CHAPTER 6

Children's Source Monitoring

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'Source monitoring' (SM) refers to hypothetical cognitive processes by which information from memory is attributed to particular origins or sources in our past experience. Just as each autobiographical episode is uniquely defined by the intersection of numerous dimensions (e.g. time, place, sensory modality, agent, etc.), so too the source of any given autobiographical memory is specified by the intersection of such dimensions. You may, for example, remember a prior encounter with the sentence, 'I'll get you, my pretty—and your little dog, too!' If so, was your prior experience of that sentence a fantasy or did you have a sensory encounter with it? If the latter, did you read the sentence or hear it spoken? If heard, who was the speaker and when and where did you hear the sentence? Answers to such questions converge to define a particular episode in your personal past (i.e. watching *The Wizard of Oz* at a particular place and time).

Identifying the sources of memories is an essential cognitive ability. For one thing, the meaning of a memory is closely bound up with its source (e.g. the import of a past utterance may vary dramatically depending on who said it, when and where, etc.). Furthermore, when reporting on past experiences (e.g. when testifying) it is often important to differentiate between memories of witnessing an event versus memories of imagining, inferring, or hearing about that event. Moreover, without the ability to identify the origins of memories, one would be bereft of autobiographical memory itself, because it is the quality of having a particular source in the personal past that makes a memory autobiographical.

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This chapter provides an overview of the SM framework, followed by a review of basic research and theory on age-related changes in children's memory for source. I then describe studies in which children's SM has been examined in contexts relevant to eyewitness testimony.

THE SOURCE-MONITORING FRAMEWORK

The SM framework is grounded in Johnson's Multiple-entry Modular (MEM) model of memory (e.g. Johnson, 1983). In MEM, memory is described as a by-product of the cognitive processes that gave rise to and constituted past experiences. Rather than being separate from other cognitive processes (e.g. those involved in perceiving, thinking, feeling, etc.), memory consists of changes in those systems as a consequence of their functioning (as in connectionist models). One implication of this view is that only processes that are abstract and proposition-like (e.g. explicitly naming objects or people, consciously reflecting on relationships between events, etc.) leave memory records of an abstract, proposition-like form. Information that is tacit and implicit in ongoing experience is tacit and implicit in memory. Thus, memories rarely include abstract designations of their sources (e.g. there is no tag or label indicating 'This statement was made by the Wicked Witch of the West'), but they usually do include many clues to source.

According to the SM account, identifying objects, people, places, time, etc. when recalling a past experience is analogous in some ways to identifying such dimensions in ongoing perception. When a friend calls you on the phone, for example, you may recognize his or her voice immediately, because knowledge about your friend is evoked in the process of perceiving the auditory input in a particular context. Likewise, you may remember an utterance as having been spoken by a particular person because the activated memory records include sensory details and/or semantic content that leads you to recognize that person as the speaker. If you do not access sufficiently detailed, source-specifying memory records, you may be unable to identify the speaker of the remembered utterance (just as you may fail to recognize your friend's voice on the phone if the connection is of poor quality).

Johnson's MEM model distinguishes between cognitive processes that are largely perceptual (data driven) versus those that are more reflective (conceptual). Perceptual and reflective processes typically interact, but they operate in parallel and are independent in that processes can occur in one subsystem without reference to the other. A key assumption of the SM framework is that a test situation may cue

memory records of some aspects of a past experience without cueing others (Chalfonte & Johnson, 1996). Your currently accessible memories of watching *The Wizard of Oz*, for example, may include information about the content of the witch's utterance and the sound of her voice but lack details regarding her appearance; if tested in a different context, you might recall other aspects of this episode. Test conditions also affect the stringency and appropriateness of the attribution-making processes performed when memory records are activated (e.g. SM is likely to be more conservative and systematic when testifying in court than when entertaining at a party).

According to the SM framework, most source attributions are performed rapidly and without awareness of decision making. Just as we usually recognize a friend's voice on the telephone without being conscious of any inferential process, so too we usually recognize memories of the friend's utterances as such without awareness of SM processes. Sometimes, however, these rapid, non-reflective SM processes fail to identify one or more dimensions of source. When this occurs, we have the subjective experience of recollecting some aspects of an event without fully remembering its source (e.g. we might remember a joke but not remember who told it). Often, we do not care about fully specifying the source of a recollection—in many situations it may be sufficient simply to remember the joke (provided we aren't about to tell it to the person from whom we learned it; Allen & Jacoby, 1990). When we do care about the source of a recollection and automatic SM processes fail to specify it, the source can sometimes be identified via strategic searches of memory or by reflective reasoning processes. Of course, people sometimes fail to remember aspects of the source of a memory despite arduous effort. Indeed, as Neisser (1982) pointed out, inability to remember the source of an otherwise clear recollection (as when we recall reading a particular fact but cannot remember where) is among the most common of everyday memory failures. Finally, and of central interest here, individuals sometimes misidentify the source of a recollection, attributing memory information that really came only from one source to another or to both. Such misattributions sometimes reflect errors in rapid, automatic SM processes and other times arise via more consciously mediated inferences.

Much of the empirical support for the SM framework comes from studies in which people were exposed to information from two sources and were later asked to identify the source (e.g. source *A*, source *B*, or new) of particular pieces of information (see Johnson, Hashtroudi, & Lindsay, 1993 and Johnson & Raye, 2000, for reviews). Such studies have shown that source errors are typically more frequent when potential memory sources are similar to one another in terms of their

perceptual properties, semantic content, or cognitive operations (orienting tasks); for example, participants are more likely to misremember which of two people made a particular statement if the two people were similar looking or if they had both talked about the same topic (Lindsay, Johnson, & Kwon, 1991). SM also improves with the amount of time given to respond to test probes (Johnson, Kounios, & Reeder, 1994) and with full as opposed to divided attention at study (Jacoby & Kelley, 1992), and at test (Jacoby, 1991).

Biases in SM further support the hypothesis that recollections are attributed to sources via decision-making processes. For example, in a study in which participants were to discriminate between memories of their own actions and memories of a confederate's actions, participants more often misidentified distractor (new) items as actions the confederate had performed than as actions they themselves had performed (the 'it had to be you' effect) (Johnson, Raye, Foley, & Foley, 1981). Presumably, the pre-experimental familiarity of a distractor action (along with its compatibility with the sorts of actions performed and imagined in the acquisition phase of the study) sometimes led participants to mistake it as an action from the acquisition phase of the experiment, and the paucity of accessible memory information (occasioned by the fact that the action had not really occurred) led them to identify it as something they had merely seen another person do rather than as something they had done themselves. Similarly, when discriminating between memories of imagined versus actual events, participants tend to identify falsely recognized distractor items as imagined rather than as actual (the 'I must have imagined it' effect) (Bink, Marsh, & Hicks, 1999; Hoffman, 1997; Johnson & Raye, 1981).

BASIC RESEARCH ON CHILDREN'S SOURCE MEMORY

The relationship between age and SM is complex. Children as young as five years of age perform as well as adults at identifying the sources of their recollections in some situations, yet children as old as nine years perform more poorly than adults in others; for example, Foley and Johnson (1985; Foley, Johnson, & Raye, 1983) found that young children performed as well as adults when asked to remember which of two other people had done particular things, but were more likely than adults to make errors when asked to remember which things they had actually done versus which they had merely imagined themselves doing.

Findings such as these led Foley, Santini, and Sopasakis (1989) to

propose that young children have special difficulty discriminating between memories of actual and imagined self-generated acts ('Realization Judgments'). Broadening this hypothesis, Lindsay *et al.* (1991) argued that young children may be more likely than adults to confuse memories from different sources when those sources give rise to memories that are highly similar to one another. Lindsay *et al.* (1991) found that the size (and in some experiments the existence) of age differences in SM interacted with source similarity; for example, in one experiment adults and eight-year-old children performed comparably and well when differentiating between memories of actual and imagined events when the actor of the imagined events differed from the actor of the actual events (act-self/imagine-other), whereas children were more likely than adults to mistake memories of actions they had merely imagined as memories of actual actions if the same actor was involved in both (act-other/imagine-other). Presumably, the fact that the same person was involved in the actual and imagined actions made memories of the two types of events relatively similar and hence confusable (but see Foley & Ratner, 1998a). Similarly, Markham, Howie, and Hlavacek (1999) found that six-year-olds performed more poorly than nine- to ten-year-olds on an auditory source-memory task that required them to differentiate between memories of words they had heard versus imagined hearing, but the two age groups performed comparably on an analogous (but easier) visual source-memory task.

Age-related changes in SM biases have also been reported. In a study by Foley *et al.* (1983), for example, six- and nine-year-old children and adults said some words and listened to the experimenter say other words; when tested, the nine-year-olds and adults showed the 'it had to be you' bias on falsely recognized items, but the six-year-old children did not. For participants in another condition, who had said some words and imagined themselves saying others, adults showed the 'I must have imagined it' bias, but neither nine- nor six-year-old children displayed this bias. Even quite young children do, however, sometimes show SM biases; for example, the six- year-old children in Foley and Ratner's (1998a) study more often mistook memories of imagined actions as memories of actual actions than vice versa, especially if instructed to imagine themselves going through the motions of performing the action, as opposed to imagining seeing themselves perform the action. Foley and Ratner (1998b) also found that young children show an 'I did it' bias when asked to remember whether they or an adult co-participant had made particular contributions to a collaborative project. The authors attributed this bias to children's tendency spontaneously to imagine themselves performing the actions they see the adult perform during the collaborative project.

A number of factors may contribute to the pattern of developmental change and invariance in SM. It may be that children's ongoing experience (and hence their memory records) differs from adults' in ways that affect some source discriminations but not others; for example, children may be better than adults at imagining themselves performing actions, such that their memories of imagined and actual self-performed actions are more similar. It may also be that the kinds of memory records that quickly and easily come to mind at test differ for children and adults, such that adults are more likely to gain access to particular kinds of source-specifying information that are especially useful in certain situations. Finally, age-related changes in SM may be due to deficiencies in children's use of retrieval strategies and reasoning processes when automatic SM processes fail to specify source; that is, when adults feel uncertain about the source of a memory they may search strategically for additional source-specifying memory information or use reflective reasoning to infer source, whereas children may fail to perform such operations or perform them less efficaciously (cf. Ackerman, 1985). Developmental differences in strategic retrieval and conscious decision-making processes could contribute to age × condition interactions because the more difficult the discrimination the more performance would require such strategies. Schacter, Kagan, & Leichtman (1995) argued that three- and four-year-olds' poor source memory may be due to immature development of the frontal lobes (which play important roles in executive control of intentional retrieval and memory judgments). In related work guided by Fuzzy Trace Theory, Brainerd and Reyna and their co-workers reported that children's memory judgments tend to be highly influenced by the extent to which the meaning of test items (especially distractors) is consistent with the gist of studied items (as opposed to relying on 'verbatim' memories of perceptual details) (Brainerd & Reyna, 1995).

According to the SM framework, memory for source is not a single skill that a child acquires at a particular age. Rather, SM involves inferences about a number of different aspects of event memories (remembering who, remembering where, remembering how, remembering when, etc.), and depends upon a number of kinds of mental activities (perceptual analysis and reflective integration during encoding, retrieval of memory records, and decision-making processes at test). Thus developmental changes in SM are gradual and situation specific rather than sudden and general. These considerations also suggest that SM development will relate to individual differences along a number of dimensions (Lorsbach & Ewing, 1995; Quas, Qin, Schaaf, & Goodman, 1997; Welch-Ross, Diecidue, & Miller, 1997).

CHILDREN'S SOURCE MEMORY IN FORENSIC RESEARCH

When individuals are asked about a past event, they sometimes include in their reports material from post-event suggestions. Such errors are more likely when witnesses are asked direct questions, but suggested information also sometimes intrudes into free-recall reports. Research indicates that some false reports reflect genuine source memory confusions, in which the witness has the subjective experience of remembering witnessing something that was actually merely suggested (with or without also accurately recollecting receiving the suggestion itself; see Higham, 1998 and Lindsay, Gonzales, & Eso, 1995). In contrast, some reports of suggestions occur because witnesses knowingly rely on memories from extra-event sources when responding to questions about an event (e.g. 'I don't remember the man wearing a hat, but I do remember that the experimenter said he did, so I'll go along with that'). False reports based on extra-event information may be confidently held (i.e. even though the person does not have an illusion of remembering witnessing the suggested event, he or she may be very confident that it occurred, due to the authority of the source of the suggestion), and such false reports may later give rise to genuine source confusions (i.e. although the witness initially was aware that the report was based solely on extra-event information, he or she may later come to 'remember' witnessing the suggested event; Bjorklund, Bjorklund, Brown, & Cassel, 1998; see also Ackil & Zaragoza, 1998). The important point is that reports of suggestions are sometimes based on aware use of extra-event information and other times reflect genuine source confusions.

Many studies have investigated age-related changes in eyewitness suggestibility (see reviews by Ceci & Bruck, 1995; Poole & Lamb, 1998; Poole & Lindsay, 1995). This research reveals that the relationship between age and suggestibility is complex. One source of this complexity is variation across experiments (and across real-life situations) in the extent to which the testing situation leads participants to assume that extra-event information is a valid source of answers. When conditions encourage participants to construe extra-event information as a valid source of answers, adult participants (who attended to suggestions in ways that promote subsequent remembering and who search memory at test in efficacious ways) may be more likely than younger participants to report suggestions (Brainerd & Poole, 1997).

This point is illustrated in a study conducted in my lab with Valerie Gonzales and Karen Eso (1995). One or three days after exposure to an illustrated story, pre-school and grade 3 children and adults listened to a narrative summary of the story that included two suggestions

Table 6.1. Mean proportion suggested details (on misinformed items) and incorrect guesses (on control items) reported in free recall.

	Pre-schoolers		Third-graders		Adults	
Condition	Misled	Control	Misled	Control	Misled	Control
High recency						
Standard	0.29	0.03	0.38	0.02	0.63	0.01
Exclusion	0.29	0.01	0.17	0.04	0.21	0.03
Low recency						
Standard	0.26	0.01	0.21	0.01	0.13	0.03
Exclusion	0.18	0.04	0.17	0.02	0.19	0.00

contradicting details in the story and two generic references to details in the story. Participants were tested by a new interviewer three days after exposure to the story (i.e. either 2 days or immediately after the misinformation) under one of two conditions. In the standard condition, participants were simply asked to 'Tell me everything you can about the Loren story that you heard that day when you saw the pictures and heard the story.' In the 'exclusion' condition, participants were informed that they had been exposed to misleading suggestions and were emphatically instructed not to base *any* of their responses on the post-event information (Jacoby, Woloshyn, & Kelley, 1989; Lindsay, 1990). Reliable misinformation effects were obtained in all conditions, but the point for present purposes is that there was a four-way interaction between age, recency of post-event information, test instructions, and target versus control items.

As shown in Table 6.1, under the standard-test instructions, suggestions were more often falsely reported when they were recent than when they had been presented two days previously, and it was the adults who most often reported recent suggestions. The exclusion instructions reduced adults' and third-graders' rates of reporting recently suggested details, but pre-schoolers did not benefit from the exclusion instructions at all. Another aspect of the interaction is that in the low-recency condition the misinformation effect was not moderated by age or test instructions, indicating that in all age groups erroneous reports of suggested details in the low recency condition were due to genuine SM confusions.

It is likely that a number of factors affect aware and unaware uses of extra-event information in the eyewitness misinformation paradigm and in real-world eyewitness situations, including:

(a) memorability of the content of the event details and of the suggestions;
(b) plausibility of the suggestions;
(c) extent to which test conditions encourage versus discourage reliance on the extra-event information as a source of answers;
(d) memorability and usefulness of source-specifying information in memories of the event details and of the suggestions; and
(e) ability to use source-specifying memory information in conjunction with automatic and consciously controlled decision-making processes to identify the sources of memories.

Inconsistent results across studies of developmental changes in suggestibility may partly be due to differences along these parameters. In the standard-test instruction conditions of the experiment described above, recently suggested details were more often reported in free recall by adults than by pre-schoolers. This may be ascribed to three factors:

(a) event details were not very memorable, because they were peripheral details in materials presented three days before the test, so the inaccuracy of the suggestions was unlikely to be detected and the event details were unlikely to pop to mind at test;
(b) the standard instructions did not discourage subjects from using the post-event information; and
(c) adults likely had better recall of the post-event suggestions than did pre-schoolers because adults are more skilled at encoding and retrieving verbal information (cf. Brainerd & Poole, 1997).

In the exclusion conditions, reports of suggestions did not reliably differ with age, perhaps because preschoolers' poorer SM was offset by their poorer memory for the content of the suggestions (cf. Coxon & Valentine, 1997).

Poole and Lindsay used source-memory tests to assess children's suggestibility in several studies using their Mr Science/parental misinformation paradigm. In this paradigm, children interact individually with an unfamiliar man named Mr Science who shows them four 'science demonstrations' (e.g. using two funnels and a rubber tube to make a telephone). Approximately three months later, parents read aloud to their children a story titled 'A Visit to Mr Science'. The story describes two demonstrations that the child had experienced and two demonstrations the child had not experienced, as well as an instance of ambiguous touching that had not actually occurred (e.g. that Mr Science had wiped the child's face with a wet-wipe that got close to the child's

mouth and tasted yucky). Each child is then interviewed by a new interviewer.

Poole and Lindsay (1995) reported an initial study using the Mr Science/parental misinformation paradigm with 17 three- to four-year-old children. The most dramatic result was that even in the free-report phase of the final interview a substantial percentage of the children falsely reported events they had merely heard about in the story (e.g. 41% reported at least one suggested event during the free-report phase of the interview). Leading questions increased false reports, with 94% of the children falsely responding 'yes' to direct questions about one or more suggested event. A source-memory test—in which children were reminded of the story, explicitly told that some events in the story might not have happened to them, and asked to indicate whether they had actually experienced each event—was ineffective in reducing false reports; for example, 71% of the children erroneously answered 'yes' during the source-memory test when asked if Mr Science had really put something yucky in their mouths.

In another study using the Mr Science/parental misinformation paradigm, Poole and Lindsay (2001) examined developmental changes in 114 three- to eight-year-old children's accurate and false reports. As in the 1995 study with pre-schoolers, false reports were quite frequent in the initial free-recall portion of an interview conducted shortly after exposure to the misleading story. Consistent with arguments presented earlier, the older children described suggested events during free recall as often as the younger children. False reports of suggested events increased when children were asked direct questions about suggested events, especially among younger children. The source-memory test enabled the older children to retract some (but not all) of their prior reports of suggested events, and it did so without reducing their reports of experienced events. As in Poole and Lindsay (1995), however, the younger children did not benefit from this test.

Poole and Lindsay's (in press) most recent study using the Mr Science/parental misinformation paradigm tested a SM training procedure designed to help children avoid false reports of suggested events. Early in the final interview, the interviewer performed three 'preparation' tasks, each of which consisted of an action and a verbal description of a non-performed action (e.g. the interviewer wiped off the tape recorder and said that she usually pushed a button to reset the counter). For approximately half of the 133 three- to eight-year-old children, after each act the interviewer asked the child to report that preparation act, using both free recall and leading and misleading questions (e.g. 'Did I push the button to reset the counter?'), and provided immediate feedback on differentiating between actions that

had been witnessed versus those that had merely been described ('No, I did not push the button—I only talked about pushing the button; when I ask you to tell me about things that happened to you, I want you to tell me only about things you remember really happening to you, not things that you only heard about).

During SM training, younger (three to five years) and older (six to eight years) children were equally accurate in reporting the source of witnessed actions, but the younger children were substantially less accurate in specifying the source of described actions. Both age groups improved across the three trials of the training procedure. Most importantly, among older children training reduced (but did not eliminate) false reports of suggested events in responses to direct questions, and did not reduce accurate reports of experienced events. When asked explicit SM questions in the final phase of the interview, children who had received training were no more likely than controls to reject suggested events to which they had acquiesced during leading questions. Thus, training reduced hearsay reports in older children but it did not improve ability to differentiate between memories of experienced and suggested events. The younger children did not benefit from SM training.

MEMORY FOR DATE OF OCCURRENCE AND FOR REPEATED OCCURRENCES

Date of occurrence is an important dimension of the source of an event memory, and one that poses special problems for source monitoring because the contents of event memories usually provide only very indirect cues to date. Suppose, for example, that you once had an automobile accident on your way to work; years later you might still be able to recall many details of that experience (because of its distinctiveness and salience), and those memories might enable you to specify the location of the accident, the approximate time of day (e.g., driving to versus from work, in light or darkness), and even perhaps the season (rain or snow), but the memory records of the experience are unlikely to provide direct cues to the date on which the accident occurred. The memories may provide constraints on date (e.g. if you retrieve information about geographical location and you travelled that route only during a particular period), but such constraints tend to be imprecise (except for memories of events intrinsically associated with particular dates).

Consistent with these ideas, people often have difficulty dating autobiographical events, for example, Friedman (1987) interviewed people

nine months after a major earthquake. On average, respondents were correct to within one hour in their judgments of the time of day the earthquake occurred, but erred by nearly two months in their judgment of the month (Thompson, Skowronski, Larsen, & Betz, 1996; Wright, Gaskell, & O'Muircheartaigh, 1997).

Repeated experiences of very similar events compound these SM difficulties. On which birthday did you receive that blue cardigan? Such a question is likely to cue multiple birthdays, each sharing numerous features and none easily dated, such that they tend to blend together in recollection (into what Neisser, 1981, termed 'repisodes'). Powell and Thomson (1997; and Chapter 5 in this book) report evidence that young children have particular difficulty differentiating between memories of repeated episodes of similar events (cf. Brainerd & Reyna, 1995; Nelson, 1986).

Repeated experiences can also modulate the effect of misleading suggestions. In a study by Connolly and Lindsay (2001), four- to eight-year-old children experienced a complex event either once or on four successive days. In the repeated-episodes condition, some details of the event remained invariant across episodes whereas others varied across episodes. Before a final interview, children were exposed to misleading suggestions (which differed from details of all past occurrences of the event). Relative to children who had experienced the event only once, those who had experienced it repeatedly were less affected by suggestions regarding invariant details and more affected by suggestions regarding variable details (cf. Martine Powell & Don Thomson, Chapter 5 in this book).

CONCLUSIONS

Both children and adults sometimes intrude into their event reports information gained from extra-event sources. In some such cases, individuals are aware that they are drawing on extra-event sources, whereas in others they erroneously believe they are remembering the to-be- reported event itself. The extent to which conditions encourage versus discourage deliberate use of memories from extra-event sources interacts with other variables (e.g. source similarity, memorability of the event and of the suggestions) in determining suggestibility, and all of these variables may interact with age. These multi-variable interactions preclude sweeping conclusions such as 'Young children are more suggestible than adults.' Nonetheless, research indicates that young

children are often especially prone to acquiescence and that they are more likely than older children or adults to confuse memories from different sources when conditions make source-monitoring difficult (e.g. when multiple sources give rise to highly similar memories).

Instructing witnesses not to use memories from a designated extra-event source ('exclusion' instructions), or asking them to differentiate between reports based on memories of the event versus memories of an extra-event source (a source-memory test), can enable adults and six- to eight-year-old children to reduce (but not necessarily eliminate) false reports of suggestions without reducing accurate reports of experienced events. This is good news for forensic interviewers. The findings indicate simple means of reducing false reports (without reducing accurate reports) in cases in which there are concerns about a particular source of misleading suggestions (e.g. a parent in a custody dispute).

Also heartening is Poole and Lindsay's (in press) recent finding that a simple and brief generic SM training procedure, which could easily be conducted by forensic interviewers, can reduce six- to eight- year-old children's rate of reporting suggestions in free recall and in response to direct (leading) questions. Compared to exclusion instructions and source-memory tests, the SM training procedure has the advantage of not being dependent upon explicit identification of a particular to-be-excluded source. This is important because in many real-world cases forensic interviewers may not be able to specify such a source.

Training has not yet been shown to enhance children's ability to discriminate memories from event versus extra-event sources, but rather merely to help them to understand that their reports should be based only on the former. Further research may yield training procedures that enhance SM skills. Perhaps even more importantly, neither exclusion instructions nor SM tests nor SM training have been found to be effective in reducing younger children's false reports of suggestions; here again, this is an important goal for future research.

The SM framework provides a useful set of metaphors and hypotheses regarding how the cognitive system differentiates between memories from different sources. Substantial additional empirical and theoretical work is required to more completely specify the cognitive processes involved in identifying the sources of memories and age-related changes in such processes (Lindsay & Johnson, 2001). Nonetheless, research inspired by the framework has already revealed much about the conditions under which children and adults are likely to confuse memories from different sources, as well as applied research on interventions designed to help witnesses avoid reports of suggestions.

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