1994).

If information acquired in social contexts is affected by expectancy-congruence, then sources of said information might be affected as well. Research in the domain of evolutionary psychology offers possible mechanisms, such as epistemic and coalitional vigilance, that might predict and explain congruence effects in source memory (Harris & Koenig, 2004; Koenig, et al., 2004; Kurzban, et al., 2001).

There are several broad research questions that remain unanswered:

- 1) What, if anything, makes source memory in social contexts and, in particular, memory for source *identity* different from source memory for incidental features?
- 2) Do the same principles that govern person memory and impression formation (i.e., expectancy-congruence) apply to memory for sources in social contexts?
- 3) If we find similar expectancy-congruence effects in source memory in social contexts as we find in memory for social information, what are the potential mechanisms that drive these effects?

## CHAPTER 2

### Dissertation Experiments

Motivated by the current literature in the domain of social memory and source memory, we can assume that individuals have a template for communication and evaluation of social information, which specifies answers to the following questions:

- (a) Is the information relevant to me? For example, am I being insulted/praised? Is the target someone I know?
- (b) Is the information relevant to the source? Does the source know the target or have a motive for providing certain information, etc? Does the information match what I expect to hear about the source?
- (c) Taking into account the answers to (b), my response to (a) might change and affect how I remember/encode information about source identity.

In view of the findings outlined above, the purpose of this dissertation is threefold: 1) to bring source memory into a social context by using socially relevant stimuli and testing conditions (i.e., focusing on source identity rather than incidental information), 2) to further examine the item/source memory connection for source identity, and 3) to use both direct and indirect tests of source memory.

Four experiments were designed to further investigate the effects of a) participants' expectations (i.e., statement congruence), b) type of source (i.e.,

first-order vs. second-order), and c) target familiarity (i.e., strength of connection between the target and the participant) on source memory. Specifically, all four experiments addressed the effect of statement congruence. Experiments 1 and 2 addressed the effect of type of source, and Experiments 1, 3, and 4 addressed the effect of target familiarity.

All four experiments followed the same general methodology. Participants viewed a series of statements made by four different sources about two targets and were later asked to recognize which source provided which statement. In addition to forced-choice source recognition tests, indirect tests of source memory were used to assess which aspects of the source and/or item are encoded and might be used during source memory decision processes. Specifically, participants were asked to judge the veridicality of statements provided by the same sources that previously made statements about the targets. The procedure and design of each experiment will be described in more detail below.

### Experiment 1

As discussed earlier, expectancy-congruence affects the processing of social information (e.g., Hastie, 1980). Specifically, acting on the assumption that individuals encode information about coalitional alliances as postulated by Cosmides and colleagues (e.g., Cosmides, et al., 2003; Kurzban, et al., 2001), we might expect to find better memory for sources that matter to (i.e., threaten) an individual's coalitional affiliation. That is, we might expect to

see better memory for sources of incongruent information. Similarly, we might expect to see lower veracity ratings for statements made by sources that threatened an individual's coalitional affiliation. Experiment 1 was designed to test these hypotheses.

## Method

*Participants.* 30 participants (22 females, 8 males) were recruited from the Washington University subject pool and received partial course credit for their participation in the experiment. Participants ranged in age from 18 to 21 with a mean age of 19.07 years and a standard deviation of 1.01 years.

*Materials.* Materials were a series of 48 statements, half positive and half negative, describing two targets in terms of their past and present behavior. The statements described either moral failings, e.g. "Jane never listens to other people's problems", or moral qualities, e.g. "John is always on time". Statements were taken from a list of normed statements (Ehrenberg, Cataldegirmen, & Klauer, 2001). All statements were tested in pilot studies to assess whether participants agreed with the intended valence of the statements. Only statements that were judged as highly positive or highly negative were selected for inclusion. Statements were displayed in 18pt font at the center of the monitor. The sources were four neutral-expression faces displayed in black and white in 6\*6cm boxes. Faces were

taken from the Productive Aging Lab Face Database of neutral-expression Caucasian faces (Minear & Park, 2004).

Materials for the second part of the experiment consisted of 64 trivia statements, all of which were true (e.g., “It takes 40 minutes to boil an ostrich egg”). Trivia statements were selected from a list of 120 trivia statements collected from different online sources. All statements were actually true, but were tested in pilot studies and only statements judged as equally likely to be true and false were included. The sources that provided the trivia statements were the previously seen four neutral-expression faces displayed in black and white in 6\*6cm boxes. Statements were displayed in 18pt font at the center of the monitor. For a list of statements and examples of faces, see Appendix.

*Procedure.* Participants were tested in the graduate student testing lab, and up to twelve participants were able to take part in the experiment simultaneously. At the beginning of the experiment participants were prompted to think of people they interact with regularly and know very well. They were asked to identify their best friend (BF) and the person they like least (LL). Participants were informed that they would see statements made by various people about the BF and LL, and they should pay attention to who said what about whom. At study, participants were presented with 24 trials in which a displayed picture of a novel face was identified as the source (speaker) of a statement displayed at the center of the computer screen.

Assignment of statements to sources was completely counterbalanced between subjects so that each source provided each statement. Within subjects, sources were consistent. That is, two sources provided both positive statements about the BF and negative statements about the LL. The other two sources provided both positive statements about the LL and negative statements about the BF. Thus, participants might have categorized sources as either congruent or incongruent. In other words, positive information about the BF and negative information about the LL would most likely be congruent with participants' expectations. On the other hand, sources that provided positive information about the LL and negative information about the BF might have been considered incongruent.

Each display with source, statement and target was maintained on the screen for 2 seconds. After a distraction period of approximately three minutes, participants started the recognition task. Old/new judgments and source recognition tests were combined. More specifically, at each of the 48 trials a statement was displayed, together with the four faces of the original sources and a response option for NEW statements. Participants were asked to decide whether the statement was new (as half of them were) or, if old, which of the sources had provided it at the study phase. The dependent measures were a) item recognition accuracy and b) forced-choice source recognition accuracy (I).

The second part of the experiment consisted of an indirect test of source memory. The same four sources that had previously provided the statements about the two targets subsequently provided trivia statements. For each of the 64 trials, a displayed picture of one of the previously seen sources was identified as the source of a trivia statement displayed at the center of the computer screen. Half the statements were presented by congruent sources, the other half by incongruent sources. Assignment of statements to sources was counterbalanced between subjects so that each source provided each statement. In addition to the source and statement, a scale from 1 (unlikely to be true) to 9 (very likely to be true) was displayed below the statement. Participants were asked to judge the veridicality of the statement by entering their response using the keypad. Each display of source, statement and scale remained on the screen until participants had responded. The dependent measure was the participants' ratings of the trivia statements.

Post-protocol questionnaires were used a) to assess how long (in years) participants had known the two targets, b) to determine how well participants actually knew the two targets they named (on a scale from 1 to 9), and c) to determine to what extent they agreed or disagreed with the implied congruence of the positive and negative statements made about the two targets. That is, each of the 48 statements was presented again, and



participants rated how likely the two targets might be to actually engage in the behavior described on a scale from 1 (not likely at all) to 9 (very likely).

*Design.* For the first part of the experiment, the two within-subjects independent variables were type of information (positive and negative) and target (BF and LL). The dependent measures were item recognition and source accuracy. Source accuracy (I) is a commonly used measure in the source monitoring literature (e.g. Raye & Johnson, 1980). It is an estimate of the conditional probability of a correct source identification given that the item was correctly recognized as old. For the second part of the experiment, the within-subjects independent variable was source congruence (congruent and incongruent). The dependent measure was participants' ratings of trivia statement veridicality.

## Results

*Item recognition.* The mean old/new recognition score was .88 (86% hits, 9% false alarms,  $d' = 1.01$ ). A 2(infotype) x 2(target) repeated measures ANOVA of the  $d'$  values showed that neither the type of information (i.e., positive vs negative) nor the target (i.e., best friend vs least liked) affected item recognition ( $F(1, 29) = .001, p > .05$ ;  $F(1,29) < 1, p > .05$ , respectively). There was no significant interaction between the two variables either ( $F(1, 29) < 1, p > .05$ ).

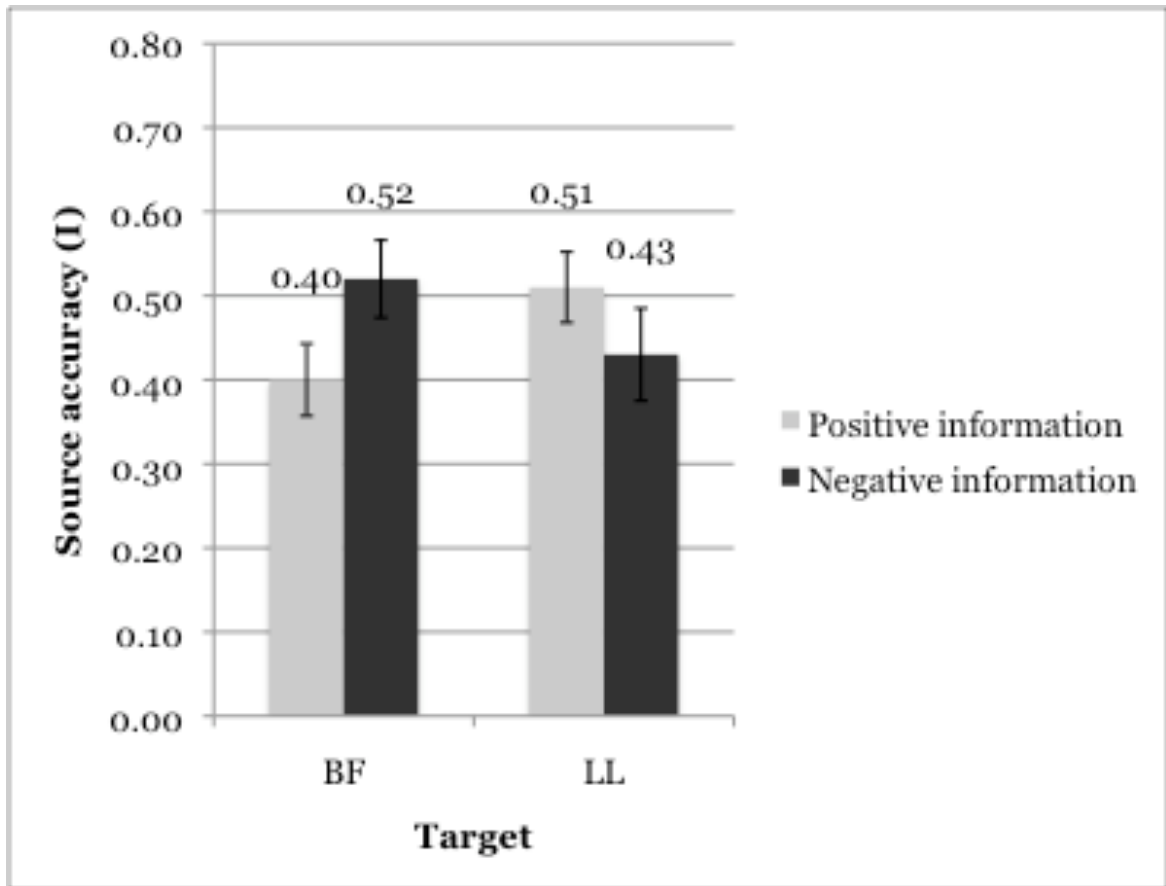
*Source accuracy.* Source accuracy for old items was on average .47 ( $SEM = .04$ ), significantly above the chance level of .25,  $t(29) = 5.953, p <$

.001). A 2(infotype) x 2(target) repeated measures ANOVA showed no significant main effects for type of information and target,  $F(1,29) < 1, p > .05$ , and  $F(1,29) < 1, p > .05$ , respectively. There was, however, a significant interaction between the two factors,  $F(1,29) = 9.501, p = .004, \eta^2 = .247$ .

Further analyses of simple effects using paired samples t-tests (applying the Bonferroni correction for multiple comparisons) showed significantly better source memory for negative statements about the BF (.52) than for positive statements about the best friend (.40),  $t(29) = 2.271, p = .031$ . There was a trend showing better source memory for positive statements about the LL (.51) than for negative statements about the LL (.43), but the difference was not statistically significant,  $t(29) = -1.477, p > .05$ . In addition, results showed better source memory for positive statements about the LL (.51) than about the BF (.40), as well as better source memory for negative statements made about the BF (.52) than about the LL (.43),  $t(29) = -2.309, p = .028$ , and  $t(29) = 2.128, p = .042$ , respectively (see Figure 1).

*Trivia ratings.* For the second part of the experiments, mean veridicality ratings for each trivia statement were computed. Paired-samples t-test results showed a significant difference in mean ratings between statements provided by congruent ( $M = 5.12$ ) and incongruent sources ( $M = 4.83$ ),  $t(29) = -2.290, p = .029$ . Specifically, participants were more likely to judge a statement as true if it had been provided by a source that previously

Figure 1. *Experiment 1 – Source accuracy.*



made congruent statements about the two targets. In other words, trivia statements made by sources that said positive things about the BF and negative things about the LL were judged as more likely to provide true trivia statements.

*Post-protocol questions.* Responses to post-protocol questions indicated that there was no significant difference between the number of years that participants had known the BF ( $M = 5.38$ ) and the LL ( $M = 3.55$ ),  $t(29) = 1.651, p = .109$ . There was, however, a significant difference between participants' ratings of how well they knew the BF and LL,  $t(29) = 6.879, p < .001$ . Specifically, on a scale from 1 (not at all) to 9 (very well), participants indicated that they knew the BF better than the LL ( $M = 7.67$  and  $M = 5.30$ , respectively).

A manipulation check was conducted to determine to what extent participants agreed or disagreed with the implied congruence of the positive and negative statements made about the two targets. Each of the 48 statements was presented again, and on a scale from 1 (not likely at all) to 9 (very likely), participants rated how likely the two targets might be to actually engage in the behavior described. Results indicated that participants rated congruent behavior as significantly more likely ( $M = 5.64$ ) than incongruent behavior ( $M = 3.57$ ),  $t(29) = 12.177, p < .001$ .

## Discussion

Several key findings emerge from Experiment 1. First, neither the type of information nor the target affected item recognition. Even though previous research has shown better item memory for negative statements (e.g., Kensinger & Corkin, 2003a), this lack of an effect was expected and, to some degree, intended. Prior to the dissertation experiments, several pilot studies were conducted to determine the ideal number of statements, sources, and trials in order to avoid floor and ceiling effects on source accuracy. With only 48 statements (24 old, 24 new), there was an expected ceiling effect for item memory.

Secondly, as predicted, source accuracy results showed an interaction between the type of information and the target. Comparisons showed that, for the most part, incongruent sources (i.e., those that provided positive information about LL and negative information about BF) were remembered better than congruent sources ((i.e., those that provided positive information about BF and negative information about LL). This parallels findings indicating that social information is remembered better if it is expectancy-incongruent (Hastie, 1980; Srull, 1981) and suggests that the same congruence effect extends to memory for sources. Participants had a strong connection and great familiarity with the targets, thus expectancy strength was relatively high. Any expectancy-incongruent information (and the source

that provided it) should have been more salient and easily accessible than congruent information.

Finally, results of the trivia veridicality ratings also showed a strong congruence effect. Statements made by congruent sources were judged as significantly more likely to be true than those made by incongruent sources. This might suggest that individuals encode source congruence and rely on it to establish the trustworthiness of the source in subsequent encounters, a finding that mirrors results from the cognitive development literature (Koenig, et al., 2004). Additional explanations for the congruence effects in both source accuracy and trivia ratings will be addressed in greater detail in the discussion following the comparison of Experiments 1 and 2 as well as the general discussion.

Results of the post-protocol questionnaires indicated that participants knew the BF better than the LL, however, this difference did not seem to have any effect on social expectations. In fact, post-protocol ratings of the statements indicated that congruent statements were consistently rated as likely and incongruent statements were rated as unlikely.

## Experiment 2

As mentioned earlier, source memory in social contexts seems to have several underlying active mechanisms. The question is which of those mechanisms drove the congruence effect in Experiment 1. Was it a) the connection between the participants and the targets (i.e., high expectancy

strength) or b) the type of source? Specifically, participants in Experiment 1 were very familiar with the targets and, therefore, had high expectations for the information that sources *should* provide. Thus, results of Experiment 1 could be attributed to expectancy strength and might the effect might disappear if expectancy strength was reduced (a question that will be addressed in Experiments 3 and 4).

Additionally, in Experiment 1, the sources could be described as first-order sources. Participants saw pictures of individuals who made statements about two targets. Would the same congruence effect that was present in Experiment 1 be present if sources were second-order sources, such as personnel files or newspaper articles? Experiment 2 was designed to address this question. Acting on the assumption that the type of source affects source memory, and that removing the *social* aspect of the source from the equation changes information processing, we might expect to find no difference in memory for sources of congruent and incongruent information. Given the fact that subsequent “interactions” with file folders are highly unlikely, we might also expect to find no difference in trivia veridicality ratings.

### Method

*Participants.* 30 participants (20 females, 10 males) were recruited from the Washington University subject pool and received partial course credit for their participation in the experiment. Participants ranged in age

from 18 to 21 with a mean age of 19.57 years and a standard deviation of 1.07 years.

*Materials.* Materials were the same as those used in Experiment 1, with the exception of the source pictures. Instead of four neutral-expression faces, sources were four different pictures of personnel files displayed in 6\*6cm boxes (see Appendix).

*Procedure.* The procedure was identical to Experiment 1. Participants viewed statements about the BF and the LL, but were told that these statements had been taken from four different personnel files (rather than being provided by four different people). Participants were then shown the old (and new) statements and asked to determine from which file the statements had been taken. Trivia statements were then presented by each of the four sources (i.e., files) and participants were asked the rate the likelihood of the statement being true considering which file it was taken from. As in Experiment 1, post-protocol questionnaires were used a) to assess how long participants had known their best friend and the person they like least, b) to determine how well participants actually knew the two targets they named, and c) to determine to what extent they agreed or disagreed with the implied congruence of the positive and negative statements made about the two targets.



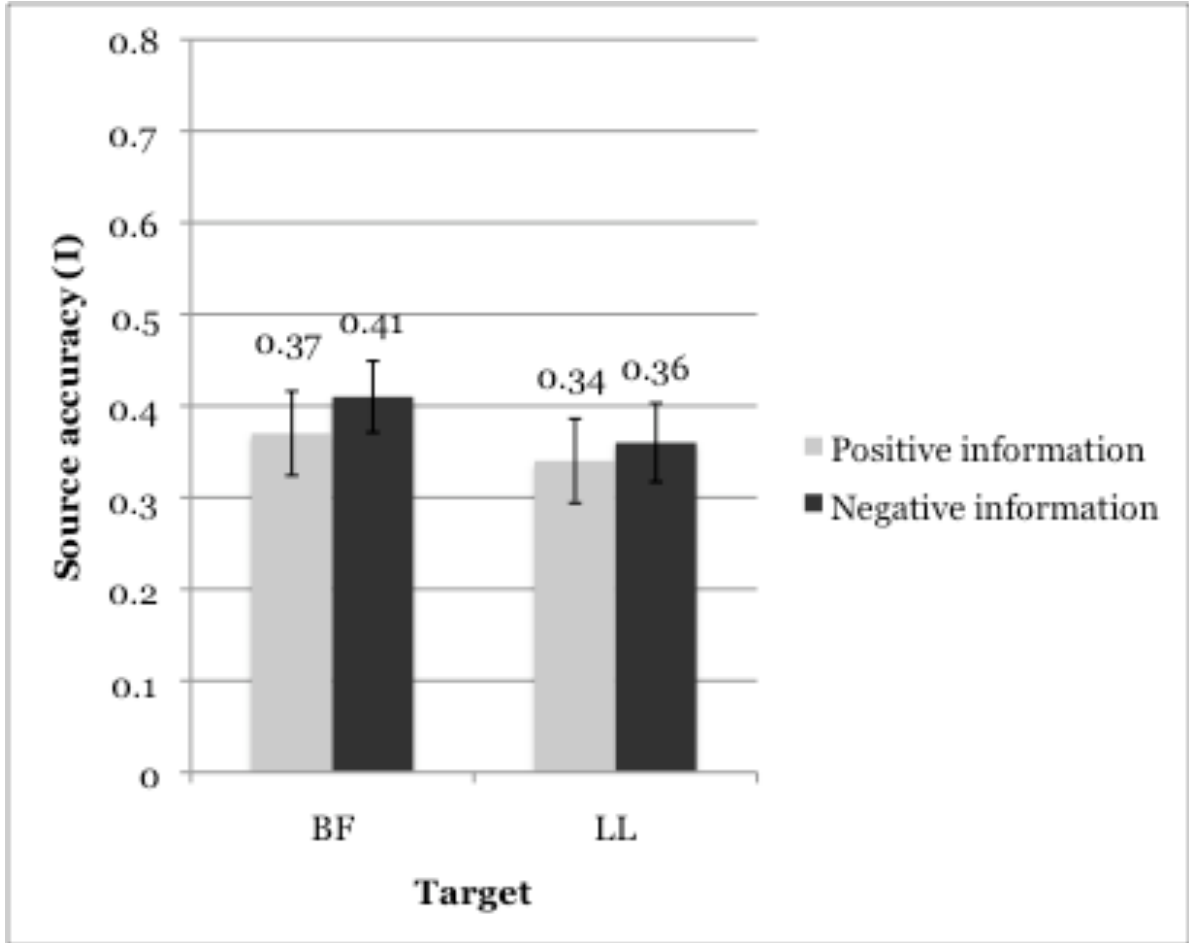
## Results

*Item recognition.* The mean old/new recognition score was .89 (87% hits, 10% false alarms,  $d' = 1.02$ ). A 2(infotype) x 2(target) repeated measures ANOVA of the  $d'$  values showed that neither the type of information (i.e., positive vs negative) nor the target (i.e., best friend vs least liked) affected item recognition ( $F(1, 29) < 1, p > .05$ ;  $F(1,29) < 1, p > .05$ , respectively). There was no significant interaction between the two variables either ( $F(1, 29) = 0.001, p > .05$ ).

*Source accuracy.* Source identification for old items was on average .37 ( $SE = .02$ ), significantly above the chance level of .25 (one group t-test,  $t(29) = 4.848, p < .001$ ). A 2(infotype) x 2(target) repeated measures ANOVA showed that neither the type of information (i.e., positive vs negative) nor the target (i.e., best friend vs least liked) affected source accuracy ( $F(1, 29) < 1, p > .05$ ;  $F(1,29) = 1.980, p > .05$ , respectively). There was no significant interaction between the two variables either,  $F(1, 29) < 1, p > .05$  (See Figure 2).

*Trivia ratings.* For the second part of the experiments, mean ratings for each trivia statement were computed. Paired-samples t-test results showed no significant difference in mean ratings between statements provided by congruent ( $M = 5.44$ ) and incongruent sources ( $M = 5.31$ ),  $t(29) = -1.336, p > .05$ . Participants were no more likely to judge a statement as true if it had been provided by a source that previously made congruent

Figure 2. *Experiment 2 – Source accuracy.*



statements about the two targets than if it had been provided by an incongruent source.

*Post-protocol questions.* Responses to post-protocol questions indicated that there was no significant difference between the number of years that participants had known the BF ( $M = 5.47$ ) and the LL ( $M = 4.10$ ),  $t(29) = 1.475, p = .151$ . There was, however, a significant difference between participants' ratings of how well they knew the BF and LL,  $t(29) = 6.602, p < .001$ . Specifically, on a scale from 1 (not at all) to 9 (very well), participants indicated that they knew the BF better than the LL ( $M = 7.77$  and  $M = 5.43$ , respectively).

To determine to what extent participants agreed or disagreed with the implied congruence of the positive and negative statements made about the two targets, each of the 48 statements was presented again, and participants rated how likely the two targets might be to actually engage in the behavior described on a scale from 1 (not likely at all) to 9 (very likely). Results indicated that participants rated congruent behavior as significantly more likely ( $M = 6.05$ ) than incongruent behavior ( $M = 3.92$ ),  $t(29) = 9.397, p < .001$ .

## Discussion

Several findings emerge from Experiment 2. First, results showed that neither the type of information nor the target had an effect on item recognition. As explained earlier, this lack of an effect was expected. Due to

the limited number of statements needed to produce acceptable source memory, there was a ceiling effect for item memory. Secondly, there was no significant effect of type of information or target on source accuracy. More importantly, there was no interaction between the two factors. Source congruence did not affect source accuracy. Trivia ratings were equally unaffected by source congruence. These findings will be addressed in more detail in the discussion following a comparison of Experiments 1 and 2.

### Combining Experiments 1 and 2

To gain a better understanding of the differences between Experiments 1 and 2 and to compare the results of both experiments directly, both sets of data were combined and the type of source was treated as a between-subjects variable. The main finding of interest was the interaction between target and type of information and its effect on source accuracy and trivia ratings. As a reminder, the four different conditions created by the two factors can be described as either congruent or incongruent. As described previously, positive statements about the BF and negative statements about the LL might be considered congruent (or expected by the participant) whereas the opposite (negative-BF, positive-LL) might be considered incongruent (or not expected by the participant). Therefore, to simplify analyses, 2(congruence)x2(source) mixed factorial ANOVAs were conducted to compare the effect of congruence on source accuracy and trivia ratings across the two experiments.

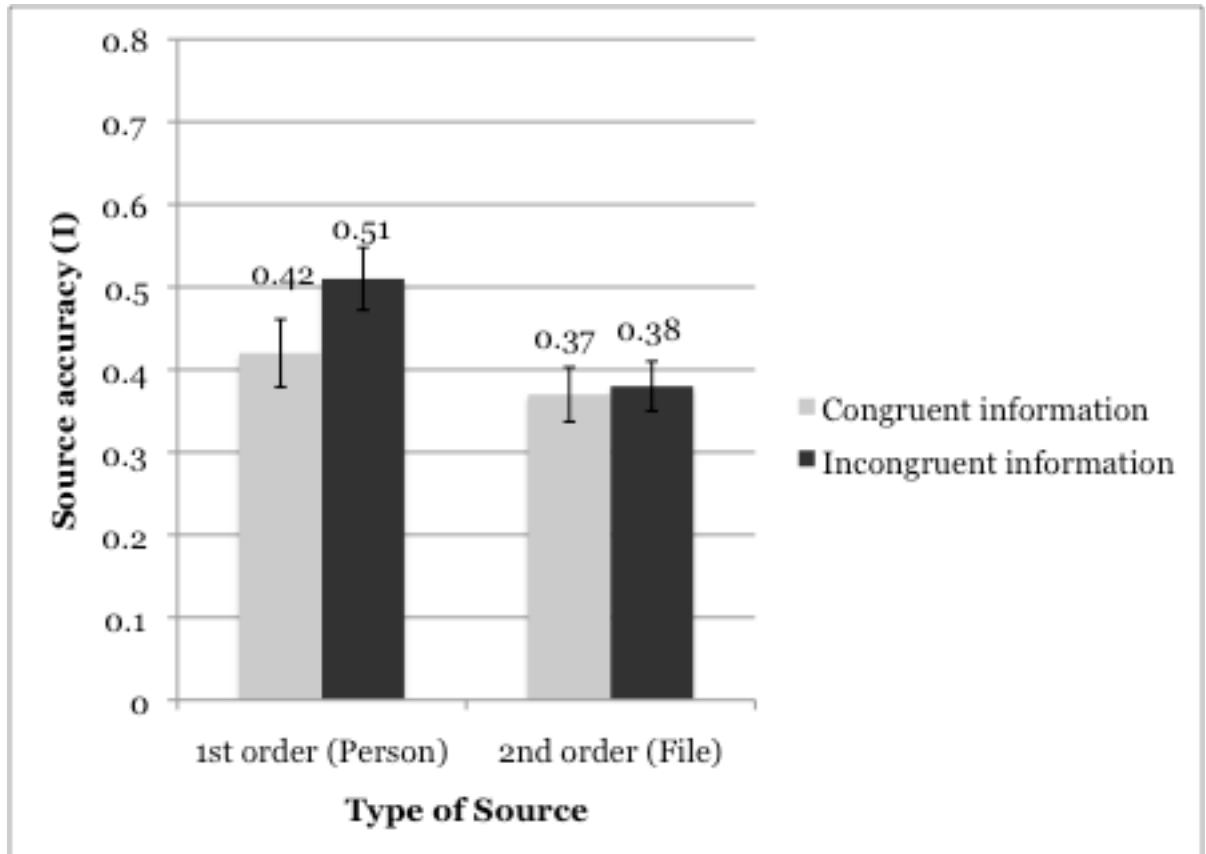
## Results

*Source accuracy.* Analyses did not show a significant main effect of congruence,  $F(1, 58) = 3.005, p > .05$ . There was, however, a significant main effect of source,  $F(1, 58) = 4.707, p = .034, \eta^2 = .075$ , with better overall memory for first-order sources (.47) than for second-order sources (.37). As expected, there was a significant interaction between congruence and source,  $F(1, 58) = 4.75, p = .033, \eta^2 = .076$ .

Paired-samples t-tests showed that for first-order sources, there was a significant difference between memory for sources of congruent and incongruent statements,  $t(29) = -3.082, p = .004$ , with better memory for sources of incongruent information (.51) than for sources of congruent information (.42). For second-order sources, there was no significant difference between memory for sources of congruent information (.37) and sources of incongruent information (.38),  $t(29) = -.289, p > .05$  (see Figure 3).

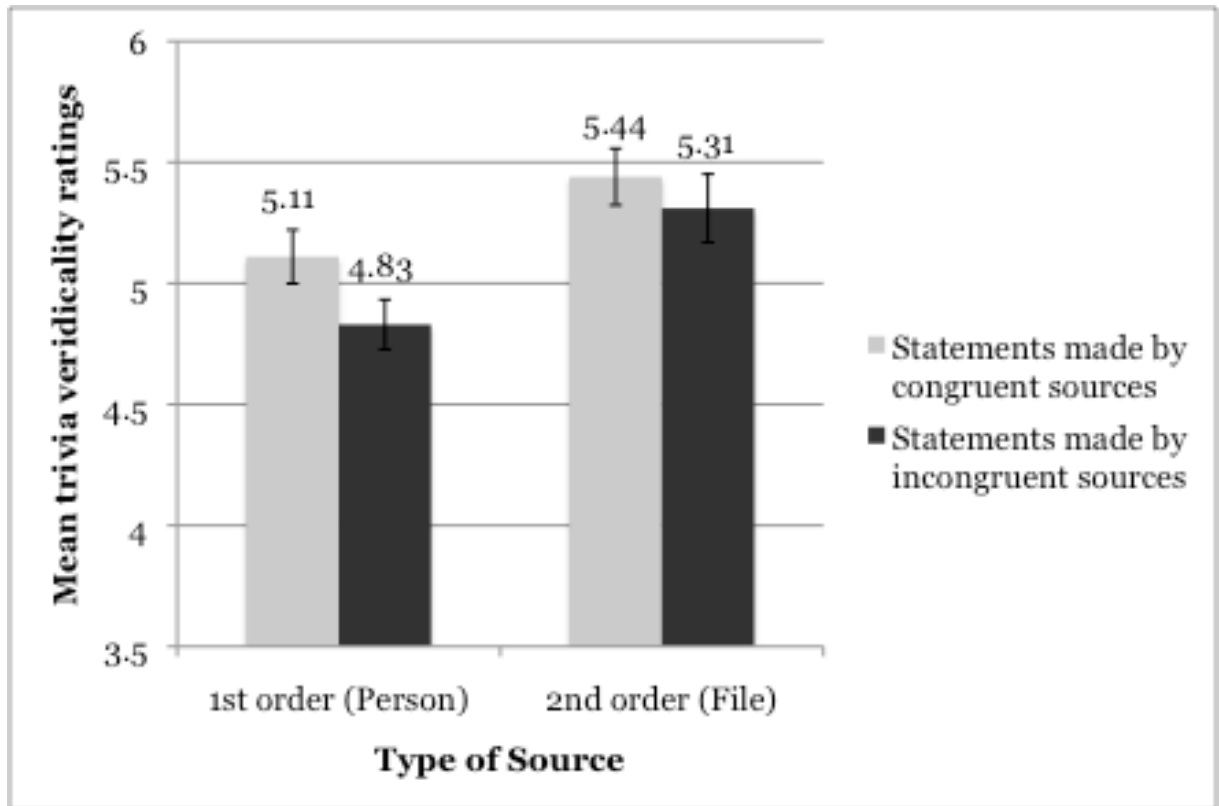
*Trivia ratings.* In addition, a 2(congruence)x2(source) mixed factorial ANOVA was conducted to compare trivia ratings across the two experiments. Results showed both a significant main effect of source and a significant main effect of congruence,  $F(1, 58) = 7.710, p < .001, \eta^2 = .117$ , and  $F(1, 58) = 6.816, p = .011, \eta^2 = .105$ , respectively). Specifically, statements made by congruent sources were rated as significantly more likely to be true than

Figure 3. *Experiments 1 and 2 – Source accuracy.*



those made by incongruent sources ( $M = 5.28$  and  $M = 5.07$ , respectively). Overall, statements made by second-order sources (i.e., Experiment 2;  $M = 5.38$ ) were rated as significantly more likely to be true than those made by first-order sources (i.e., Experiment 1;  $M = 4.97$ ). There was no significant interaction between the two variables,  $F(1, 58) < 1, p > .05$  (see Figure 4).

Figure 4. *Experiments 1 and 2 – Trivia ratings.*





## Discussion

Combining both experiments reveals a more complete picture.

Overall, source accuracy is significantly higher for first-order sources than for second-order sources. One possible explanation might be that pictures of faces are more memorable and easier to distinguish than pictures of file folders (Curby & Gauthier, 2007), a limitation of the experiments that will be addressed later. There is, however, more recent research to suggest that when asked to remember and distinguish a set of four items, memory for faces is not different from memory for other complex stimuli (Wong, Peterson, & Thompson, 2008).

Alternatively, higher levels of source accuracy for first-order sources might indicate that, when presented with first-order sources, participants are more likely to engage in systematic source monitoring than heuristic source monitoring (Johnson, 1988, 1992). As discussed earlier, the decision to engage in heuristic or systematic source monitoring depends on the individual's motivation, social conditions, and purposes underlying the source monitoring behavior (Johnson, 1988; Johnson et al., 1993). When presented with a social context (i.e., a person makes statements) rather than a merely implied social context (i.e., an anonymous person added information to a file folder), participants might be more motivated to engage in systematic source monitoring, thus leading to higher overall source accuracy.

The significant interaction between congruence and source confirms the difference in congruence effects between the two experiments. For first-order sources, incongruent sources were remembered better than congruent sources. The same difference was not found for second-order sources. It is important to note that expectancy strength and the relationship between targets and participants were the same in both experiments. However, even though participants could assume that an actual person added information to the file folder, a mere implication of a social context was not enough to elicit the same congruence effects in Experiment 2 as were seen in Experiment 1.

As mentioned previously, social expectations affect how social information is encoded. Incongruent information is processed in a more elaborative manner than congruent information (Hastie, 1980). However, the present results suggest that these findings only extend to the sources of information when said sources establish an immediate social context. If a social context is merely implied, social expectations seem to have little effect on source memory.

Combining both data sets also reveals a significant main effect of source on trivia ratings. Statements made by second-order sources are rated as significantly more likely to be true than statements made by first-order sources. This difference might be due to the more “official” nature of the file folder. While individuals (i.e., first-order sources) might or might not give

correct information, participants might feel that information that is included in an official personnel file is more reliable and can be judged as more accurate.

The difference in trivia ratings between congruent and incongruent first-order sources' statements is significant, yet not very large. Similarly, the difference in trivia ratings between congruent and incongruent second-order sources' statements is not significant, yet there is a trend indicating higher ratings for congruent sources. Thus, there is a significant main effect of congruence and no interaction between source and congruence. As discussed earlier, there are two possible mechanisms that might drive this congruence effect – epistemic or coalitional vigilance (Harris & Koenig, 2004; Koenig, et al., 2004; Kurzban, et al., 2001). During the study phase, participants might encode congruent sources as *accurate*, thus being more likely to trust them in subsequent interaction. Alternatively, participants might encode congruent sources as *allies*, thus being more willing to trust them in subsequent interactions. The last two experiments were designed to parse out the influence of epistemic and coalitional vigilance.

### Experiment 3

In Experiment 1, participants and targets had a strong connection, thus social expectations were high. Therefore, source memory was better for incongruent than for congruent sources and trivia ratings were lower for incongruent than for congruent sources. What are the underlying

mechanisms of the congruence effects? Does coalitional vigilance affect social expectations? As Cosmides and colleagues suggest (Kurzban, et al., 2001), perhaps incongruent sources are considered a threat to the participants coalition and therefore remembered better. Perhaps “threatening” sources are considered less trustworthy and thus rated as less likely to provide true statements. Or can the results be attributed simply to source reliability (i.e. epistemic vigilance)? As Harris and colleagues suggest (Harris & Koenig, 2004; Koenig, et al., 2004), perhaps incongruent sources are considered less reliable (and inaccurate) and thus remembered better. Perhaps congruent sources are considered more accurate and thus trusted more.

Making targets less familiar and less connected to the participants should decrease the expectancy strength by decreasing the coalition participants feel with the targets. Thus, in Experiment 3, targets were two historical figures, one of which is typically considered a “good guy”, the other of which is typically considered a “bad guy”. If familiarity and personal connection with the targets affect source memory in the same way if affects person memory (Srull & Wyer, 1989), incongruent statements made about two historical figures should have little or no affect on source memory. In addition, trivia ratings should be unaffected by source congruence. If, on the other hand, epistemic vigilance drives the congruence effects, we might

continue to find source accuracy and trivia ratings affected by source congruence.

### Method

*Participants.* 30 participants (16 females, 14 males) were recruited from the Washington University subject pool and received partial course credit for their participation in the experiment. Participants ranged in age from 18 to 22 with a mean age of 19.4 years and a standard deviation of 1.22 years.

*Materials.* Materials were identical to those used in Experiment 1.

*Procedure.* At the beginning of the experiment participants were introduced to two of four historical figures: Martin Luther King, Jr. (MLK) or Mother Theresa (MT) and serial killer Ted Bundy (TB) or Adolf Hitler (AH). Participants read a short biography of each target. They were informed that historians and reporters had compiled a list of little known information about the two targets. Before the study phase, participants were informed that they would see statements made by historians and reporters about the two targets, and they should pay attention to who said what about whom.

The study and test phase were identical to those described in Experiment 1. Participants viewed statements about the historical figures and were then shown the old (and new) statements and asked to determine which source had provided the statements. Trivia statements were then presented by each of the four sources and participants were asked the rate

the likelihood of the statement being true considering which source had provided it.

Post-protocol questionnaires were used a) to determine how much participants actually knew about the two targets prior to the experiment, and b) to determine to what extent they agreed or disagreed with the implied congruence of the positive and negative statements made about the two targets. Specifically, the same 48 positive and negative statements were presented again, and participants rated how likely the two targets might be to actually engage in the behavior described. As an additional manipulation check, participants' feelings toward the two historical figures were assessed to verify that participants considered one figure as positive and one as negative.

*Design.* For the first part of the experiment, the two within-subjects independent variables were type of information (positive and negative) and target (MLK/MT and TB/AH). The dependent measures were item recognition and source accuracy. For the second part of the experiment, the within-subjects independent variable was source congruence (congruent and incongruent). The dependent measure was participants' ratings of trivia statement veridicality.

## Results

*Item recognition.* The mean old/new recognition score was .89 (83% hits, 5% false alarms,  $d' = 1.03$ ). A 2(infotype) x 2(target) repeated measures

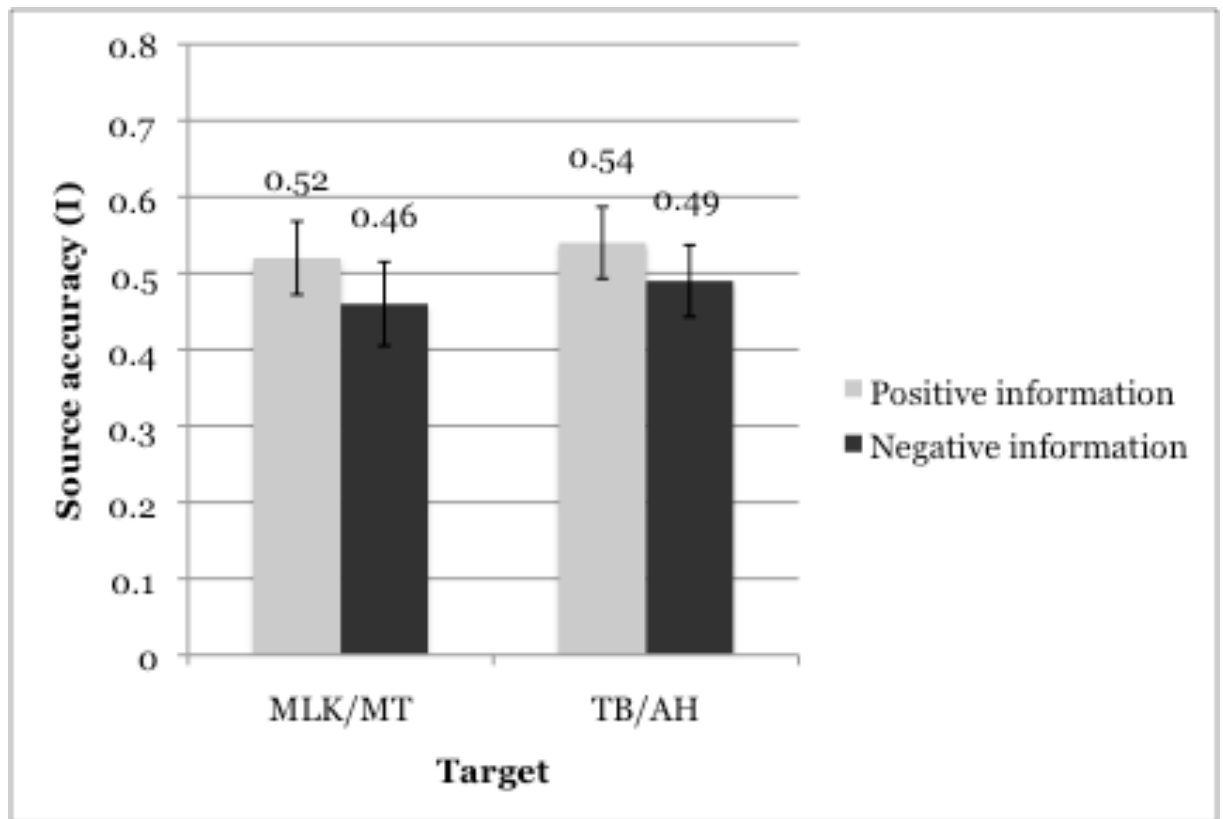
ANOVA of the  $d'$  values showed that neither the type of information (i.e., positive vs negative) nor the target (i.e., best friend vs least liked) affected item recognition,  $F(1, 29) = 3.219, p > .05$ ;  $F(1,29) < 1, p > .05$ , respectively. There was no significant interaction between the two variables either,  $F(1, 29) = 1.412, p > .05$ .

*Source accuracy.* Source identification for old items was on average .50, significantly above the chance level of .25 (one group t-test,  $t(29) = 6.999, p < .001$ ). A 2(infotype) x 2(target) repeated measures ANOVA showed no significant main effects for type of information and target,  $F(1,29) = 2.276, p > .05$ , and  $F(1,29) < 1, p > .05$ , respectively. There was no significant interaction between the two factors either,  $F(1,29) < 1, p > .05$  (See Figure 5).

*Trivia ratings.* For the second part of the experiments, mean ratings for each trivia statement were computed. Paired-samples t-test results showed no significant difference in mean ratings between statements provided by congruent ( $M = 5.07$ ) and incongruent sources ( $M = 5.20$ ),  $t(29) = 1.180, p > .05$ . Participants were no more likely to judge a statement as true if it had been provided by a source that previously made congruent statements about the two targets.

*Post-protocol questions.* Responses to post-protocol questions indicated that, similar to results in Experiments 1 and 2, there was a difference between participants' ratings of how much they knew about the

Figure 5. *Experiment 3 – Source accuracy.*





two historical figures prior to the experiment,  $t(29) = 3.051, p < .05$ . Specifically, on a scale from 1 (no knowledge at all) to 9 (a great amount of knowledge), participants indicated that they knew the positive historical figures better than the negative figures ( $M = 5.80$  and  $M = 4.00$ , respectively).

To determine to what extent participants agreed or disagreed with the implied congruence of the positive and negative statements made about the two targets, each of the 48 statements was presented again, and participants rated how likely the two targets might be to actually engage in the behavior described on a scale from 1 (not likely at all) to 9 (very likely). Results indicated that participants rated congruent behavior as significantly more likely ( $M = 6.27$ ) than incongruent behavior ( $M = 3.68$ ),  $t(29) = 8.560, p < .001$ .

Finally, the manipulation check showed that on a scale from 1 (extremely negative) to 9 (extremely positive) participants, in fact, consistently viewed the positive historical figure as positive ( $M = 8.23$ ) and the negative figure as negative ( $M = 2.23$ ). A paired-samples t-test showed a significant difference in ratings,  $t(29) = 17.697, p < .001$ .

### Discussion

Results of the post-protocol questionnaires indicated that participants evidently considered MLK/MT as positive historical figures and TB/AH as negative historical figures. Results also indicated that participants had

enough prior knowledge about the targets to have certain expectations as to what types of statements might be made. In fact, post-protocol ratings of the statements indicated that congruent statements were consistently rated as likely and incongruent statements were rated as unlikely. Therefore, participants' social expectations should have been similar to those in Experiments 1 and 2. However, expectancy-congruence had no effect on either source accuracy or trivia ratings.

These findings indicate that social expectations are necessary but not sufficient to elicit congruence effects. Removing the personal connection between the target and the source also removed the congruence effects. Thus, it is likely that congruence effects are, at least in part, driven by coalitional vigilance (Kurzban, et al., 2001). However, if participants had clear expectations as to what type of information (positive or negative) sources should provide about the targets, why did we not see any epistemic vigilance effects for the trivia ratings? Social cognition researchers have studied the processing motivations or goals of the social perceiver as he or she takes in social information (e.g., Kruglanski, 1989). These processing motivations affect the likelihood of elaboration processes. In Experiment 3, participants had no connection with the targets (in fact, targets were deceased before most participants were born), thus were likely not very motivated to encode information in an elaborative manner.

Even though participants seemed to have certain expectations about the type of information sources *should* provide, the statements described everyday situations and behaviors and participants likely had no basis to make judgments about how *accurate* these descriptions actually were. This combination of lack of motivation and lack of ability to judge the accuracy of statements made it very unlikely that epistemic vigilance would affect subsequent trivia ratings.

#### Experiment 4

Experiment 1 showed strong congruence effects. Source memory was better for incongruent sources whereas trivia ratings were lower for incongruent sources. Again, the question remains whether this is due to coalitional vigilance or simple epistemic vigilance. Results from Experiment 3 suggested that reducing target familiarity and participants' connection with the target eliminated congruence effects by eliminating coalitional vigilance. In addition, giving participants no basis for judging the accuracy of statements removed epistemic vigilance, thus removing congruence effects for trivia ratings.

Making targets completely unknown to the participants should eliminate coalitional alliances participants feel with the targets. However, as suggested by research on person memory (e.g., Alba & Hasher, 1983), choosing two unknown, yet highly stereotypical, targets might elicit deeper processing and epistemic vigilance. That is, participants might expect to hear

good things about good people and bad things about bad people. If the congruence effect is, at least in part, driven by epistemic vigilance, sources that violate participants' expectations should be judged as less credible in the future and might possibly be remembered better than congruent sources. Experiment 4 addressed these issues.

### Method

*Participants.* 30 participants (22 females, 8 males) were recruited from the Washington University subject pool and received partial course credit for their participation in the experiment. Participants ranged in age from 18 to 22 with a mean age of 19.2 years and a standard deviation of 1.24 years.

*Materials.* Materials were identical to those used in Experiment 1.

*Procedure.* At the beginning of the experiment participants were introduced to two of four fictional characters: Joe/Jenny, the "bad guy", a high school dropout, skin-head/drug addict and small-time criminal/drug dealer, and Steven/Beth, the "good guy", a social work grad student who volunteers at an orphanage. Participants read a short biography of each target. They were informed that the targets' friends and families had compiled a list of information about the two targets. Before the study phase, participants were informed that they would see statements made friends and family members about the two targets, and they should pay attention to who said what about whom.

The study and test phase were identical to those described in Experiment 1. Participants viewed statements about the two stereotypical figures and were then shown the old (and new) statements and asked to determine which source had provided the statements. Trivia statements were then presented by each of the four sources and participants were asked to rate the likelihood of the statement being true considering which source had provided it.

Post-protocol questionnaires were used to determine to what extent participants agreed or disagreed with the implied congruence of the positive and negative statements made about the two targets. That is, each of the 48 statements was presented again, and participants rated how likely the two targets might be to actually engage in the behavior described. In addition, a manipulation check assessed participants' impressions of the two targets to verify that the negative figure was, indeed, considered negative and the positive figure was considered positive.

*Design.* For the first part of the experiment, the two within-subjects independent variables were type of information (positive and negative) and target (good guy and bad guy). The dependent measures were item recognition and source accuracy. For the second part of the experiment, the within-subjects independent variable was source congruence (congruent and incongruent). The dependent measure was participants' ratings of trivia statement veridicality.

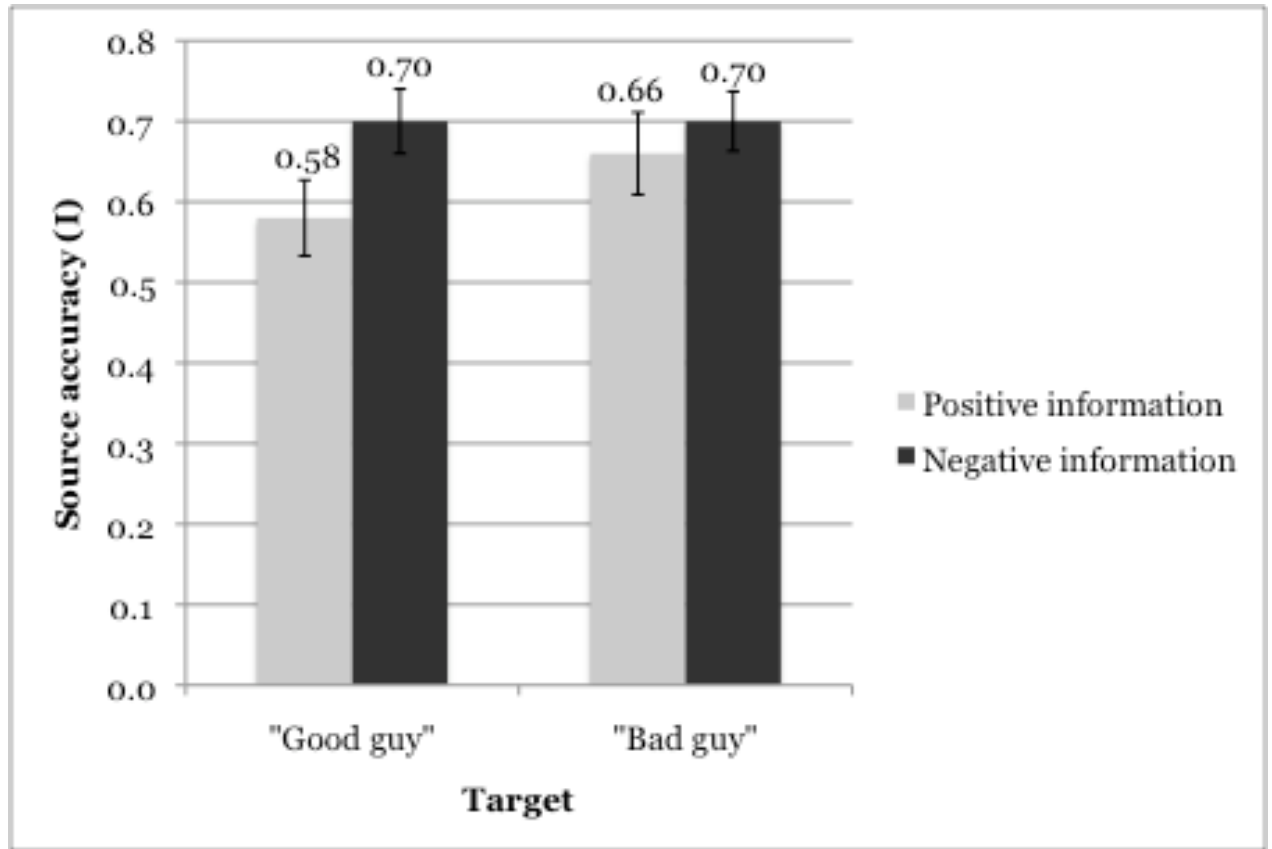
## Results

*Item recognition.* The mean old/new recognition score was .92 (89% hits, 4% false alarms,  $d' = 1.13$ ). A 2(infotype) x 2(target) repeated measures ANOVA of the  $d'$  values showed that the target (i.e., good guy vs bad guy) affected item recognition ( $F(1, 29) = 6.036, p = .020, \eta^2 = .172$ ), with better discrimination for statements about the bad guy ( $d' = 1.19$ ) than about the good guy ( $d' = 1.08$ ). However, there was no effect of type of information and no interaction ( $F(1, 29) < 1, p > .05$ , and  $F(1, 29) < 1, p > .05$ , respectively).

*Source accuracy.* Source identification for old items was on average .66, significantly above the chance level of .25 (one group t-test,  $t(29) = 11.938, p < .001$ ). A 2(infotype) x 2(target) repeated measures ANOVA showed a significant main effect for type of information,  $F(1,29) = 5.844, p = .022, \eta^2 = .168$ , with better source memory for negative information (.70) than for positive information (.62). However, there was no significant main effect of target and no significant interaction,  $F(1,29) = 1.869, p > .05$ , and  $F(1, 29) = 1.655, p > .05$ , respectively (see Figure 6).

*Trivia ratings.* For the second part of the experiments, mean ratings for each trivia statement were computed. Paired-samples t-test results showed a significant difference in mean ratings between statements provided by congruent ( $M = 5.32$ ) and incongruent sources ( $M = 4.83$ ),  $t(29) = -4.311, p < .001$ . Participants were more likely to judge a statement as true if it had

Figure 6. *Experiment 4 – Source accuracy.*



been provided by a source that previously made congruent statements about the two targets. In other words, trivia statements made by sources that said positive things about the good guy and negative things about the bad guy person were judged as more likely to provide true trivia statements.

*Post-protocol questions.* To determine to what extent participants agreed or disagreed with the implied congruence of the positive and negative statements made about the two targets, each of the 48 statements was presented again, and participants rated how likely the two targets might be to actually engage in the behavior described on a scale from 1 (not likely at all) to 9 (very likely). Results indicated that participants rated congruent behavior as significantly more likely ( $M = 6.08$ ) than incongruent behavior ( $M = 4.64$ ),  $t(29) = 4.598$ ,  $p < .001$ .

Finally, the manipulation check showed that on a scale from 1 (extremely negative) to 9 (extremely positive) participants, in fact, consistently viewed the good guy as positive ( $M = 6.37$ ) and the bad guy as negative ( $M = 4.60$ ). A paired-samples t-test showed a significant difference in ratings,  $t(29) = 3.636$ ,  $p < .01$ .

## Discussion

Unlike in any of the previous three experiments, the type of information affected source accuracy. Results showed better source memory for negative information. As discussed earlier, these findings parallel results from the person memory literature (Ito, et al., 1998; Kensinger & Corkin,



2003a; Pratto & John, 1991). Better memory for negative information also extends to source memory. Several studies that were conducted prior to developing the dissertation experiments described here, showed that in the absence of other vital information (such as a motive) the type of information was encoded by default and sources of negative information were remembered better than sources of positive information (Basten & Boyer, in preparation).

Results of the post-protocol questionnaires indicated that participants evidently considered the good guy as a positive figure and the bad guy as a negative figure. Results also indicated that post-protocol ratings of the statements indicate that congruent statements were rated as likely and incongruent statements were rated as unlikely. Therefore, participants' social expectations should have been similar to those in Experiments 1 and 2. However, expectancy-congruence had no effect on source accuracy. Again, this suggests that social expectations are necessary yet not sufficient to elicit congruence effects. Removing the personal connection participants had with the target, once again, removed the congruence effects on source accuracy.

Results did, however, show a strong congruence effect for trivia ratings, which might be attributed to epistemic vigilance. Participants had strong expectations about what *should* be said about the targets, yet had no personal connection with them and, therefore, no need to explicitly remember which source provided which statement. However, similar to

findings by Harris and colleagues, the reliability of the source seems to have been encoded and in subsequent interactions participants trusted *accurate* sources more than *inaccurate* sources (Harris & Koenig, 2004; Koenig, et al., 2004). These findings also parallel results of previous experiments, which suggested that stereotypes serve as strong schemas and act as source monitoring cues (Ehrenberg & Klauer, 2005; Mather, Johnson, & De Leonardis, 1999; Sherman & Bessenoff, 1999). Results will be addressed in more detail in the general discussion that follows the comparison of Experiments 1, 3, and 4.

#### Combining Experiments 1, 3, and 4

To gain a better understanding of the differences between the three different targets and to compare the results of Experiments 1, 3, and 4 directly, all three sets of data were combined and target (BF/LL, historical figures, stereotypical figures) was treated as a between-subjects variable. Again, to simplify analyses, 2(congruence)x3(target) mixed factorial ANOVAs were conducted for both source accuracy and trivia ratings.

#### Results

*Source accuracy.* Analyses did not show a significant main effect of congruence,  $F(1, 87) = 2.133, p > .05$ . There was, however, a significant main effect of target,  $F(2, 87) = 8.549, p < .001, \eta^2 = .164$ . Post-hoc comparisons show significantly better overall source memory when targets are stereotypical figures (.66) than when targets are historical figures (.50) or

BF/LL (.46). There was no significant difference in source memory between historical figures and BF/LL. The main effect was superseded by a significant interaction between congruence and target,  $F(1, 87) = 5.041, p = .027, \eta^2 = .055$ ).

As described earlier, paired-samples t-tests showed that for BF/LL, there was a significant difference between memory for sources of congruent and incongruent statements,  $t(29) = -3.082, p = .004$ , with better memory for sources of incongruent information (.51) than for sources of congruent information (.42). However, the same difference was not found for historical figures or stereotypical figures,  $t(29) = .113, p > .05$ , and  $t(29) = -1.287, p > .05$ , respectively (see Figure 7).

*Trivia ratings.* Results showed a significant main effect of congruence but no effect of target ( $F(1, 87) = 9.881, p = .002, \eta^2 = .102$ , and  $F(1, 87) = .996, p > .05$ , respectively). Specifically, statements made by congruent sources were rated as significantly more likely to be true than those made by incongruent sources ( $M = 5.32$  and  $M = 4.83$ , respectively). More importantly, there was a significant interaction between the two variables,  $F(1, 87) = 7.462, p = .001, \eta^2 = .146$ . As described earlier, there was a significant effect of congruence for BF/LL and stereotypical figures, but not for historical figures (see Figure 8).

Figure 7. Comparing Experiments 1, 3, and 4 – Source accuracy.

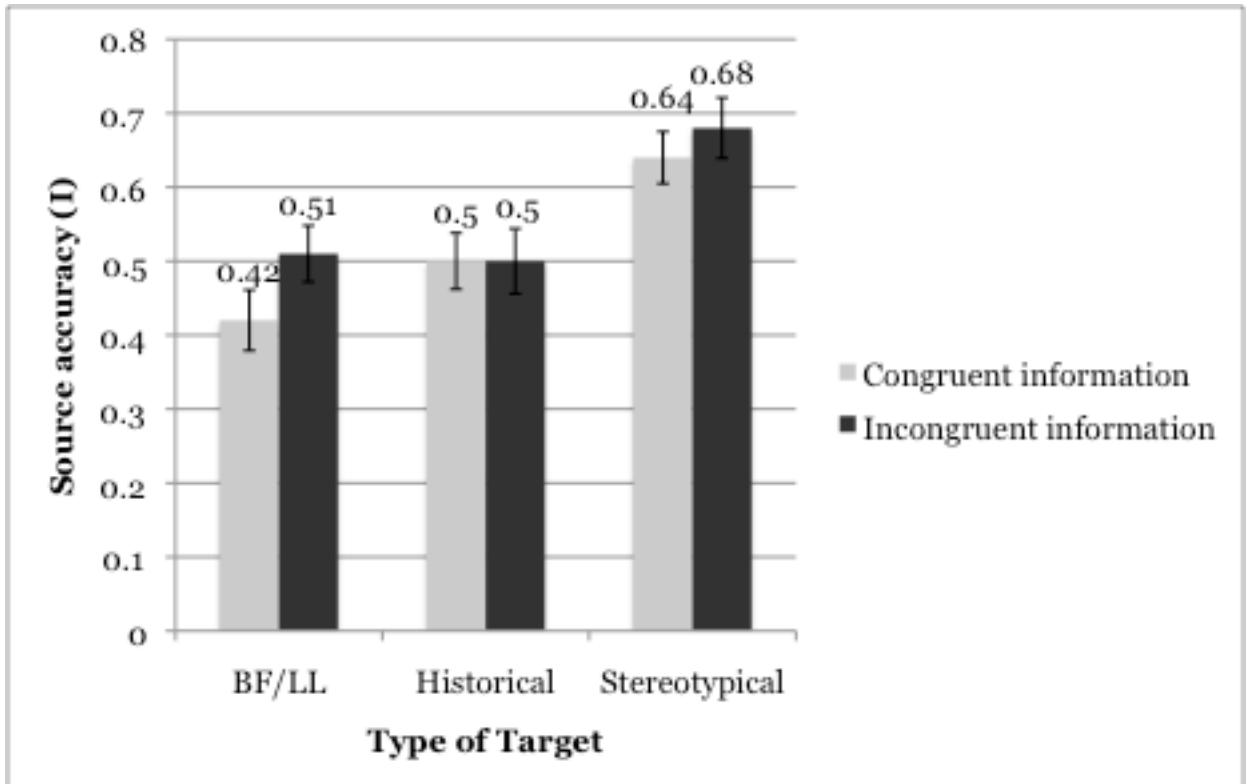
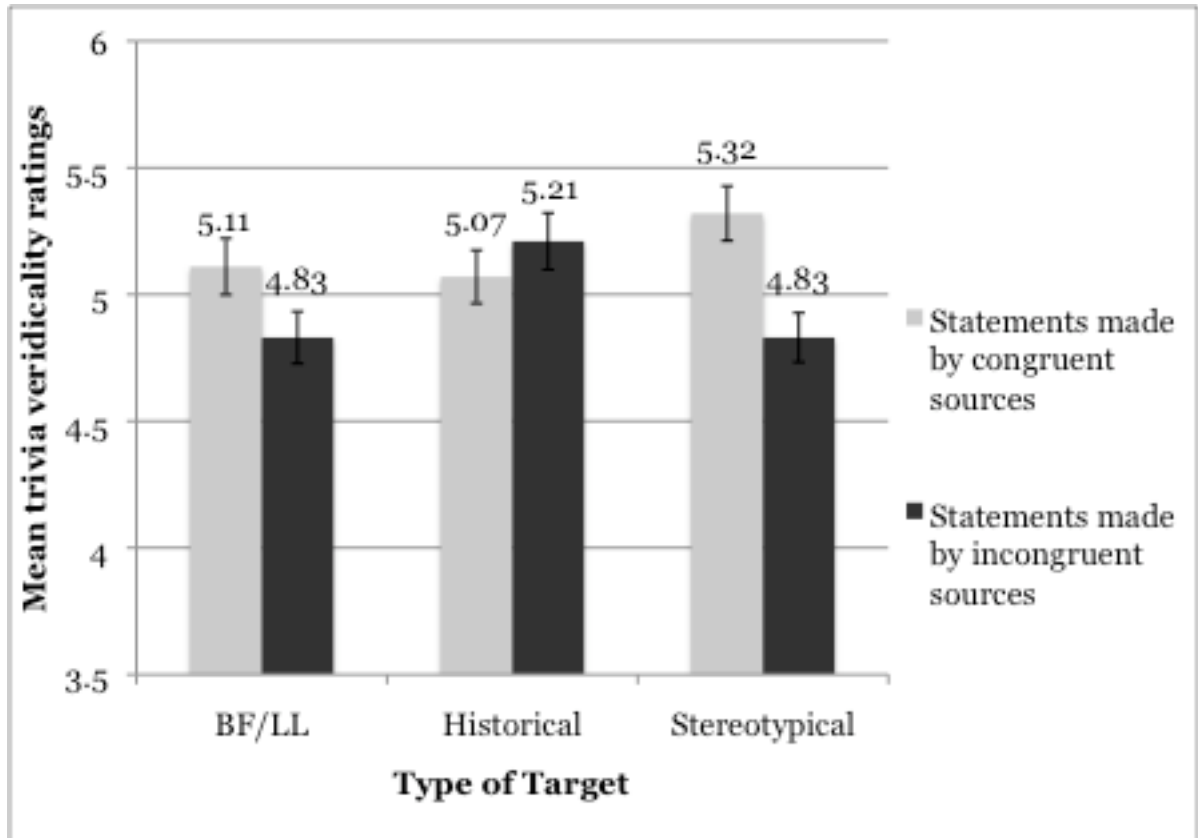


Figure 8. Comparing Experiments 1, 3, and 4 – Trivia ratings.



Findings suggest that source accuracy is not simply influenced by social expectations and congruence effects, but more importantly by the strength of the social connection between the target and the participant. Both epistemic and coalitional vigilance appear to partially drive the congruence effects for source accuracy and trivia ratings. Findings will be discussed in more detail in the general discussion.

## CHAPTER 3

### General Discussion

As discussed earlier, a review of the existing literature on source memory and, in particular, source memory in social contexts left several questions unanswered:

- 1) What, if anything, makes source memory in social contexts and, in particular, memory for source *identity* different from source memory for incidental features? Experiments 1 and 2 compared first-order sources (i.e., source *identity*) and second-order sources and addressed the effect of the strength of social contexts.
- 2) Do the same principles that govern person memory and impression formation (i.e., expectancy-congruence) apply to memory for sources in social contexts? Experiment 1 addressed the effect of expectancy congruence.
- 3) If we find similar expectancy-congruence effects in source memory in social contexts as we find in memory for social information, what are the potential mechanisms that drive these effects? Experiments 1, 3 and 4 addressed the effect of expectancy strength, epistemic vigilance, and coalitional vigilance.

A number of findings that might provide answers to the above questions emerge from the four dissertation experiments. First, all four experiments showed that memory for sources in social contexts displays

some parallels to person memory. Specifically, congruence-expectancy effects can be found in both source accuracy and trivia ratings. Second, the presence of congruence-expectancy effects seems to be affected by a) the strength of the social context (Experiments 1 and 2) and b) the strength of the connection between the participant and target (Experiments 1, 3, and 4). Third, coalitional and epistemic vigilance likely drive the observed effects. Each of these findings will be discussed in turn in the following section.

### *Source Memory in Social Contexts*

As stated previously, the majority of research on source memory ignores source memory in social contexts or memory for the identity of the source. The four dissertation experiments presented here tested source memory in social contexts and, more specifically, memory for the identity of sources. The social context was created by providing socially relevant information (i.e., valenced statements describing targets' behavior) and creating a connection between the participant and the target. Indirect tests of source memory (i.e., trivia ratings) simulated possible future interactions between participants and sources.

### *Parallels to person memory*

One way to gain insight into the processes underlying source memory is to assess whether well-established item memory effects can be extended to source memory (e.g., Jurica & Shimamura, 1999; Macklin & McDaniel, 2005). Results of the dissertation experiments suggest that information



valence and expectancy-congruence, both of which affect the processing of and memory for social information, also have an effect on source memory for social information:

*Valence effects.* Research on impression formation suggests that negative information not only receives more attention, but also affects how a person is evaluated more so than positive information (Ito, et al., 1998; Pratto & John, 1991). Experiment 4 showed better source memory for negative information than for positive information, indicating that, under certain circumstances, the valence effect extends to source memory. Pratto and John (1991) postulated an automatic vigilance hypothesis, suggesting that the perceiver's attention is automatically directed toward information that may have undesirable consequences.

As mentioned previously, several experiments conducted prior to the dissertation experiments confirmed that participants seem to process the valence of information by default. In Experiment 4, participants had no prior knowledge of the stereotypical targets. Thus, motivation to encode other aspects of the information and its sources (such as congruence) was likely low, and sources were processed according to the valence of the statements they provided. Although encoding the valence of information and its source seems to be a default mechanism, it can be replaced if participants' processing motivations and goals are changed, as could be seen in Experiment 1. When participants had strong connection with the targets

(i.e., BF and LL) the motivation to encode source congruence was high and information valence became less relevant than source congruence.

*Congruence effects.* Hastie's (1980; Hastie & Kumar, 1979) associative network (AN) model of social memory proposes that, under certain circumstances (which will be addressed in the following section), expectancy-incongruent information is processed in a more elaborative manner than expectancy-congruent information. The connections formed at encoding then serve as retrieval cues, thus making incongruent information more memorable. Experiment 1 showed better memory for sources of incongruent information than for sources of congruent information, suggesting that the congruence effect extends to memory for sources of social information.

According to the AN model, the perceiver's need to engage in incongruence-resolution processes leads to more elaborative encoding of the information (e.g., Srull & Wyer, 1989). Participants in Experiment 1 had a strong connection with the targets and specific expectations as to what sources *should* say about the targets. Thus, the need for incongruence-resolution was likely high. As mentioned above, this elaborative processing of incongruent information only occurs under certain circumstances.

The AN model and other schema models of social memory propose several moderating variables that affect the processing of information. Some potential moderators, among others, include expectancy strength (e.g., Srull

& Wyer, 1989), processing complexity (e.g., Stangor & Duan, 1991), nature of the targets (Srull, Lichtenstein, & Rothbart, 1985), and processing goals (e.g., Kruglanski, 1989). Similarly, there seem to be moderating variables that affect the processing of source identity, such as the strength of the social context and the strength of the connection between the target and the perceiver.

*Strength of social context.* Experiment 1 most closely simulated real-life social interactions. Participants had direct knowledge of and a close connection with the targets. As stated above, the need for incongruence-resolution was likely high. In addition, sources were first-order sources (i.e., actual persons), further creating parallels with real-world interactions. Experiment 1 showed a strong congruence effect on source accuracy (i.e., memory for incongruent sources was better than memory for congruent sources). In contrast, there was no congruence effect in Experiment 2. The connection between participants and targets was the same as in Experiment 1. Thus, the need for incongruence-resolution should have been equally high. However, sources were second-order sources (i.e. personnel folders), thus making the social context less immediate.

As proposed by the SMF, individuals' decisions to engage in heuristic or systematic source monitoring depends on the individual's motivation, social conditions, and purposes underlying the source monitoring behavior (Johnson, 1988; Johnson et al., 1993). When presented with a strong social

context (i.e., a person makes statements) rather than a merely implied social context (i.e., an anonymous person added information to a file folder), participants might be more motivated to engage in systematic source monitoring.

Alternatively, the difference in processing and lack of congruence effect could be accounted for by differences in processing goals. Processing goals are believed to be important as they influence the perceiver's underlying orientation toward the processing task (e.g., Kruglanski, 1989). As mentioned earlier, statements made about a particular target oftentimes give the perceiver as much information about the source as about the target. In Experiment 1, participants' processing goals were two-fold: process information about the target *and* process information about the source that might become relevant in future interactions. In Experiment 2, participants had little need to process information about the source seeing as future "interactions" with a file folder are highly unlikely. Thus, congruence (or even accuracy) processing was less crucial in Experiment 2 than in Experiment 1. Consequently, in Experiment 2 both source accuracy and trivia ratings were unaffected by source congruence.

*Strength of connection between target and participant.* A second potential moderator that emerged from the results of the four experiments was the nature of the target or the strength of the connection between the target and the participant. As before, the AN model addresses this variable

and suggests that information incongruence is less salient (and therefore less memorable) if it refers to an entire group rather than an individual (e.g., Srull et al., 1985). However, the AN model and other schema models do not address the connection between the target and the perceiver.

In Experiments 1, 3, and 4, the nature of the target was manipulated. Participants either had a strong connection with and great knowledge of the targets (Exp. 1), had no personal connection, but knew basic facts about the targets (Exp. 3) or had no personal connection but had great knowledge of the target based on strong stereotypes (Exp. 4). Results suggest that the strength of the connection between target and participant moderate the effect of expectancy-congruence on both source memory and trivia ratings. Specifically, Experiment 1 showed congruence effects on source accuracy. When removing the connection between participant and target (Exp. 3 and 4), the congruence effect disappeared.

Results of post-protocol questionnaires indicate that participants in all three experiments had strong expectations as to what sources *should* say about the targets. That is, participants in all three experiments expected to hear negative information about the negative target and positive information about the positive target. Thus, expectancies were activated in either experiment. However, removing the personal connection between the target and participant and target likely lowered participants' need for incongruence-resolution, therefore reducing the relative advantage of

incongruent information and memory for its source (e.g., Srull & Wyer, 1989). As a whole, these findings suggest that social expectations are necessary yet not sufficient to elicit congruence effects.

Results of trivia ratings provide a slightly different picture. Experiment 1 showed congruence effects on trivia ratings. Specifically, sources that previously provided congruent information were rated as more likely to provide true information than sources that previously provided incongruent information. When removing the connection between participant and target (Exp. 3), this congruence effect disappeared. However, when removing the connection, but activating strong stereotypes (Exp 4), the congruence effect on trivia ratings remained strong despite an absence of congruence effects on source memory.

As before, the lack of an effect in Experiment 3 might be explained by a) insufficient information about the two targets to make judgments about the congruence or incongruence about the statements, and b) participants' lack of motivation to encode (or resolve) incongruence. If incongruence was never encoded to begin with, it cannot be used to make judgments about the source in subsequent interactions. In contrast, the congruence effect in Experiment 4 complements results of previous experiments, which suggested that stereotypes serve as strong schemas and can act as source monitoring cues (Ehrenberg & Klauer, 2005; Mather, et al., 1999; Sherman & Bessenoff, 1999).

While stereotypical targets activated strong expectations about what *should* be said about the targets, participants had no personal connection with them and, therefore, no need to explicitly remember which source provided which statement. However, similar to findings by Harris and colleagues, the reliability of the source seems to have been encoded and in subsequent interactions participants trusted *accurate* sources more than *inaccurate* sources (Harris & Koenig, 2004; Koenig, et al., 2004).

These differences in congruence effects on source accuracy and trivia ratings might be explained by two different underlying mechanisms: epistemic and coalitional vigilance.

*Epistemic vigilance.* As mentioned previously, research suggests that individuals encode details of an episode to assess whether the actor is likely to be reliable and credible in the future (Harris & Koenig, 2004; Koenig, et al., 2004; Wilson & Sperber, 2002). When a source provides incongruent information about a familiar target, said source might be labeled as inaccurate. Inaccurate sources are processed in a more elaborative manner and thus remembered better. When later asked whether the same source provides true or false trivia statements, epistemic vigilance might cause participants to judge the source as less trustworthy.

*Coalitional vigilance.* Similarly, research suggests that individuals pay attention to which information implies friendships, alliances, hostility and other valenced social relations (Cosmides, et al., 2003; Kurzban & Neuberg,

2005; Kurzban, et al., 2001). When a source provides incongruent information about a familiar target, said source might be labeled as a threat to the participant's coalition. Threatening sources are processed in a more elaborative manner and thus remembered better. When later asked whether the same source provides true or false trivia statements, coalitional vigilance might cause participants to judge the source as less trustworthy.

A comparison of Experiments 1, and 4 might offer some insight into which of these mechanisms drives the congruence effects on source accuracy and trivia ratings. Participants in Experiment 1 had a strong personal connection to the targets. As described above, incongruent information might have been considered either inaccurate or a threat to participants' coalitions. Thus, both epistemic and coalitional vigilance might have driven the congruence effects. In contrast, participants in Experiment 4 had no personal connection to the targets, thus likely did not feel any coalition with the targets. Yet, based on stereotypical information, participants had high expectations about the kind of information that sources should provide. Thus, incongruent information was likely considered inaccurate suggesting that epistemic vigilance was, at least in part, responsible for the congruence effect on trivia statements. A lack of a significant effect on source accuracy suggests that coalitional vigilance drives this particular effect.



### *Future Directions*

Although results of the dissertation experiments offered some answers to previously unanswered questions, as is usually the case, findings also led to new questions that should be addressed in future research.

*Incidental information.* Is memory for source identity different from memory for incidental information? The experiments presented here compared memory for first- and second-order sources and found differences in source memory. Future experiments might compare memory for source identity to memory for incidental information while holding the social context constant. That is, given a strong participant-target connection and socially relevant information, will we see similar congruence effects on memory for incidental features (such as color, or location) as we have seen for memory for source identity?

Based on results of Experiment 2, one might predict that reducing the strength of the social context even more (i.e., from implied social context and second-order sources to an absence of *true* sources) will also reduce, or even eliminate, the effect of expectancy-congruence. Seeing as incidental features, such as the color or location of information, are not directly relevant in social situations, participants' motivation to encode the "source" will likely be low. Low motivation might also lead to more heuristic source monitoring, thus resulting in lower source accuracy (Johnson, 1988, 1992).

*Face versus file folder.* As mentioned earlier, one limitation of Experiment 2 might have been the type of source picture used (i.e., pictures of file folders). We cannot rule out that differences between Experiments 1 and 2 can be contributed to differences in the complexity of source pictures. There is some evidence to suggest that faces are encoded differently, and thus remembered better, than other stimuli (e.g. Curby & Gauthier, 2007). Thus, Experiment 1 might have shown better source memory for faces, rather than better source memory for first-order sources. Future research might address these issues by eliminating the use of pictures entirely. The different sources might be referred to by name. For example, “John said that Joe stole money from his employer” or “Newspaper A reported that John often volunteers at the homeless shelter”. At test, participants would be presented with the sources’ names (or titles) and asked to identify the correct source.

*Nature of target.* Further manipulation of the nature of the target might provide more insight into the mechanisms that drive the expectancy-congruence effect. The AN model suggests that incongruent information is perceived as less incongruent when it describes an entire group of targets than when it describes an individual (Srull et al., 1985). Accordingly, we might expect congruence effects on source memory to be less pronounced. If, however, coalitional vigilance drives the congruence effects on source memory, we should expect to see more pronounced expectancy-congruence

effects (Kurzban, et al., 2001). If sources that threaten an individual's coalition with one person (such as the best friend) are highly memorable, sources that threaten an individual's coalition with an entire group of people (such as the participants circle of close friends) should be even more memorable.

*Nature of source.* In all of the dissertation experiments the nature of the source was held constant. Sources were either four unknown individuals or four personnel files. As discussed earlier, in real-world interactions, sources often have a more direct connection with the target and/or the perceiver of the information. Manipulating the characteristics of the source might provide more insight into the mechanisms underlying source memory in social contexts. Previous research suggests that information linked to a motive is remembered better than information without an attached motive (Owens, et al., 1979). Studies conducted prior to the dissertation experiment suggest that these findings extend to source memory (Basten & Boyer, in preparation). Specifically, sources that have a motivation for providing particular information about a target are remembered better than sources without a motive. Future research might address participants' familiarity with the source, the credibility of the source, and the strength of the connection between the source and the target.

*Indirect tests of source memory.* The dissertation experiments described above employed an indirect test of source memory simulating

future interactions between the source and the participant. Results suggest that participants use information acquired about the source during the study phase to make decision about the trustworthiness of the source in subsequent interactions. To parse out the effects of coalitional and epistemic vigilance, future studies might employ different types of indirect tests. Specifically, making judgments about the accuracy of statements provided by sources might be primarily affected by epistemic vigilance. Future experiments might use trust games (such as the investment game described in Berg, Dickhaut, & McCabe, 1995) to test coalitional vigilance and the level of trust between participants and sources.

### *Conclusion*

The present experiments examined source memory in social contexts. Findings suggest that source memory in social contexts is governed by similar rules as memory for social information. Specifically, Experiment 1 showed that expectancy-congruence has a strong effect on source accuracy as well as indirect tests of source memory. That is, sources of incongruent information are remembered significantly better than source of congruent information. In addition, sources of congruent information are subsequently judged as more reliable and believable than sources of incongruent information.

Several variables that potentially moderate this congruence effect have been discussed. For example, results from Experiment 2 showed that

expectancy-congruence effects depend on the strength of the social context. That is, when sources are no longer actual persons, but second-order sources, such as file folders, the social context is weakened and congruence effects no longer appear. Moreover, expectancy-congruence effects depend on the strength of the connection between the target and the perceiver.

When participants only have a weak connection with the targets (Experiment 3), both coalitional and epistemic vigilance are weakened and congruence effects no longer appear. When epistemic vigilance is reactivated (Experiment 4), we find congruence effects for indirect tests of source memory.

Finally, various avenues for future research have been presented. For example, future research should address whether congruence effects can be found for memory for incidental information. In addition, manipulating the nature of the target (e.g., groups versus individuals) and the nature of the source (e.g., reliable versus unreliable) might provide more insight into the mechanism underlying source memory in social contexts.

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## Appendix A

### List of statements (Ehrenberg, et al., 2001)

#### Negative valence

XXXX lies if it gives him an advantage.

XXXX often drinks too much at parties and becomes aggressive.

XXXX can't laugh about his own mistakes.

XXXX has much higher expectations of others than of himself.

XXXX gossips about others behind their back.

XXXX enjoys embarrassing others in public.

XXXX believes everybody should share her opinions.

XXXX didn't take care of her mother when she was seriously ill.

XXXX never lends money to friends with financial problems.

XXXX yells at others instead of giving constructive criticism.

XXXX never waits his turn in line.

XXXX never tells friends or co-workers they are doing a good job.

XXXX smokes in public places even if others are bothered by it.

XXXX never gives money to the red cross or other relief efforts.

XXXX often comes across as a know-it-all.

XXXX often parks in handicapped spots when all others are taken.

XXXX often rides the bus or metro without buying a ticket.

XXXX would rather give up than ask others for help.

XXXX can't stand it if friends and family drop by unannounced.

XXXX isn't a good team-player.

XXXX refuses to participate in the recycling program.

XXXX often forgets appointments.

XXXX always interrupts others and never listens.

XXXX has a hard time keeping secrets.

#### Positive valence

XXXX is always on time.

XXXX once found a wallet with 500 dollars and returned it to the owner.

XXXX always remembers birthdays of friends and family members.

XXXX has an open ear for other people's problems.

XXXX is friendly when people ask for directions.

XXXX donates money to animal rights groups.

XXXX always gives servers a generous tip.

XXXX learned sign language when a friend went deaf after an accident.

XXXX is always able to cheer up others who are in a bad mood.

XXXX never crosses the street at a red light when children are around.

XXXX is never rude to servers or sales people.

XXXX does not give up easily, even when faced with obstacles.

XXXX is a great storyteller.



XXXX takes care of friends' pets when they go on vacation.

XXXX is patient when dealing with older adults.

XXXX gives up her seat on the bus to older people or pregnant women.

XXXX lobbied for handicapped access in public buildings.

XXXX tutors underprivileged youths.

XXXX always takes great care of things she borrowed.

XXXX always slows down in school zones.

XXXX always offers to be the designated driver.

XXXX always makes sure to be quiet when the neighbor's baby is sleeping.

XXXX always offers help if someone is having car problems.

XXXX always goes to church on Sundays.

## Appendix B

### Trivia statements

If Jell-O is hooked up to a heart monitor, it registers movements virtually identical to the brain waves of a healthy adult.

The amount of blood in a horse's body is equivalent to 1/18 of its total weight.

Soybeans bring in the most cash for Missourians as a crop.

Camels have three eyelids.

It takes forty minutes to hard boil an ostrich egg.

Matches were invented in 1827.

All of the swans in England are the property of the queen.

A kiwi bird has nostrils at the end of its beak.

Dishabiliophobia is the fear of undressing in front of someone.

It takes about two years for a pineapple to grow to its full size.

The average life span of a robin is 12 years.

A newborn kangaroo is about 1 inch in length.

In the Middle Ages, chicken soup was believed to be an aphrodisiac.

It takes, on average, 345 squirts from a cow's udder to yield one gallon of milk.

Tequila is made from the root of the blue agave cactus.

It takes about 2.5 pounds of grapes to make a bottle of wine.

Pineapples are classified as berries.

The herring is the most widely eaten fish in the world.

Camel milk does not curdle.

The first successful parachute jump to be made from a moving airplane was made in 1912.

A woodpecker can peck twenty times a second.

Dublin was originally called 'Dubh Linn' which means 'Black Pool'.

Worldwide paper consumption is projected to expand 46 percent by the year 2040.

A healthy cow gives about 200,000 glasses of milk in her lifetime.

The state animal of Missouri is the Mule.

At latitude 60 degrees south you can sail all the way around the world.

Ducks will only lay eggs in the morning.

The original Guinness Brewery in Dublin has a 9,000 year lease on its property.

Martha Washington appeared on the \$1 silver certificate in 1886 and 1891.

Windshield wipers were invented by a woman.

The first school for bakers opened in Rome in AD 100.

The white part of an egg is the albumen.

Each sheet of toilet paper in ancient China measured 2 ft by 3 ft.

Cats purr at the same frequency as an idling diesel engine.

The word 'watermelon' first appeared in the English dictionary in 1615.

The Atlantic Ocean is saltier than the Pacific Ocean.

Goldfish lose their color if kept in dim light.

The clock on Independence Hall on the back of the \$100 bill is set to 4:10.

The mouse is the most common mammal in the US.

The only rock that floats in water is pumice.

Early Hawaiians used coconut shells for toilet paper.

The adhesive used to attach gold leaf to paper or plaster is egg whites.

Scientists use ear growth rings to determine a fish's age.

Birds actually dream when they sleep.

On average, pigs live for about 15 years.

Air friction breaks up raindrops when they fall faster than 18 miles/hour.

Some baby giraffes are more than six feet tall at birth.

The bones of a pigeon weigh less than its feathers.

The first known contraceptive was crocodile dung, used by the Egyptians in 2000 B.C.

The parking meter was invented in North Dakota.

Mt. Vernon grows more tulips than the entire country of Holland.

The photocopier was invented in 1937.

A raisin dropped in a glass of fresh champagne will bounce up and down from the bottom of the glass to the top.

Kenaf is a fibrous plant used as an alternative to wood for papermaking.

In the renaissance, almonds were revered as fertility charms and blessing for

marriages.

Human fingernails grow about four times faster than toenails.

Catfish have 100,000 taste buds.

The cashew nut in its natural state contains a poisonous oil.

Corrugated cardboard is often held together with cornstarch.

The Sargasso Sea does not have a coastline.

The river Danube empties into the Black Sea.

The average bra is designed to last for only 180 days of use.

Normal body temperature for a cat is 102 degrees F.

Iceberg lettuce is the second most popular vegetable in the US.

