

The Role of Recollection and Partial Information in Source Monitoring

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Two experiments were conducted to assess the degree to which source monitoring required recollective details or could be based on vaguer partial information. Source judgments were followed by remember–know judgments during testing. On the authors' assumption that remember judgments are highly correlated with the presence of recollective details, the results showed that accurate source monitoring did not necessarily require such recollective details. Rather, the high proportion of correct source judgments that were associated with know responses suggests that source-monitoring processes can successfully use the partial information that is recorded in vaguer memories. Consequently, source monitoring can be based on recollection but can also effectively use qualitative characteristics that lack clarity and sufficient amounts of details to give rise to the subjective feeling of remembering.

Source monitoring consists of a constellation of flexible cognitive processes that are used to determine the origin of a memory. During source monitoring, qualitative characteristics of an experience are retrieved, such as perceptual details, affective information, or cognitive operations that were associated with elaboration or organization during encoding. Of course, these are just examples of characteristics, because there are many other potential pieces of diagnostic information as well. The relevant information that is retrieved is then weighed according to the decision criteria being used at that particular moment. If sufficient details can be found that are more diagnostic of one source versus another, then a judgment will be made to attribute the memory to that particular source (Johnson, Hashtroudi, & Lindsay, 1993). In this example, a sufficient amount might be determined by an internal criterion such as how vivid the retrieved information is. However, decision criteria can change depending on the mental agenda of the situation or the person making the source judgment (see, e.g., Dodson & Johnson, 1993; Johnson & Raye, 1981; Marsh & Hicks, 1998). On some occasions these decision criteria result in source judgments that are executed quickly and heuristically, whereas at other times judgments of origin are made much more deliberately, such as when plausibility checks are used or when schematic information must be consulted (Johnson, Bush, & Mitchell, 1998; Mather, Johnson, & De Leonardis, 1999). In other words, there are a variety of flexible cognitive processes by which to decide that information was experienced in one context versus another.

The present study investigated one question concerning the bases by which source judgments are made. That question is the degree to which source monitoring requires access to recollective

details. On the basis of the preceding paragraph, source judgments might appear to require recalling details associated with one source versus another (i.e., qualitative characteristics). For this reason, some researchers have argued that source monitoring requires access to recollective details (e.g., Guttentag & Carroll, 1997; Perfect, Mayes, Downes, & Van Eijk, 1996; Yonelinas, 1999). At face value this claim makes a great deal of sense because source judgments (as compared with recognition judgments) often reduce various types of memory errors (Hicks & Marsh, 1999a; Lindsay & Johnson, 1989; Marsh, Landau, & Hicks, 1997; Multhaup, 1995). By contrast, Johnson and her colleagues are much more inclusive in their description of the types of information that can be used to determine the origin of memory (e.g., Mitchell & Johnson, 2000). By this account, many features of a particular context are often bound together during learning, and the quality of the features' representations in memory is likely to vary along a continuum. When presented with a cue with an undetermined origin, that cue will also vary in how well it brings to mind various features of the memory (i.e., its *ecphoric* value varies). Therefore, because learning is imperfect with regard to specific attributes and their bindings to one another, and because test cues are imperfect with regard to their ability to foster recollection, sometimes source-monitoring processes must be based on what has been labeled in the literature as *partial knowledge* (e.g., Bink, Marsh, & Hicks, 1999; Dodson, Holland, & Shimamura, 1998; Gruppuso, Lindsay, & Kelley, 1997). This partial information is argued to vary in a nondiscrete fashion in which the amount of the available activated information could range from a vague sense of familiarity or a vague detail (e.g., visual or auditory), at the low end, to a very vivid sense of recollecting such features, at the high end.

Therefore, a debate exists over what types of information or what types of processes are able to contribute to successful source monitoring. Some believe that a recollective threshold process is usually involved, whereas others believe that partial and incomplete information can be sufficient in identifying the origin of a memory. Increased scrutiny of this issue has recently played out in investigations that are aimed at determining whether source memory receiver operating characteristics (ROCs) are linear or curvi-

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linear (Qin, Raye, Johnson, & Mitchell, 2001; Slotnick, Klein, Dodson, & Shimamura, 2000; Yonelinas, 1999). A linear ROC implies a threshold process based on all-or-none recollection, whereas a curvilinear ROC implies that decisions are based on a continuum such as familiarity or strength. Of course, some instantiations of dual-process models could argue that source judgments are based on both (Jacoby, 1991; Yonelinas, Dobbins, Szymanski, Dhaliwal, & King, 1996). In this particular study we do not enter this emerging ROC debate, and in fact, we did not collect empirical evidence that would allow us to do so. However, we did conduct experiments that we feel are able to inform these issues from a slightly different perspective. Our approach was to follow source judgments with additional remember-know judgments to gain some insight into the phenomenological experiences of remembering, that people report are associated with source monitoring.

As in many of the previous remember-know studies, we assumed that when participants claim to remember details associated with an item (i.e., a remember response) then they have retrieved clear and vivid details about the prior experience (e.g., Gardiner, 1988; Gardiner, Gawlik, & Richardson-Klavehn, 1994; Gardiner & Gregg, 1997; Gardiner & Java, 1990). By contrast, when they claim that a test item is only familiar (i.e., a know [K] response) we assumed that they were unable to retrieve vivid information about the prior experience. We assumed further that knowing constitutes only partial knowledge, or in other words that the information retrieved lacks the same clarity that can be found for other items in the test sequence. Thus, our assumptions concerned the relative amount of information available. If proponents of the source-monitoring framework are correct, then accurate source attributions can be made on the basis of vaguer details that are not strong enough to be labeled recollective in nature as would be the case when an item receives a K judgment. By this logic, items receiving a K judgment reflect source monitoring in the presence of only partial information about the studied origin. Obviously, and to reiterate, the term *partial knowledge* is only used as a relative comparison with when information in memory is judged to have recollective details.

To our knowledge, only two studies bear directly on using the remember-know paradigm to study the basis of source judgments. Perfect et al. (1996) found that participants could accurately specify various sources only when they had just given items a remember (R) as opposed to a K judgment. In other words, accurate source determination was mainly associated with Rs but not with Ks. That finding supports the notion that source monitoring requires more recollective details, as some researchers have argued. By contrast, Conway and Dewhurst (1995) measured Rs and Ks following subject-performed tasks that were watched, performed, imagined, or new. They found evidence that accurate source judgments could be based on the partial knowledge associated with K responses. That finding supports the notion that source judgments can be made on the basis of qualitative characteristics that lack sufficiently vivid details to be labeled *remembered*. Thus, the only two studies that have been conducted are somewhat at odds with one another in terms of their evidence for the role of partial information in source monitoring.

Of course, some have claimed that there are other bases on which to issue a source judgment. For example, when two sources differ in their diagnosticity (i.e., memorability) such that one can

be labeled *strong* and the other *weak*, some researchers believe that attributions to the weaker source can be made on the basis of the absence of information about the stronger source if the item simply feels familiar (e.g., Hoffman, 1997). Bink et al. (1999) argued very strongly that within the parameters of a standard source-monitoring task undifferentiated familiarity is a poor alternative to assuming that the qualitative characteristics found in memory vary in their clarity and their detail (see especially the General Discussion in Bink et al., 1999). Bink et al.'s argument was that the diagnosticity of a particular source is a function of the average amount and quality of the information retrieved. From this perspective, the information in the memory trace may indeed be weaker on average from one source versus another, but it is nevertheless associated with certain attributes of the encoding experience (e.g., vague perceptual details). Nevertheless, in Experiment 1 we purposely chose two sources that we knew would have equivalent source-monitoring performances (e.g., Hicks & Marsh, 2001; Marsh & Hicks, 1998). We hypothesized that if the average inferred-recognition hit rate was the same for both sources but participants claimed that they only "know" but do not have associated vivid recollective details for correct source judgments, then this would suggest that vaguer information can be used to monitor source.

Experiment 1

We used a combination of seen and heard items that generally yields equivalent old-new detection rates. The ability to use partial information for accurate source judgments was fundamentally at question. If source monitoring requires recollection, then most of the accurate judgments for both sources should have been given an R. By contrast, if partial information can be sufficiently diagnostic, then accurate source judgments may have accompanied items for which participants claimed they had no recollective details.

Method

Participants. Thirty-five University of Georgia undergraduates volunteered in exchange for partial credit toward a course research requirement. Each participant was tested individually in sessions that lasted approximately 30 min.

Materials and procedure. One hundred twenty medium frequency words were selected as stimuli. For each participant 40 words were randomly selected anew to be seen in the center of the computer monitor, and 40 words were selected to be heard spoken by the experimenter. The remaining 40 words served as distractors and should have been judged new in the source-monitoring test. At encoding, participants saw a brief fixation point and heard a short tone for 250 ms followed by the presentation of a word. The software was written so that items presented to the participant's computer were read silently. When presented to the experimenter's computer, the experimenter read them out loud to the participant who could not see the experimenter's monitor. All stimuli were presented at a 3-s rate. Words for the two sources were presented in a random order that was unique to each participant tested. The experiment began with written instructions explaining the procedure, which participants read from the computer monitor. Participants were informed that they should learn the words for an unspecified memory test. All of the components of the procedure were then verbally reiterated by the experimenter.

After studying the 80 items, participants read instructions for the test phase. These directions were quite detailed. Participants were instructed to press one of three keys on the keyboard to indicate whether the item was

seen, was heard, or was new. If they chose one of the two old sources, they were informed that they would have to make a binary remember-know judgment concerning whether the item had recollective details or not. The instructions used here were the standard ones that we have used consistently in our laboratory (e.g., Hicks & Marsh, 1999b). This point is nontrivial, because we did not specifically constrain the definition of recollective details to aspects of the two sources. Our logic in so doing was that (a) the binding of contextual attributes to aspects of a memory is likely to be quite general and (b) recollective details of all varieties could be used as potentially diagnostic evidence of the studied origin. All of the instructions concerning the test phase were verbally reiterated by the experimenter. For each of the 120 items tested, a brief fixation point and warning tone preceded the word. Beneath each word was the initial query, "seen, heard, or new?" If the participant chose one of the first two options, then a "remember or know?" query appeared. The intertrial interval between test items was 700 ms.

Results and Discussion

Our main hypotheses concerned correct source attributions, and we focus our attention mainly on this aspect of the data. The data are summarized in Table 1 in a manner consistent with other source-monitoring studies conducted in this laboratory (e.g., Bink et al., 1999; Marsh & Hicks, 1998). Columns of the table correspond to the true origins of items, and rows correspond to the claims of origin and the claims of the phenomenological experience associated with them. Entries of the table represent the average percentage of claims conditionalized on a particular studied origin such that columns of the table sum to 100%. The inferred-recognition hit rate was calculated as old items identified as *old* without regard to source specification. In other words, this measure is the complement to calling a studied item *new* as summarized in the final row of Table 1. As anticipated, the inferred-recognition hit rate did not differ between the heard and seen sources indicating identical levels of item detection, $t(34) < 1.0$, *ns*.

For items correctly attributed to their origin, remembering versus knowing was analyzed separately for each source. For heard items, the proportion of accurate source judgments associated with knowing was the same as that associated with remembering, $t(34) = 1.38$, *ns*. The same null difference occurred for seen items, $t(34) < 1.0$, *ns*. In other words, with this combination of two external sources, accurate source attributions appear to have been made on the basis of equivalent amounts of recollective details

versus vaguer and more undifferentiated qualities found in the memory traces. In addition, equivalent numbers of new items were erroneously attributed to the seen and heard sources with equivalent numbers of R versus K responses, both $ts(34) < 1.0$, *ns*. What these nonsignificant statistical analyses demonstrate is that recollective information does not guarantee correct source decisions, and further, that source-monitoring processes can be quite accurate in the absence of recollective details (i.e., when associated with K responses).

The small number of misclassified items associated with recollection (i.e., Rs) are probably the consequence of what Yonelinas and Jacoby (1996) have labeled *noncriterial* recollection. Noncriterial recollection refers to details that are vividly recalled but are not diagnostic to the memory test being conducted. In other words, participants probably had some recollections associated with items that might not help them in determining the source of items. For example, studying the word *dog* might have made a participant think of their own dog, but such a recollective detail might be unlikely to help participants specify the origin of a memory. Obviously, the remember-know paradigm does not allow us to measure the amount of noncriterial recollection, but misattributions to the wrong source that are labeled *R* are probably a good index of its occurrence. As can be seen in Table 1, we assume that noncriterial recollection did not play a major role in this study. Nevertheless, this issue does highlight the point that we are merely using the remember-know paradigm to gain some insight into the amount of recollection versus partial information that is used in various types of source tests.

In sum, these outcomes are consistent with the notion that source-monitoring processes can be based on recollection but the absence of such details does not prevent correct source attributions. Thus, source judgments can be made on the basis of vaguer, partial information that is nonetheless diagnostic about the studied context. In addition, this claim is consistent with the idea that Marsh and Hicks (1998) proposed concerning the fact that the absence of information can also be diagnostic to the origin of a memory.

Experiment 2

In the next experiment we attempted to demonstrate the generality of accurate source monitoring when items are labeled *known* as opposed to when they are claimed to have more vivid recollective details associated with them. In Experiment 1, the two sources were both perceptual, and therefore similar to one another. The more similar two sources are to one another, the harder it is to monitor source (e.g., Lindsay, Johnson, & Kwon, 1991). In Experiment 2, we used conditions of reality monitoring (Johnson & Raye, 1981). In reality monitoring, an internal source is paired with an external source. The external source was the same one used in Experiment 1 (i.e., seen items). The internal source was having participants solve half of the studied items as anagrams. This anagram manipulation is believed to leave detailed records of cognitive operations in memory that should be associated with more reports of recollective details as compared with the seen items. The goal was to demonstrate that high levels of accurate source monitoring on the seen items could be achieved when associated with mere knowing even in the context of a more diagnostic source.

Table 1
Average Percentage of Correct Identifications and Misattributions in the Source-Monitoring Test of Experiment 1

Claims	True item origin		
	Heard	Seen	New
Heard			
Remember	31	7	2
Know	25	7	6
Seen			
Remember	7	29	2
Know	9	27	5
New	28	30	85

Note. Columns sum to 100%.

Method

Participants. Thirty-six University of Georgia undergraduates volunteered in exchange for partial credit toward a course requirement. Each participant was tested individually in sessions that lasted approximately 25 min.

Materials and procedure. The materials and general procedure were virtually identical to those of Experiment 1 except in the following respects. The 40 items studied as anagrams had two random letters interchanged under the constraints that the two letters had to be different and nonadjacent and could not be in the first-letter position of the word. Each anagram was generated anew on-line as it was needed, and therefore an anagram of the same word was likely to be different for two participants. A caret (^) was printed under the interchanged letters, and participants were asked to mentally invert the letters to decipher the word. Participants pressed the space bar on that trial to indicate that they had solved the item and to advance to the next study trial. Our experience with this manipulation of source has shown that it takes participants on average about 3 s per word, and thus the study duration for all items in this experiment was 3 s. When items were seen, they were read silently by the participant just as in Experiment 1. The details of the test, the instructions, and so forth were otherwise identical to Experiment 1 except as it related to specifying the combination of the two particular sources used in this experiment.

Results and Discussion

The results are summarized in Table 2. As expected, item detection was greater for the anagrams than it was for the seen items as indicated by an analysis of the inferred-recognition hit rate, $t(35) = 11.69$, $p < .01$, $SE = 2.54$. Items generated from anagrams had more recollective details (Rs) when correctly attributed as compared with vaguer representations leading to K responses, $t(35) = 5.29$, $p < .01$, $SE = 5.51$. By contrast, know responses exceeded remember responses for correctly attributed seen items, $t(35) = 2.33$, $p < .01$, $SE = 4.24$. Thus, there was essentially a crossover interaction with this internal-external combination of sources that was not found in Experiment 1, in which the sources had equal diagnosticity. When the two sources used in this experiment shared visual details (i.e., both were seen), source identification for the seen items relied less on unique recollective information and more on vaguer details constituting partial information.

Misattributions of generated items to the seen source were accompanied by less recollection and more knowing, $t(35) = 3.06$, $p < .01$, $SE = 2.20$. Misattributions of seen items to being

generated was small and accompanied by equal mixtures of R and K responses, $t(35) < 1.0$, *ns*. New items erroneously believed to have been studied were attributed to the seen source rather than the generated, $t(35) = 4.64$, $p < .01$, $SE = 6.03$. In addition, less recollection accompanied these erroneous memories, $t(35) = 6.35$, $p < .01$, $SE = 3.22$.

By way of summary, accurate source monitoring on the seen items did not depend on the majority of them having associated recollective details. Rather, more often there was only vaguer information on which to base source judgments as indicated by the greater proportion of K responses. Even the accurate responses for anagram items were associated with some mixture of recollective details and the use of vaguer information. We believe that these outcomes clearly gainsay the notion that recollective details are necessary to supporting accurate source-monitoring decision processes.

General Discussion

In both experiments, classes of items that were correctly attributed to their source had some mixture of both recollective details (Rs) and vaguer qualities about which participants were unwilling to claim that they had specific recollection (Ks). To researchers who believe that source monitoring primarily involves a recollection-based process, these results should appear somewhat surprising. The fact that many correct source decisions could be made in this study in the absence of any report of recollective details suggests that source-monitoring processes can successfully use a variety of information that varies in its degree of clarity. To further refine this idea, the present results demonstrate that bits and pieces of information concerning the origin of a memory may not be sufficient for specific recollection of the original occurrence (or any related aspect of it). However, what partial information is retrieved can be used to place successfully the item within one context versus another.

The idea that memories can vary in the amount (or quantity) of various attributes is an older, established notion. Johnson and Raye (1981) were the first to discuss the idea that memories were likely to vary considerably in the quantity and quality of characteristics that could be retrieved. For this reason they argued that decision criteria had to be established and that these criteria could be conceptualized in several different ways. For a particular combination of sources, a criterion could be established along a single dimension ranging from, for example, cognitive operations at one end of the continuum to perceptual details at the other. Such a single dimension would appropriately describe the reality-monitoring conditions tested in Experiment 2. If a memory trace contained relatively more perceptual details than remnants of cognitive operations, then it would be attributed to the external source. By contrast, Johnson and Raye also argued that two decision criteria could be established along the two dimensions tested in a particular experiment. In the present example, one would be used for the internal source and another one for the external source. In this approach, a criterion could be placed along each continuum to make decisions about each potential source individually, and then the dimension with the strongest evidence would be chosen (presumably as a function of being most distant from the relevant individual criterion). Therefore, the idea that memories contain imperfect and variable amounts of detail that necessarily have to

Table 2
Average Percentage of Correct Identifications and Misattributions in the Source-Monitoring Test of Experiment 2

Claims	True item origin		
	Generated	Seen	New
Generated			
Remember	48	3	1
Know	19	4	3
Seen			
Remember	7	21	3
Know	14	30	13
New	12	42	80

Note. Columns sum to 100%.

be used by source-monitoring processes has been around for quite some time.

There is some irony in the fact that when signal-detection models gave way to two-process theories of memory many researchers may have forgotten that the older tenets of the source-monitoring framework were based, in part, on signal-detection theory (Johnson & Raye, 1981). Accordingly, even in its earlier incarnations source-monitoring decision processes allowed for, at least in a conceptual sense, decisions based on partial information. Part of the confusion and the emergence of the erroneous belief that source processes had to be largely recollective (or required recollective details) could be a consequence of the development of Jacoby's process-dissociation framework, which somewhat dominated the theories proposed in the 1990s (e.g., Jacoby, 1991). That procedure places a premium on the logic of opposition in which recollection can be used to oppose the influences of familiarity. As described in many articles over the years, recollection of list or class membership can be used to oppose errors based on familiarity. Of course, there is a strong resemblance between performance in an exclusion condition and performance on a source-monitoring test. However, it is not clear to us that the cognitive processes used in an exclusion condition map directly onto the cognitive processes used in a standard source-monitoring situation (e.g., Dodson & Johnson, 1996). Nevertheless the present results strongly suggest that source attributions, perhaps even in the context of the process-dissociation procedure, do not necessarily require recollective details and can successfully function when only partial information is retrieved.

The results of the present study also suggest that the characterization of Ks in the remember-know literature may need to be refined further. Currently, K responses are believed to reflect undifferentiated familiarity (e.g., Rajaram, 1993; Wagner, Gabrieli, & Verfaellie, 1997). If this were true, then source decisions must be able to be made on the basis of undifferentiated information. As Johnson et al. (1993) have described, source monitoring requires more differentiated input than a recognition decision. The present results, along with those of Conway and Dewhurst (1995), suggest that K responses can reflect retrieval of partial contextual details that might not be vivid or clear enough to support recollection but do contain enough clarity to be useful to source monitoring. Although we have before characterized K responses as undifferentiated familiarity (Hicks & Marsh, 1999b), that claim was made prior to understanding the implications of the present results. The memorial details that are retrieved when a K response is given may be vague, may be incomplete, or may be small in a quantitative sense, but these details are probably neither undifferentiated nor lacking sufficient quality to be diagnostic of the context in which the memory occurred. As reports such as this one begin to appear that use the remember-know procedure to test different aspects of memory than have traditionally been used in the paradigm, we will gain a better understanding of the bases on which K responses are made.

In a related vein, we admitted at the outset that we were only using the remember-know paradigm as an approximate estimate of the degree to which different classes of items could give rise to recollection versus not. We are not implying that every R response that was issued was indeed associated with criterial recollection of source-specifying information. Moreover, we are not saying that the remember-know procedure yields estimates of remembering

and knowing that would directly map onto values of, for example, the process-dissociation procedure or other metrics of recollection versus familiarity (e.g., Yonelinas & Jacoby, 1995). On the contrary, we believe that the remember-know procedure is another, albeit different, paradigm with which to sort specific items into broad groupings that on average may or may not have associated recollective details. Although this lack of specificity may make some uneasy, even a quick glance at Tables 1 and 2 should indicate that many correct source attributions were made for items that participants claimed had no recollective details. The fact that more misattributions were made for items given a K response only reinforces our major point, namely that items given a K have vaguer representations in memory and are comprised of only partial details of qualitative characteristics. Although these details are more likely to result in errors in source monitoring, the partial information can be strong enough and diagnostic enough to support accurate source decisions in the absence of being able to recollect details with any clarity.

Extrapolating our study to real-world source monitoring, the use of recollection versus partial knowledge will depend on the pool of candidate sources, the mental agenda of the decision maker, the degree to which attributes are bound together during learning, and the effectiveness of the cue to evoke in an ephoric sense the attributes that are diagnostic to the origin of the memory. Therefore, the present results suggest that all of these factors are prime candidates for determining the mixture of details that support accurate source memory. As such, they are good avenues to pursue for those interested in identifying the memorial bases of source monitoring. That said, source monitoring is likely to always be based on some combination of recollective information and vaguer details that lack perfect clarity because very few memory tasks are process pure.

References

- Bink, M. L., Marsh, R. L., & Hicks, J. L. (1999). An alternative conceptualization to memory "strength" in reality monitoring. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *25*, 804–809.
- Conway, M. A., & Dewhurst, S. A. (1995). Remembering, familiarity, and source monitoring. *Quarterly Journal of Experimental Psychology: Human Experimental Psychology*, *48*, 125–140.
- Dodson, C. S., Holland, P. W., & Shimamura, A. P. (1998). On the recollection of specific- and partial-source information. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *24*, 1121–1136.
- Dodson, C. S., & Johnson, M. K. (1993). Rate of false attributions depends on how questions are asked. *American Journal of Psychology*, *106*, 541–557.
- Dodson, C. S., & Johnson, M. K. (1996). Some problems with the process dissociation approach to memory. *Journal of Experimental Psychology: General*, *125*, 181–194.
- Gardiner, J. M. (1998). Functional aspects of recollective experience in recognition memory. *Memory & Cognition*, *16*, 309–313.
- Gardiner, J. M., Gawlik, B., & Richardson-Klavehn, A. (1994). Maintenance rehearsal affects knowing, not remembering; elaborative rehearsal affects remembering, not knowing. *Psychonomic Bulletin & Review*, *1*, 107–110.
- Gardiner, J. M., & Gregg, V. H. (1997). Recognition memory with little or no remembering: Implications for a detection model. *Psychonomic Bulletin & Review*, *4*, 474–479.

- Gardiner, J. M., & Java, R. I. (1990). Recollective experience in word and nonword recognition. *Memory & Cognition*, *18*, 23–30.
- Gruppuso, V., Lindsay, D. S., & Kelley, C. M. (1997). The process-dissociation procedure and similarity: Defining and estimating recollection and familiarity in recognition memory. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *23*, 259–278.
- Guttentag, R. E., & Carroll, D. (1997). Recollection-based recognition: Word frequency effects. *Journal of Memory and Language*, *37*, 502–516.
- Hicks, J. L., & Marsh, R. L. (1999a). Attempts to reduce the incidence of false recall with source monitoring. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *25*, 1195–1209.
- Hicks, J. L., & Marsh, R. L. (1999b). Remember-know judgments can depend on how the question is asked. *Psychonomic Bulletin & Review*, *6*, 117–122.
- Hicks, J. L., & Marsh, R. L. (2001). False recognition occurs more frequently during source identification than during old-new recognition. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *27*, 375–383.
- Hoffman, H. G. (1997). Role of memory strength in reality monitoring decisions: Evidence from source attribution biases. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *23*, 371–383.
- Jacoby, L. L. (1991). A process dissociation framework: Separating automatic from intentional uses of memory. *Journal of Memory and Language*, *30*, 513–541.
- Johnson, M. K., Bush, J. G., & Mitchell, K. J. (1998). Interpersonal reality monitoring: Judging the sources of other people's memory. *Social Cognition*, *16*, 199–224.
- Johnson, M. K., Hashtroudi, S., & Lindsay, D. S. (1993). Source monitoring. *Psychological Bulletin*, *114*, 3–28.
- Johnson, M. K., & Raye, C. L. (1981). Reality monitoring. *Psychological Review*, *88*, 67–85.
- Lindsay, D. S., & Johnson, M. K. (1989). The eyewitness suggestibility effect and memory for source. *Memory & Cognition*, *17*, 349–358.
- Lindsay, D. S., Johnson, M. K., & Kwon, P. (1991). Developmental changes in source monitoring. *Journal of Experimental Child Psychology*, *52*, 297–318.
- Marsh, R. L., & Hicks, J. L. (1998). Test formats change source-monitoring decision processes. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *24*, 1137–1151.
- Marsh, R. L., Landau, J. D., & Hicks, J. L. (1997). The contribution of inadequate source monitoring during idea generation to unconscious plagiarism. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *23*, 886–897.
- Mather, M., Johnson, M. K., & De Leonardis, D. M. (1999). Stereotype reliance in source monitoring: Age differences and neuropsychological test correlates. *Cognitive Neuropsychology*, *16*, 437–458.
- Mitchell, K. J., & Johnson, M. K. (2000). Source monitoring: Attributing mental experiences. In E. Tulving and F. I. M. Craik (Eds.), *Oxford handbook of memory* (pp. 179–195). New York: Oxford University Press.
- Multhaup, K. S. (1995). Aging, source, and decision criteria: When false fame errors do and do not occur. *Psychology and Aging*, *10*, 492–497.
- Perfect, T. J., Mayes, A. R., Downes, J. J., & Van Eijk, R. (1996). Does context discriminate recollection from familiarity in recognition memory? *Quarterly Journal of Experimental Psychology: Human Experimental Psychology*, *49*, 797–813.
- Qin, J., Raye, C. L., Johnson, M. K., & Mitchell, K. J. (2001). Source ROCs are (typically) curvilinear: Comment on Yonelinas (1999). *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *27*, 1110–1115.
- Rajaram, S. (1993). Remembering and knowing: Two means of access to the personal past. *Memory & Cognition*, *21*, 89–102.
- Slotnick, S. D., Klein, S. A., Dodson, C. S., & Shimamura, A. P. (2000). An analysis of signal detection and threshold models of source memory. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *26*, 1499–1517.
- Wagner, A. D., Gabrieli, J. D. E., & Verfaellie, M. (1997). Dissociations between familiarity processes in explicit recognition and implicit perceptual memory. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *23*, 305–323.
- Yonelinas, A. (1999). The contribution of recollection and familiarity to recognition and source-memory judgments: A formal dual-process model and an ROC analysis. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *25*, 1415–1434.
- Yonelinas, A. P., Dobbins, I., Szymanski, M. D., Dhaliwal, H. S., & King, L. (1996). Signal-detection, threshold, and dual-process models of recognition memory: ROCs and conscious recollection. *Consciousness and Cognition*, *5*, 418–441.
- Yonelinas, A. P., & Jacoby, L. L. (1995). The relation between remembering and knowing as bases for recognition: Effects of size congruency. *Journal of Memory and Language*, *34*, 622–643.
- Yonelinas, A. P., & Jacoby, L. L. (1996). Noncriterial recollection: Familiarity as automatic, irrelevant recollection. *Consciousness and Cognition*, *5*, 131–141.

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