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Dividing Attention During a Witnessed Event Increases Eyewitness Suggestibility

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Abstract

Real-life witnesses often encounter complex situations that may prevent them from devoting their full attention to encoding forensically-relevant information about the event. Although prior research has demonstrated that divided attention can impair aspects of event memory, the current study examined the effect of attention during encoding of the event on participants' memory for the source of post-event misleading information. Participants first viewed a slide sequence depicting a theft under full or divided attention conditions. Subsequently, they answered questions about the event that included misleading information, and finally received a source test. Results revealed that Divided Attention participants showed poorer memory for event items and were more likely to misattribute post-event misinformation to the event than were Full Attention participants. The findings suggest that typical laboratory conditions (which allow full deployment of attentional resources during encoding) may underestimate the suggestibility of witnesses.

Dividing Attention During a Witnessed Event Increases Eyewitness Suggestibility

Imagine that you have stopped at a convenience store on the way home from work to pick up some milk. You are selecting a carton at the cooler in the back of the store when you hear a disturbance at the front counter. You begin to walk to the front, and as you draw near, you realize that you are witnessing a robbery in progress. A man has drawn a gun and is demanding money. Quickly, you consider what action you should take, and start to worry about your safety and that of the clerk. You glance outside the store to see if anyone is approaching who could help. You find yourself hoping that this event will be over soon.

The above example describes a hypothetical eyewitness scenario. In this situation, a witness's attention would be drawn not only to forensically relevant details of the event (e.g., the perpetrator's appearance), but also to many internal (e.g., thoughts and fears) and external (e.g., looking outside for help) details that would be largely irrelevant to a criminal investigation. This fact is likely to have implications for the accuracy and completeness of the witness's account of what happened during the event. For example, research has found that divided attention during encoding may decrease memory for some event details (e.g., *weapon focus effect*; Mitchell, Livosky, & Mather, 1998; Pickel, 1998). Further, it is not uncommon for witnesses to be later exposed to accurate or misleading information about the event via other witnesses, investigators or the media. Thus, one potential impact of divided attention is that witnesses will be more likely to incorporate post-event information into their later testimony than if they had been able to deploy full attention during the act of witnessing. This question is the focus of the present study.

It has been argued that many laboratory studies of eyewitness memory lack some of the characteristics that are typical of real-life eyewitness situations (Ihlebaek, Love, Eilertsen, &

Magnussen, 2003; Malpass, Sporer & Koehnken, 1996). For example, in typical studies of eyewitness memory, participants encounter conditions that are relatively free of distraction during the encoding of the witnessed event (or for that matter, during any phase of the experiment). Yet, real-world witnesses often must encode witnessed events in a highly stressful environment with multiple competing goals (e.g., looking for an escape, trying to remember the perpetrator, etc.). Because real-world events are likely to differ with respect to the attentional demands on the witness, it is clearly important to understand the impact of these demands on the suggestibility of witnesses. Furthermore, the legal system has acknowledged that attention can play a role in assessing eyewitness accuracy. For example, degree of attention during the witnessed event is one of five *Biggers* criteria (Neil v Biggers, 1972; Manson v Braithwaite, 1977) that can be considered by the court to assess the accuracy of eyewitness identifications. For these reasons, understanding the effects of divided attention on eyewitness memory is of great practical importance.

Eyewitness Suggestibility

The extent to which people report misleading post-event suggestions as having been seen or heard in the witnessed event has been termed eyewitness suggestibility. In typical studies (e.g., Loftus, Miller, & Burns, 1978), participants first view a videotape or slides depicting a crime. Next, they read a narrative describing the witnessed event or answer questions about it. In the context of the narrative or questions, participants are exposed to misleading suggestions (e.g., that a thief stole a ring when he had not). Finally, participants are tested (typically a recognition, recall or source test) on their memory for the event. Suggestibility is indicated by the extent to which participants report the misleading information as being from the witnessed event.

Numerous studies have documented eyewitness suggestibility (e.g., Belli, 1989; Loftus, et al., 1978; McCloskey & Zaragoza, 1985), and much of the early theorizing on the topic focused on the fate of the memory representation of the witnessed event as a function of exposure to misinformation (e.g., whether the event representation was overwritten). More recently, researchers in the field have largely accepted that errors observed in eyewitness suggestibility experiments can often be characterized as source misattributions (e.g., Belli & Loftus, 1994; Ceci, Loftus, Leichtman & Bruck, 1995; Johnson, Hashtroudi, & Lindsay, 1993; Lindsay, 1994; Zaragoza & Lane, 1994; although c.f., Eakin, Schreiber, & Sergent-Marshall, 2003). Specifically, participants in these studies are misattributing information obtained from a post-event source to the witnessed event.

The processes involved in determining the origin of information are characterized by the Source Monitoring Framework (SMF; see Johnson, et al., 1993; Mitchell & Johnson, 2000, for reviews). On average, different sources of information have different phenomenal characteristics associated with them. For instance, memories of perceived events are more likely to include perceptual (e.g., color, shape, sound) and contextual detail (e.g., time and place information) than memories of imagined events (e.g., Johnson, Foley, Suengas & Raye, 1988). In contrast, memories of imagined events are more likely to include information about the cognitive operations involved (e.g., Durso & Johnson, 1980; Finke, Johnson, & Shyi, 1988). These average differences provide a heuristic basis for source judgments. Generally, these judgments involve a comparison between the activated characteristics of a memory record and the characteristics which are expected for memories from a given source. In addition, more systematic retrieval processes can be used to attempt to retrieve supporting information, or to evaluate the consistency or plausibility of the memory record. Both systematic and heuristic

retrieval processes are assumed to be operating in typical suggestibility studies utilizing source tests (e.g., Zaragoza & Lane, 1994). Retrieval conditions can play a powerful role in the accuracy of source decisions. For instance, when participants adopt a more strict criterion during retrieval (e.g., Lindsay & Johnson, 1989; Zaragoza & Lane, 1994), or are given enough time to retrieve sufficient source-relevant information (Johnson, Kounios, & Reeder, 1994; Zaragoza and Lane, 1998), their source judgments are more likely to be accurate. Although SMF specifies a number of factors that can affect source monitoring accuracy in the eyewitness suggestibility paradigm, source misattribution errors (claiming to have seen an item that was only suggested) should vary as a function of the similarity of characteristics associated with memories from the event and post-event sources, and the type of evidence considered before claiming to have seen it in the witnessed event.

Effects of Divided Attention

It is generally believed that dividing attention disrupts resource-demanding encoding processes (e.g., Troyer & Craik, 2000). For example, divided attention may disrupt the ability to note contextual relations, decrease elaboration, or impair other effortful mnemonic strategies. Further, the resulting memory representation is likely to be impoverished (e.g., fewer recollective details) relative to full encoding conditions, making it difficult to make accurate retrieval decisions. Thus, divided attention has the potential to affect many aspects of eyewitness memory.

Although a number of studies have examined attention during eyewitness encoding, most have focused on its effect on the identification and description of the perpetrator (e.g., MacLin, et al., 2001). Further, most of these studies have examined attention by manipulating the presence or absence of a weapon during the witnessed event (*the weapon focus effect*). The

general finding is that the presence of a weapon leads witnesses to focus on the weapon and away from other aspects of the event (for a review, see Steblay, 1992). Thus, witnesses have better memory for central aspects of the event (those surrounding the weapon) and poorer memory for more peripheral aspects of the crime (although c.f., Mitchell, et al., 1998). In summary, divided attention at encoding can disrupt memory for event details.

The effect of divided attention on eyewitness suggestibility has been the focus of much less research. In one such study, Zaragoza and Lane (1998; Exp. 1) manipulated the attentional resources available to participants while reading and answering the post-event questionnaire by requiring them to concurrently perform a secondary task (music identification). Relative to a full attention control condition (who performed the tasks sequentially), divided attention participants were more likely to attribute the post-event suggested items to the eyewitness event on a final source test. Zaragoza and Lane argued that divided attention disrupted the encoding of source-specifying features (i.e., that indicate the item had been read in the questionnaire), while having less impact on the content of the suggestion (e.g., that the thief put money in a *wallet*). This finding is supported by research in other paradigms examining the effect of attention on the ability to monitor source. For example, dividing attention at encoding increases conjunction errors in face recognition (Reinitz, Morrissey & Demb, 1994), the false fame of non-famous names (Jacoby, Woloshyn & Kelley, 1989), and decreases memory for the spatial location of an item (Troyer, Winocur, Craik, & Moscovitch, 1999). In each of these studies, participants' ability to accurately attribute the source of items that were encoded under conditions of divided attention was negatively affected.

In the following study, the effect of dividing attention during encoding of the eyewitness event on participants' tendency to misattribute post-event suggestions to the witnessed event was

examined. One clear prediction is that divided attention will disrupt normal encoding processes and result in a more impoverished representation of event details (i.e., DA participants should show poorer memory for event details). However, note that in contrast to previous studies (e.g., Jacoby, et al., 1989; Zaragoza & Lane, 1998), the focus of this study is on how divided attention during encoding of items from one source (i.e., the eyewitness event) will impact the attributions of items from a second source (i.e., the post-event questionnaire) which are encoded under full attention. A source test procedure was used to assess the effect of divided attention on memory for event items and post-event suggestions under conditions that require participants to carefully examine their memories. In this procedure, participants are informed prior to test that some of the information from the post-event questionnaire had not been seen in the slides. Further, the test format had participants answer two separate questions about their memory for each item ("Seen in the slides?" and "Read in the questions?") [1]. Such test instructions and format appear to encourage participants to scrutinize their memories more carefully than standard recognition tests (with resulting decreases in suggestibility; e.g., Lindsay & Johnson, 1989; Zaragoza & Lane, 1994). Under such conditions, participants who are attempting to determine the source of their memories of post-event items may or may not show increased suggestibility as a function of divided attention, depending on the judgment process employed at test. Keep in mind that the divided attention manipulation does not directly do anything to increase the "event-like" characteristics of memories of suggested items; it only leads to impoverished representations of event items. Thus, it may be possible to avoid increasing misattribution errors. For example, under the SMF (Johnson, et al., 1993) DA participants could engage more systematic retrieval processes (e.g., by more carefully examining the features of the retrieved record or retrieving supporting detail) or set a very high criterion in a heuristic retrieval process (e.g., only items that

contain very vivid visual detail were seen in the event). On this view, divided attention would lead to poorer memory for event (slide) items, but not necessarily more source misattribution errors, because the manipulation would not increase the level of visual detail in memories of suggested items. Similarly, Jacoby and his colleagues (e.g., Jacoby, et al., 1989) have found that participants are capable of reducing errors by increasing the criteria for attributing an item to a given source (e.g., by relying more heavily on recollection rather than familiarity).

Although divided attention during the event does not affect the qualities associated with suggested items, it does potentially increase the overlap of features between event items and suggested items. More precisely, under full attention conditions, features of event memories differ on average from memories of post-event information, and this allows participants to correctly attribute most suggestions to the questionnaire (Zaragoza & Lane, 1994). Divided attention at encoding reduces (either in quantity or quality) characteristics that distinguish event memory representations from memories of suggested details. In this case, if participants utilize a similar criterion for attributing items to the event under divided and full attention conditions, this would predict greater misattributions of suggested items to the event[2]. Alternatively, because of poor memory for the event, DA participants may shift to a reliance on other less discriminative characteristics (e.g., familiarity) to make their attributions. Jacoby's process dissociation framework (e.g., Jacoby, 1991) makes a similar prediction. Because DA participants have poorer memory for event items, they may be more likely than FA participants to rely on familiarity[3] to make their attributions to the event, thus increasing errors.

In the following experiment, participants saw a series of slides depicting a crime and completed a music task concurrently or sequentially. Later, they answered questions about the event that included misleading information and finally received a source test. The primary

hypothesis was that DA participants would be more likely to claim to have seen post-event suggestions in the witnessed event than participants whose attention was not divided.

Method

Participants

A total of 144 undergraduates participated for course credit in their Introductory Psychology course. An equal number of participants were randomly assigned to the Divided Attention (DA) and Full Attention (FA) conditions.

Materials and stimuli

The slide sequence (modified from McCloskey & Zaragoza, 1985; described in Zaragoza & Lane, 1994) depicted an incident in which a maintenance man enters an office, repairs a chair, finds and steals $20.00 and a calculator, and leaves.

The postevent questionnaire consisted of 15 questions (Zaragoza & Lane, 1994). For each participant, six of the questions were misleading in that they presupposed the existence of an item that was not in the slide sequence. The suggested items supplemented rather than contradicted information in the slides.

A total of 12 critical items were used in the experiment: *a rag, a paperback book, a jar of Folger's coffee, a Coke can, a pack of bubblegum, a hammer, a coat rack, a wristwatch, a cigarette lighter, a newspaper, a xerox machine,* and *a wallet*. For each participant, six of these items functioned as suggested items and six functioned as never-presented control items on the source test. There were two versions of the questionnaire and therefore any specific item served equally often as a suggested and control item. Below is an example of a question where the misleading item *coat rack* was suggested:

> At the beginning of the sequence, there was a young woman standing at her desk. As she gathered her purse and blue umbrella from a nearby coat rack, what was she was preparing to do?

In the control version of the question, the phrase "from a nearby coat rack" was removed.

Procedure

All participants were informed that their task would be to view a series of slides and attempt to understand the incident depicted in the slides. The slides were presented at a rate of one every 4 s. Participants in the DA condition were further informed that they would be watching the slides while listening to a tape containing clips of popular music (adapted from Zaragoza & Lane, 1998, with an additional 5 clips of music lasting 1 min 40 s). They were instructed that the tape could be stopped at any moment, and that when it did, they were to indicate the titles or the artists of the last two songs that had been played. In addition, they were told to try to do both tasks (watch the slides and listen to the music) equally well. The tape was presented via a cassette player and consisted of 20 short clips of popular music, lasting a total of 6 min 17 s. The duration of each clip varied from 14-25 s to prevent participants from anticipating when the next clip would begin. The music tape started approximately 17 s before the slide sequence began, and finished approximately five seconds after the slide presentation ended. Participants then completed a recognition test for the music. The music recognition test consisted of 40 artists and associated song titles: 20 targets and 20 lures (songs similar in type and genre to the presented songs). Participants were instructed to first indicate the last two songs they heard (with a checkmark) and then circle any other songs they remembered from the tape. After watching the slides and performing the song identification task, DA participants worked on a word search puzzle for 6 minutes to equate the groups on the amount of time that elapsed between viewing the slides and exposure to the suggested items.

Participants in the FA condition were treated identically except that they viewed the slide sequence before they began the song identification task. Thus the critical manipulation was whether participants watched the eyewitness event concurrently with the music task (DA condition) or performed the music task after watching the eyewitness event (FA condition).

Following the slide sequence and music task, participants received the postevent questionnaire. Participants were informed they were going to answer some questions about the event they had just viewed, and that they were to give an answer for each of the questions, even if they had to guess. Participants next worked on a filler task for 6 minutes.

Finally, all participants received a surprise source test. Participants were told that they would hear 25 test items played over the tape player at 8 s intervals. They were informed that the test items could be from one of four sources: Slide only, questionnaire only, both, or neither (for specific instructions, see Zaragoza and Lane, 1994). For each test item, participants responded "yes" or "no" to two questions: a) "Saw in the slides?," and b) "Read in the Questions?"

The source memory test consisted of a list of 25 items. In addition to the 6 suggested and 6 control items, an additional 13 items were on the final test. Of these, 5 items were seen only in the slides, 7 appeared in both the slides and the questionnaire, and 1 was new for all participants. Following the test, participants filled out a post-test questionnaire that contained two questions which asked participants to rate their confidence (on a 1 to 7 scale) that they had been able to accurately remember items from the slides and from the post-event questionnaire.

The criterion for including DA participants in the final analysis was whether they were able to recognize at least six of the 20 songs that were played on the tape. This criterion was chosen in order to ensure that participants were in fact attempting to perform both tasks. Twelve

participants in the DA condition failed to meet this criterion leaving a total of 60 participants in the DA condition and 72 in the FA condition[4].

Results

In the analyses to follow, the measure of greatest interest is simply the proportion of "yes" responses to a given source question (e.g., Saw in slides?). As in previous studies (e.g., Zaragoza & Lane, 1998), an item was scored as "recognized" if it was attributed to one or more experimental sources (i.e., "yes" to one or both of the source questions).[5] An item was considered "not recognized" (not attributed to either source) when participants answered "no" to both source questions. In addition, **Table 1** presents the data broken down into four categories (Saw only, Read Only, Both, and Neither) based on responses to the two test questions.

Suggested and Control items

The primary question of interest was whether disrupting attention during the witnessed event increases eyewitness suggestibility (claiming to have seen a suggested item in the slides). This prediction was confirmed as DA participants were more likely to falsely claim to have seen suggested items in the slides (M = .54) than were FA participants (M= .39, F (1,130) = 10.07, p <.05, η_p^2=.07). In addition, the attention manipulation did not affect participants' accurate claims of having read the suggested item in the context of the questions (M = .49 and .50, DA and FA conditions, respectively, F < 1). The two conditions did not significantly differ with respect to overall recognition of suggested items (M = .70 and .67, F (1,130) = 1.1, n.s. η_p^2=.008). Thus, the results clearly show that disrupting attention during the encoding of the witnessed event can increase susceptibility to post-event suggestions. In addition, attributions broken down by response type were also examined (**See "Questions" column for both conditions in Table 1**). Analyses of these responses revealed that divided attention significantly

reduced "Read Only" responses (F (1,130) = 8.3, p < .05, η_p^2=.06), and significantly increased "Both" responses (F (1,130) = 6.8, p < .05, η_p^2=.05), but did not significantly affect "Saw Only" responses (F (1,130) = 2.1, n.s. η_p^2=.016), or "Neither" responses (F = 1.1).

Next, the effect of the attention manipulation on participants' responses to never-presented control items was examined. The two conditions did not significantly differ with respect to claims of having seen the control items in the witnessed event (M = .27 and .23 for DA and FA conditions, respectively; F (1,130) = 1.4, n.s., η_p^2=.01). However, participants in the DA condition were less likely than FA participants to attribute control items to the questionnaire (M = .02 and .06, F (1,130) = 7.6, p < .05, η_p^2=.055).

Finally, the suggestibility or source misattribution effect (e.g., Zaragoza & Lane, 1994) was examined using a 2 x 2 mixed model ANOVA with Attention (Divided vs Full) as a between-subjects variable, and Type of Item (Suggested vs Control) as a within-subjects variable. The analysis revealed main effects of Attention (F (1,130) = 8.0, p < .05, η_p^2=.06), Type of item (F (1,130) = 83.7, p < .05, η_p^2= .39), and a significant interaction (F (1,130) = 4.99, p < .05, η_p^2=.04, **See Figure 1**). Although both conditions exhibited significant source misattribution effects (27%, F (1,59) = 59.5, p < .05, η_p^2= .50 for DA, and 16%, F (1,71) = 26.3, p < .05, η_p^2= .27 for FA), the magnitude of this effect was greater for participants whose attention had been divided during the witnessed event than it was for participants whose attention was not divided.

Slide-only items

A second question concerns whether the manipulation of attention during the slide presentation affected participants' memory for items that were shown only in the slides. This was indeed the case as DA participants were less likely to accurately attribute the slide-only

items to the event (M = .47) than FA participants (M = .62, F (1,130) = 16.8, p < .05, η_p^2=.11). The two conditions were equally likely to claim to have read about slide-only items in the questions, M = .04 and .03, F <1. However, results also revealed that DA participants were, overall, less likely to recognize slide-only items (M = .48) than were FA participants (M = .63, F (1,130) = 17.5, p <.05, η_p^2= .12). Thus, participants whose attention was divided during the slide sequence were less likely to remember having encountered the slide-only items in the experimental context. To follow up on this finding, a conditionalized measure of source memory was computed[6]. Specifically, the proportion of recognized items from a given source (e.g., slides) that were attributed to a particular source (e.g., the event) was examined. Analyses revealed that the two conditions did not differ in terms of attributions to the event (M = .96 and .98 for DA and FA participants, respectively, F (1,128) = 1.05, η_p^2= .008) or to the questions (M = .10 and .05, F = 2.0, n.s., η_p^2=.015). Thus, dividing attention while encoding the slides increased the likelihood that these items would be attributed to neither source (i.e., called new) rather than increasing a bias to attribute the items to either of the sources. Most importantly, though, the results plainly reveal that the attention manipulation had the intended effect of disrupting memory for the witnessed event.

Confidence Measures

Participants made overall confidence judgments for the accuracy of their memory for event items and questionnaire items following the source test. FA participants were significantly more confident that they accurately remembered items from the event (M = 4.9) than were DA participants (M = 4.0; F (1,130) = 20.0, p < .05, η_p^2=.13). Thus, DA participants' confidence judgments were sensitive to the fact that their memory for event items had been affected. FA participants were also significantly more confident (M = 5.1) that they accurately

remembered items from the post-event questionnaire ($\underline{M}$ = 4.6; $\underline{F}$ (1,130) = 4.4, $\underline{p} < .05$, η_p^2=. 03).

A second important question concerns the relationship of participants' confidence to the accuracy of their test judgments. For each condition, participants' confidence in their memory for the event was correlated with attributions to the event for each item type (i.e., slide items, suggested items, control items). For the DA condition, significant correlations were found for accurate attributions of slide items to the event ($\underline{r}$ =.50, $\underline{p} < .05$) and inaccurate attributions of control items ($\underline{r}$ =.27, $p < .05$). Although of similar magnitude, the correlation for suggested items failed to reach significance ($\underline{r}$=.24, $\underline{p} < .07$). Thus, the more confident DA participants were in their memory for the event, the more likely they were to have attributed items, accurately and inaccurately, to the slides. In the FA condition, significant correlations were found only between confidence and inaccurate attributions of control items to the slides ($\underline{r}$ = -.35, $\underline{p} < .05$; $\underline{r}$s = .19 and -.12 for slide and suggested items, respectively). The most notable point about this set of correlations is that, in contrast to the DA condition, the direction of the correlations are in the expected direction for suggested & control items (negative; indicating higher confidence with fewer errors). To follow up on these findings, a measure of source accuracy for the event was computed (Accurate attributions of slide items to event – Inaccurate attributions of suggested items to event) and correlated with confidence. The confidence/accuracy relationship failed to reach significance for either condition ($\underline{r}$=.17, $\underline{p} > .10$ for DA and $\underline{r}$=.23, $\underline{p}$ =.051 for FA). Although there is some weak evidence that divided attention may impact the confidence-accuracy relationship, no firm conclusions can be reached without further research.

Discussion

As predicted, the results clearly demonstrate that limiting the attentional resources available at the time of the witnessed event can have important consequences on memory for the event *and* later suggestibility. Specifically, the attentional manipulation impaired memory for the witnessed event and increased participants' claims that they saw misleading post-event information in the context of the event. Given that the test instructions and format encouraged participants to scrutinize their memories carefully, it is argued that the manipulation of attention reduced the source-specifying information (e.g., visual, spatial, contextual detail) available in the memory records of event items. According to the SMF (Johnson, et al., 1993), this would increase the overlap of characteristics between event and suggested items, thus increasing the difficulty of discrimination. Further, the results suggest that DA participants were unable (or did not attempt) to utilize additional systematic retrieval processes or a stringent criterion that could have prevented an increase in source misattributions to the event, even though they appeared to be aware that their memory for the event had been affected (as indicated by lower confidence). Instead the pattern of results suggests that DA participants adopted a similar criterion to FA participants for attributing items to the event, or because of the paucity of event details, switched to less discriminative characteristics such as familiarity. Viewed through Jacoby's process dissociation framework (e.g., Jacoby, et al., 1989), DA participants (because of their relatively poorer event memory) were less able than FA participants to rely on recollection to make their attributions to the event, and thus relied more heavily on familiarity.

A second factor may have also played a role in the obtained results. One way to avoid errors in the suggestibility paradigm is to detect discrepancies between the questionnaire and the event (Tousignant, Hall & Loftus, 1986), and retrieve this information at test to avoid making a misattribution. In the current experiment, the post-event information was supplementary rather

than contradictory, which prevents a type of recall-to-reject strategy (e.g., Gallo, 2004) that would allow suggested items to be more easily detected because they conflict with a specific event item (e.g., "I know this is wrong because the man in the slides put a screwdriver in the toolbox, not a hammer"). However, the fact that FA participants were significantly more likely than DA participants to attribute suggestions to the questionnaire alone implies that the manipulation may have made it more difficult to later detect more general discrepancies between the event and the post-event information (e.g., "The thief did not put money in a wallet because I don't remember a wallet") and thus increased source misattributions to the event. Although this may have played a role in the current findings, FA participants were also more likely to attribute control (never-presented) items to the questionnaire than DA participants, suggesting that this factor is unlikely to be entirely responsible for the obtained findings.

The results of this experiment, along with those of Zaragoza & Lane (1998), shed light on the role of attention in producing errors in the eyewitness suggestibility paradigm. Zaragoza & Lane (1998) found that dividing attention during the post-event questionnaire (Exp. 1) leads to poorer old/new recognition of suggestions, and as a result, the DA and FA conditions did not differ in terms of overall number of source misattribution errors (DA participants did show a higher rate of conditionalized misattributions to the event). DA participants showed reduced attributions of suggestions to the questionnaire, but increased "Saw Only" (conditionalized) responses to suggestions. When attention was divided during retrieval (Exp. 2) by restricting the time available to make a source decision, DA participants significantly increased both "Saw Only" and "Both" responses to these items. In addition, DA participants were more likely to attribute never presented control items to the event. These findings demonstrate both commonalities and differences in the impact of divided attention during these phases. First, the

results appear explicable in terms of reduced ability to access source-related information whether because of impaired encoding of that information (as in the present experiment and Exp. 1 of Zaragoza & Lane) or because of insufficient time to engage systematic retrieval processes or revive discriminative characteristics (Zaragoza & Lane, Exp. 2). However, when attention is divided will have an impact on the pattern of responses to suggested items. For example, dividing attention at suggestion leads to poor memory for characteristics that could help establish that a suggested item was encountered in the questionnaire, and thus participants are more likely to attribute these items only to the event. Note also that this manipulation will also sometimes lead to poorer item memory for suggested items, which will work to lower the overall number of misattributions. When attention is divided during the event, participants have relatively good memory for having read the item in the questionnaire and thus will tend to attribute suggested items to both sources. Finally, when attention is divided at test, access to source-specifying information for both the event and the post-event questionnaire is reduced. Because of this, suggested items are equally likely to be assigned to the event only or both the event and the questionnaire.

The results of this study fit with and extend previous research on eyewitness suggestibility that has manipulated the quality of memory for the eyewitness event. For example, Zaragoza & Mitchell (1996) found that the longer the delay between the event (and the post-test questionnaire) and the final test, the greater the misattribution of suggestions to the event. However, unlike the present study, participants also increased misattributions of never-presented control items to the event. The likely explanation for this difference is that the delay also affected participants' memory for the suggested items, making the characteristics of event, suggested, and control items less discriminable. In this study, memory was still quite good for

suggested items, and thus DA increased misattributions of suggested items selectively. Further, the results demonstrate that increased vulnerability to suggestion can occur even with very short time intervals. The findings of this experiment are also consistent with Pezdek and Roe (1995), who found that children with better memory for an eyewitness event (due to repeated presentation) were less likely to claim to have seen suggested items. The results of the current study further suggest that increased suggestibility that results from poor event memory does not occur simply because witnesses are less able to reject direct contradictions during exposure to post-event information. In addition, this increased suggestibility is found even with a source test; a format that has been found to increase scrutiny and decrease suggestibility relative to standard recognition tests (e.g., Zaragoza & Lane, 1994).

Real-world witnesses are often confronted with complex situations that require pursuing multiple goals (e.g., remember the perpetrator, avoid injury, look for an escape route, etc.), and as a consequence there will be limited attentional resources available for encoding forensically-relevant detail. Following the event, witnesses will frequently be exposed to new or misleading information, yet the legal system expects them to report only information they themselves saw and heard at the time of the witnessed event. The current study demonstrates that the allocation of attentional resources during the act of witnessing has a major effect not only on memory for the details of the event, but also the likelihood that witnesses will incorporate post-event information into their accounts of the event. Thus, these findings suggest that the results of typical eyewitness suggestibility studies may underestimate the potential for suggestibility in real-world witnesses.

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Footnotes

[1]This test format eliminates the "both" response seen in 4-option source tests (e.g., Slides, Questions, Both, Neither), which some researchers have argued could be used by participants as a low-confidence compromise response. In Table 1, the presented "both" response is computed from responses on the two separate questions rather than being a specific test option.

[2]This also suggests that divided attention could also increase source misattributions from the event to the questionnaire. However, because memory for the questionnaire is not impaired by the attention manipulation, DA participants can use the *absence* of memory for reading the information to reject that potential source and thus attribute the memory of the event item to neither source (call it "new").

[3] Familiarity alone does not completely account for this prediction. Instead, familiarity must be accompanied by a bias to attribute an item to the event. In the eyewitness suggestibility paradigm, this bias is introduced because the post-event questionnaire concerns the eyewitness event and includes correct information about the event.

[4] Given the nature of the divided attention task, it can be argued that poor performance can be due to poor music knowledge or to failure to follow the dual-task instructions. With this in mind, complementary analyses were also conducted on 1) participants from both conditions who were over the criterion, and 2) the full set of participants. The pattern of results from #1 is exactly the same as for the reported analyses, and as might be expected if below-criterion participants were not dividing their attention to the same extent as criterion participants, the pattern of results for #2 is somewhat weaker (e.g., a smaller suggestibility effect), but all major comparisons are still statistically significant. Thus, these analyses lead to the same conclusions as do the reported analyses.

[5] An item can be counted as "recognized" only once. Because some items are attributed to both sources, recognition performance will not simply be the sum of "saw" and "read" responses.

[6] Under most conditions, conditionalized measures are the least likely empirical measures to confound item and source memory (see Murnane and Bayen, 1996, for further discussion). The df for analyses of conditionalized source attributions will differ from those on unconditionalized source attributions when a participant fails to recognize a single item from a given source (e.g., slides). For slide-only items, this was the case for two DA participants.

Table 1

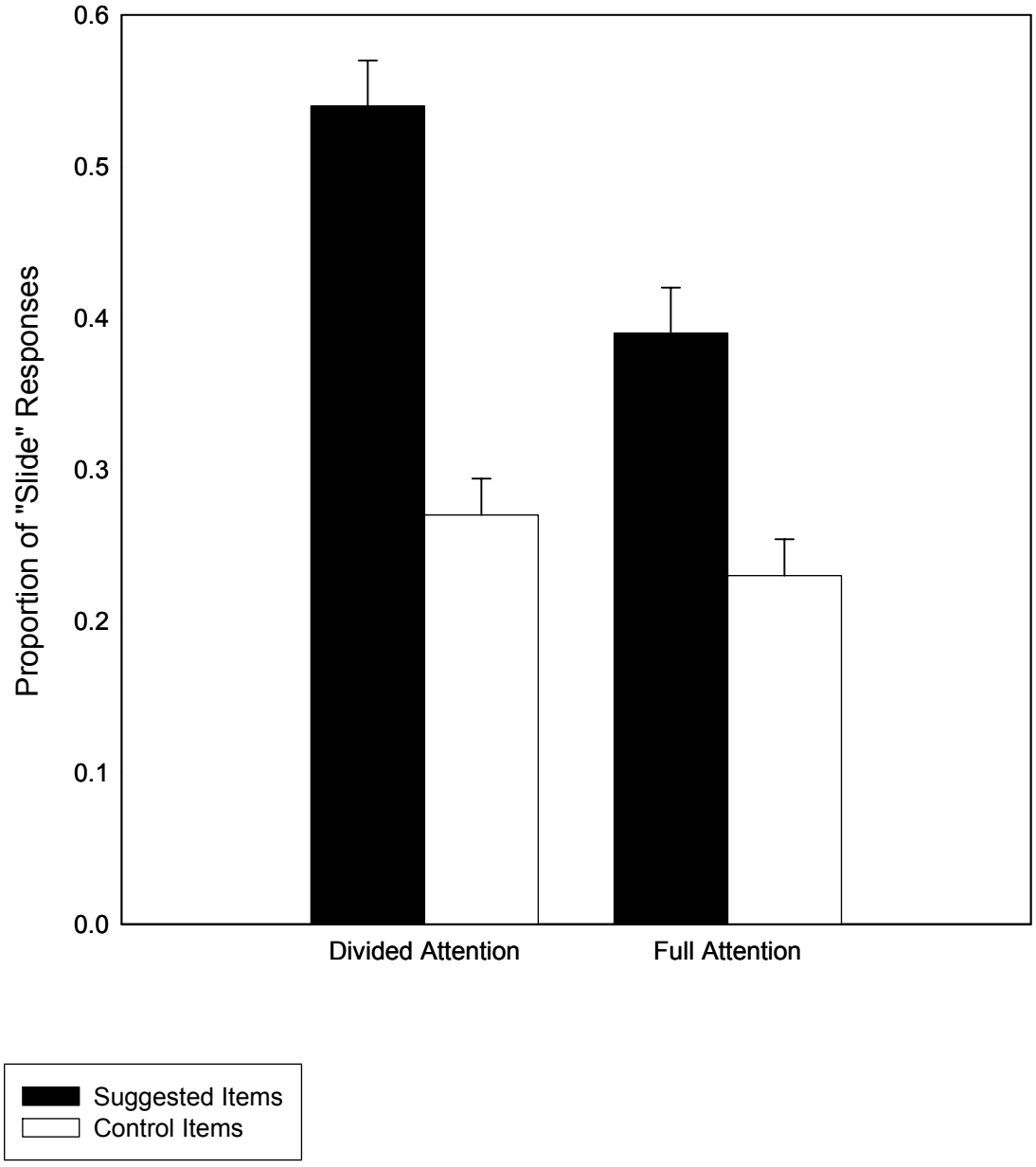
Distribution of Responses to Slide-Only, Suggested, and Control Items as a Function of Attention Condition.

	Full Attention			Divided Attention		
Response	Slides	Questions	Control	Slides	Questions	Control
Saw Only	.60 (.03)	.17 (.02)	.19 (.02)	.44 (.03)	.21 (.02)	.25 (.02)
Read Only	.01 (.01)	.27 (.03)	.02 (.01)	.01 (.01)	.16 (.03)	.00 (.00)
Both	.02 (.01)	.23 (.03)	.04 (.01)	.03 (.01)	.33 (.03)	.02 (.01)
Neither	.37 (.02)	.33 (.02)	.75 (.03)	.52 (.03)	.30 (.02)	.73 (.02)

Note. Standard errors in parentheses. Participants gave yes or no answers to two separate test questions: "Saw in the Slides?" and "Read in the Questions?" Thus "Both" is a "yes" response to both questions.

Figure Caption

Figure 1. Mean proportion of "yes" responses to the "Saw in the Slides?" test question as a function of attention condition and type of item.


0.6
0.5
0.4
0.3
0.2
0.1
0.0
Proportion of "Slide" Responses
Divided Attention
Full Attention
Suggested Items
Control Items