The problem with introspective eyewitnesses: Can thinking too much harm the identification process?

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The problem with introspective eyewitnesses:
Can thinking too much harm the identification process?

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ABSTRACT

Correct eyewitness identifications from lineups tend to be characterized by quick, automatic cognitive process whereas false identifications tend to be characterized by slower, controlled cognitive process. The present study examined whether limiting allowable deliberation time (the amount of time witnesses were able to engage in controlled, deliberative processes) would increase lineup identification accuracy. Participants ($N = 259$) viewed a mock crime video of four individuals and were then shown four lineups (one for each criminal) for either 1.5, 3.0, 10.0, or 30.0 seconds each. Participants made their identification decisions (by either responding that the criminal was in the lineup or that the criminal was not in the lineup) immediately following this time period. Each participant saw two lineups in which the criminal was present and two lineups in which the criminal was absent. Contrary to predictions, accuracy rates did not differ significantly as a function of allowable deliberation time; both correct identification rates of the criminal and incorrect identification rates of an innocent suspect remained constant across allowable deliberation time conditions. Results show that limiting controlled processes does not increase eyewitness accuracy. Implications for a model of eyewitness identification that incorporates an eyewitness's quality of memory as a third variable that influences both decision process and accuracy are discussed.
INTRODUCTION

Recently, U.S. Department of Justice researchers examined a number of cases of wrongful incarcerations in which the defendants were later proven, through DNA evidence, to have been innocent of the crime for which they were convicted. In most cases, the defendant was identified by one or more eyewitnesses (Connors, Lundregan, Miller, & McEwen, 1996). Eyewitness testimony can be extremely influential. It is estimated that roughly 77,000 people are charged with crimes annually in the United States based on eyewitness testimony alone (Goldstein, Chance, & Schneller, 1989). Juries also find such evidence highly compelling; eyewitness testimony against a defendant dramatically increases jurors' belief in the guilt of the defendant, even when the eyewitness was shown to be legally blind at the time of the crime (Loftus, 1974). In fact, juries have been shown to be completely unable to differentiate between accurate and inaccurate eyewitnesses (Wells, Lindsay, & Ferguson, 1979). Determining the accuracy of an eyewitness at the time of trial, therefore, may be extremely difficult. Consequently, maximizing the accuracy of eyewitnesses at the time of lineup administration is of paramount importance. Because various eyewitness behaviors (selecting the suspect from a lineup, for example) can be influenced by a number of cognitive and social processes (e.g., Buckhout, 1974; Malpass & Devine, 1981; Phillips, McAuliff, Kovera, & Cutler, 1999; Wells, Wright, & Bradfield, 1999), an understanding of these processes is necessary to construct procedures that minimize the probability of an innocent suspect being falsely identified.

System versus Estimator Variables

In order to focus eyewitness research more efficiently, Wells (1978) distinguished between two categories of variables applicable to eyewitnesses: estimator variables and
system variables. Estimator variables may affect eyewitness accuracy but are beyond the control of the criminal justice system. Such factors as race and age of the criminal, how good a view the witness had at the time of the crime, and length of time between the crime and lineup administration are examples of estimator variables. The impact of such factors cannot be controlled in real world cases but must rather be estimated. In contrast, system variables not only affect eyewitness accuracy but can also be controlled by the criminal justice system. Such factors as the resemblance of the lineup fillers to the suspect, the instructions given to a witness before viewing a lineup, and the behavior of a lineup administrator are examples of system variables; these factors have been shown to influence the accuracy of a witness and are controllable (e.g., Malpass & Devine, 1981; Wells, Rydell, & Seelau, 1993). The importance of this distinction between estimator and system variables lies in the potential for improving eyewitness accuracy; relatively little (if anything) can be done a priori to alter estimator variables in order to maximize eyewitness accuracy. However, system variables, being controllable, offer persons involved in the legal system a means of improving such accuracy.

Since this dichotomization, the thrust of eyewitness psychological research has been on controllable system variables in an attempt to increase eyewitness accuracy. Eyewitness research has been largely successful in this arena. Eyewitness research findings were used heavily in developing national guidelines concerning how to properly conduct lineups. These guidelines have now been published under the mandate of then-Attorney General Janet Reno (Technical Working Group for Eyewitness Evidence, 1999). Yet despite the emphasis on the impact of system variables on eyewitness accuracy among eyewitness researchers, the court system largely continues to ignore the effects of these variables.
The Postdiction of Eyewitness Accuracy

In its ruling *Neil v. Biggers* (1972), the Supreme Court handed down five criteria that courts should consider when determining the accuracy of an eyewitness: a) how good a view the witness had of the criminal, b) the degree of attention paid to the criminal by the witness, c) the accuracy of the witness's prior description of the criminal, d) the confidence displayed by the witness at the time of identification, and e) the length of time between the crime and the identification. According to this ruling, if it is determined that these criteria were adequately met, then the eyewitness testimony can be considered valid. However, a perusal of this list of criteria reveals that despite the empirical evidence supporting the effects of system variables on eyewitness accuracy, there is not a single system variable in this list (except, to the extent that it is controllable, time between the crime and lineup administration).

*Neil v. Biggers* (1972), in effect, delineates the Supreme Court's opinion as to the variables that postdict accuracy. Postdiction refers to predicting something after it has already occurred. Once eyewitnesses make one of four possible responses to a lineup (identify the suspect, identify a known-innocent filler, claim that the culprit is not in the lineup, or claim that they do not know whether the culprit is in the lineup or not), their accuracy has been established. However, unless witnesses identify a known-innocent filler as the culprit (which is a known error), the triers of fact are not aware of their accuracy. Witnesses who identified the suspect, for example, may have been accurate (i.e., the suspect actually is the culprit) or may have been inaccurate (i.e., the suspect actually is not the culprit). Hence, *Neil v. Biggers* is the Supreme Court's view as to what variables should be considered at the time of trial to postdict the accuracy of the eyewitness at the time of
identification. These criteria have come under attack from eyewitness researchers (e.g., Wells & Murray, 1983; Wells & Bradfield, 1998), and are generally considered among those researchers to be flawed or incomplete. Although many criticisms of the Neil v. Biggers criteria are aimed at the lack of postdictive power of certain criteria, or the potential biased retrospective self-reports of certain criteria, a large criticism also pertains to the ruling's overemphasis on estimator variables and its ignorance of appropriate system variables that actually do postdict eyewitness accuracy.

For example, the Neil v. Biggers ruling stated that the confidence of an eyewitness, which cannot be accurately manipulated by the justice system, is a valid postdictor of that witness's accuracy. In fact, most people already believe this; eyewitness confidence is one of the most (if not the most) commonly used and influential postdictors of eyewitness accuracy among most people examined in a lab (Leippe, Manion, & Romanczyk, 1992; Lindsay, Wells, & Rumpel, 1981; Wells, 1984a; Wells, Ferguson, & Lindsay, 1981). Numerous empirical studies have shown that the confidence expressed by eyewitnesses in their identifications is the primary determinant of judgments of those witnesses' accuracy, and supercedes virtually any other factor that may influence eyewitness accuracy, including how good a view the witness had of the criminal (Lindsay, Wells, & Rumpel, 1981) and time between the witnessed event and the identification (Cutler, Penrod, & Stuve, 1988).

Unfortunately, the implicit assumption that confidence is highly correlated with accuracy has been shown to be faulty (see Wells, Olson, & Charman, 2002). Actual correlations between confidence and accuracy vary with circumstance, but generally tend to be small to moderate in size (Sporer, Penrod, Read, & Cutler, 1995). One of the main reasons for this is that unlike identification accuracy, witnesses' confidence is malleable after the identification itself, and
can often be dissociated from their accuracy by factors such as receiving feedback about their identification (Wells & Bradfield, 1998). A main problem with using confidence as a postdictor of accuracy is that confidence is a self-report measure and is therefore susceptible to distortions. The Supreme Court's (and other people's) reliance on confidence to postdict accuracy, then, tends to be largely overused and miscalibrated with its actual ability to postdict accuracy, and consequently, more useful postdictors may be ignored.

For example, the type of lineup used has been shown to be one of the most useful system variable postdictors of witnesses' accuracy. Over the past two decades, research has been accumulating showing that sequential lineups, in which the lineup members are shown to the witness one at a time, produce a lower rate of false identifications than the more standard simultaneous lineup, in which all lineup members are shown to the witness at the same time (e.g., Lindsay & Wells, 1985; Lindsay et al., 1991). Although the sequential lineup has also been shown to produce a slightly lower rate of correct identifications, the reduction in false identifications has been shown to be proportionately greater than the reduction in correct identifications (Steblay, Dysart, Fulero, & Lindsay, 2001). Lindsay and Wells (1985) have shown that this pattern of results leads to an increase in the diagnosticity of an identification procured through a sequential lineup, and thus increases the information gained from a sequential lineup identification relative to the information gained from a simultaneous lineup identification (see Wells & Olson, 2002, for a discussion on information gain from various types of lineups). The net result is that an identification obtained with a sequential lineup is more likely to be accurate than an identification obtained with a simultaneous lineup. In other words, the type of lineup that is used to obtain an identification (sequential vs. simultaneous) is a valid postdictor of eyewitness accuracy.
The Supreme Court's ruling in *Neil v. Biggers* (1972) thus failed to recognize several important factors in its determinants of valid eyewitness accuracy postdictors. First, and most obviously, a good postdictor of accuracy should be related to accuracy over a wide variety of circumstances and contexts. Because eyewitness confidence fluctuates across various contexts and often has a weak correlation with accuracy, it does not meet this requirement. Second, a good postdictor of accuracy should be minimally susceptible to distortions; self-report measures, such as how good a view the witness had of the criminal and how much attention the witness paid to the criminal at the time of the crime, are based on memory processes, and such retrospective accounts can be biased by a variety of factors (Wells & Bradfield, 1999). Third, a good postdictor of accuracy should be difficult to become dissociated from the accuracy of the identification itself; measures such as an eyewitness's confidence in the identification can be changed dramatically after the identification, diminishing its usefulness as a postdictor. The type of lineup given to eyewitnesses (simultaneous or sequential) has already been shown to satisfy these requirements and has been shown empirically to be a good postdictor of accuracy. Are there other valid postdictors of eyewitness accuracy that were overlooked by the Supreme Court?

Recent research has shown that the length of time it takes witnesses to make an identification from a lineup (decision time) may be a useful and overlooked postdictor of eyewitness accuracy. Decision time is strongly and negatively related to accuracy; witnesses who correctly identify the culprit from a lineup tend to do so significantly more quickly than people who identify an innocent person (Kneller, Memon, & Stevenage, 2001; Sporer, 1992, 1993). Decision time is a function of a behavior as opposed to a self-report and is therefore less susceptible to distortions, and less likely to become dissociated from accuracy, than are
many other possible postdictors such as eyewitness confidence. Smith, Lindsay, and Pryke (2000) entered eleven variables associated with accuracy into a multiple regression and found that decision time was the strongest postdictor of accuracy. For these reasons, decision time may be one of the more promising postdictors of accuracy of which researchers are currently aware. But why is decision time a good postdictor?

**Controlled versus Automatic Processing**

It is generally thought that the identification of the culprit occurs via a different cognitive route than the identification of an innocent person (Dunning & Stern, 1994). Identification of the culprit is a recognition task - the eyewitness has seen the actual culprit before and recognizes that person from the lineup. The recognition process tends to be automatic; that is, it occurs quickly and effortlessly with little awareness. Accordingly, research participants who correctly identify the culprit from a lineup (and thus have performed a recognition task) tend to endorse statements describing their identification process as automatic (Dunning & Stern, 1994; Kneller et al., 2001). For example, they tend to report the culprit's face as having "popped out" at them, and that they knew that the person they identified was the culprit but did not know why. Conversely, identification of an innocent suspect is not a recognition task because the witness has not seen that person before. Research participants who incorrectly identify an innocent person tend to engage in a more time-consuming, effortful, and reasoned process in order to arrive at their identification decision. These witnesses tend to endorse statements describing their identification process as more deliberate and controlled (Dunning & Stern, 1994; Kneller et al., 2001). For example, they tend to report having engaged in a process of elimination in order to identify someone from the lineup. Evidence from research such as this supports the idea that accurate
judgments seem to be the ones made automatically, with little effort, and with little reasoned analysis (Robinson & Johnson, 1998). Research shows that facial recognition may be an especially non-analytic task (e.g., Lewicki, 1986), which explains why deliberation does not seem to help the identification process. In fact, not only is controlled deliberation not helpful to the identification process, but it can actually harm it. Participant eyewitnesses who are asked to analyze or verbalize features of someone's face (and thus engage in a controlled process) show an impaired ability to later identify that person from a lineup (Schooler & Engstler-Schooler, 1990; Meissner & Brigham, 2001).

This distinction between automatic recognition judgments and controlled reasoned judgments that is found in the eyewitness literature is very similar to a number of more general dual-processing theories that have dichotomized cognitive processing in various ways. For example, distinctions have been made between central and peripheral processing (Petty & Cacioppo, 1981), experiential versus rational processing (Epstein, 1994), spontaneous versus deliberative processing (Fazio & Towles-Schwen, 1999), associative versus rule-based reasoning (Sloman, 1996), heuristic versus systematic processing (Chaiken, 1980; Chaiken, Liberman, and Eagly, 1989), and automatic versus controlled cognitive processing (Schneider & Shiffrin, 1977; Shiffrin & Schneider, 1977; Schneider & Chein, 2003). Although the specific dual-processing theories differ in a number of respects, they all share the same basic characterization that humans have one cognitive system that is rapid, effortless, and holistic and another that is slow, effortful, and analytic. For the sake of simplicity, this proposal will use Shiffrin and Schneider's nomenclature of automatic and controlled processes, respectively, to describe these two general cognitive systems because their dichotomization is the most widely known dual-process theory. This is not to say,
However, that the various other theories should be rejected in favor of the automatic/controlled distinction.

Under this distinction, controlled processes are capacity limited, require attention, tend to be verbally-mediated, and are under the control of the subject. In contrast, automatic processes are not capacity limited, do not require attention, do not tend to be verbally-mediated, and are activated without need for control by the subject. Because automatic processes do not require control or attention, they can act in parallel, and thus tend to run to completion relatively quickly. Controlled processes, on the other hand, require control and attention, and thus must act in serial, resulting in a longer time to run to completion. Hence, an automatic process should tend to be quicker than an analogous controlled process (Shiffrin & Schneider, 1977). This basic cognitive psychology finding translates well to the eyewitness area and helps explain why decision time is such a good postdictor of accuracy. An eyewitness identification based on a recognition judgment (which is an automatic process) should be quicker than an eyewitness identification based on a reasoned judgment (which is a controlled process). Therefore, an identification that occurs quickly from a lineup should tend to indicate an automatic process, and hence a recognition experience (i.e., the culprit is in the lineup). Conversely, an identification that occurs slowly should tend to indicate a controlled process, and hence the absence of a recognition experience (i.e., the culprit is not in the lineup).

In fact, the distinction between controlled and automatic processes corresponds fairly well with a well-established dichotomization in the eyewitness literature between relative and absolute judgment strategies, respectively (Wells, 1984b). Witnesses who claim that the culprit "popped out" at them from the lineup, or that they recognized the culprit but did not
know why, are thought in the eyewitness literature to have arrived at their identifications primarily through an absolute judgment strategy. It is thought that these witnesses primarily tend to compare each member of the lineup to their memory of the culprit, and make an identification if a match between a lineup member and their memory is made. Conversely, those witnesses who claim that they compared the lineup pictures with each other, and that they engaged in a process of elimination, are thought to have arrived at their identifications primarily through a relative judgment strategy. It is thought that these witnesses primarily tend to compare the members of a lineup to each other and make an identification of the person who looks most like the criminal. Whereas this is often not a problem when the culprit is present in the lineup (because the culprit presumably looks more like himself/herself than do the other lineup members), when the culprit is not present in the lineup (i.e., there is an innocent suspect in the lineup) witnesses will tend to identify someone nonetheless. As a result, those witnesses who report having engaged in more absolute judgment strategies when viewing a lineup tend to be more accurate in their identifications than those witnesses who report having engaged in more relative judgment strategies when viewing a lineup (Lindsay & Bellinger, 1999).

As they relate to eyewitness behavior, then, absolute judgments are characterized by quick, automatic, and non-deliberative identification strategies whereas relative judgments are characterized by slow, controlled, and deliberative identification strategies. The fact that identifications made with absolute judgment strategies tend to be more accurate than identifications made with relative judgment strategies suggests that reliance upon controlled processes when making identifications may be detrimental. Unfortunately, witnesses are very easily enticed into relying on more controlled processes such as the use of relative judgment
strategies. For example, subtle variations in a lineup administrator's instructions to the witness can drastically increase that witness's proclivity towards comparing lineup photographs to each other and identifying someone, even if the culprit is not in the lineup (Malpass & Devine, 1981). It seems that witnesses who do not experience a feeling of recognition when first presented with a lineup that does not contain the actual culprit (known as a culprit-absent or target-absent lineup) often may engage in the more effortful and deliberate process of a relative judgment strategy, which will tend to lead them to identify an innocent person. Interestingly, the weak confidence-accuracy correlation means that witnesses who make correct identifications are generally only slightly more confident on average than are witnesses who make false identifications, suggesting that witnesses may not be aware that the absence of a quick, effortless, and automatic recognition experience is indicative of a false identification. Assuming that automatic identifications are more accurate than controlled identifications, it is important for the legal system to differentiate between identifications based on effortless recognition and identifications based on effortful deliberation. In fact, because visual facial recognition should be an automatic process, then somehow having witnesses dispense with their slower, analytic processes while viewing a lineup might be desirable. But if witnesses cannot intuitively censor their own tendency to identify someone in the absence of an automatic recognition experience, what can the legal system do to cause witnesses to abandon their reliance on controlled judgments and adopt a reliance on automatic judgments?

In fact, some researchers have already done something similar to this. Recall the introduction of the sequential lineup by Lindsay and Wells (1985). Participants witnessed a mock crime and were then shown a lineup to attempt an identification. Half of the witnesses
were given a standard simultaneous lineup in which the lineup members were presented to the witness at the same time. The other half of the witnesses were given a sequential lineup in which each lineup member was presented to the witness one at a time. These witnesses had to make a decision as to whether the lineup member they were currently being shown was the culprit or not before viewing the next photograph, and once a photograph was viewed, it could not be viewed again. In effect, the sequential lineup forced witnesses to adopt an absolute judgment strategy. Presumably, because the witnesses could not compare the photographs to each other, their reliance on effortful and deliberate identification strategies (such as engaging in a process of elimination) was hindered, and their reliance on more automatic identification strategies (such as following their initial instincts) was necessitated. Therefore, if a reliance on controlled processes causes eyewitness accuracy to deteriorate, witnesses presented with a sequential lineup should have been more accurate than witnesses presented with the standard simultaneous lineup. In fact, Lindsay and Wells showed that compared to simultaneous lineups, sequential lineups resulted in a reduction in false identifications that was proportionately greater than the corresponding reduction in correct identifications.

Cognitive Processing as a Mediator

There are two main findings from the eyewitness literature that relate to the distinction between controlled and automatic processes: quick identifications are more likely to be accurate than slow identifications, and identifications made with absolute judgment strategies are more likely to be accurate than identifications made with relative judgment strategies. It is proposed here that the reason for both of these findings is that any reliance on controlled and effortful cognitive processing (i.e., deliberate and effortful thinking) during
lineup identifications harms the accuracy of the identifications, and any reliance on automatic and effortless cognitive processes during lineup identifications improves the accuracy of the identifications. It appears that this simple concept may be one of the most powerful determinants of eyewitness accuracy - decision time and judgment strategy are two of the best postdictors of eyewitness accuracy of which researchers are currently aware. The reason that they may be so good at postdicting eyewitness accuracy is that they are both proxies for the amount of cognitive processing that is taking place. In other words, perhaps there is nothing about decision time or judgment strategy per se that determines eyewitness accuracy, but perhaps it is the fact that they are both reflecting the more general underlying concept of deliberate thinking that explains their usefulness as postdictors. Because quick decisions and absolute judgments are both indicative of little cognitive effort (and thus suggest a recognition experience), the findings of these two disparate concepts may actually be tapping into the same construct of cognitive processing. The main purpose of this study, therefore, is to test the prediction that limiting witnesses' deliberate thinking about a lineup will increase their accuracy.

Interestingly, this prediction falls in line with the more general social psychological finding that deliberate cognitive processing harms certain types of decision-making. For example, participants asked to generate and list reasons for why they liked or disliked various types of jams before rating them were less congruent with professional tasters in their ratings than participants who simply rated the jams without generating and listing reasons for their rating (Wilson & Schooler, 1991). In another study, ratings of romantic partners by participants who first generated and listed reasons for why they liked their partner were less predictive of relationship stability than the ratings of romantic partners by participants who
did not first generate and list reasons for why they liked their partner (Wilson, Dunn, Bybee, Hyman, & Rotondo, 1984). In other words, some types of decision-making are best done without conscious deliberation, and can be hampered by cognitive processing. The same principles may hold true for eyewitness identifications; relying on non-deliberative processes may lead to more accurate identifications and explicitly thinking about the lineup may actually harm the identification process.

But how does one stop witnesses from thinking during an identification process? The way witnesses think during a lineup identification has largely been an estimator variable, out of the control of the legal system. How can one transform this estimator variable into a system variable? Lindsay and Wells (1985) have already accomplished that goal to a certain extent; their introduction of the sequential lineup forced witnesses to abandon specific controlled judgment strategies such as comparing the pictures to each other. Forcing abandonment of controlled, comparative judgments in this way has been shown to increase eyewitness accuracy and has been adopted by the legal system. In fact, in 2001, New Jersey became the first state to mandate the use of the sequential lineup for all eyewitnesses. In such a way, judgment strategy, normally an estimator variable, has been manipulated as a system variable.

It is possible to manipulate cognitive processing another way. Because deliberate thinking is a controlled process that takes time, limiting the amount of time witnesses have to make an identification decision necessarily limits the amount of controlled processing in which they can engage. Decision time, however, is a trickier variable than judgment strategy to manipulate. Decision time is an estimator variable; the legal system does not control the length of time it takes a witness to identify someone from a lineup, and it is doubtful whether
it would ever consider doing so. As a result, its use in the eyewitness literature has been
somewhat limited to the estimation of its correlation with accuracy under varying conditions
(e.g., Dunning & Perretta, 2002; Kneller et al., 2001; Sporer, 1992, 1993). This is especially
unfortunate considering that decision time is such a good postdictor of accuracy. It would be
beneficial if decision time could be manipulated; its superiority as a postdictor of accuracy
coupled with its ability to be manipulated as a system variable could allow us to
experimentally examine its role in eyewitness accuracy more clearly. Is it possible, therefore,
to manipulate decision time?

In fact, something very similar to manipulating decision time has been done before. Brewer, Gordon, and Bond (2000) and Dunning and Perretta (2002) reported attempts to
increase eyewitness accuracy by limiting the amount of time witnesses had to view and make
an identification decision from a lineup. Although these manipulations did not technically
manipulate decision time per se (because eyewitness could have made their decisions before
their allotted time was up), what was manipulated was allowable deliberation time—the
possible time witnesses had to think about and process the lineup. To the extent that
deliberation harms the identification process, limiting allowable deliberation time should
increase eyewitness accuracy. In both sets of studies, however, limiting allowable
deliberation time had no effect on accuracy. Schooler and Engstler-Schooler (1990) also
assessed the effects of manipulating allowable deliberation time on facial recognition. In
their series of studies they found that having participants verbally describe the appearance of
a person's face before attempting an identification of that person from a stimulus array of six
people (the target plus five distractors) significantly impaired those participants' recognition
of that person from the array. Note that this is consistent with the idea that controlled, verbal
processes harm the identification process. Additionally, it was found that limiting the amount of time that the participants had to make their identification decisions to five seconds caused this impairment to disappear. Thus, after verbalization, limiting allowable deliberation time eliminated the impairment in eyewitness accuracy. It is important to note, though, that the purpose of this study was to show that limiting allowable deliberation time could eliminate the negative effects of explicit verbalization. The purpose was not to address the issue of whether limiting allowable deliberation time could actually increase accuracy rates in the absence of verbalization. However, because the experimental design of the study fully crossed allowable deliberation time (unlimited or limited) with verbalization (absent or present), analyzing the simple main effects of allowable deliberation time in the absence of verbalization is relevant to the proposed study. In fact, contrary to the hypothesis that limiting allowable deliberation time increases accuracy, it was found that there was no simple main effect of allowable deliberation time among participants who were not in the verbalization condition.

Unfortunately, none of these failed experiments included stimulus arrays in which the target was absent; all studies used only arrays in which the actual target was present. When testing the prediction that limiting controlled processing can improve witness accuracy, however, it is essential to include a target-absent condition for at least two reasons. First, from a theoretical perspective, including target-absent conditions (i.e., culprit-absent lineups) as well as target-present conditions (i.e., culprit-present lineups) helps control for response bias. It may be, for example, that a manipulation that limits controlled processing does in fact increase hit rates (i.e., identifications of the culprit from culprit-present lineups). However, unless one also knows how false identification rates (i.e., identifications of an innocent
suspect from culprit-absent lineups) are affected by the manipulation, one cannot say how eyewitness accuracy was affected overall. For example, perhaps the manipulation only increases witnesses' proclivity towards making an identification, regardless of whether they view a culprit-present or culprit-absent lineup. If the manipulation causes false identification rates to increase to a proportionately greater extent than hit rates, average eyewitness accuracy actually decreases, despite the increase in hits. Thus, an interpretation of the effect of any manipulation on eyewitness accuracy must include an analysis of the manipulation's effect on responses to target-absent lineups as well as target-present lineups.

Second, from a more applied perspective, including target-absent lineups maintains a certain degree of ecological validity to the eyewitness experiments. Real-world lineups may or may not contain the actual perpetrator of the witnessed crime. Thus, in order to generalize from eyewitness experiments to the real world, it is necessary to include experimental conditions that simulate important real world experiences, such as the potential for witnesses to encounter target-absent lineups as well as target-present lineups.

In the context of the specific study reported here, it is especially necessary to include target-absent lineups because it is in those lineups where it is suspected that the manipulations will have their greatest impact. Presumably, quick identification decisions tend to be accurate because witnesses experience an automatic and spontaneous feeling of recognition. Hence, limiting witnesses' allowable deliberation time while viewing lineups in which the actual culprit is present (culprit-present lineups) should not significantly increase accuracy because witnesses who experience an automatic feeling of recognition should do so regardless of the length of time they have to deliberate. Consequently, it is not surprising that previous studies did not find differences in accuracy as a function of allowable deliberation
time because they only used target-present arrays. According to the idea proposed here - that deliberate thinking leads to inaccurate identifications - it is the culprit-absent lineups in which decision accuracy should increase by limiting allowable deliberation time. Because eyewitnesses should not experience a feeling of automatic recognition from culprit-absent lineups, limiting those witnesses' allowable deliberation time should limit their controlled cognitive processing about the lineup, which should reduce their tendency to identify someone compared to witnesses who have a longer time to deliberate about and make their decisions.

*The Present Study*

The present study tested whether limiting witnesses' controlled cognitive processing can help the identification process. Cognitive processing was manipulated by manipulating the amount of time witnesses were allowed to deliberate about their identification decisions from lineups (both culprit-present and culprit-absent). If the hypothesis proposed here is true, then limiting allowable deliberation time, and thus the amount of deliberation in which a witness can engage, should lead to fewer false identifications from culprit-absent lineups. Of course, shortening allowable deliberation time should only increase accuracy up to a point. There is undoubtedly a deliberation time that is so short that witnesses simply do not have time to process the faces in the lineup. Obviously, at this point, shorter deliberation times should fail to increase accuracy, and should instead decrease accuracy.

The current study manipulated allowable deliberation time by forcing eyewitnesses to make their identification decisions within a specified window of time. Witnesses who were forced to make quick decisions should not have been able to deliberately cognitively process the lineups to a significant extent, and consequently, their lineup decisions should be more
accurate than witnesses who were permitted more time to deliberate about their decisions. It is possible that forcing quick decisions would also lead to a decline in the rate of correct identifications from target-present lineups (because presumably, some correct identifications are made through an analytic and thoughtful process). Because it is assumed that most correct identifications are made through automatic recognition judgments, however, the primary prediction for this study is that shortening the amount of time that witnesses were allowed to deliberate about their identification decisions should increase their accuracy from culprit-absent lineups at a rate proportionately greater than the corresponding decrease in their accuracy from culprit-present lineups. In other words, decreasing allowable deliberation time should decrease the number of false identifications resulting from controlled processes at a rate proportionately greater than that of the corresponding decrease in the number of correct identifications resulting from automatic processes.

The current study measured accuracy at a slightly different level than traditional eyewitness studies. Most eyewitness studies have measured accuracy by having the eyewitnesses either identify a specific person from a lineup or reject the lineup entirely. The current study essentially broke this process down into two separate steps. First, witnesses were asked the more general question of whether they thought the criminal was somewhere in the lineup or not. After responding to this question, they were then asked whom they would identify if they had to identify someone. Breaking down witnesses' identifications into these two separate steps accomplished two purposes. First, even witnesses who indicated that they did not think the criminal was in the lineup were nonetheless asked to select the lineup member they would identify if forced to identify someone. Because some witnesses were only shown the lineups for a very short period of time, it is possible that they did not have
time to become confident enough to identify anyone, even if the criminal was in the lineup. Having witnesses identify someone after they have rejected a lineup could reveal that these witnesses had knowledge of the presence of the criminal, but only lacked the confidence to make an identification. Conditions in which witnesses were allowed only short deliberation times could have lead to a lower rate of identification attempts than conditions in which witnesses were allowed longer deliberation times. Thus, by having everyone make an identification regardless of whether they rejected the lineup or not, differential rates of identification between the different deliberation time conditions could be eliminated.

The second reason that witnesses' identification responses were broken into two separate steps is that it was possible that after a briefly-presented lineup, eyewitnesses may have had knowledge of the presence or absence of the criminal in a lineup without being aware of the criminal's exact position within the lineup. If this is the case, then only asking witnesses to identify a given lineup member may have overlooked their more general knowledge of the presence or absence of the criminal. Contrary to this idea, numerous cognitive psychology studies have demonstrated that target identification is conditioned on target localization; in other words, if people can identify a target from a briefly-presented array, they must also have knowledge of that target's position within that array (Johnston & Pashler, 1990; Donk & Meinecke, 2001). These studies, however, used simple stimuli (such as letters) as targets and distractors. Because faces are much more complex stimuli, it is unclear whether the finding that target identification is conditioned on target location also holds for lineups. Also, those studies used exact stimulus recognition; in other words, the stimuli presented to the participants before the identification task were exactly the same as the stimuli presented to the participants during the identification task. Lineups function
differently; the picture of a criminal within a lineup (the target) is not exactly the same stimulus that was presented to the witness earlier (during the crime). Whether a lineup task (in which the task is to identify someone if a picture of the criminal is sufficiently similar to one's memory of the criminal) is equivalent to the more classic cognitive psychology recognition tasks (in which the task is to identify a target if it is exactly the same as a previously-seen stimulus) in terms of one's knowledge of target identity and location is unknown, and therefore, the relevance of results of those studies is unclear. Consequently, it is possible that identification of the criminal is not conditioned on location of the criminal within the lineup; separating the identification task into two separate tasks should speak to this issue. By measuring eyewitness accuracy at a level that takes into consideration witnesses' sensitivity to the presence or absence of a criminal in a lineup, the present study was designed to potentially uncover eyewitness response patterns overlooked by most other eyewitness studies.

Confidence

Because confidence is such a prevalent and important variable within the eyewitness literature as well as within the court system itself, a short discussion of its relevance to the present study is warranted. One of the reasons that controlled processing may result in worse identification decisions from a culprit-absent lineup is that witnesses' confidence may become unjustifiably inflated as they think about the lineup, leading to a greater likelihood of identifying someone. In fact, Wells and Bradfield (1999) showed that having eyewitnesses engage in reflective thought inflated their false confidence. Hence, manipulations that prohibit deliberate thinking, or at least limit it, should also fail to inflate one's confidence. Therefore, because limiting allowable deliberation time was expected to limit deliberate
cognitive processing, it was predicted that as allowable deliberation times became shorter across conditions, that eyewitnesses' average confidence in their decisions would become lower as well.

It has thus far been hypothesized that limiting witnesses' deliberate thinking should result in lower confidence but increased accuracy (compared to allowing witnesses to engage in as much deliberate thinking as they want). Although at first glance this might seem to indicate that limiting deliberate thinking would cause the confidence-accuracy correlation to increase as witnesses become less overconfident, remember that the confidence-accuracy correlation, in effect, represents the difference in mean confidence between accurate witnesses and inaccurate witnesses. If limiting deliberate thinking causes witness confidence to decrease regardless of the witnesses' accuracy, the difference in mean confidence between accurate and inaccurate witnesses (i.e., the confidence-accuracy correlation) would remain the same. Consequently, predictions as to the effect of deliberate thinking on confidence and accuracy separately cannot speak to the prediction of what will happen to the confidence-accuracy correlation.

Nonetheless, the confidence-accuracy correlation tends to be small under normal circumstances, perhaps because inaccurate eyewitnesses tend to be overconfident in their identification decisions (Bradfield, Wells, & Olson, 2002). Thus, manipulations that reduce (over)confidence in inaccurate eyewitnesses (but not accurate witnesses) might increase the confidence-accuracy correlation. To the extent that limiting controlled processing reduces the confidence of inaccurate witnesses to a greater extent than in reduces the confidence of accurate witnesses, the manipulation should also increase the confidence-accuracy correlation.
Empirical studies have produced results consistent with the idea that limiting witnesses' deliberate thinking should help the confidence-accuracy correlation. Robinson and Johnson (1998) examined a number of potential moderators of the confidence-accuracy correlation, including context reinstatement, public self-consciousness, and retrospective narration, among others. Contrary to their predictions that these variables would lead to an improvement in the confidence-accuracy correlation as a result of improved insight into the identification process, they found that only participants in the control condition experienced unqualified insight into their identification accuracy. The authors hypothesized that their various manipulations failed to improve the confidence-accuracy correlation because they were designed to increase deliberate thinking about the lineup. Because the current study was designed to limit, as opposed to increase, witnesses' deliberate thinking, it was predicted that this manipulation would improve the confidence-accuracy correlation.

Hypotheses

This study, therefore, tested the general hypothesis that deliberate and effortful thinking impairs eyewitnesses' lineup identification accuracy (or, stated differently, that not engaging in deliberate and effortful thinking improves eyewitnesses' lineup identification accuracy). The more specific predictions can be summarized as follows:

1) Limiting the time that witnesses have to deliberate about their identification decisions from a lineup should lead to a reduction of false identifications from culprit-absent lineups that is significantly and proportionately greater than the corresponding reduction of correct identifications from culprit-present lineups.

2) Eyewitnesses' confidence in their identification decisions should be
highest in the control condition and decrease across conditions as allowable deliberation time gets shorter.

3) The confidence-accuracy correlation should be higher in the conditions in which allowable deliberation time has been limited than in the control condition.

From hypothesis 1 it can be seen that an interaction was predicted between lineup type (culprit-present and culprit-absent) and allowable deliberation time. These specific hypotheses all stem from the more general hypothesis that any manipulation that discourages controlled processing when viewing a lineup should increase eyewitness accuracy in the absence of an automatic recognition experience.

It should be mentioned that the purpose of the reported research is almost entirely theoretical. Undoubtedly, the legal system would strongly resist actually limiting witnesses' allowable deliberation time in a real world setting, and the thrust of this research is not to suggest that this procedure should be implemented. Rather, the focus of this study is on the more general theoretical principle that deliberate thinking can be harmful to the identification process. Hopefully, the findings of this study can help elucidate a possible underlying cognitive process that affects eyewitness accuracy, and the more general theoretical principles that these studies hope to demonstrate may offer insight into procedures that may be developed and used with real world eyewitnesses. However, the manipulation used in this study does not purport to be that procedure.
METHOD

Participants

Participants were drawn from the research pool of undergraduate psychology students at Iowa State University. All participants received extra credit for their participation. Sample size was determined as follows:

\[ n_j = \frac{2 (Z_{a/2} + Z_p)^2}{d^2} + 1 \]

Using alpha = .05, power = .80, and a meaningful effect size = .5 (defined as a medium effect size in Cohen, 1988):

\[ n_j = \frac{2 (1.96 + .842)^2}{.5^2} + 1 = 64 \text{ participants per between-subjects condition.} \]

The present study had four between-subjects conditions, and it was therefore initially planned to use 64*4 = 256 participants. Some participants' data was excluded because they had already seen the stimulus video, and a few extra participants were run through the experiment; hence 259 participants total participated in the experiment.

Design

The design of this study was a 2 (lineup type: present or absent) X 4 (allowable deliberation time: 1.5 s, 3.0 s, 10.0 s, or 30.0 s) mixed factorial, with lineup type as the within-subjects factor and allowable deliberation time as the between-subjects factor.

Procedure

Participants entered the lab either individually or in groups of two, but viewed the mock crime and all subsequent lineups individually. Participants were randomly assigned to one of four between-subjects conditions corresponding to the different amounts of time witnesses had to deliberate about the lineups - 1.5 seconds, 3.0 seconds, 10.0 seconds, or 30.0 seconds (the control condition). These deliberation times were chosen such that the shortest
time (1.5 seconds) was thought to be too short to adequately scan the array of photographs, the next shortest deliberation time (3.0 seconds) was thought to be just adequate to scan the array, the next shortest deliberation time (10.0 seconds) was thought to approximate the upper time boundary after which eyewitness accuracy significantly declines (Dunning & Perretta, 2002), and the longest deliberation time (30.0 seconds) was thought to be long enough to have given all eyewitnesses adequate time to completely process the lineup.

Upon entering the lab, participants read and signed a consent form and were told that they would be watching a short video about some people and that we were interested in their impressions of those people. They were individually led to private cubicles and seated directly in front of a computer. The experimenter started a video on the computer through the software program Medialab and left the room. The video briefly stated that the participant would be shown a short clip of four people and that the participant should pay close attention to these people because we were interested in his or her impressions of those people. The video described the four people in the upcoming clip in terms of their sex and hair (male with short, dark hair, male with blond hair, female with blond hair, female with dark hair).

Participants then viewed a video of a mock crime in which the four individuals drove up to a locked garage, cut the lock, entered the garage, took a number of items out of the garage, placed them in a car, and ran away once they discovered that someone was aware of their presence. The video lasted approximately four minutes; the faces of each of the four individuals were clearly visible for a portion of that time. At the termination of the mock crime, a short instructional video automatically played for each participant. This video stated that the participant was now an eyewitness to a crime and that he or she would be asked to view four lineups, one for each of the suspects, and would be required to indicate whether the
criminal was present or absent from each lineup, his or her confidence in the choice, and which person he or she would identify if forced to identify someone from the lineup. Participants were instructed that the actual criminals may or may not be in the lineups and that there was an equal chance of viewing a present or an absent lineup for each suspect. (In reality, each participant viewed two culprit-present lineups and two culprit-absent lineups for data analytic purposes; however, in order to maintain independence between observations, participants were led to believe that all combinations of present/absent lineups were possible). Participants were also instructed to use a 50% criterion for determining whether each criminal was in his or her respective lineup such that if the participant was more than 50% confident that the criminal was in the lineup, he or she should indicate that the criminal was present. Similarly, if the participant was more than 50% confident that the criminal was not in the lineup, he or she should indicate that the criminal was absent. This instruction was added to control for individual differences in identification criteria. Finally, the video demonstrated to the participants how to make their lineup decisions on the computer.

At the termination of the video, a different software program called DirectRT displayed lineups to the participants. Participants were first shown four practice lineups in which they were asked to identify whether George W. Bush and Bill Clinton were present or absent (they viewed one present lineup and one absent lineup for each target). The presentation of the practice lineups was identical to the presentation of the actual lineups; participants were required to respond to the lineups after the same length of time that corresponded to their condition (i.e., 1.5 s, 3.0 s, 10.0 s, or 30.0 s). All lineups were presented in a 2 (rows) X 3 (columns) photo array on the computer screen. Each of the six pictures within each lineup measured approximately 3.0 inches tall X 2.5 inches wide. Participants
were then shown the real lineups in one of two versions. In version 1, participants viewed culprit-present lineups for male A and female A, and culprit-absent lineups for male B and female B. In version 2, participants viewed culprit-present lineups for male B and female B, and culprit-absent lineups for male A and female A. Participants were randomly assigned to which version of the lineups they received, as well as to the order in which they viewed the lineups within their version. Finally, the location of the criminal/innocent suspect was randomized for all lineups such that each criminal/innocent suspect, and each filler, randomly occupied any of the six possible positions in the photo array. Before each lineup, participants were cued, by means of the sex and hair color of the suspect, as to which of the four lineups they were about to view (male with short, dark hair; female with blond hair, etc.). All members of each lineup matched the description of the suspect contained in that lineup.

After each participant's allotted deliberation time (according to condition) expired, the lineup disappeared and the participants heard a beep. Participants were then given 5.0 seconds to indicate whether the criminal was in the lineup or not by pressing a key on the keyboard with the word "yes" on it (if they thought that the criminal was in the lineup) or by pressing a key on the keyboard with the word "no" on it (if they thought that the criminal was not in the lineup). Alternatively, if the participants could not make a decision one way or the other, they could make no response at all; the experiment automatically proceeded at the end of the 5.0-second decision period. Participants heard beeps at one-second intervals for the duration of the 5.0 seconds, and saw a timer count down from five to zero. Once the 5.0-second response window was over, participants heard a beep of a lower pitch. Immediately once the participant made his or her response to the lineup (or, if the participant did not make a response, once the final beep occurred) the computer screen automatically changed to a
blank screen. No responses were recorded prior to, or following, this 5.0-second response window. Following each lineup, participants who had explicitly responded to the lineup were then asked their confidence in their choice, ranging from 50% to 100% in 10% increments. (Recall that the participants were asked to use a 50% confidence criterion for making their decisions, and thus the lower bound for their confidence in their pick should have been 50% if they were completely guessing). Participants who did not make a response to the lineup were not asked this question. All participants were then asked whom they would identify from the lineup if they were forced to identify someone, regardless of whether they had previously stated that the culprit was present or absent. The six different lineup positions were numbered according to a diagram on the wall behind the computer, and participants responded by pressing the number key that corresponded to the position of the person they would identify. After all four lineups had been viewed and all questions had been answered, the participants were asked to indicate their sex and their level of suspicion that they knew that they were going to have to make an identification before viewing the video. Participants were then debriefed, thanked, and excused.
RESULTS

Overview

To examine the three main hypotheses, analyses were undertaken to examine a) differences in accuracy between cells, b) differences in confidence between cells, and c) differences in the confidence-accuracy correlation between cells. Because the presentation order of the lineups, the position of the criminals/suspects within each lineup, and which specific criminal-present and criminal-absent lineups the participants viewed were all randomized, data were not analyzed based on these factors. Also, because the predictions of the current study were not concerned with specific individual criminals, the data were analyzed by collapsing across the four criminals. In order to look at accuracy, an accuracy score was calculated for each participant. Recall that each participant viewed two lineups in which the actual criminal was present and two lineups in which the actual criminal was absent. Therefore, a given participant could have made either zero, one, or two correct identification decisions from the criminal-present lineups (i.e., by saying that the criminal was present in the lineup), and zero, one, or two correct identification decisions from the criminal-absent lineups (i.e., by saying that the criminal was not present in the lineup). An accuracy score of zero, one, or two was calculated for each participant for both the criminal-present and criminal-absent lineups. In other words, one accuracy score for criminal-present lineups and one accuracy score for criminal-absent lineups was calculated for each participant. When examining accuracy, the principal unit of analysis was this accuracy score.

Recall as well that participants were not required to respond to the lineup if they could not decide whether a given criminal was in a given lineup. A non-response to a lineup occurred 57 times out of 1036 lineups (259 participants who each saw four lineups), or 5.5%
of all lineups. These 57 incidents of non-responses were made by 40 (out of 259) participants, or 15.4% of all participants. The proportion of non-responders differed significantly as a function of allowable deliberation time, \( \chi^2 (3, N=259) = 13.87, p < .05 \). Post-hoc analyses revealed that there were significantly more non-responders in the 1.5 s deliberation time condition \((n = 32)\) than in the 3.0 s \((n = 12)\), the 10 s \((n = 6)\), or the 30 s \((n = 7)\) deliberation time conditions, \( \chi^2 = 13.78 (1, N=259), p < .05 \). The remaining three deliberation time conditions did not differ significantly from each other in terms of non-responders, \( \chi^2 (2, N = 191) = 3.70, n. s. \)

For purposes of data analysis, non-responses were treated in two different ways. Non-responses in the present study resulted from witnesses both being unable to identify a criminal and being unable to say that the criminal was not in the lineup (otherwise known as "rejecting" the lineup), and were consequently conceptually similar to responses from witnesses from other eyewitness studies who respond that they "don't know" whether the criminal is in the lineup. Wells and Olson (2002) showed that "don't know" responses to lineups have diagnostic value in that they tend to indicate that the perpetrator is not in the lineup. Thus, an interpretation of "don't know" responses is that the witness failed to identify the criminal, and is therefore implicitly rejecting the lineup. Analyses were therefore conducted that treated non-responses as lineup rejections.

Because non-responses may be qualitatively different than lineup rejections, however, all analyses were also repeated with non-responses being excluded from the data set. Unfortunately, simply excluding non-responses led to a statistical problem. Accuracy scores in each cell were an average of participants' accuracy scores, which were themselves an average based on two responses. Excluding an individual's single non-response meant that
that individual's accuracy score for that particular cell would have been based on only one response, whereas everyone else's accuracy score within that particular cell would be based on two responses. Pooling accuracy scores based on one response with accuracy scores based on two responses would have created an undefined error term for that cell's mean. Therefore, when an individual made a non-response to one or more lineups, it was necessary to exclude all of that individual's data from the analyses. As a result, 40 participants were excluded from the data set when making these analyses.

All accuracy results were therefore calculated twice: once by treating non-responses as lineup rejections and again by eliminating non-responders from the data set. Eliminating non-responders did not change the pattern of means or the results of significance tests; therefore, only accuracy results based on treating non-responses as lineup rejections are reported in the text and in tables. Significance test results for accuracy scores based on excluding non-responders from the data set are shown in Appendix A. Percentages of accurate witnesses based on excluding non-responders from the data set, as a function of lineup type and allowable deliberation time, are shown in Appendix B.

Choosing rates

Overall, participants responded that a criminal was present in a lineup 34.7% of the time. In order to examine choosing rates (the rate at which participants responded to the lineups by saying the criminal was present) as a function of lineup type (target-present or target-absent) and allowable deliberation time, choosing scores were calculated for every participant. Because every participant was shown two target-present lineups and two target-absent lineups, every participant could have chosen to identify a criminal 0, 1, or 2 times from target-present lineups, and 0, 1, or 2 times from target-absent lineups. Thus, every
participant received a choosing score of 0, 1, or 2 for target-present lineups, and another choosing score of 0, 1, or 2 for target-absent lineups. The percentages of witnesses choosing to make an identification, as a function of allowable deliberation time and lineup type, are displayed in Table 1. Choosing scores in the target-present condition were significantly higher than choosing scores in the target-absent condition, $F(1, 255) = 27.25, MSE = .42, p < .01$, suggesting that witnesses were able to some extent to identify the criminals when they were present in the lineups. The main effect of allowable deliberation time on choosing rates was not significant, $F(3, 255) = 1.62, MSE = .46, n. s.$; however, a linear contrast revealed a significant linear effect of allowable deliberation time on choosing rates, $F(1, 255) = 119.02, p < .001$, indicating that witnesses were increasingly more likely to attempt an identification as allowable deliberation time was limited. The interaction between allowable deliberation time and lineup type was not significant, $F(3, 255) = 1.82, MSE = .42, n. s.$

Table 1. Percent of Eyewitnesses Who Chose to Identify a Lineup Member as a Function of Allowable Deliberation Time and Lineup Type

<table>
<thead>
<tr>
<th>Allowable Deliberation Time</th>
<th>1.5 s</th>
<th>3.0 s</th>
<th>10.0 s</th>
<th>30.0 s</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target-present</td>
<td>.44 (.34)</td>
<td>.47 (.36)</td>
<td>.44 (.34)</td>
<td>.33 (.34)</td>
<td>.42 (.34)</td>
</tr>
<tr>
<td>Target-absent</td>
<td>.34 (.34)</td>
<td>.24 (.30)</td>
<td>.24 (.28)</td>
<td>.26 (.34)</td>
<td>.27 (.32)</td>
</tr>
<tr>
<td>Mean</td>
<td>.39 (.26)</td>
<td>.36 (.24)</td>
<td>.34 (.22)</td>
<td>.30 (.24)</td>
<td></td>
</tr>
</tbody>
</table>

*Note.* Standard deviations are given in parentheses.
Accuracy

Accuracy scores were assessed in the following three ways:

*Present/Absent decisions.* The first way accuracy was assessed was by using the general present/absent decisions that participants made to each lineup as the dependent variable. A participant was accurate for a given target-present lineup if he or she indicated that a criminal was present, regardless of the specific lineup member that was identified, and was accurate for a given target-absent lineup if he or she indicated that the criminal was not present. A participant was inaccurate for a given target-present lineup if he or she indicated that the criminal was not present, and was inaccurate for a given target-absent lineup if he or she indicated that the criminal was present. Using these present/absent decisions as the basis for calculating accuracy scores, a 2 (lineup type: present or absent) X 4 (allowable deliberation time: 1.5 s, 3.0 s, 10.0 s, or 30.0 s) mixed ANOVA was calculated with lineup type as the within-subjects variable and allowable deliberation time as the between-subjects variable. Percentages of accurate witnesses, based on present/absent decisions, as a function of lineup type and allowable deliberation time, are shown in Table 2. The main effect of lineup type was significant, indicating that participants were significantly more accurate when viewing a target-absent lineup than when viewing a target-present lineup, $F(1, 255) = 107.25, MSE = .46, p < .001$. The main effect of allowable deliberation time was not significant, indicating that participants were equally accurate, as assessed by present/absent decisions, regardless of the length of time they had to deliberate about their decisions, $F(3, 255) = 1.82, MSE = .42, n. s$. Most importantly to the purpose of the study, the interaction between present/absent and allowable deliberation time was not significant, $F(3, 255) = 1.62, MSE = .46, n. s$. 
Table 2. Percent Accurate Eyewitnesses, Based on Present/Absent Decisions, as a Function of Allowable Deliberation Time and Lineup Type

<table>
<thead>
<tr>
<th>Lineup Type</th>
<th>Allowable Deliberation Time</th>
<th>1.5 s</th>
<th>3.0 s</th>
<th>10.0 s</th>
<th>30.0 s</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target-present</td>
<td>.44 (.34)</td>
<td>.47 (.36)</td>
<td>.44 (.31)</td>
<td>.33 (.34)</td>
<td>.42 (.34)</td>
<td></td>
</tr>
<tr>
<td>Target-absent</td>
<td>.66 (.34)</td>
<td>.76 (.30)</td>
<td>.76 (.28)</td>
<td>.74 (.34)</td>
<td>.73 (.32)</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>.55 (.22)</td>
<td>.62 (.23)</td>
<td>.60 (.22)</td>
<td>.53 (.24)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note. Standard deviations are given in parentheses.*

Specific identification decisions. The second way in which accuracy was assessed was by using specific identification responses as the dependent variable. Recall that all participants, even if they had previously stated that the criminal was not in the lineup, were asked whom they would identify if they were forced to identify someone. Thus, a participant was accurate for a given target-present lineup if he or she both a) indicated that the criminal was present in the lineup, and b) identified the actual criminal from the lineup, and was accurate for a given target-absent lineup if he or she indicated that the criminal was not present in the lineup. Note that the calculation of mean accuracy scores based on specific identification decisions in the absent condition is identical to the calculation of mean accuracy scores based on present/absent decisions in the absent condition; in both cases, a participant was accurate if he or she simply indicated that the criminal was not in the lineup. Thus, the difference between the two methods of calculating accuracy scores only affected accuracy scores from target-present lineups.

Using specific identification decisions as the basis for calculating accuracy scores, a
2 (lineup type: present or absent) X 4 (allowable deliberation time: 1.5 s, 3.0 s, 10.0 s, 30.0 s) mixed ANOVA was calculated with lineup type as the within-subjects variable and allowable deliberation time as the between-subjects variable. Percentages of accurate witnesses, based on specific identification decisions from the lineups, as a function of lineup type and allowable deliberation time, are shown in Table 3. The main effect of lineup type was significant, indicating that participants were significantly more accurate when viewing a target-absent lineup than when viewing a target-present lineup, $F(1, 255) = 393.62, MSE = .34, p < .001$. The main effect of allowable deliberation time was not significant, indicating that participants were equally accurate, as assessed by specific identifications, regardless of the length of time they had to deliberate about their decisions, $F(3, 255) = .96, MSE = .38, n. s$. Finally, the interaction between lineup type and allowable deliberation time was not significant, $F(3, 255) = .94, MSE = .34, n. s$.

Table 3. Percent Accurate Eyewitnesses, Based on Specific Identification Decisions, as a Function of Allowable Deliberation Time and Lineup Type

<table>
<thead>
<tr>
<th>Lineup Type</th>
<th>1.5 s</th>
<th>3.0 s</th>
<th>10.0 s</th>
<th>30.0 s</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target-present</td>
<td>.22 (.32)</td>
<td>.20 (.28)</td>
<td>.24 (.26)</td>
<td>.20 (.26)</td>
<td>.22 (.28)</td>
</tr>
<tr>
<td>Target-absent</td>
<td>.66 (.34)</td>
<td>.76 (.30)</td>
<td>.76 (.28)</td>
<td>.74 (.34)</td>
<td>.73 (.32)</td>
</tr>
<tr>
<td>Mean</td>
<td>.44 (.23)</td>
<td>.48 (.22)</td>
<td>.50 (.20)</td>
<td>.47 (.24)</td>
<td></td>
</tr>
</tbody>
</table>

*Note.* Standard deviations are given in parentheses.
Conditional identification accuracy. The third way in which accuracy was assessed was through conditional identifications, which combined the present/absent and specific identification methods of assessing accuracy. These analyses answer the question: Given that the witnesses viewed a target-present lineup and either responded that the criminal was present or that the criminal was absent, what was the rate at which they correctly identified the actual criminal? Percentages of correct identifications from target-present lineups as a function of the response of the witness and allowable deliberation time are shown in Table 4. Due to the nature of the experimental design, it would have been statistically inaccurate to perform an ANOVA comparing "present" witnesses to "absent" witnesses as a function of allowable deliberation time. Because witnesses could not be randomly assigned to respond either "present" or "absent" to any given lineup, and because each participant responded to multiple lineups, some participants responded "present" to one target-present lineup and "absent" to the other target-present lineup whereas other participants responded either "present" or "absent" to both target-present lineups. Thus, the response of the witness ("present" or "absent") was a between-subjects variable for some and a within-subjects

<table>
<thead>
<tr>
<th>Allowable Deliberation Time</th>
<th>1.5 s</th>
<th>3.0 s</th>
<th>10.0 s</th>
<th>30.0 s</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Present&quot;</td>
<td>59.1</td>
<td>44.6</td>
<td>66.0</td>
<td>61.5</td>
</tr>
<tr>
<td>&quot;Absent&quot;</td>
<td>22.9</td>
<td>30.4</td>
<td>24.6</td>
<td>34.2</td>
</tr>
</tbody>
</table>
variable for others. An error term for such a design is undefined, and thus an ANOVA could not be computed. A similar problem exists when attempting to compare either "present" or "absent" witnesses to chance levels of performance. Nonetheless, although statistical tests of significance could not be computed, by looking at the conditional identification rates from Table 4, it appears that witnesses who responded that the criminal was present from a target-present lineup ("present" witnesses) were more likely than chance (1/6, or 16.7%) to identify the actual criminal. Averaged across allowable deliberation times, "present" witnesses correctly identified the criminal approximately 57% of the time. Therefore, although "present" witnesses identified the wrong lineup member roughly 43% of the time on average, they nonetheless seem to have displayed an ability to recognize the actual criminal. Witnesses who responded that the criminal was absent from a target-present lineup ("absent" witnesses) also appear to have been more likely than chance to identify the actual criminal. Averaged across allowable deliberation times, "absent" witnesses correctly identified the criminal approximately 28% of the time. Therefore, despite having rejected a lineup, "absent" witnesses nonetheless seem to have displayed an ability to recognize the actual criminal at a rate greater than chance.

It also appears that participants who responded that the criminal was present in the lineup were more likely to identify the actual criminal than participants who responded that the criminal was not present in the lineup. Although it is statistically impossible to assess whether allowable deliberation time had any significant effect on mean percent correct conditional identifications, it can be seen that such an effect would be relatively small, if it exists at all. Interestingly, upon examination of the extreme allowable deliberation time conditions, it can be seen that "present" witnesses given 1.5 s to deliberate about their
decisions were roughly equally as accurate in their specific identifications as "present" witnesses given 30.0 s to deliberate about their identification decisions.

Confidence

Because confidence measures were only assessed when a response was made to a lineup, all non-responders were necessarily excluded from these analyses. For reasons mentioned above, all data from any participant who made at least one non-response was excluded from the analyses. Mean confidence ratings (which could range from 0 - 100) as a function of allowable deliberation time and lineup type (present or absent) are displayed in Table 5. Allowable deliberation time had a significant effect on confidence ratings, $F(3, 215) = 7.90, MSE = 247.00, p < .001$. Neither lineup type (present or absent) nor the interaction between lineup type and allowable deliberation time had a significant effect on confidence judgments, $F(1, 215) = .19, MSE = 105.50, n. s.$, and $F(3, 215) = 1.15, MSE = 105.50, n. s.$, respectively. In order to determine how allowable deliberation time affected confidence judgments, post-hoc linear contrasts were performed. Because the 30.0 s deliberation time condition was essentially a control condition, comparisons were only made between this control condition and each time-limited condition. Thus, three contrasts were calculated. A Bonferroni correction adjusted for the multiple contrasts that were calculated. Confidence in the control condition was found to be significantly higher than confidence in the 1.5 s condition, $t(215) = -4.23, SE = 2.19, p < .001$, indicating that participants who had 30.0 s to deliberate about their decisions were significantly more confident than participants who had 1.5 seconds to deliberate about their decisions. Participants in the control condition were not significantly more confident than participants in the 3.0 s condition, $t(215) = -1.445, SE = 2.10, n. s.$, or participants in the 10.0 s condition, $t(215) = .04, SE = 2.07, n. s.$
Table 5. Mean Confidence Ratings as a Function of Allowable Deliberation Time and Lineup Type

<table>
<thead>
<tr>
<th>Lineup Type</th>
<th>Allowable Deliberation Time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.5 s</td>
</tr>
<tr>
<td>Target-present</td>
<td>66.9 (12.4)</td>
</tr>
<tr>
<td>Target-absent</td>
<td>66.2 (12.2)</td>
</tr>
<tr>
<td>Mean</td>
<td>66.6 (10.4)</td>
</tr>
</tbody>
</table>

Note. Standard deviations are given in parentheses. Scale range is from 0 to 100. Higher numbers indicate greater confidence.

Confidence-Accuracy Relation

Because confidence scores were only obtained from responders, any participant who made at least one non-response to a lineup was excluded from the confidence-accuracy correlation analyses. Each participant's accuracy score within each lineup type (present or absent) was matched with his or her average confidence within the corresponding lineup type. Thus, each participant had one confidence-accuracy score for present lineups and one confidence-accuracy score for absent lineups.

Table 6 displays the confidence-accuracy correlations when present/absent decisions were used to calculate accuracy scores. The confidence-accuracy correlation in the target-present condition ($r = - .19$) was significantly lower than zero, $t(217) = - 2.85, p < .01$, indicating that on average, when participants were shown target-present lineups, they reported higher confidence when they incorrectly rejected the lineups than when they correctly said the criminal was present in the lineups. The confidence-accuracy correlation in
Table 6. Confidence-Accuracy Correlations, as Calculated by Present/Absent Decisions, as a Function of Allowable Deliberation Time and Lineup Type

<table>
<thead>
<tr>
<th>Lineup Type</th>
<th>Allowable Deliberation Time</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.5 s</td>
<td>3.0 s</td>
</tr>
<tr>
<td>Target-present</td>
<td>.03</td>
<td>-.23</td>
</tr>
<tr>
<td>Target-absent</td>
<td>.10</td>
<td>.24</td>
</tr>
<tr>
<td>Mean</td>
<td>.06</td>
<td>.01</td>
</tr>
</tbody>
</table>

* Indicates that the correlation is significant at the $p < .05$ level

the target-absent condition ($r = .24$) was significantly higher than zero, $t(217) = 3.64$, $p < .001$, indicating that on average, when participants were shown target-absent lineups, they reported higher confidence when they correctly rejected the lineups than when they incorrectly said the criminal was present in the lineups. The correlation was significantly larger in the target-absent condition than in the target-present condition, $z = -4.54$, $SE = .07$, $p < .001$. Looking at the confidence-accuracy correlation as a function of allowable deliberation time (collapsed across type of lineup), none of the correlations were significantly different from zero; 1.5 s: $t(46) = .41$; 3.0 s: $t(54) = .07$; 10.0 s: $t(57) = -.30$; 30.0 s: $t(54) = .74$, indicating that regardless of the amount of time participants had to deliberate about their decisions, participants' confidence showed no relation to their present/absent judgment accuracy. Allowable deliberation time had no effect on the confidence-accuracy correlation.

Table 7 displays the confidence-accuracy correlations when specific identification decisions were used to calculate accuracy scores. The confidence-accuracy correlation from
target-present lineups ($r = - .01$) was not significantly different from zero, $t(217) = - .19$, n. s., indicating that participants who correctly identified the criminal from present lineups were equally as confident as participants who incorrectly rejected the lineups. Recall that responses to target-absent lineups calculated using specific identification decisions are identical to responses to target-absent lineups calculated using present/absent decisions; as such, the confidence-accuracy correlations were also identical. The confidence-accuracy correlation was significantly larger in the target-absent condition than in the target-present condition, $z = - 2.65$, $SE = .07$, $p < .01$. Looking at the confidence-accuracy correlation as a function of allowable deliberation time (collapsed across type of lineup), none of the correlations were significantly different from zero; 1.5 s: $t(46) = 1.02$; 3.0 s: $t(54) = .88$; 10.0 s: $t(57) = .16$; 30.0 s: $t(54) = 1.40$, indicating that regardless of the amount of time participants had to deliberate about their decisions, participants' confidence showed no relation to their specific identification accuracy. Allowable deliberation time had no effect on the confidence-accuracy correlation.

Table 7. Confidence-Accuracy Correlations, as Calculated by Specific Identification Decisions, as a Function of Allowable Deliberation Time and Lineup Type

<table>
<thead>
<tr>
<th>Lineup Type</th>
<th>Allowable Deliberation Time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.5 s</td>
</tr>
<tr>
<td>Target-present</td>
<td>.20</td>
</tr>
<tr>
<td>Target-absent</td>
<td>.10</td>
</tr>
<tr>
<td>Mean</td>
<td>.15</td>
</tr>
</tbody>
</table>

* Indicates that the correlation is significant at the $p < .05$ level
DISCUSSION

The results clearly did not support the hypothesis that limiting allowable deliberation time would improve eyewitness accuracy. As predicted, limiting allowable deliberation time did not affect the rate of correct identifications from target-present lineups. Contrary to predictions, however, limiting allowable deliberation time did not increase the number of correct rejections from target-absent lineups. Limiting allowable deliberation time had no significant effect on accuracy rates at all. This finding is notable not just because it failed to support the main hypothesis, but because it also means that witnesses given 1.5 seconds to deliberate about their lineup decisions were just as accurate as witnesses given 30.0 seconds to deliberate about their lineup decisions. In other words, it seems that identification decisions were made rapidly, and were relatively insensitive to the amount of time that was available to deliberate about those decisions. The null results of this study are consistent with the null findings of other studies that have attempted to increase accuracy by decreasing controlled deliberation (e.g., Brewer, Gordon, & Bond, 2000; Perretta, 1998), although the current study now extends those null findings to target-absent lineups as well.

Consistent with the second hypothesis of this study, there was a significant effect of allowable deliberation time on confidence judgments. Limiting allowable deliberation time to 1.5 s caused participants to become less confident in their present/absent identification decisions. Confidence judgments, therefore, were affected by allowable deliberation time, suggesting a controlled processing component to confidence judgments. But did limiting allowable deliberation time decrease overconfidence, or did it suppress confidence below a baseline, or both? In other words, did limiting allowable deliberation time improve or impair the ability of confidence to postdict accuracy? This question could potentially be answered if
the confidence-accuracy correlation had been affected by allowable deliberation time. If limiting allowable deliberation time was associated with both a decrease in confidence and an increase in the confidence-accuracy correlation (but not a change in accuracy), then one could assume that limiting allowable deliberation time decreased overconfidence and thus increased its ability to postdict accuracy. However, if limiting allowable deliberation time was associated with a decrease in confidence and a decrease in the confidence-accuracy correlation (but not a change in accuracy), then one could assume that limiting allowable deliberation time suppressed confidence judgments below a baseline, and thus impaired its ability to postdict accuracy.

The third hypothesis of the study—that limiting allowable deliberation time would increase the confidence-accuracy correlation—was therefore important in assessing the potential benefits of limiting allowable deliberation time on confidence judgments. However, contrary to predictions, there was no effect of allowable deliberation time on the confidence-accuracy correlation. Because the confidence-accuracy correlation was not significantly affected by allowable deliberation time, it seems as though the lower confidence resulting from shorter allowable deliberation times was neither beneficial nor detrimental. In fact, whether lowered confidence resulting from limited allowable deliberation time aids or impairs the confidence-accuracy correlation may in part be dependent on the type of lineup the witness is viewing; although not significant, there was a general tendency for witnesses' confidence in the 1.5 s condition, compared to the 30.0 s condition, to become more diagnostic of accuracy when viewing target-present lineups, but to become less diagnostic of accuracy when viewing target-absent lineups.

It is interesting to note from Table 6 that the mean confidence-accuracy correlation
(as calculated using present/absent responses to determine accuracy) was positive when witnesses viewed target-absent lineups ($r = .24$), but negative when witnesses viewed target-present lineups ($r = -.19$). The direction and magnitude of the confidence-accuracy correlation in the target-absent condition was generally consistent with previous findings of a weak but positive confidence-accuracy correlation (e.g., Smith, Lindsay, & Pryke, 2000), but the negative correlation in the target-present condition was contrary to previous research findings and indicates that eyewitnesses who expressed greater confidence in their decisions were actually less likely to be accurate. Why was that the case? These correlations may be an artifact of a more general tendency for witnesses to be more confident when rejecting the lineups than they were when making an identification from the lineups. This tendency would then result in a positive confidence-accuracy correlation when rejecting the lineup was an accurate response (i.e., from target-absent lineups) and a negative confidence-accuracy correlation when rejecting the lineup was an inaccurate response (i.e., from target-present lineups). The fact that the confidence-accuracy correlation was not significantly different from zero in all four deliberation time conditions when averaged across lineup type supports the idea that participants' primary means of assessing their confidence was through whether they did or did not reject the lineups.

The results seem to indicate that limiting allowable deliberation time does not affect accuracy from either target-present or target-absent lineups, but it does affect confidence judgments. These data suggest that identification accuracy is not a function of controlled processes, but that confidence is. There are, however, at least two anomalous findings that need to be examined more closely.

First, the data show that confidence judgments decreased as allowable deliberation
time was limited. But if lineup identifications are a function of confidence (in other words, if
greater confidence in a potential identification leads to a greater chance of making that
identification), then choosing rates should have decreased as allowable deliberation time, and
thus confidence, decreased. A linear contrast, however, revealed that participants were more
likely to choose someone from a lineup as allowable deliberation time decreased. There are
at least two partial explanations for this finding. The first concerns the specific instructions
that were given to participants. Recall that participants were told to use a 50% confidence
criterion when making their identifications. Thus, limiting allowable deliberation time may
have limited confidence, but if it did not limit confidence to the extent that it pushed
participants past the criterion point, the limiting of confidence would not translate to a
change in choosing rates. Consistent with this explanation, confidence dropped from
approximately 76% in the 30.0 s condition to approximately 67% in the 1.5 s condition.
Because 67% is substantially larger than the 50% criterion point at which an identification
would change to a non-identification, it is possible that although confidence dropped, it did
not cross that 50% threshold. Nonetheless, although this explanation can explain the lack of a
decrease in choosing rates as allowable deliberation time was limited, it cannot account for
the observed increase in choosing rates as allowable deliberation time was limited.

The second explanation for the finding is that pre-identification confidence (the
confidence needed to make an identification from a lineup) is different from post-
identification confidence (a retrospective measure of confidence). Retrospective reports of
confidence during an identification can be altered by events that occur following the
identification itself, indicating that retrospective reports of an eyewitness's confidence can
become dissociated from, and are thus not necessarily the same thing as, pre-identification
confidence (Wells, Olson, & Charman, 2003). Participants in the current study gave retrospective confidence reports; these reports may not have accurately reflected the confidence with which they actually made their identifications. An increase in identification likelihood coupled with a decrease in confidence about those identifications as allowable deliberation time was limited indicates that there is a factor other than post-identification confidence that was driving choosing rates. The nature of that factor, however, is beyond the scope of the current study.

The second anomalous finding in the data is that the null effects of limiting controlled processing on accuracy and on the confidence-accuracy correlation found in the current study, and in various past studies (e.g., Brewer et al., 2000; Perretta, 1998), seem to contradict earlier work that has shown that increased controlled processing results in decreased accuracy (e.g., Perretta & Dunning, 2001; Schooler & Engstler-Schooler, 1990; Wells & Turtle, 1988) and a decreased confidence-accuracy correlation (Robinson & Johnson, 1998). How can these findings be reconciled with earlier work? Studies showing the detrimental effects of controlled processing on accuracy have manipulated controlled processing by having some participants engage in tasks that encouraged deliberation relative to control participants. For example, studies have had witnesses verbally analyze features of a criminal's face at the time of the crime (Wells & Turtle, 1988), verbally give a description of a criminal prior to the lineup presentation (Schooler & Engstler-Schooler, 1990), or verbally describe reasons why each individual person in the lineup might or might not be a good match to the criminal (Perretta & Dunning, 2001). There are at least two interpretations of such findings that allow them to be reconciled with the null results of limiting controlled processing on accuracy.
First, results from these studies have often been interpreted as demonstrating that increasing the amount of controlled processing in which a witness can engage relative to controls impairs accuracy. The current study, and the other studies that have failed in their attempts to increase accuracy, however, have attempted to **decrease** the amount of controlled processing in which a witness could engage compared to controls. The current study, like that of Brewer et al. (2000), limited allowable deliberation time, and thus the time witnesses had to engage in controlled processes. Perretta (1998) gave some of his witnesses a cognitive task to perform while viewing a lineup, thus impairing those witnesses' abilities to engage in controlled processes compared to witnesses not given a cognitive task. Thus, the effects of controlled processing on accuracy seem to have non-symmetric effects: increased deliberation and reliance on controlled processing decreases accuracy, but decreased deliberation and reliance on controlled processing has no effect on accuracy.

It is not entirely clear, however, that these non-symmetric effects necessarily exist. The second interpretation of results from studies that have shown a detrimental effect of increased controlled processing on accuracy is that it is interference, and not increased controlled processing per se, that caused the observed detriment in eyewitness accuracy. Past studies showing an effect of increased deliberation on accuracy not only increased controlled processing, but may have also created interference for the witness's memory of the criminal. Researchers who have attempted to increase controlled processing have done so by giving their participants an additional task to perform: verbalizing some aspect of the criminal or of the lineup procedure. It may be, therefore, that it was the interference of the witnesses' memories of the criminal caused by the additional task that caused the detrimental effects. Perhaps, for example, a witness who gives a verbal description of the criminal prior to a
lineup becomes biased to retrieve only description-consistent (i.e., verbalizable) information about the criminal from memory at the time of the lineup task, and to ignore other more diagnostic information about the criminal, thus leading the witness to make an inaccurate identification. Thus, it might not have been the amount of controlled processing that caused the detriment in accuracy, but rather the interference produced by the additional task. Additional tasks that are not relevant to the lineup task, such as the cognitive busyness manipulation of Perretta (1998), would not interfere with the memory of the criminal, and thus would not cause a decrement in accuracy. Therefore, controlled processing, whether increased or decreased, may actually have no effects whatsoever on eyewitness accuracy; the apparent harm in accuracy caused by increased controlled processing may actually reflect the harmful effects of interference.

What consequences does this have on the automatic versus controlled process distinction as it pertains to eyewitness identification? To the extent that limiting allowable deliberation time limited the extent to which participants could engage in controlled processing, the null results of allowable deliberation time on accuracy suggest that decision process is not a causal factor in determining eyewitness accuracy. Nonetheless, there is a correlation between self-reported decision process and accuracy, as well as between decision time and accuracy. If decision process does not directly lead to accuracy, how does one explain these correlations?

Brewer et al. (2000) have suggested that there may be a third variable that accounts for both accuracy and decision process. Specifically, they have argued that it may be the quality of memory that an eyewitness has of the criminal that determines both the accuracy of the eyewitness and the decision process that is used to make the identification. A witness
who has a high quality memory of the criminal should tend to be more accurate than a witness who has a low quality memory of the criminal, and may also tend to engage in quicker, more automatic decision processes. Recall the absolute versus relative judgment distinction (Wells, 1984b). Because absolute judgments require a comparison of each individual lineup member to the witness's memory of the criminal, a witness must have a relatively good memory in order to engage in these processes. A relative judgment, however, involves comparing lineup members to each other, and thus does not require as good a memory for the criminal. Thus, witnesses with a high quality memory for the criminal may tend to engage in absolute judgments whereas witnesses with a low quality memory for the criminal may tend to engage in relative judgments. To the extent that absolute judgments are more automatic and less controlled than relative judgments, witnesses with a good memory for the criminal should tend to endorse having engaged in more automatic decision processes than witnesses with a poor memory for the criminal. Conversely, witnesses with a poor memory for the criminal, not being able to rely on absolute judgments, should tend to endorse having engaged in more controlled decision processes than witnesses with a good memory for the criminal.

This quality-of-memory-as-third-variable account of witnesses' decision processes, although so far untested, accounts for the observed data regarding eyewitness decision processes in three important areas. First, memory as a third variable explains the correlations between self-reported decision strategy and accuracy (e.g., Dunning & Stern, 1994). Witnesses with a good memory of the criminal should tend to be accurate and should tend to endorse having engaged in automatic processes; witnesses with a poor memory of the criminal should tend to be inaccurate and should tend to endorse having engaged in
controlled processes. Thus, consistent with observation, this model would predict that self-reported decision process should be correlated with accuracy.

Second, memory as a third variable explains the negative correlation between decision time and accuracy (e.g., Sporer, 1992). Imagine a witness who has a high quality memory of the criminal, and thus engages in an absolute judgment decision process when shown a lineup. Because that witness compares every picture in the lineup to his or her memory of the criminal, that witness only needs to engage in \( n \) comparisons, where \( n \) is equal to the number of people in the lineup. Conversely, imagine a witness who has a low quality memory of the criminal, and thus engages in a relative judgment decision process when shown a lineup. Because that witness compares all the lineup members to each other, the number of comparisons in which that witness can engage is equal to:

\[
\sum_{i=1}^{n} (n - i)
\]

Assuming that all comparisons take an equal amount of time, an absolute judgment should be quicker than a relative judgment. For example, if a lineup contains six people, a witness engaging in an absolute judgment process should make 6 comparisons. A witness engaging in a relative judgment process should make up to \( 5 + 4 + 3 + 2 + 1 = 15 \) comparisons. Thus, this model predicts an association between quality of memory and decision time; witnesses with a good memory for the criminal, who tend to engage in absolute judgment processes, should make their identification decisions quicker than witnesses with a poor memory for the criminal, who tend to engage in relative judgment processes. Because quality of memory is also associated with accuracy, good memory should tend to produce quick and accurate decisions, whereas poor memory should tend to produce slower and less accurate decisions.
The idea that quality of memory drives the decision time-accuracy correlation is therefore consistent with data.

Third, the quality-of-memory-as-third-variable approach explains the apparent non-symmetric effects of manipulating decision process on accuracy. Whereas the idea that automatic and controlled processes directly influence the accuracy of identification decisions cannot account for the null effects of limiting controlled processing on accuracy (e.g., Brewer et al., 2000; Perretta, 1998; Schooler & Engstler-Schooler, 1990; present study), the quality-of-memory-as-third-variable idea can account for these null effects. Because manipulating decision process does not alter the underlying memory that the witness has of the criminal, those manipulations should have no effect on eyewitness accuracy, according to the quality-of-memory-as-third-variable approach. Indeed, this is consistent with the null findings of studies that have limited controlled processing (e.g., present study). But what about studies that have shown a decrease in eyewitness accuracy as a result of increasing controlled processes? Because, as previously discussed, the detrimental effects of increasing controlled processing on accuracy can be explained through an interference effect, the memory-as-third-variable hypothesis is consistent with these findings as well. In fact, note that the interference explanation of the effects of increasing controlled processing on accuracy involves a degradation of the accessed memory (resulting from an overemphasis on verbalizable features of the criminal) that causes the decrement in accuracy; as such, it incorporates the idea that it is memory, and not decision process, that is the main determinant of eyewitness accuracy. Thus, the null effects of limiting controlled processing on accuracy, as well as the detrimental effects of increasing controlled processing on accuracy, are both explained by the memory-as-a-third-variable hypothesis.
In fact, the idea that quality of memory leads to both eyewitness accuracy and the decision process in which an eyewitness engages is similar to Logan's (1988) instance theory of automatization, a well-known and highly respected cognitive psychology theory of automaticity. Instance theory was proposed as an alternate account of the nature of automaticity; whereas earlier theories tended to view the development of automaticity as the gradual withdrawal of attention from a task, instance theory views automaticity as a memory-based phenomenon that reflects a shift in reliance on cognitive processes. According to instance theory, people initially respond to a novel stimulus with slow and algorithmic responses. However, as people accrue distinct memories, or instances, of having interacted with and responded to the stimulus, they become able to respond to the stimulus on the basis of these memories. Eventually, with enough exposure to the stimulus, people can rely almost solely on memory-based processes and abandon the need for algorithmic-based processes. Logan visualized instance theory as a race of sorts; both memory-based and algorithm-based processing occur simultaneously and whichever process finishes first controls the response. Thus, as instances accumulate over time, memory-based responding is more likely to win the race over algorithmic-based responding simply because there are more memories from which to draw. According to instance theory, this shift in emphasis from algorithm-based processing to memory-based processing is known as automaticity.

There are numerous parallels between instance theory in general and the specific idea that memory of the witness may drive both accuracy and decision process. Algorithm-based responding and memory-based responding are roughly analogous to controlled and automatic processing, respectively. Whether algorithmic-based or memory-based responding will tend to occur is contingent on the number of instances one has in memory; similarly, the memory-
as-a-third-variable approach would predict that the use of automatic or controlled processes is contingent on the quality of memory that one has. Instances are discrete traces one has in memory of interacting with a given stimulus; if a witness's exposure time to a criminal can be thought of as an accumulation of instances, then the quality of memory that a witness has (which should be related to exposure time) is essentially a function of the number of instances that the witness has in memory.

The memory-as-third-variable idea of eyewitness identification processes can therefore be reconciled within a pre-existing cognitive framework of automaticity. An eyewitness with a high quality memory of the face of the criminal (i.e., a large number of instances of the face of the criminal in memory), will be able to engage in automatic, memory-based processes when viewing a lineup (such as engaging in an absolute judgment strategy). These judgments should tend to be quick and accurate (explaining both the correlation between self-reported decision process and accuracy and the correlation between decision time and accuracy). However, because these judgments are the result of a memory variable, they do not cause accuracy per se (explaining the null effects of limiting controlled processes on accuracy found by the current study and past studies).

The development of the idea that quality of memory may drive both accuracy and decision process stemmed from the null findings of limiting controlled processing on accuracy, and as such, the implications of the null results of the current study are important. By showing that accuracy did not increase after limiting controlled processes, even under conditions in which the effects were most likely to occur (i.e., from target-absent lineups), this study indirectly adds support to the memory-as-third-variable approach to eyewitness decision processes. The third variable approach has important consequences. It may be
unfruitful to attempt to get witnesses to rely on automatic processes and to abandon
controlled processes if these processes are simply a natural consequence and reflection of
witnesses' underlying memory of the criminal. There may be little a lineup administrator, or
anyone else, can do to improve accuracy by changing the decision processes in which
witnesses will engage. Instead, improvements in eyewitness accuracy may originate through
the quality of memory variable. Manipulations that can reduce the degradation of a witness's
memory for a criminal, for example, may aid eyewitness accuracy.

Of course, the memory-as-third-variable approach, although consistent with data, is
speculative. Future research may be interested in testing this model of eyewitness decision
processes. For example, do automatic identification decisions tend to be quicker than
controlled identification decisions because absolute judgments require fewer time-consuming
comparisons than relative judgments, or because memory-based processes tend to beat
algorithm-based processes for control of the response when the number of instances in
memory is high (i.e., absolute judgment comparisons are quicker than controlled judgment
comparisons)? Furthermore, the model as described here rests on a number of assumptions
that also need to be tested. For example, the model assumes that absolute judgment strategies
tend to be primarily automatic processes and relative judgment strategies tend to be primarily
controlled processes; however, this has never been explicitly tested. It is suggested that
research be aimed at determining causal mechanisms of eyewitness accuracy. The majority
of the research on eyewitnesses' cognitive processes has been directed towards finding
correlates with eyewitness accuracy (such as decision time, decision process, etc.), which
although important (for determining good postdictors of accuracy, for example), do not
provide researchers with the necessary causal claims needed to develop procedures to
maximize eyewitness accuracy. Consequently, causality is often assumed. It is hoped that the implications of the null findings of this study result in a questioning of these assumptions, and that they highlight the importance of discovering causal mechanisms of eyewitness accuracy.
APPENDIX A
SUPPLEMENTAL TABLE 1

Accuracy Score Statistics Based on Present/absent Decisions and Specific Identification Decisions: Non-responders Excluded from Data Set.

<table>
<thead>
<tr>
<th>Test</th>
<th>df</th>
<th>F</th>
<th>p</th>
<th>MSE</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lineup type</td>
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<td>80.05</td>
<td>&lt; .001</td>
<td>.45</td>
</tr>
<tr>
<td>Deliberation time</td>
<td>(3, 215)</td>
<td>1.55</td>
<td>n. s.</td>
<td>.44</td>
</tr>
<tr>
<td>Lineup type X Deliberation time</td>
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<td>1.57</td>
<td>n. s.</td>
<td>.45</td>
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<tr>
<td>Specific identification decisions</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Lineup type</td>
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<td>297.36</td>
<td>&lt; .001</td>
<td>.34</td>
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<tr>
<td>Deliberation time</td>
<td>(3, 215)</td>
<td>.41</td>
<td>n. s.</td>
<td>.39</td>
</tr>
<tr>
<td>Lineup type X Deliberation time</td>
<td>(3, 215)</td>
<td>1.39</td>
<td>n. s.</td>
<td>.34</td>
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</tbody>
</table>
APPENDIX B
SUPPLEMENTAL TABLE 2

Percent Accurate Eyewitnesses as a Function of Allowable Deliberation Time, Method of Calculating Accuracy, and Lineup Type: Non-Responders Excluded

<table>
<thead>
<tr>
<th>Allowable Deliberation Time</th>
<th>Lineup Type</th>
<th>1.5 s</th>
<th>3.0 s</th>
<th>10.0 s</th>
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<td>.56 (.22)</td>
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<td>.23 (.28)</td>
<td>.26 (.27)</td>
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<td>.48 (.22)</td>
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Note. Standard deviations are given in parentheses.
REFERENCES


