BASIC AND APPLIED SOCIAL PSYCHOLOGY, *27*(1), 47–58

Finishing Strong: Recency Effects in Juror Judgments

Kristi A. Costabile
Stanley B. Klein
University of California, Santa Barbara

We investigated the effects of evidence order on juror verdicts. Results from 4 mock juror studies suggest that incriminating evidence is more likely to lead to a guilty verdict when it is presented late in the trial than when it is presented early. This recency effect was found both with admissible and inadmissible evidence. Further analyses suggested that recency effects may have been mediated by jurors' memory of the incriminating evidence: Evidence presented late in a trial was more likely to be remembered by jurors and thus more likely to have influenced their verdicts. Implications for the judicial system and juror decision making are discussed.

A district attorney has been assigned to a murder trial. Just before the opening arguments, he uncovers the trial's key evidence: a tape-recording of the defendant's confession. When should he present this incriminating evidence to the jury to garner a guilty verdict? In this article we examine (a) how the order in which jurors encounter testimony influences their verdicts and (b) the cognitive processes underlying these effects.

The process of judging of a defendant in a court of law differs in an important way from other types of social judgment. In most social judgment tasks (for review, see Wyer & Srull, 1989), the participant attempts to integrate each new piece of evidence into his or her evolving evaluation of the target person (e.g., Anderson & Hubert, 1963; Asch, 1946; Hastorf, Schneider, & Polefka, 1970; Lichtenstein & Srull, 1987). By contrast, in juror decision-making tasks, participants are instructed to carefully consider each piece of evidence, but to withhold judgment until all evidence has been presented (Kassin & Wrightsman, 1988). The goal of our current research was to better understand the manner in which the processing objectives embodied in the juror decision-making task—comprehension and withholding judgment—influence the way information about a defendant is represented in memory and subsequently used when a decision about guilt or innocence is requested.

We propose that the juror decision-making task can fruitfully be conceptualized as a specific example of a more general class of processing tasks referred to by Srull and colleagues as "comprehension set objectives" (e.g., Lichtenstein & Srull, 1987; Wyer & Srull, 1986). According to these authors, tasks that require comprehension processing encourage participants to focus attention on understanding each item of information as it is presented. Global evaluation of the information is assumed to be deferred until a judgment is explicitly requested, at which time it is computed on the basis of those items most readily accessible from memory.

For example, in a study by Lichtenstein and Srull (1987), participants were shown a list of behavior statements attributed to a target person and asked to comprehend each statement as it was presented. After the presentation phase of the study, participants were asked to recall the target's behaviors and then judge the target's personality (to control for possible order effects, half the participants performed the judgment task before the recall task).

Drawing on their task analysis of comprehension set processing, Lichtenstein and Srull reasoned that participants would refrain from forming a summary representation of the target until a judgment specifically was requested. Accordingly, judgments necessarily would be based on behavioral evidence retrieved from memory. Because information is easier to recall the more recently it has been encountered (i.e., the Recency Effect; for reviews, see Crowder, 1976; Murdock, 1974), Lichtenstein and Srull further predicted judgments would disproportionately be influenced by behavior statements presented late in learning about the target. An analysis of participants' recall and judgment performance strongly supported these predictions (see also, Richter & Kruglanski, 1998; Wyer & Srull, 1986).

Extrapolating these findings to the domain of juror decision making predicts a positive correlation should be observed between (a) juror verdict and (b) memory for the specific evidence presented: Evidence presented late in a trial

Requests for reprints should be sent to Kristi Costabile, Psychology Department, University of California, Santa Barbara, Santa Barbara, CA 93106-9660. E-mail: costabil@psych.ucsb.edu

should be disproportionately recalled and thus have a greater impact on the decision rendered. The literature is largely consistent with these predictions. For example, Anderson (1959) had participants read successive arguments summarized from the testimony and procedure of an actual jury trial. To manipulate order, either the prosecution or defense presented its arguments first. Under these conditions, recency effects were observed: The side that presented last had the greatest influence on jurors' perceptions of the defendant's guilt (see also Furnham, 1986; Wilson, 1971).

Some exceptions, however, can be found. Pennington (1982), for example, observed that participants rendered a greater number of guilty verdicts and had greater confidence in their verdicts when prosecution witnesses appeared first, indicating a primacy effect, whereas Kerstholt and Jackson (1998) found evidence for both recency and primacy, depending on the specific manipulations they used.

Although the influence of evidence order on juror verdicts is generally supportive of the predictions derived from Lichtenstein and Srull's (1987) comprehension processing model, there are, as noted, exceptions. Although not surprising, given the methodological differences characterizing these research efforts, this variability does make it difficult to draw firm conclusions about effects of presentation order on juror decision making.

In this study, we examined the order effects on juror verdicts using a simplified mock juror paradigm. Our strategy, unabashedly one of methodological reductionism, was motivated by the desire to establish a reliable pattern of order effects under simple experimental conditions that then could serve as a foundation on which to build a more comprehensive understanding of the ways in which variables of interest interact to produce the findings reported by previous research.

Previous research on serial position effects in juror decision making typically has manipulated whether the prosecution or the defense presents its case first (see, for example, Anderson, 1959; Kerstholt & Jackson, 1998; Wilson, 1971). In real court settings, by contrast, attorneys are not free to choose the order in which they present their arguments: The prosecution always presents first. Attorneys can, however, decide on the witness order within their argument. Thus, investigating serial position effects within a lawyer's argument offers both a methodologically simple, yet ecologically interesting, way of examining the effects of information order on juror decision making. This is the strategy we adopted in the current set of studies.

GENERAL OVERVIEW OF STUDIES

Participants in our mock juror studies were asked first to read a series of arguments and then to render a verdict about the defendant's guilt or innocence. Included among the arguments presented was one piece of highly incriminating evidence (the "critical evidence"). Presentation of the critical evidence varied between participants, with some viewing the critical evidence early in the trial proceedings and some viewing it late. Based on the work of Lichtenstein and Srull (1987), we predicted that the critical evidence would have a greater effect on juror verdicts when presented toward the end of the trial proceedings than when presented near the beginning. In our first three experiments, we investigated this hypothesis using only evidence provided by witnesses for the prosecution. In our fourth experiment, we included both prosecution and defense witnesses in an effort to replicate and generalize the findings of Experiments 1–3. In Experiment 1, the critical evidence always was ruled admissible; in Experiments 2–4, we included conditions under which the critical evidence was ruled inadmissible.

EXPERIMENT 1

A mock juror study was conducted to compare the relative effect of evidence presented at the beginning of a trial with evidence presented at the end of a trial on subsequent juror verdicts. Participants read a transcript summary of a murder trial in which the defendant was charged with two counts of first-degree murder. The critical evidence in the trial, a wiretapped confession by the defendant, was presented by either the first or last witness. Because the wiretapped confession was the most incriminating evidence presented in the trial summary, an increased conviction rate when the critical witness testified first would indicate a primacy effect, whereas an increased conviction rate when the critical witness testified last would be evidence for a recency effect. We used the Lichtenstein and Srull (1987) model to predict that we would find recency effects (for a related view, see Betz, Gannon, & Skowronski, 1992).

Method

Participants. Sixty-one undergraduate students played the role of mock jurors in exchange for partial course credit in their introductory psychology class. Participants were scheduled in groups ranging in size from 10 to 20. Participants were assigned randomly to experimental conditions.

Stimulus material. Participants received one of two versions of a criminal trial summary entitled *State v. Givens*, adapted from the materials used by Kassin and Sommers (1997). The defendant was described as having been charged with two counts of murder in the first degree: He was accused of murdering his estranged wife and a male neighbor. The trial summary consisted of 13 paragraphs including testimony and cross-examination of five witnesses (a police officer, a private investigator, a coroner, an eyewitness, and a friend of the defendant) and the judge's instructions as to the requirements of proof. The paragraphs were presented in a

booklet, with each paragraph on a separate page. Participants read the booklet at their own pace.

The critical evidence was presented by the police officer. He revealed a wiretap from an unrelated case containing an audio-taped telephone conversation in which the defendant could be heard confessing to a friend minutes after fleeing the scene ("I killed Marylou and some bastard she was with. God, I don't … yeah, I ditched the blade.").

The police officer was either the first or fifth witness called to the stand. The other witnesses were called in the following order: (a) private investigator, (b) coroner, (c) eyewitness, and (d) friend of the defendant. In the early condition, the wiretap evidence was presented in the third paragraph. In the late condition, the wiretap evidence was presented in the 11th paragraph.

Procedure. Participants were told that we were interested in how jurors make decisions on the basis of information in written trial transcripts. They were instructed that when they were finished reading through the summary, they would be asked to give a verdict of whether the defendant is guilty or not guilty. Participants were instructed to read through the trial summary carefully because they would be asked questions about its content without being able to refer back to the summary. In addition, participants were asked to read the transcript in its given order and were not permitted to take notes as they read the trial transcript. An experimenter was in the room at all times monitoring the participants to ensure that instructions were followed. After reading the summary, participants placed the summary into an envelope and were given a posttrial questionnaire. Participants indicated their verdict (guilty or not guilty) and rated their confidence in that verdict on a 10-point scale (ranging from 1 = *not at all confident* to 10 = *extremely confident*). Participants then completed the following sentence: *The defendant should be found guilty if there is at least a _____% chance that he committed the crime.* They then listed the factors that led them to their verdicts. Finally, participants indicated whether they used the wiretapped confession when deciding on a verdict by marking *yes* or *no*.

Results

An increased conviction rate in the early condition would provide evidence for a primacy effect. In contrast, increased conviction rate in the late condition would indicate a recency effect.

Evaluation of evidence. To ensure that the wiretap evidence was the critical (i.e., most incriminating) evidence, 16 undergraduate students from an introductory psychology course were recruited to evaluate the persuasiveness of all testimony presented. Participants rated the testimony on a 10-point scale (ranging from 1 = *not at all convincing that the defendant is guilty* to 10 = *extremely convincing that the defendant is guilty*). A within-subjects analysis of variance (ANOVA) computed on the 10 pieces of evidence (2 from each witness) indicated that the wiretapped confession was perceived to be the most incriminating evidence in the trial ($M = 8.44$), $F(9, 135) = 12.41$, $p < .001$. Planned contrasts revealed that the wiretapped confession was perceived as significantly more incriminating than each of the other pieces of evidence in the trial (all ps $< .001$).[1]

Verdict. Fifteen participants responded not guilty, and 46 responded guilty, yielding an overall conviction rate of 75.4%. Of the participants exposed to the critical evidence by the first witness, 62.5% rendered guilty verdicts compared with 89.7% of those exposed to the critical evidence by the last witness, χ^2 (1, $N = 61$) = 6.05, $p < .05$.

Verdict × Confidence. Following the procedure suggested by Kassin and Sommers (1997), a more sensitive measure of verdict was constructed by multiplying the participants' dichotomous guilty–not guilty verdicts by their confidence in their verdict. Participants' dichotomous guilty–not guilty verdicts were recoded either 1 (guilty) or –1 (not guilty); this value then was multiplied by the participants' confidence in their verdicts. This yielded a variable ranging from –10 to +10, where higher numbers indicate greater confidence that the defendant was guilty. A one-way ANOVA on this measure produced an effect of order, $F(1, 59) = 7.97$, $p < .01$. Consistent with the χ^2 analysis, participants who received the critical evidence late in the trial summary had more confidence in a guilty verdict ($M = 6.62$) than those receiving the evidence early ($M = 2.34$).[2]

Use of critical evidence. A χ^2 analysis on participants' self-reported use of the critical evidence indicated an effect of order, χ^2 (1, $N = 61$) = 4.53, $p < .05$. Participants who received the critical evidence late in the trial were more likely

[1] In addition, we included a control condition in which participants read the same trial summary as in the experimental conditions without the inclusion of the wiretapped confession. Under these conditions, only 15% of the 58 participants rendered a guilty verdict. A χ^2 analysis comparing these results to those obtained in the experimental condition (75.4%) demonstrated that the inclusion of the wiretapped confession was more likely to lead to guilty verdicts, χ^2 (1, $N = 119$) = 28.80, $p < .001$. A difference between control and experimental conditions also was found for the reported confidence in a guilty verdict. When the wiretapped confession was not presented, jurors' confidence in a guilty verdict ($M = –2.16$) was significantly lower than when the confession was presented ($M = 4.51$), $F(1, 111) = 35.01$, $p < .001$.

[2] This constructed variable is reported throughout this article because it is often reported in articles of juror decision making (see, for example, Sommers & Kassin, 2001). It is important to note, however, that it may be biased. That is, participants who rendered a guilty verdict were more confident in this verdict ($M = 7.78$) than participants who rendered a not guilty verdict ($M = 6.07$), $F(1, 59) = 11.64$, $p < .01$. Because this asymmetry in confidence level will be amplified further when confidence is multiplied by verdict, caution must be taken when interpreting the results of this analysis. Note that in *all* cases, the findings of the ANOVA are consistent with the findings of χ^2 analyses performed on verdict (independent of confidence in verdict).

to report using the critical evidence when rendering a verdict (96.6%) than those receiving the evidence early in the trial (78.1%).

Guilt threshold. Participants who received the critical evidence early indicated guilt thresholds ($M = 83.44$) that did not differ significantly from those receiving the critical evidence late ($M = 87.83$), $F(1, 59) = .96$, $p = .33$. This suggests there was no significant difference of evidence order on the participants' threshold of finding a defendant guilty.

DISCUSSION

The findings of our initial experiment provided support for a recency effect. Evidence presented late in the trial had a greater influence on juror verdicts than the same evidence presented early. Additional analyses revealed that across conditions, participants did not differ with respect to the criterion adopted for rendering a guilty verdict but did differ in their self-reported use of the critical evidence when deciding on a verdict. With respect to this latter finding, these results suggest that participants are more likely to use the critical evidence in rendering a verdict when that evidence is presented late in the trial. This raises the possibility that explicit recollection of evidence may play a role in juror decisions, a possibility we examine in Experiment 3.

EXPERIMENT 2

According to Lichtenstein and Srull's comprehension-set model, evaluation is based on information that is most accessible at the time of judgment. An implicit assumption of the model is that a perceiver is free to use any information remembered about the target when making his or her judgment. In the courtroom, however, jurors sometimes are exposed to evidence that they subsequently are instructed to disregard. In Experiment 2, as well Experiments 3 and 4, we included conditions in which the critical evidence was ruled inadmissible.

Evidence Admissibility

To ensure that each defendant receives a fair and just trial, the rules of evidence state that all elements of trial procedure must be clearly and explicitly defined (Mueller & Kirkpatrick, 1995). Despite this, juries may be exposed to evidence that is inadmissible (Kassin & Studebaker, 1998). This exposure may lead to a juror bias—a bias that the law is designed to eliminate. Evidence may be deemed inadmissible if it is too prejudicial, inflammatory, or misleading, or if it is illegally obtained (Kassin & Studebaker, 1997). If a lawyer or witness presents inadmissible evidence to the jury, the judge has two options: (a) declare a mistrial or (b) strike the evidence from the record and admonish the jury to disregard it. Mistrials are expensive and reserved for only the most harmful breaches of the rules of evidence. Therefore, judges routinely choose to instruct the jury to disregard the inadmissible evidence. Because of the prevalence of this instruction to disregard evidence, it is important to gain an understanding of the factors that influence whether jurors can successfully follow these instructions.

Logically, inadmissible evidence should not be subject to order effects, because the juror is instructed *not* to use the evidence. To the extent that jurors follow the judge's instructions, inadmissible evidence should not influence juror verdicts—regardless of its placement in the trial. However, mock juror research has demonstrated that inadmissible evidence can affect a juror's perception of the defendant's guilt or innocence (e.g., Carreta & Moreland, 1983; Kassin & Sommers, 1997; Kassin, Williams, & Saunders, 1990; Otto, Penrod, & Dexter, 1994; Pickel, 1995; Sommers & Kassin, 2001; Sue, Smith, & Caldwell, 1973). This research also indicates, however, that the extent of this influence is moderated by a number of factors such as an elaborated admonishment from a judge (Pickel, 1995), the juror's perception of fairness (Kassin & Sommers, 1997; Sommers and Kassin, 2001), and an opportunity to deliberate (Carretta & Moreland, 1983; London & Nunez, 2000).

Goals of Experiment 2

Experiment 2 had two goals. First, we wanted to discover whether the recency findings obtained in Experiment 1 would extend to conditions in which the critical evidence was ruled inadmissible. Second, we wanted to explore a procedural issue in our first study that may have colored the interpretation of our findings.

In Experiment 1, we demonstrated that evidence presented late led to more guilty verdicts than did evidence presented early. However, these data cannot rule out the possibility that information primacy, albeit less pronounced in its effect than that of information recency, also influenced juror verdicts. To test this possibility, we added a control condition in which the critical testimony was presented by a witness testifying near the middle of the prosecution's argument. Because items appearing in or near the middle of a stimulus set are known to have less impact on judgment and memory than items appearing either early or late (for review, see Crowder, 1976), we hypothesized that if the primacy effects were present, more guilty verdicts should be rendered when the critical evidence is presented by the first witness than when it is presented by the middle witness.

Method

Participants. One hundred eight-four undergraduate students played the role of mock jurors in exchange for partial course credit in their introductory psychology class. They

were scheduled in groups ranging in size from 20 to 28 students. Students randomly were assigned to one of six conditions that varied both admissibility and placement of the critical evidence.

Design. The design was a 2 (Admissibility) × 3 (Evidence Order) between-subject factorial. The critical evidence was ruled either admissible or inadmissible, and evidence was presented by either the first, third, or fifth witness called to the stand.

Materials and procedure. Participants received one of six versions of a criminal trial summary entitled *State v. Givens*, adapted from the materials used by Kassin and Sommers (1997). The stimuli used in this experiment are identical to those used in Experiment 1 with the following exceptions: (a) in addition to the beginning and end conditions, a middle condition was added in which the police officer presented the wiretapped confession as the third witness, and (b) the confession was ruled either admissible or inadmissible by the judge.

As in Experiment 1, the critical evidence was presented by the police officer. He revealed a wiretap from an unrelated case containing an audio-taped telephone conversation in which the defendant could be heard confessing to a friend minutes after fleeing the scene. In all conditions, the defense attorney objected to this evidence. In the admissible condition, the judge overruled the objection, admitted the tape, and instructed the jury that it was a proper form of evidence. In the inadmissible condition, the judge sustained the objection and admonished the jury to disregard the tape because it was secured without a proper warrant. The judge explained that to ensure a fair trial, the jury should not consider evidence that was illegally obtained.

Results

Verdict. Overall, 81 participants voted not guilty, and 103 voted guilty, yielding a conviction rate of 55.9%. The percentage of guilty verdicts rendered was virtually identical for participants in the early and middle critical testimony conditions (48.4% vs. 49.2%). By contrast, when the critical evidence was presented by the last witness, the conviction rate rose to 69.8%, which differed reliably from both the early and middle conditions, χ^2 (2, N = 184) = 7.64, $p < .005$. In addition, participants were more likely to render a guilty verdict when the critical evidence was ruled admissible (75.3%) than when it was ruled inadmissible (37.9%), χ^2 (1, N = 184), 26.06, $p < .01$.

Verdict × Confidence. As in Experiment 1, we followed the procedure suggested by Kassin and Sommers (1997) to assess jurors' confidence in a guilty verdict. Consistent with the χ^2 analysis, participants who received the critical evidence by the final witness were more confident in their guilty verdict (M = 3.81) than those who received the critical evidence from either the middle (M = .81) or the first witness (M = .66), F(2, 178) = 4.81, $p < .01$. The latter two conditions did not differ reliably, thus providing no evidence for a primacy effect (see Table 1).

A main effect of admissibility also was found, F(1, 178) = 27.21, $p < .001$: When the critical evidence was ruled admissible, participants were more confident that the defendant was guilty (M = 4.38) than when the evidence was ruled inadmissible (M = –.64). The interaction of order and admissibility was not significant, F(2, 178) = .34, *ns,* indicating that in both admissible and inadmissible conditions, incriminating evidence had its greatest influence on juror verdicts when it was presented late in the trial.

Use of critical evidence. A χ^2 analysis on participants' self-reported use of the critical evidence indicated an effect of order, χ^2 (2, N = 181) = 5.90, $p < .05$: Participants who received the critical evidence late in the trial were more likely to report using the critical evidence when rendering a verdict (65.1%) than those receiving the evidence early (44.3%) or in the middle of the trial (49.1%). Chi-square analysis also revealed an effect of admissibility on participants' self-reported use of the critical evidence. Not surprisingly, participants were more likely to report using the critical evidence in rendering their verdict when it was ruled admissible (78.2%) than when it was ruled inadmissible (29.8%), χ^2 (1, N = 181) = 42.48, $p < .01$.

Guilt threshold. A one-way ANOVA revealed no significant difference of evidence order on the participants' threshold of finding a defendant guilty. Participants who received critical evidence early indicated guilt thresholds (M = 89.69) that did not differ significantly from those given by participants receiving critical evidence in the middle (M = 88.16) or late (M = 87.90), F(2, 175) = .248, *ns.* In addition, the guilt threshold of participants who read critical evidence ruled admissible (M = 87.51) did not differ reliably from that of participants who read critical evidence ruled inadmissible (M = 89.56), F(1, 175) = .90, *ns.*

TABLE 1
Mean Confidence in a Guilty Verdict by Admissibility and Evidence Order (Experiment 2)

	Type of Evidence	
Evidence Order	*Admissible*	*Inadmissible*
Early	2.97	–1.65
Middle	3.29	–1.42
Late	6.87	1.03

Note. The scale ranged from –10 to +10 with higher numbers indicating more confidence in a guilty verdict and more negative numbers indicating more confidence in a not guilty verdict.

Discussion

Replicating Experiment 1, we again found recency effects. When the critical evidence was placed at the end of the trial summary, mock jurors were more likely to render a guilty verdict and to have more confidence in their guilty verdicts. These effects were obtained regardless of evidence admissibility. We also found no evidence for the effects of primacy on decision making. Juror verdicts did not differ reliably as a function of whether the critical evidence was presented by the first or the middle witness. Also replicating Experiment 1, participants did not adopt different criteria for rendering a guilty verdict but did differ in their self-reported use of the critical evidence when deciding on a verdict.

EXPERIMENT 3

Experiments 1 and 2 provided evidence for recency effects. Mock jurors were more likely to render a guilty verdict when the critical evidence was presented late in the trial proceedings than when it was presented early. Drawing on the work of Lichtenstein and Srull (1987), we hypothesized these effects to be caused by the relative accessibility of items in short-term memory at the time of judgment (see also Bargh & Thein, 1985; Reyes, Thompson, & Bower, 1980;Tversky & Kahneman, 1973). However, no direct assessment of the role of memory was provided. Accordingly, we tested whether the observed recency effects in our first two studies were caused by the mock jurors' memory of the critical evidence at the time of judgment making.

In Experiment 3, participants first rendered a verdict and indicated their confidence in the verdict. They then were asked to recall all the evidence they could remember from the trial. This enabled us to test directly whether the relationship between evidence order and juror verdicts is mediated by the juror's memory of the critical evidence.[3]

Method

Participants. One hundred and fourteen undergraduate students participated in exchange for partial credit in their psychology course. Participants were assigned randomly to one of four conditions manipulating placement and the admissibility of the critical evidence.

Design, materials, and procedure. The design, materials, and procedure were identical to that of Experiment 2 with several changes. First, in addition to participants rendering their verdict and rating their confidence in their verdicts, participants also rated the likelihood that the defendant committed the murder on a scale ranging from 1 (*not at all likely*) to 10 (*extremely likely*). This continuous measure allowed participants to indicate their belief in the defendant's guilt, even under conditions in which the legal requirement for a guilty verdict is not satisfied (i.e., when the critical evidence was ruled inadmissible). Second, immediately after rendering their verdict and confidence judgments, participants were given a sheet of paper and asked to list, in any order, any evidence from the trial they could remember, regardless of whether or not the evidence was used when they made their decision. We gave participants 5 min to complete this task (all participants finished within the allotted time). Third, because comparable findings were obtained when evidence was presented by the first and middle witnesses, we did not include a middle condition in the present experiment.

Results

Memory coding. Three independent judges blind to experimental condition read the free recall responses of the participants. Judges were instructed to code participant responses for the presence of evidence pertaining to wiretapping. Responses containing the terms "wiretapped," "taped conversation," "confession," and other variants of those terms were scored as memory of critical evidence. Interrater reliability was high ($\alpha = .98$). The few disagreements that occurred were resolved through discussion.

Verdict. Forty-two participants voted not guilty, and 72 voted guilty, yielding a conviction rate of 63.2%. Replicating the findings of our first two experiments, participants were more likely to render a guilty verdict when the critical evidence was presented late in the trial (71.2%) than when it was presented early (54.5%), χ^2 (2, $N = 114$) = 3.40, $p < .05$. Interestingly, χ^2 analysis did not reveal an effect of admissibility of the critical evidence, χ^2 (2, $N = 114$) = .66, *ns.* When the critical evidence was ruled admissible, the percentage of guilty verdicts rendered (66.2%) did not differ reliably from the percentage of verdicts when the critical evidence was ruled inadmissible (58.7%).

Verdict × Confidence. A 2 (Evidence Order) × 2 (Admissibility) between-subject ANOVA performed on the constructed variable of jurors' confidence in verdict yielded only a main effect of evidence order, $F(1, 110) = 4.07$, $p < .05$. Regardless of whether the critical evidence was ruled admissible or inadmissible, participants had greater confidence in their guilty verdicts when the evidence was presented by the final witness ($M = 4.08$) than when it was presented by the first witness ($M = 1.49$; see Table 2).

Likelihood estimates. A 2 (Evidence Order) × 2 (Admissibility) between-subject ANOVA performed on participants' likelihood estimates of whether the defendant actually

[3]Although admissible and inadmissible evidence both produced recency effects in Experiment 2, comparable outcome does not necessarily imply commonality of underlying process. Accordingly, in Experiment 3 we examined the relation between judgment and recall for both types of evidence.

TABLE 2
Effects of Evidence Order on Confidence in a Guilty Verdict (Experiment 3)

	Admissibility	
Evidence Order	*Admissible*	*Inadmissible*
Early	2.03	.74
Late	4.39	3.61

Note. The scale ranged from –10 to +10 with higher numbers indicating more confidence in a guilty verdict and more negative numbers indicating more confidence in a not guilty verdict.

TABLE 3
Effects of Order and Admissibility on Recall of Critical Evidence (Experiment 3)

	Admissibility	
Evidence Order	*Admissible*	*Inadmissible*
Early	.69	.52
Late	.97	.78

Note. The data indicate the proportion of participants in each condition that listed the critical evidence in a memory test of the trial events.

committed the crime yielded only a main effect of evidence order, $F(1, 110) = 4.19$, $p < .05$. Regardless of whether the evidence was ruled admissible or inadmissible, participants rated the defendant as more likely to have committed the crime when the critical evidence was presented late in the trial ($M = 7.95$) than when the evidence was presented early ($M = 7.22$).

Use of critical evidence. One participant was removed from this analysis for failing to indicate whether s/he used the critical evidence. A χ^2 analysis on the remaining participants' self-reported use of the critical evidence indicated an effect of order, $\chi^2 (1, N = 113) = 9.48$, $p < .01$. Participants who received the critical evidence late in the trial were more likely to report using the evidence when rendering a verdict (74.6%) than were those receiving the evidence early (46.3%). Chi-square analysis also revealed an effect of admissibility on participants' self-reported use of the critical evidence. Participants were more likely to report using the critical evidence in rendering their verdict when it was ruled admissible (70.1%) than when it was ruled inadmissible (47.8%), $\chi^2 (1, N = 113) = 5.71$, $p < .05$.

Memory of critical evidence. Next we examined the effects of order on memory for the critical evidence. Overall, 76.3% of participants recalled the critical evidence. A 2 (Evidence Order) × 2 (Admissibility) between-subject ANOVA on the number of participants recalling the critical evidence yielded a significant main effect of order, $F(1, 110) = 12.81$, $p < .005$. Participants who read the critical evidence late in the trial were more likely to recall it (90%) than were those who read the evidence early (62%). A main effect of admissibility also was obtained, $F(1, 110) = 5.44$, $p < .05$. Participants were more likely to recall the critical evidence when it was ruled admissible (84%) than when ruled inadmissible (65%). The interaction of order and admissibility was not significant (see Table 3).

These analyses support the inference that memory of critical evidence plays an important role in juror decision making. To test this hypothesis directly, we conducted a series of regression analyses following procedures outlined by Baron and Kenny (1986). The results of those analyses are summarized in Figure 1.

First we regressed participants' confidence in verdict on the order in which the evidence was presented. As predicted, participants had greater confidence in their guilty verdicts when the critical evidence was presented late than when it was presented early, ($b = 1.30$, $B = .190$, $p < .05$). Next we regressed memory (as indexed by recall of the critical evidence) on evidence order. As predicted, participants were more likely to recall the critical evidence when it was presented late in the trial than when it was presented early ($b = .140$, $B = .329$, $p < .001$).[4] Finally, we regressed confidence in a guilty verdict on both evidence order and memory. As shown in Figure 1, participants who recalled the critical evidence were more likely to render a guilty a verdict ($b = 6.79$, $B = .424$, $p < .001$). Moreover, the association between evidence order and confidence in verdict was no longer significant when memory entered in the equation ($b = .345$, $\beta = .051$, *ns*), and a Sobel test indicated that this was a significant reduction, $z = 2.90$, $p < .01$. These findings suggest that recency effects found in our studies are moderated by jurors' recall of critical evidence at the time a verdict is rendered.

Discussion

The results of Experiment 3 show that when evidence is presented by the last witness, participants are more likely to (a) render a guilty verdict, (b) have more confidence in their guilty verdicts, (c) believe the defendant actually committed the crime, (d) explicitly recall the critical evidence, and (e) report using the critical evidence when making their deci-

[4]We report a linear regression despite the fact that our mediator in this model is coded dichotomously and thus is characterized by a logistic function. Kessler (1983) noted that when the dependent variable is not highly skewed (when the rarer outcome occurs at least 10% of the time; these conditions are met by our data set), there is an approximately linear relationship between probabilities and the logit function. In addition, a linear probability model appears to be a more natural measurement of the extent to which an independent variable produces an outcome in terms of probabilities. Therefore, to maintain consistency and ease of interpretation of the mediational analyses, we reported the linear regression coefficient. We note, however, that a logistic regression analysis also yields a significant relationship between evidence order and memory for the critical evidence, (Wald = 10.964, $p < .01$).

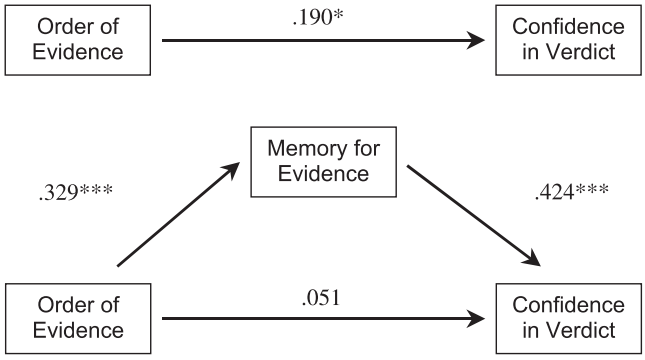

FIGURE 1 Summary of the regression analyses testing the mediation hypothesis for memory on confidence in a guilty verdict using abbreviated trial summary (Experiment 3).

sion. Mediational analyses suggested that the recency effects observed in previous studies were caused, in part, by the relative accessibility of the critical evidence in memory at the time of judgment. When the evidence was presented late, it was more likely to be remembered by the participants, and as such, more likely to influence their judgments.

With respect to evidence admissibility, participants were less likely to recall the evidence when it had been ruled inadmissible. One reason for this might be that participants paid less attention to the inadmissible material, thus rendering the information less available in memory. However, it is also possible that the decreased memory of the critical evidence was because of the specific wording of our recall instructions. In Experiment 3, we asked participants to list all the "evidence" they remembered from the trial. Because the critical evidence was ruled inadmissible, some participants may have believed that the information was not "evidence" and therefore did not list it in their free recall. In our next study, we altered our recall instructions in an attempt to eliminate any confusion with respect to items permissible to recall.

Although participants who received information labeled inadmissible were less likely to report using the critical evidence when making their decision, admissibility did not reliably affect juror verdicts, confidence in a guilty verdict, or belief that the defendant committed the crime. These results suggest that the critical evidence was used regardless of its admissibility and contradict the findings of Experiment 2 as well as those obtained by Kassin and Sommers (e.g., Kassin & Sommers, 1997; Sommers & Kassin, 2001). One possible explanation for this finding is suggested by postexperimental questioning of participants: Although the majority of participants correctly understood the judge's instructions, a subset expressed confusion as to the meaning of the admissibility ruling. Accordingly, in Experiment 4, we added a manipulation check to ensure that participants were carefully reading and understanding the admissibility rulings.

EXPERIMENT 4

One consequence of our strategy of examining the effects of evidence order on juror decisions under minimal, but hopefully ecologically relevant, conditions was that the transcript summaries we used were greatly abbreviated: Only prosecution witnesses testified and were cross-examined. To increase the external validity of our findings, our next study added defense witnesses to the trial summary to assess whether the recency effects obtained in the Experiments 1–3 would replicate under these conditions.

Method

Participants. One hundred and fifty-three undergraduate students played the role of mock jurors in exchange for partial course credit in their psychology course. Participants randomly were assigned to one of four conditions that varied placement and admissibility of the critical evidence.

Design. The design was a 2 (Evidence Order) × 2 (Admissibility) between-subject factorial. The critical evidence was presented either by the first or last witness for the prosecution and was ruled either admissible or inadmissible after an objection from the defense attorney.

Materials and procedure. Participants received one of four versions of a criminal trial summary entitled *State v. Givens*, adapted from the materials used by Kassin and Sommers (1997). The trial summary consisted of 15 paragraphs including testimony and cross-examination of four witnesses for the prosecution (a police officer, a private investigator, a coroner, and an eyewitness), testimony and cross-examination of two witnesses for the defense (a friend of the defendant and the defendant), and the judge's instructions regarding requirements of proof. The paragraphs were presented in a booklet, with each paragraph printed on a separate page. Participants were instructed to read the booklet at their own pace.

As in our first three experiments, the critical evidence was a wiretapped confession presented by the police officer. The officer testified either as the first witness for the prosecution or as the fourth (and last) witness for the prosecution. After an objection from the defense attorney, the evidence was ruled either admissible or inadmissible.

The other witnesses were called in the following order: (a) private investigator, (b) coroner, (c) eyewitness, (d) friend of the defendant, and (e) defendant. In the early condition, the critical evidence was presented in the third paragraph, and the judge's ruling was presented in the fourth paragraph. In the late condition, the critical evidence was presented in the ninth paragraph and the judge's ruling followed in the tenth.

The procedure used was the same as that in Experiment 3, with the following exceptions. First, in Experiment 3, participants in the inadmissible condition were less likely to recall the

critical evidence than were participants in the admissible condition. One possible reason for this difference is that the former group remembered the critical information but did not consider it "evidence" and thus did not report it during recall. Therefore, in Experiment 4, participants were asked to list *everything* they remembered from the trial. Second, participants were asked whether they used the wiretapped confession when making their decision on a 10 point scale (ranging from 1 = *not at all* to 10 = *very much*). Finally, as a manipulation check to ensure that all participants read the trial summary carefully and interpreted the rulings as we intended, participants also were asked to indicate whether the wiretapped confession was allowed to be used in the trial (admissible) or not allowed (inadmissible) by checking a box to indicate their choice.

Results

Fourteen participants were removed from analysis because they failed to correctly remember the admissibility of the wiretapped confession. Three others were dropped for not following experimental instructions. The following analyses were performed on the remaining 136 participants.[5]

Memory coding. Two independent judges blind to experimental condition read the free recall responses of the participants. Judges were instructed to code participant responses for the presence of evidence pertaining to wiretapping. Responses containing the terms "wiretapped," "taped conversation," "confession," and other variants of those terms were scored as memory of critical evidence. Interrater reliability was high ($\alpha = .96$). The few disagreements that occurred were resolved through discussion.

Verdict. Overall, 61 participants found the defendant not guilty and 75 found him guilty, yielding a conviction rate of 55.1%. A χ^2 analysis revealed an effect of order, χ^2 (1, N = 136), 4.87 = $p < .05$. Participants were more likely to render a guilty verdict when the critical evidence was presented by the final witness for the prosecution (64.3%) than when the evidence was presented by the first witness for the prosecution (45.5%). In addition, participants were more likely to render a guilty verdict when the critical evidence was ruled admissible (69.4%) than when it was ruled inadmissible (43.2%), χ^2 (1, N = 136), 9.30, $p < .01$.

Confidence × Verdict. A 2 (Evidence Order) × 2 (Admissibility) between-subject ANOVA performed on the constructed variable of jurors' confidence in a guilty verdict yielded a main effect of evidence order, $F(1, 132) = 9.86$, $p < .01$, and a main effect of evidence admissibility, $F(1, 133) = 8.14$, $p < .01$. Participants had greater confidence in their guilty verdicts when the critical evidence was presented by the final prosecution witness ($M = 3.51$) than when it was presented by the first witness ($M = .18$). In addition, participants had greater confidence in their verdicts when the critical evidence was ruled admissible ($M = 3.52$) than when it was ruled inadmissible ($M = .54$). The interaction of order and admissibility was not significant, $F(1, 132) = .02$, *ns* (see Table 4).

TABLE 4
Mean Confidence in a Guilty Verdict by Admissibility and Evidence Order (Experiment 4)

	Type of Evidence	
Evidence Order	*Admissible*	*Inadmissible*
Early	1.91	–1.44
Late	5.23	2.23

Note. The scale ranges from –10 to +10 with higher numbers indicating more confidence in a guilty verdict and more negative numbers indicating more confidence in a not guilty verdict.

Likelihood estimates. A 2 (Evidence Order) × 2 (Admissibility) between-subject ANOVA performed on the participants' estimates that the defendant actually committed the crime revealed only a main effect of order, $F(1, 132) = 11.04$, $p < .01$. Regardless of whether the evidence was ruled admissible or inadmissible, participants rated the defendant as more likely to have committed the crime when the critical evidence was presented late in the trial ($M = 7.74$) than when it was presented early ($M = 6.60$).

Use of critical evidence. A 2 (Evidence Order) × 2 (Admissibility) between-subject ANOVA performed on the participants' self-reported use of the critical evidence revealed only a main effect of admissibility, $F(1, 132) = 18.75$, $p < .01$. Participants were more likely to report using the critical evidence when rendering their verdict when it was ruled admissible ($M = 6.94$) than when it was ruled inadmissible ($M = 4.41$). The effect of order on reported use of the wiretapped confession was marginally significant. Participants indicated greater use of the evidence when it was presented late ($M = 6.03$) than when it was presented early ($M = 5.06$), $F(1, 132) = 3.09$, $p < .06$.

Guilt threshold. One participant was removed from this analysis for not indicating a guilt threshold. A two-way ANOVA on the remaining participants revealed no significant difference of evidence order or admissibility on participants' threshold of finding a defendant guilty. The guilt thresholds for participants who received the critical evidence early ($M = 89.56$) did not differ reliably from those receiving the critical evidence late ($M = 88.10$), $F(1, 131) = .185$, *ns*. In addition, the guilt threshold when the critical evidence was

[5]We also analyzed the data set including all participants and found similar results to those reported. We found a marginally significant effect of order on verdict, χ^2 (1, N = 153) = 2.39, $p < .09$; an effect of admissibility on verdict, χ^2 (1, N = 153) = 4.78, $p = .02$; a main effect of order on confidence in a guilty verdict, $F(1, 149) = 4.86$, $p < .05$; a marginally significant main effect of admissibility on confidence in a guilty verdict, $F(1, 149) = 2.758$, $p < .10$; a significant main effect of order on likelihood that the defendant actually committed the crime, $F(1, 149) = 6.78$, $p < .05$.

ruled admissible ($M = 90.47$) did not significantly differ from that when the critical evidence was ruled inadmissible ($M = 87.41$), $F(1, 131) = 1.55$, *ns*.

Memory of evidence. Overall, 106 participants (77.9%) recalled the critical evidence. A 2 (Evidence Order) × 2 (Admissibility) between-subject ANOVA on the number of participants recalling the critical evidence yielded only a main effect of order, $F(1, 132) = 7.14$ $p < .01$. Participants who read the critical evidence late were more likely to recall this evidence (87%) than were those who read the evidence early (68%). There was no effect of admissibility on recall, $F(1, 132) = .00$, *ns,* and the interaction between evidence order and admissibility was not significant, $F(1, 132) = .019$, *ns.*

To test whether memory mediates the relationship between evidence order and juror verdicts, we conducted a series of regression analyses following procedures outlined by Baron and Kenny (1986). First we regressed participants' confidence in verdict on the order in which the evidence was presented (Figure 2). As predicted, participants had greater confidence in their guilty verdicts when the critical evidence was presented late than when it was presented early, ($b = 1.66$, B = .246, $p < .01$). Next we regressed memory on evidence order and found participants were more likely to recall the critical evidence when it was presented late in the trial ($b = .095$, B = .229, $p < .01$). Finally, we regressed confidence in a guilty verdict on both evidence order and memory. This analysis revealed that participants who recalled the critical evidence were more likely to render a guilty a verdict ($b = 4.94$, $B = .303$, $p < .001$). Although the association between evidence order and confidence in verdict remained statistically significant when memory was entered in the equation ($b = 1.20$, $B = .177$, $p < .05$), a Sobel test indicated that this was a significant reduction, $z = 2.18$, $p < .05$.

Discussion

As in the previous experiments, when the critical evidence is presented by the last prosecution witness, participants were more likely to find the defendant guilty, have more confidence in a guilty verdict, and believe the defendant actually committed the crime. Although reported use of the evidence did not differ significantly as a function of presentation order, the results were in the expected direction.

Restricting analyses to those participants who demonstrated an understanding of the inadmissibility ruling, we found participants were less likely to render a guilty verdict and report using the critical evidence when making their decision when the evidence presented was ruled inadmissible. Interestingly, admissibility did not reliably affect juror beliefs that the defendant actually committed the crime.

Turning to recall measures, participants were more likely to remember the critical evidence when it was presented by the last prosecution witness than when it was presented by the first prosecution witness. Replicating the results of Experiment 3, mediational analyses suggested that memory may be the mechanism producing recency effects in juror verdicts. However, in contrast to Experiment 3, both memory and presentation order were found to independently influence juror verdicts. These findings will be discussed in more detail as follows.

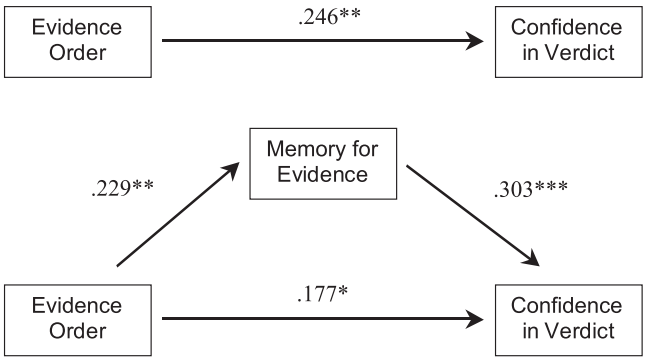

FIGURE 2 Summary of the regression analyses testing the mediation hypothesis for memory on confidence in a guilty verdict using expanded trial summary (Experiment 4).

GENERAL DISCUSSION

The literature on order effects in juror decision making has been mixed, with some researchers finding primacy effects (e.g., Pennington, 1982), and others finding recency effects (e.g., Anderson, 1959; Wilson, 1971). Part of the reason for these differences may be attributable to procedural and methodological differences between studies. One goal of our research was to use a minimal, yet ecologically relevant, paradigm as a way of establishing a set of findings that could serve as a foundation on which to build an increasingly complex understanding of the effects of evidence order on juror decision making.

The results of our experiments suggest that incriminating evidence is more likely to lead to a guilty verdict when it is presented late in the trial than when it is presented early. This pattern was the same whether the evidence was ruled admissible or inadmissible. Further analyses suggested that this effect was partially caused by the juror's memory of the critical evidence. Later evidence was more likely to be remembered by the juror, and thus, more likely to influence juror verdicts. These findings accord well with the comprehension set model of juror decision making that we adopted from the work of Srull and colleagues (e.g., Lichtenstein & Srull, 1987; Wyer & Srull, 1986), suggesting that memory plays an important role in producing the recency effects obtained in our studies.[6]

[6]In addition to its theoretical interest as an underlying mechanism, there are pragmatic reasons to examine the part played by memory. Approximately 90% of federal judges do not permit jurors to take notes (Kassin & Wrightsman, 1988). Therefore, most jurors must rely on their memories of trial events during verdict deliberation.

Taken together with the findings of Experiment 3, the results of Experiment 4 lend additional support for the role played by memory. However, although these analyses reveal that the recency effects found across studies are partially mediated by jurors' recall of critical evidence, it also appears that under certain conditions—for example, when defense witnesses were added to the trial summary (i. e., in Experiment 4)—evidence order has an independent effect on jurors' confidence in a guilty verdict.

There are two likely explanations for the finding that recency is mediated by factors in addition to explicit recall of the critical evidence. First, in our experiments, we adopted a rather strict criterion for successful recall of the critical evidence—for a response to be coded as memory of the critical evidence, participants had to explicitly mention the words "wiretap," "taped conversation," or "confession." It is possible that some participants remembered critical evidence, but did not mention the key words and thus were coded as *not* remembering the critical evidence. This would have the effect of weakening the correlation between memory and judgment, thereby reducing the mediating effect of memory on evidence order and verdict. Future research should examine a broader definition of memory to better understand the relationship between evidence order and juror verdicts.

A second reason for the less-than-perfect correlation between recency and memory may be the type of processing strategies adopted by our participants. A well-known finding in social cognitive research is that the relation between memory and judgment varies as a function of the processing task used (e.g., Hastie & Park, 1986). Our predictions for this set of experiments were based on Lichtenstein and Srull's (1987) comprehension set processing task, whose task analysis (consider each piece of evidence carefully, but withhold judgment until all evidence as been presented) fits well with the processing directions given to jurors. However, it is reasonable to surmise that mock jurors may have additional processing objectives when hearing a case. For example, in addition to trying to understand the testimony, a juror may be trying to create a coherent impression of the defendant (e.g., Kerstholt & Jackson, 1998). This impression formation objective may motivate the perceiver to give increased attention to early trial information (e.g., Anderson & Hubert, 1963), thereby reducing the correlation between memory and judgment.

Limitations and Future Directions

Our results suggest that jurors' use of incriminating inadmissible evidence may be moderated by the placement of the evidence in the trial. However, this might not be the case for all inadmissible rulings. The evidence used in our studies was adopted from that used by Kassin and Sommers (1997). In their research, Kassin and Sommers found that when evidence was ruled inadmissible because it violated due process, jurors were still likely to use that evidence. However, if the same evidence was ruled inadmissible because it was unreliable (e.g., the wiretapped confession was described as barely audible among the background noise), jurors were no more likely to convict than when the evidence was not presented.

In our experiments, the wiretapped confession was ruled inadmissible because it was obtained without the proper warrant, thus violating due process. The work of Kassin and Sommers suggests that if the critical evidence is ruled inadmissible because it is unreliable, order effects on juror verdicts may be attenuated. Consistent with this hypothesis, a pilot study in our laboratory using the "unreliable" ruling found that participants were as likely to find the defendant guilty when the critical evidence was presented by the first witness (33.3%) as when it is presented by the last witness (34.8%), χ^2 (1, N = 50) = .012, p = .94. Accordingly, the recency effects obtained in our experiments cannot be generalized to all types of inadmissible rulings.

Another limitation with our studies is that we examined only the effects of incriminating evidence. An interesting follow-up study would be to investigate whether this pattern would hold up with proacquittal evidence provided by the defense witnesses.

In addition, it is important to consider potential differences in the ways in which mock jurors and actual jurors experience and process trial evidence. For example, given the artificiality of the laboratory setting, mock jurors may be less motivated to come to the "fair" verdict. Along these lines, Petty, Tormala, Hawkins, and Wegner (2001) found that order effects in persuasion may be moderated by one's motivation to process information.

Another difference concerns the amount of evidence presented at a trial. In actual trial settings, jurors are expected to track a greater number of witnesses whose testimony extends over a much longer interval. Research by Webster, Richter, and Kruglanski (1996) suggests that increased length and difficulty of actual trial proceedings may deplete cognitive resources leading to mental fatigue of actual jurors.

Finally, this research examined only the effects of evidence order on individual juror judgments. Future research should examine whether recency effects are affected by an opportunity for jurors to deliberate before rendering a verdict. For example, research by Pritchard and Keenan (2002) found that jury deliberation led to an increase in the recall of trial events. If deliberation enhances memory of critical evidence, the process of deliberation may have a mitigating effect on the memorial advantage we found for critical evidence presented late in the trial.

Concluding Comments

Our research presents a preliminary investigation of the effects of incriminating evidence on a juror's verdict. These studies reveal a recency effect of incriminating evidence, indicating that when such evidence is presented near the end of the prosecution's argument, it has its greatest impact on juror verdicts.

Future research should investigate how to extend these findings and apply them more directly to the courtroom.

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