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PRESUMPTION INSTRUCTIONS AND JUROR DECISION MAKING

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Presumption instructions are deductive devices that require or allow the fact finder to infer the existence of one fact upon proof of another fact. The effects of three types of presumptions on verdicts were examined in a four (defendant culpability) by six (presumption instruction) factorial design. The six presumption instruction conditions were no presumption, permissive presumption, mandatory presumption intended to shift the burden of production (two versions), mandatory presumption intended to shift the burden of persuasion, and conclusive presumption. Only one presumption, the conclusive presumption, significantly increased overall guilty verdicts. Additional analyses indicated that as defendant culpability decreased there was a greater tendency to nullify the presumption instructions. The mandatory presumption instruction intended to shift the burden of production elicited the most misapplications of the presumption instructions (guilty verdicts that are inconsistent with the presumption instruction).

It is the constitutional right of criminal defendants to have each element of a crime proven beyond a reasonable doubt (*In re Winship*, 1970; *Mullaney v. Wilber*, 1975). But where direct proof of a required fact is difficult, a presumption is often employed to aid the prosecution.* For example, a defendant's state of mind is critical in

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*Presumption instructions have been used to prove such elements as possession of weapons by occupants of the automobile in which the weapons were found (*County Court of Ulster County v. Allen*, 1979), knowing importation of marijuana (*Leary v. United States*, 1969), transportation of weapons in interstate commerce (*Töt v. United States*, 1943), operation of an illegal still (*United States v. Gainey*, 1965; *United States v. Romano*, 1965), the knowing importation of illegal narcotics (*Turner v. United States*, 1969), and the knowing possession of stolen property (*Barnes v. United States*, 1973).

determining the severity of the crime (i.e., an intentional killing is murder whereas "recklessly" or "negligently" killing are far less serious types of homicide). Yet despite the importance of this factor, the defendant's mental state cannot be proven directly by the state, it must be inferred from circumstantial evidence. Many presumptions deal with the mental state element of crimes or other elements for which evidence may be inaccessible to the state and not susceptible to direct proof. For example, in a murder case, the jury might be instructed that if the state proves that the defendant used a gun or a deadly weapon, then the jury may or must (depending on the type of presumption; see p. 167) find that the defendant killed intentionally.

In theft cases, where there has been no direct encounter between the victim and the thief it may be difficult to prove that the defendant actually committed the theft despite the suspicious circumstance of the defendant's possession of the stolen property. Even when there are no witnesses to the actual taking of the property, a familiar common law presumption may significantly assist the State: the jury is instructed that if the State proves that the defendant is in possession of recently stolen property, then the jury may or must find that the defendant stole the property. However, since the crime for which the defendant is on trial involves stealing the property, not merely possession of the stolen property (although *knowing* possession of stolen property may also be a crime), the assistance given to the prosecution by the presumption raises legal issues concerning the defendant's due process right to proof of the crime charged beyond a reasonable doubt.

As the possession of recently stolen property instruction demonstrates, a presumption is a deductive device that requires or allows the fact finder to assume the existence of one fact (the presumed fact, i.e., defendant stole the property) upon proof of another fact (the basic fact, i.e., defendant possessed the recently stolen property). There are different types of presumptions that vary according to the strength of the link between the basic and presumed fact. Four types of presumption instructions have commonly been used: conclusive, mandatory (two types), and permissive. Table 1 illustrates the different types of presumptions and how they operate.

With conclusive presumptions, upon proof of the basic fact, the presumed fact must be found and is not subject to rebuttal by the

party against whom the presumption operates. Thus, for example, using the common law presumption concerning possession of recently stolen property for illustration, upon proof that the defendant was in possession of recently stolen property (the basic fact, fact A in Table 1), the jury is required to find the presumed fact (fact B in Table 1): that the defendant stole the property. The link between the two facts *must* be found and *no rebuttal* is possible. The unfairness and unconstitutionality of this type of presumption is clear; if the jury understands the court's instruction and the jury obeys its oath to follow the law, it must find the defendant guilty of the theft of the property despite evidence that the defendant did not himself steal the property, but acquired possession innocently without knowledge of its stolen nature.

Unlike conclusive presumptions, mandatory presumptions are subject to rebuttal, but only if the defendant meets a required burden of either: coming forward with some evidence that the presumption does not apply (type two, which shifts a "burden of production" to the defendant) or convincing the jury that the presumption does not apply (type one, which shifts a "burden of persuasion" to the defendant). Unless the applicable burden is met, the jury *must* make the required finding (if the basic fact has been proven). The operation of the two different types of mandatory presumptions is based upon the two burdens, production and persuasion, which comprise the generic term, the "burden of proof." The burden of production is simply the burden of coming forward with some evidence of an issue while the burden of persuasion refers to evidence which convinces the fact finder (the judge or jury depending on the type of trial). The concept of the

TABLE 1 Types of Presumptions

Irrebuttable

Conclusive presumption: If A, you *must* find B.

Rebuttable

Mandatory presumptions:

Burden of persuasion shifting: If A, you must find B unless defendant persuades you of not B.

Burden of production shifting: If A, you must find B unless defendant produces some evidence of not B.

Permissive presumption: If A, you *may* find B.

production of evidence does not involve a weighing of the credibility of the evidence (beyond a threshold finding by the trial judge that “some” evidence of the issue exists), while the burden of persuasion *is* concerned with convincing the jury. Since there can be no ties, if the jury believes that the evidence on an issue is exactly even, the party who has the burden of persuasion loses. Both the burden of production and the burden of persuasion can be placed on the same party or the two burdens can be split. For example, in some states the burden of going forward with some evidence that an assaultive act or killing was justified by self-defense and the burden of persuading the jury that all of the legal requirements for self-defense have been proven are placed on the defendant. In such a state, to win an acquittal on the basis of self-defense, the defendant must convince the jury that the justification to use force existed. However, in other states, the defendant is only required to meet a production burden by presenting “some” evidence of self-defense. If this burden is met, self-defense becomes an issue in the case but the State is required to prove the lack of self-defense in order to win a conviction.

If the mandatory presumption is one which shifts a burden of persuasion, the jury would be instructed that *if* it finds the defendant was in possession of recently stolen property, then the jury *must* find that the defendant stole the property *unless* the defendant’s evidence convinces or persuades the jury that he did not steal it (the nonexistence of the presumed fact, not B). Although this type of presumption is allowed in a civil case, it would be unconstitutional in a criminal case. This is so because in a criminal trial, the state must prove the defendant’s guilt beyond a reasonable doubt, and this type of mandatory presumption has the effect of requiring the defendant to prove that he did *not* commit the theft in order to win an acquittal.

Mandatory presumptions that shift only a burden of production operate like defenses in which the defendant is required to come forth with “some” evidence. If the judge determines that the burden was met, the presumption disappears from the case. For example, upon satisfactory proof that the defendant was in possession of recently stolen property (fact A, the basic fact in the Table 1), the jury *must* find that the defendant stole the property (fact B, the presumed fact) *unless* the defense comes forward with *some* evidence that the

defendant did not steal the property (produces some evidence of the nonexistence of the presumed fact, or not B). Because this type of presumption does not shift a burden to persuade the fact finder, it is constitutional in a criminal case but it is subject to more stringent review on appeal than the permissive presumption, which shifts no evidentiary burden to the criminal defendant (see p. 167).

Permissive presumptions authorize but do not require the jury to draw the connection between the fact proved and the fact presumed. For example, upon proof that the defendant was in possession of recently stolen property (fact A, the basic fact), the jury *may* (but need not) find that the defendant stole the property (fact B, the presumed fact). Even if the defense fails to present any evidence that he did not steal the property, the jury is not required to find that the defendant did; however, the presumption *allows* a finding of possession of the property to suffice as proof of stealing the property.

Much of the legal controversy about the use of presumptive instructions (see Schmolesky, 1981, for a complete review) rests on two issues: (1) confusion as to which of several types of presumption instructions may be constitutionally employed and (2) doubt as to whether or not jurors understand and rationally employ presumption instructions.* It is the latter issue with which this research is primarily concerned. Conclusive presumptions and mandatory presumptions intended to shift the burden of persuasion to the defendant have been declared unconstitutional in criminal cases since

*The precise wording of presumption instructions is important because the Supreme Court has made clear that no matter what type of instruction is intended by legislative drafters, it is the actual instruction given by the judge at trial that controls the classification of the presumption. If a juror can reasonably interpret the instruction actually given as requiring a conclusive or mandatory shifting of the burden of persuasion, reversible error has occurred despite the fact that legislature may have intended a constitutional presumption. For example, in one of the most widely cited presumption cases (*Sandstrom v. Montana*, 1979), David Sandstrom offered evidence at his murder trial that a personality disorder aggravated by the use of alcohol precluded the possibility that he knowingly committed murder. The court instructed the jury that "[T]he law presumes that a person intends the ordinary consequences of his voluntary acts" (p. 513). Although this instruction was intended to shift only the burden of production to the defendant, the Supreme Court argued that a rational juror may have interpreted this instruction as conclusive or as shifting the burden of persuasion. Thus, the mere possibility that a juror may have reached a verdict in an unconstitutional manner—by interpreting the instruction as shifting the burden of persuasion—was sufficient evidence for the Supreme Court to reverse the lower court's decision.

such a shift violates the principle that the defendant is not required to prove his or her innocence, but rather the prosecution must prove all elements of a crime beyond a reasonable doubt (see *Sandstrom v. Montana*, 1979). However, mandatory presumptions shifting only a burden of production and permissive presumption instructions may still be employed. (Although conclusive and burden of persuasion shifting presumptions are now prohibited, examples of these types of presumption instructions were included in this experiment in order to test the impact of a full spectrum of presumptions. It should be noted that presumptions that are prohibited in criminal cases may still be employed in civil cases.)

Permissive presumptions and mandatory presumptions shifting only a burden of production may be employed in criminal cases but are still subject to review by appellate courts based upon a traditional "rational connection" test, which is intended to prohibit arbitrary presumptions by examining the logical link between the presumption's basic and presumed facts. A presumption that allowed a finding of criminal intent upon proof that the crime occurred on an odd-numbered day doubtless would fail the test because of a lack of a "rational connection" between basic and presumed facts. A good illustration of the rational connection test is provided by U.S. Supreme Court decisions in two cases decided the same year: *United States v. Gainey*, 1965, and *United States v. Romano*, 1965. The presumption in *Gainey* provided that proof of presence at an illegal liquor distillery "shall be deemed sufficient evidence to authorize conviction" for the offense of "carrying on" the business of an illegal still unless the defendant satisfactorily explained his presence. The U.S. Supreme Court found that the rational connection test was satisfied because stills are usually located in secluded areas where no one is invited except for those persons who in some way are aiding in the manufacture of the illegal liquor.

By contrast, in *Romano*, the court found no rational connection between the basic and presumed fact of a presumption that provided that proof of presence at an illegal distillery "shall be deemed sufficient evidence to authorize conviction of the offense of being in possession, custody, and control" of an illegal still unless the defendant satisfactorily explained his presence. While the basic fact was the same as in *Gainey*, there was no rational connection as in *Romano* because the presumed fact was "possession, custody, and

control” rather than merely some type of participation. The Supreme Court reasoned that:

Presence at an operating still is sufficient to prove the charge of “carrying on” because anyone present at the site is very probably connected with the illegal enterprise. . . . But presence tells us nothing about what the defendant’s specific function was and carries no . . . reasonable inference that he was engaged in one of the specialized functions connected with the possession, rather than in one of the supply, delivery or operational activities having nothing to do with possession . . . [A]bsent some showing of the defendant’s function at the still, its connection with possession is too tenuous to permit a reasonable inference of guilt—“the inference of the one from proof of the other is arbitrary. . . .”

The rational connection test remains the standard of review for the two constitutional types of presumptions in a criminal case (permissive and mandatory presumptions shifting only a burden of production), but the nature of the rational connection review varies depending on the type of presumption. If the presumption is mandatory (shifting a burden of production), the presumed fact must follow from the basic fact beyond a reasonable doubt, while the standard is only a “preponderance of the evidence” or “more likely than not” if the presumption is permissive. Furthermore, if the presumption is mandatory (shifting a burden of production) the rational connection review is “facial,” meaning based upon the face of the statute creating the presumption, while the review of a permissive presumption is a less restrictive “applied” review, meaning applied to the facts of the particular case.

The difference between the two methods was delineated in a U.S. Supreme Court case involving the issue of possession of weapons by the occupants of the automobile in which the weapons were found (*County Court of Ulster County v. Allen*, 1979). In *Allen*, the State of New York instructed the jury that “upon proof of the presence of the machine gun and the hand weapons, you may infer and draw a conclusion that such a prohibited weapon was possessed by each of the defendants who occupied the automobile at the time when such instruments were found” (p. 161).

Because the presumption was permissive, the Supreme Court held that an “applied” review was appropriate and that the lower appellate court incorrectly had ruled that the presumption was in-

valid based on a "facial review." The lower court had reasoned that it would be illogical to say that one who had a fleeting connection with a car, such as a hitchhiker, could logically be said to "possess" the gun or weapon (in the required legal sense of "possession" as "care, custody, control and management" of the item). Since none of the car's occupants in the *Allen* case were hitchhikers, the Supreme Court held that the lower court incorrectly considered this hypothetical situation and that the question should have been whether it was rational to infer the presumed fact of possession from proof of presence under the circumstances presented by the evidence in the case. In contrast, if the instruction to the jury had been mandatory (shifting a burden of production to the defendant), the appellate court, in facially reviewing the statute, could have properly determined the rationality of this presumption by considering whether it would be true in a hypothetical case of a hitchhiker, even though the defendants in the actual case were not hitchhikers.

The legal treatment of presumptions demonstrates that the courts have assumed that the permissive presumption poses the least threat to rational jury verdicts while other forms of presumptions so imperil due process concerns that an absolute prohibition is necessary. But in reality, do permissive instructions differ significantly from other forms in their impact upon the jury? Is the jury attuned to the nuances in meaning suggested by the use of the word "may" rather than the word "shall?" Isn't the average juror who hears the judge, an authority figure, say that a finding "may" be made likely to interpret this statement as a command rather than an invitation, as does the 10-year-old who is told by his parent that he or she "may" leave the room? If a presumption is viewed as a command, isn't there a danger that the juror will make the leap from the basic fact to the permitted conclusion based upon the presumption's authorization alone without considering the rationality of this conclusion under the particular facts of the case?

The dissenting judges in the *Allen* opinion were concerned with these issues, questioning whether the jury would have convicted all four of the individuals in the car of the joint possession of two guns without the assistance of the presumption. The evidence, unaided by the presumption, appeared to the dissenters to be particularly weak for the two male passengers in the back seat of the car. The

guns bulged out of the top of a purse which was located on the floor of the front seat between the male driver and the 16-year-old girl. The guns may have been visible from the back seat, but they were not within the easy reach of the two defendants in the back who were also convicted of possession of the guns. The dissent argued that the jury's verdict of guilty for all the charged defendants may have been based solely on the invitation offered by the presumption to find the defendants guilty of "possession" of the guns merely because the defendants and the guns were both present somewhere in the car, a fact that the defense did not dispute. According to the dissent, the effect of the presumption was not merely to make clear that the presence of the defendants in the vehicle was a *relevant* fact that could be considered in determining whether the defendants illegally possessed the guns, but to authorize the jury to make this fact *sufficient* for conviction. Despite the fact that merely being present in a car with contraband is not legally sufficient to constitute "possession," the dissent reasoned that the effect of the presumption may have been to allow the jury to find possession based upon presence alone and that *possibility* should mandate reversal of the convictions in a system that resolves any reasonable doubt in favor of the criminal accused.

An "applied" review of permissive presumptions was regarded as appropriate by the *Allen* majority because it was assumed that the jury will evaluate a permissive presumption in light of the evidence presented at trial. But since a permissive presumption invites the jury to find the presumed fact upon proof of the basic fact, there is a danger that the jury may accept this authorization without evaluating the logic of doing so based upon the evidence. Because the court is not allowed to inquire how a verdict was reached, it is possible that the jury could reach a verdict in an unacceptable manner. Nesson (1978) refers to this problem as a "two route" dilemma. A guilty verdict might be reached in either an appropriate manner (by evaluating the presumption in light of the facts in the case) or in an inappropriate manner (by simply inferring the presumed fact upon proof of the basic fact without analysis of the evidence presented at trial). Given existing research on juror comprehension of legal instructions (Charrow & Charrow, 1979; Elwork, Sales, & Alfini, 1982; Lind, 1982; Penrod & Cutler, 1987; Tanford & Penrod, 1984), it is questionable whether jurors are ca-

pable of evaluating evidence in complete accordance with typical presumption instructions. Despite the importance of these issues, there has been no prior empirical research on the impact of presumption instructions on jury decision making.

To differentiate judgments that might fall under the rubric of impermissible decision making, we distinguish the following types of decisions. *Correct application* refers to situations in which the connection between facts is inferred only after the presumption is evaluated with respect to the appropriate criterion. For the permissive presumption, the criterion is the rational connection, which is passed when the jury finds based upon an evaluation of the evidence presented at trial that the presumed fact follows from the basic fact by a preponderance of the evidence. For the mandatory presumption intended to shift the burden of production, the criterion is passed when there is no evidence negating the presumed fact. For the mandatory presumption intended to shift the burden of persuasion, the criterion is tied to the defendant's burden of persuasion. This criterion is passed when the evidence offered by the defense fails to convince the jury that the presumed fact does not follow from the basic fact. A decision to acquit after finding the presumption instruction to be invalid (the criterion is not passed) is also a correct application.

Misapplication, on the other hand, refers to situations in which the presumed fact is inferred when there is no rational connection between the presumed and basic facts. A misapplication also occurs when the fact finder neglects the rational connection test altogether and simply assumes the existence of the presumed fact. *Nullification* refers to the decision to acquit despite the fact that the presumption instruction is found to be valid. In the case of the mandatory presumption instruction, nullifications must be viewed as noncompliant with the law; however, with regard to permissive presumption instructions, a nullification may be viewed as a correct application. It is difficult to determine whether verdicts that appear to be either misapplications or nullifications are deliberate acts of noncompliance with the presumption instructions or if they result from the juror's failure to understand the presumption instruction. In the case of the latter, the juror's failure to understand the application of the law may be remedied by providing him or her with more explicit and more coherent instructions as to how the law

must be applied in a given case. More important, however, is the consideration that any type of presumption instruction has a tendency to divorce fact finding from the particulars of the case at hand (Nesson, 1979).

To what extent are jurors' verdicts influenced by failures to understand presumption instructions, or failures to properly apply them and by intentional nullification? An experiment was designed to determine (1) the effects of different presumption instructions on verdicts involving defendants differing with respect to culpability and (2) the extent to which verdicts rendered under presumption instructions comply with the standards developed by the Supreme Court.

The case used to examine these issues was modeled after *County Court of Ulster County v. Allen*. Four defendants differing with respect to culpability were tried for possession of a controlled substance (in place of weapons). Subjects in the role of jurors rendered a verdict of "not guilty," "guilty of possession," or "guilty of possession with intent to deliver" for each defendant under one of five presumption instructions or under no presumption instruction. The presumption instructions are designed to meet an element of defense that requires knowing possession of the controlled substance. Since the State's evidence rests solely on the basic fact—proof that the suspects were occupants of the automobile in which the cocaine was found—a conviction may only be obtained with the aid of a presumption instruction. The six presumption instruction conditions are described below.

No presumption. This was intended as a control condition against which the effects of presumption instructions may be compared.

Permissive presumption. The legislature of this state has found that the presence of cocaine in a car strongly suggests the knowing possession of the cocaine by the occupants of the car. You may consider this legislative finding in reaching your verdict based on all of the facts and circumstances that have been presented at this trial.

Mandatory presumption intended to shift the burden of production (version 1). If the State proves beyond a reasonable doubt that the defendants were occupants of a car in which co-

caine was present then you must find that the defendants knowingly possessed the cocaine unless some evidence to the contrary is produced. You must presume that the defendants possessed the cocaine unless there is evidence contradicting the conclusion that the defendants knowingly possessed the cocaine. The presumption of possession disappears when any contradictory evidence is produced.

*Mandatory presumption intended to shift the burden of production (version 2).** The presence of cocaine in an automobile in which the defendants are occupants is presumptive evidence that the defendants possessed the cocaine. In other words, upon proof of the presence of the cocaine you may infer and draw a conclusion that the cocaine was possessed by each of the defendants who occupied the automobile at the time when the cocaine was found. The presumption is effective only so long as there is no substantial evidence contradicting the conclusion that the defendants possessed the cocaine and the presumption is said to disappear when such contradictory evidence is produced. Thus, if the defendants offer substantial evidence that they did not possess the cocaine, you may not infer that the defendants possessed the cocaine.

Mandatory presumption intended to shift the burden of persuasion. If the State proves beyond a reasonable doubt that the defendants were occupants of a car in which cocaine was present then you must find that the defendants knowingly possessed the cocaine unless the defendants persuade you by a preponderance of the evidence (convince you that it is more likely than not that they did not possess the cocaine in the car).

Conclusive presumption. If the State proves beyond a reasonable doubt that the defendants were occupants of a car in which

*Although we have classified this presumption as intended to shift the burden of production, it could be argued that the language in the instruction could be interpreted as shifting a burden of persuasion to the defendant. Our classification, therefore, might be one that a defendant would likely disagree with on an appeal from a conviction in which an instruction like this was given.

cocaine was present then you must find that the defendants knowingly possessed the cocaine.

The full design was a six (presumption: between-subject) \times four (defendant culpability: within-subject) design. Presumption instructions were expected to produce a main effect on verdicts (increase guilty verdicts) relative to the no instruction condition, with the conclusive presumption yielding the largest effect. The case was designed so that the defendants would be perceived as differing with respect to culpability, and the effects of presumption instructions were expected to vary as a function of defendant. If the jurors in fact perceive variance in culpability, then some defendants might be found to meet the burden of production or persuasion while others might not; thus, mandatory presumption instructions might affect verdicts for some defendants but not for others. Similarly, the jury might find the presumption rational for some defendants but not for others, and the effects of permissive presumptions on verdicts might vary with respect to defendant. The basic fact, occupancy of the car in which the cocaine was found, is expected to be proven beyond a reasonable doubt for each defendant. If defendant culpability influences verdicts such that the less culpable receive fewer guilty verdicts, then the effect of the conclusive presumption instruction is expected to be stronger for the less culpable than for the more culpable. The above predictions lead us to anticipate a significant defendant \times presumption instruction interaction.

Method

Subjects and Procedures

Two hundred sixty-four undergraduates were recruited from an introductory psychology class to participate as mock jurors. Subjects assembled in groups ranging from 25 to 50. Once all subjects in a given group were assembled, each subject was handed a package of materials that contained a seven-page case summary and a questionnaire concerning the case summary. Subjects were instructed to

read the trial materials carefully and to then proceed to complete the questionnaire.

Stimulus Materials

Case Summary. The stimulus case was modeled after *County Court of Ulster County v. Allen* and involved four individuals charged with possession of a controlled substance, cocaine, with intent to deliver. The case summary was approximately 4050 words in length (excluding the presumption instruction). The prosecution's primary evidence rested on the testimony of the arresting officer who had stopped the defendant's automobile on an interstate highway for a routine traffic violation. There were four male occupants of the automobile. As the officer approached the automobile, he noticed a plastic bag containing a white powdery substance partially exposed from within a travel-bag located in the front seat of the automobile. At this time the officer ordered the defendants out of the automobile and arrested them under charges of suspicion of possessing a controlled substance. The substance in the bag was found to be cocaine.

There were four defendants. Alfred Bates was the owner and driver of the automobile. He owned the travel-bag as well. He testified that the travel-bag was used by only him to store his personal possessions while on vacation just prior to the arrest. The passenger in the front seat was Barry Bates, who had been vacationing with his brother, Alfred Bates. Barry Bates testified that at no time during the vacation had he made use of the travel-bag. One passenger in the back seat was Byron Cook, an acquaintance of Barry Bates. The Bateses had offered to give Cook a ride from the city in which they vacationed to their home town (their destination at the time of the arrest) and had picked him up at a prearranged time and day. The fourth occupant (also in the back seat) was Charles Davis, a hitchhiker who was offered transportation from the Bateses after they stopped at a diner and just before they were arrested. The defendants' testimony went as follows. While the three occupants (all except Davis, as he had not yet been picked up) were dining at a rest stop, the cocaine was placed in their automobile without their knowledge. Thus, although they were admittedly occupants of the automobile in which cocaine was found, they did not own the co-

caine, nor did they have knowledge of its presence. It is important to note that jurors were instructed that there was not enough evidence to prove beyond a reasonable doubt that any of the defendants in fact possessed the cocaine. Therefore, a guilty verdict could not legally be reached without the aid of a presumption instruction.

There were six versions of the case summary. The only difference between them was the presumption instruction appearing in the "Judge's Instructions" section of the summary. Subjects either received no presumption instruction or one of the five presumption instructions described above. With this exception, the case summaries were identical. Case summaries were distributed randomly to subjects within each experimental session.

Questionnaire. Before rendering verdicts for the four defendants, subjects answered three questions concerning each defendant:

Do you feel that the state proved beyond a reasonable doubt that <defendant> was an occupant of the car in which cocaine was present?

Was there any evidence to support the claim that <defendant> did not possess the cocaine in the car?

Were you persuaded by a preponderance of the evidence (convinced that it is more likely than not) that <defendant> did not possess the cocaine in the car?

Subjects were encouraged to refer to these judgments when completing the remainder of the questionnaire. It can be argued that requiring subjects to respond to these questions in writing and to refer to their responses when rendering verdicts sensitizes them to the critical elements of the task by making the production and persuasion burdens highly salient features. These issues may be less salient to the actual juror, and the actual juror may consequently pay less attention to the production and persuasion criteria when discussing the evidence and rendering verdicts. Furthermore, research by Tanford, Penrod, and Collins (1985) and Tanford and Penrod (1984) indicates that undergraduate subjects are better able to understand and apply legal instructions than are actual jurors. Therefore, the present experiment probably represents a conserva-

tive test of the juror's understanding of and ability to correctly apply presumption instructions.

After completing the dependent measures, subjects were asked to rate the degree to which they thought the instruction was fair to the defendants. Subjects then rendered separate verdicts for the defendants. Each time subjects rendered verdicts by checking "not guilty," "guilty of possession," or "guilty of possession with intent to deliver." In an attempt to determine the extent to which subjects understood the legal terms appearing in the case summaries, data from several questions were analyzed. Subjects were asked to indicate how difficult they found it to understand seven legal terms that had appeared within the case materials: presumption of innocence, burden of proof (and who has it), proof beyond a reasonable doubt, possession, possession with intent to deliver, constructive possession, and guilty of possession. Responses were recorded on nine-point scales ranging from "very difficult to understand" (score of 1) to "very easy to understand" (score of 9).

Results

Subjects' understanding of the legal terms was analyzed first. The legal terms were presumption of innocence, burden of proof (and who has it), proof beyond a reasonable doubt, possession, possession with intent to deliver, constructive possession, and guilty of possession. Mean responses to the items were 6.06, 6.03, 6.49, 7.02, 7.00, 5.81, and 6.71, respectively, indicating that subjects thought they understood the terms. A series of six one-way analysis of variance (ANOVAs) indicated that differential understanding of the terms could not be attributed to presumption instruction condition: F values are 0.09 for presumption of innocence, 0.38 for burden of proof, 0.54 for proof beyond a reasonable doubt, 0.55 for possession, 1.19 for possession with intent to deliver, 1.16 for constructive possession, and 0.27 for guilty of possession ($p > 0.20$ for each). Fairness of instructions was also measured on a nine-point scale ranging from "very fair" (score of 9) to "very unfair" (score of 1). Mean score for this rating was 5.38. A one-way ANOVA with six levels of presumption instruction indicated that instructions were not viewed as differentially fair to the defendants, $F(5, 250) =$

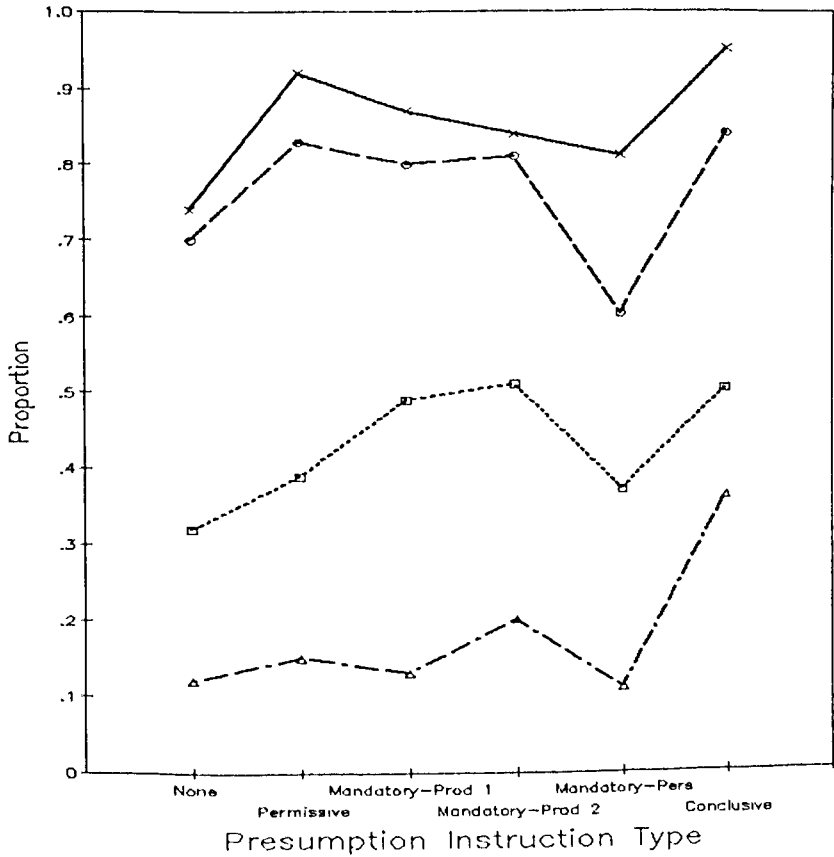


FIGURE 1 Overall proportion of guilty verdicts. Legend: x, Alfred Bates; O, Barry Bates; □, Byron Cook; Δ, Charles Davis.

0.43; however, it should be noted that subjects responded to the judge's instructions in general, and not specifically to the presumption instruction.

Effects of Presumption Instructions on Verdicts

Although subjects indicated their verdicts (Fig. 1) on a three-point scale, not guilty, guilty of possession, or guilty of possession with intent to deliver, the third option is irrelevant to the presumption instructions. In analyzing the effects of presumptions, therefore, we collapsed the latter two categories by scoring verdicts as follows: not

guilty, score of 0; guilty of possession, or guilty of possession with intent to deliver, score of 1 (with the aid of the central limit theorem to meet the ANOVA assumption of normally distributed dependent variable).

A four (defendant culpability) \times six (presumption instruction) ANOVA yielded a significant main effect for both presumption instruction and defendant, $F(5, 258) = 2.66, p < 0.03$, and $F(3, 774) = 259.67, p < 0.0001$, respectively. The anticipated presumption instruction \times defendant interaction, however, was non-significant, $F(15, 774) = 1.15$. In all of the analyses reported below, defendant produced significant simple main effects.

In order to determine the effects of each presumption instruction on verdicts relative to the baseline condition, a series of two (presumption instruction versus no presumption instruction) by four (defendant) simple main effect and interaction analyses was performed on the data. The permissive presumption was only marginally significantly different from the no instruction condition, $F(1, 82) = 2.52, p < 0.12$. The interaction between the permissive presumption and defendant culpability was nonsignificant, $F(3, 246) = 1.00$. Thus, defendants differing in apparent culpability were not treated in a differential manner under permissive versus no presumption instructions.

The effects on verdicts of mandatory presumption instructions intended to shift the burden of production were also only marginally significantly different from the no instruction condition. For the first version, $F(1, 81) = 2.39, p < 0.13$, and for the second version, $F(1, 82) = 3.22, p < 0.08$. For neither version was the defendant \times presumption simple interaction significant ($F < 0.90$ for both). Again, defendants differing in apparent culpability were treated similarly in the mandatory and no presumption instruction conditions. To compare the effects of the two instructions intended to shift the burden of production, a two (version of instruction) \times four (defendant) ANOVA was computed. The difference between instructions was negligible, both with respect to main effect, $F(1, 85) = 0.10$, and interaction with defendant, $F(3, 225) = 0.30$.

Consistent with the pattern for other instructions, the mandatory presumption intended to shift the burden of persuasion had no significant effect on verdicts relative to the no instruction condition,

$F(1, 87) = 0.00$, and did not interact significantly with defendant, $F(3, 261) = 0.99$.

In contrast to the other instructions, the conclusive presumption instruction, however, had a significant main effect on verdicts, $F(1, 82) = 8.01$, $p < 0.01$, but did not interact with defendant, $F(3, 246) = 0.24$. Inspection of Fig. 1 indicates that although the conclusive presumption increased guilty verdicts for each defendant, an appreciable number of subjects still found both Byron Cook and Charles Davis not guilty (55% and 65%, respectively), despite the fact that at least 95% found the basic fact to be proven beyond a reasonable doubt. Thus, the effect of the conclusive presumption was to increase the likelihood of conviction for all the defendants in a fairly uniform manner. Subjects' judgments continued to reflect a sensitivity to the apparent culpability of the defendants despite the fact that a strict interpretation of the instruction should have yielded a high conviction rate for all defendants irrespective of their apparent culpability.

Misapplications and Nullifications

For each presumption instruction there is a criterion that must be tested and passed before the connection between facts may be inferred. Subjects responded to questions concerning whether or not three criteria had been passed for each defendant: (1) reasonable doubt (whether the basic fact, being an occupant of the car in which cocaine was found, was proven beyond a reasonable doubt), (2) production (whether the defendant produced any evidence to suggest that the presumed fact, possessing the cocaine, does not follow from the basic fact), and (3) persuasion (whether the subject was convinced beyond a preponderance of evidence that the presumed fact does not follow from the basic fact). The proportions of subjects for which these criteria were passed with regard to each defendant are displayed in Table 2. Main effects of defendant on the data for the production and persuasion criteria were, as expected, highly significant, $F(3, 777) = 50.42$, $p < 0.0001$, and $F(3, 786) = 140.05$, $p < 0.0001$, respectively. This finding may be viewed as a manipulation check on the defendant culpability variable. It is not clear, however, why the proportion of subjects who were persuaded beyond a preponderance of evidence that Davis did not possess the

TABLE 2 Defendant Culpability^a

Criterion	Defendant			
	A. Bates	B. Bates	B. Cook	C. Davis
Reasonable doubt	0.98	0.97	0.96	0.96
Burden of production	0.26	0.35	0.47	0.56
Burden of persuasion	0.13	0.19	0.47	0.68

^aValues represent proportions of subjects for whom criteria passed.

cocaine should be larger than the proportion who felt that Davis did not produce any evidence to suggest that he did not possess the cocaine. Perhaps subjects did not fully understand what constitutes "any evidence."

The relevant criterion for testing the permissive presumption instruction is whether or not the state has persuaded the jurors that the presumed fact follows from the basic fact based upon an evaluation of the evidence at trial. For the two mandatory presumption instructions intended to shift the burden of production, the relevant criterion is whether or not the defendants produced some evidence suggesting that the presumed fact does not follow from the basic fact; for the mandatory presumption intended to shift the burden of persuasion, the relevant criterion is whether or not the defendants persuaded the jurors beyond a preponderance of evidence that the presumed fact does not follow from the basic fact. The relevant criterion for the conclusive presumption is whether or not the basic fact had been proven beyond a reasonable doubt.

Misapplications. In all, 8% of verdicts were misapplications (guilty verdicts rendered when the operative presumption criterion was not met): 8% of verdicts for Alfred Bates, 12% for Barry Bates, 8% for Byron Cook, and 1% for Charles Davis. In order to test for differences in proportions of misapplications as a function of defendant and instruction, misapplications were scored 1 and all other decisions were scored 0. A four (defendant) by five (presumption instruction) ANOVA was performed on these scores. A main effect was found for both defendant, $F(3, 657) = 10.39, p < 0.0001$, and for presumption instruction, $F(4, 219) = 7.81, p < 0.0001$. These main effects were qualified by a two-way interaction, $F(12, 657) =$

2.58, $p < 0.003$. A series of four ANOVAs examining the simple effects of presumption instruction on misapplications for each of the defendants separately yielded significant main effects for presumption instructions for Alfred Bates, $F(4, 219) = 5.69$, $p < 0.0002$; for Barry Bates, $F(4, 219) = 5.67$, $p < .0002$, for Byron Cook, $F(4, 219) = 4.39$, $p < 0.002$; but not for Charles Davis, $F(4, 219) = 0.53$.

Few subjects found Charles Davis guilty (44), and even fewer (3) misapplied the presumption instruction in doing so. Among verdicts for the remaining defendants, the mandatory presumptions intended to shift the burden of production yielded the most misapplications, with version 2 eliciting more than version 1. Under version 2, 25% of verdicts for Alfred and Barry Bates and 20% of verdicts for Byron Cook were misapplications. Under version 1, 23% of verdicts for Barry Bates, 9% of verdicts for Alfred Bates, and 14% of verdicts for Byron Cook were misapplications. Under the permissive presumption, 9% of verdicts for Barry Bates, 7.5% of verdicts for Byron Cook, and 2% of verdicts for Alfred Bates and Charles Davis were misapplications. For all defendants less than 5% of verdicts rendered under the mandatory presumption intended to shift the burden of persuasion and under the conclusive presumption were misapplications.

Nullifications. In total, 18% of verdicts were nullifications: 6% of verdicts for Alfred Bates, 11% for Barry Bates, 25% for Byron Cook, and 31% for Charles Davis. Nullifications were scored 1 and all other verdicts were scored 0. A four (defendant) \times five (presumption instruction) yielded a significant main effect for both defendant, $F(3, 657) = 41.26$, $p < 0.0001$, and presumption instruction, $F(4, 219) = 3.12$, $p < 0.02$, as well as a significant interaction, $F(12, 657) = 3.59$, $p < 0.0001$. This interaction is displayed in Fig. 2. Simple effects analyses indicated that the main effect of presumptions on verdicts for the two most culpable defendants—Alfred and Barry Bates—were nonsignificant, $F(4, 219) = 0.27$ and $F(4, 219) = 0.72$, respectively. Presumption instructions yielded significant main effects on verdicts for Byron Cook and Charles Davis, $F(4, 219) = 2.94$, $p < 0.03$ and $F(4, 219) = 5.87$, $p < 0.001$. Figure 2 shows that as defendant culpability decreases, the effect of presumption instructions on nullifica-

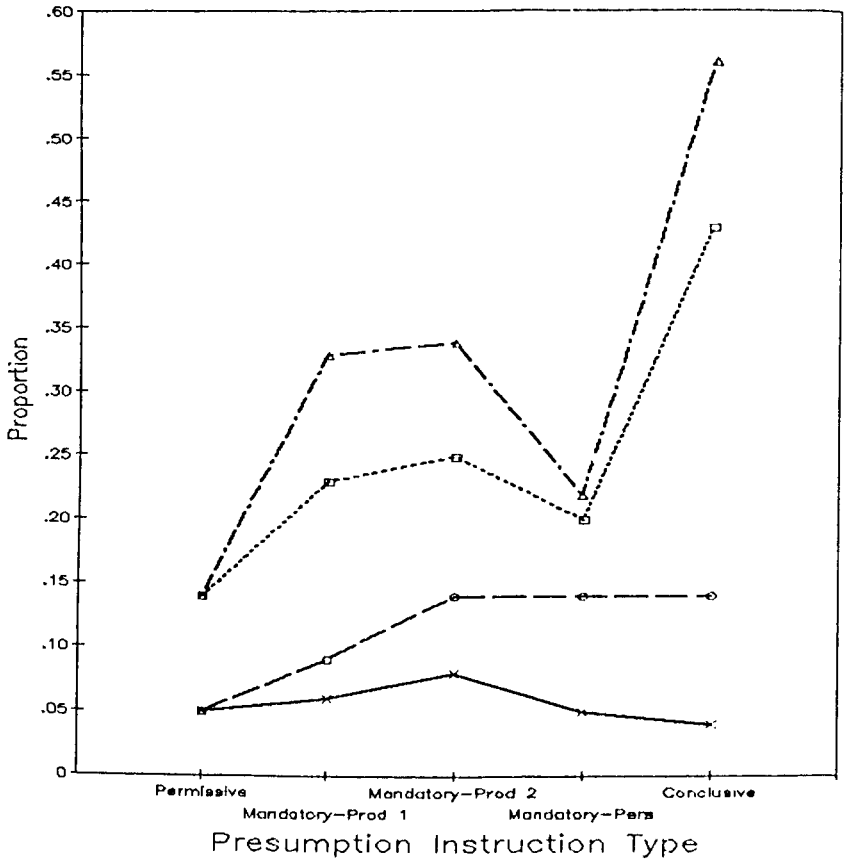


FIGURE 2 Proportion of nullifications. Legend: X, Alfred Bates; O, Barry Bates; □, Byron Cook; Δ, Charles Davis.

tions increases, with the conclusive presumptions eliciting the most nullifications (57% of verdicts for Davis and 43% of verdicts for Cook), followed by the mandatory presumption instructions intended to shift the burden of production, version 2 (34% of verdicts for Davis and 25% of verdicts for Cook).

Discussion

With respect to overall verdicts, this experiment demonstrated that only the conclusive presumption significantly increased guilty verdicts. Given that the presumption instructions should differentially

affect defendants who vary with respect to culpability, a presumption instruction by defendant interaction was anticipated. One plausible form of this interaction would be that mandatory presumptions increased convictions uniformly across defendants, but the permissive presumption increased convictions to a greater extent among the more culpable than among the less culpable. The fact that no such interaction appeared is strong evidence that the jurors in this study were not using the instructions in the intended manner. To determine the source of juror errors required a detailed examination of their perceptions of the trial evidence and their application of the various presumption instructions to that evidence.

In addition to providing their verdicts, subjects responded to a series of questions assessing their perceptions of the defendants' levels of guilt. These questions specifically asked, for each defendant, whether the defendant met the burden of production and burden of persuasion, whether the basic fact had been proven, and whether there was a rational relation to the presumed fact based on the evidence. These inquiries allowed more detailed analyses of verdicts—which were classified into four categories. *Misapplications* refer to guilty verdicts rendered when the presumption instruction is judged by the juror to be invalid. *Nullifications* refer to verdicts of not guilty when the presumption instruction is judged valid by the juror. An acquittal rendered after the presumption instruction is judged by the juror to be invalid is referred to as a *correctly applied acquittal*; a *correctly applied conviction* refers to guilty verdicts rendered after the presumption is judged by the juror to be valid.

The permissive presumption instruction led to a high proportion of correctly applied acquittals for the less culpable defendants, and a high proportion of correctly applied convictions for the more culpable defendants. However, a substantial proportion of verdicts for the more culpable defendants were misapplications. Misapplications of this instruction are evidence that subjects do not fully understand that the evidence must be analyzed to determine if there is a rational connection between the basic and presumed fact. In this research misapplications and correct applications are distinguishable simply by asking jurors to indicate whether a rational connection was found. Due to the degree to which jury deliberations are protected from outside inquiry, the courts typically do not ask the jury to evaluate the rational connection between facts and are there-

fore not able to distinguish between correct applications of the presumption instruction and misapplications. Therefore, Nesson's "two-route" dilemma is a valid concern. In this experiment some subjects reached a guilty verdict in a permissible manner (by first considering the rational connection between facts) while others reached a guilty verdict in an impermissible manner (by simply inferring the connection between the facts without regard to the evidence).

There was also a substantial proportion of nullifications of the permissive presumption instruction, especially for the less culpable defendants. Nullifications of a permissive presumption, though, are acceptable by law. The instruction states that the juror may or may not infer the connection between the basic and presumed fact. The problem with permissive inferences is the risk that jurors may simply accept the invitation to find the existence of the presumed fact upon proof of the basic fact without a critical evaluation of the logical connection between these facts based upon the facts of the particular case.

Two versions of the mandatory presumption instruction intended to shift the burden of production were examined here. Both versions yielded appreciable proportions of noncompliant verdicts. Many subjects nullified these instructions for the less culpable defendants. In other words, despite the fact that subjects felt Charles Davis and Byron Cook did not come forth with evidence supporting their claims of innocence, not guilty verdicts were rendered. It is not clear whether subjects deliberately nullified the instructions or whether they misunderstood the manner in which the presumption was to be applied. Analyses of fairness ratings indicated that subjects did not view these instructions as less fair to the defendants than other instructions; perhaps, therefore, the misunderstanding explanation is more plausible. A large percentage of subjects also misapplied these presumption instructions, especially when rendering verdicts for the more culpable defendants. Further research is clearly needed to determine the bases of subjects' noncompliant verdicts. If misunderstanding of the presumption instruction is to blame, then rewording and elaboration of the instructions may lead to more acceptable decisions. In general, version 1 fared slightly better than version 2 of this instruction. We exert caution in our interpretation of our findings concerning version 2 as we had no

direct measure of whether or not subjects were convinced that the defendants produced "substantial evidence" that the presumed fact does not follow from the basic fact.

It should be noted that in criminal cases the determination of whether the production burden has been met is for the judge. Thus, if the judge determines that a defendant has met the burden of production, he generally allows the presumption to drop out of the case by never instructing the jury about it. In this case, for example, all four defendants meet a production burden. The hitchhiker's testimony clearly introduces some evidence that he was not aware of the existence of the cocaine, which, of course, is a prerequisite to possession. The testimony of the other three defendants, while not as believable, is some evidence of nonpossession because the testimony that the cocaine was not present prior to their stop in the restaurant against suggests that they were not aware of the presence of cocaine in the car. Thus, the production burden was met and in a properly conducted trial, the instruction should not have been given.

What if no evidence of nonpossession had been introduced by any of the defendants? What should the trial court do? One possibility is suggested by the two mandatory production shifting presumptions studied here. These instructions inform the jury in terms of evidence production even though it is ordinarily an issue for the judge. In a criminal case, it is unacceptable for a judge to direct the verdict against the party that failed to meet the production burden (though it is acceptable in a civil case). That party in a criminal case is the defendant, and the defendant has an absolute right under the Sixth Amendment to a jury verdict no matter how much or how little evidence of guilt has been produced. The major problem with allowing the jury to decide whether a production burden has been met is that the jury is not informed that their role has anything to do with determining a burden of production. Other jury instructions reinforce the idea that the jury is there to resolve all factual questions, in other words, to decide whether they are persuaded. The concept of production of evidence is not explained to the jury and it is foreign to the jury's true role. Our findings indeed support the notion that jurors have difficulty determining whether a production burden has been met (see Table 2).

Another possible alternative when the defendant has failed to

meet the burden of production is for the judge to convert it to a permissive presumption instruction. This eliminates the problem of instructing the jury in terms of production burden, but such a resolution essentially eliminates the mandatory presumption shifting a burden of production, a presumption the Supreme Court has acknowledged is constitutionally permissible. If the burden of production is met, the presumption drops out, and if the burden is not met then the instruction is permissive. But to give any type of instruction other than a permissive one where the defendant has failed to meet the production burden runs the risk of violating the *Sandstrom* principle again. The critical question is not what type of device the legislature intended, but rather, what a reasonable juror could interpret the device to mean. Arguably, any instruction other than a permissive one could reasonably be interpreted as shifting the burden of persuasion to the defendant. If the presumption disappears upon introduction of some evidence, why would the judge be telling the jury about the existence of their mandatory obligation to find the presumed fact unless the defendant had failed to introduce some evidence? Furthermore, since the jury's only function relates to the burden of persuasion, any instruction is apt to be interpreted in those terms. Certainly an instruction like our production shifting presumption, version II, with its suggestion that the defendant must produce "substantial evidence" of nonpossession, could easily be interpreted by a reasonable juror as requiring the defendant to prove his innocence.

Few subjects misapplied the mandatory presumption instruction intended to shift the burden of persuasion. However, a substantial proportion (21%) of subjects nullified this instruction when rendering verdicts for the less culpable defendants. Again, it is not clear whether this nullification is deliberate or whether subjects did not fully understand the presumption instruction. Further studies are needed to address this issue.

In reference to the conclusive presumption instruction, the majority of verdicts were either correctly applied convictions or nullifications, since nearly all subjects judged the basic fact, occupancy of the car in which the cocaine was found, to be proven beyond a reasonable doubt. For the least culpable defendant, Charles Davis, nearly 60% of verdicts were nullifications. Analyses of fairness ratings did not show that subjects perceived this instruction to be more

unfair than other instructions and still, the possibility that nullifications of these instructions were deliberate must be entertained; that is, subjects may have fully understood that if the basic fact is proven then the presumed fact must be found and the defendants convicted.

Further investigations of the influence of presumption instructions on juror decision making are warranted. It is clear that subjects are either deliberately not applying the instructions correctly or not understanding the manner in which the presumption instructions are to be applied, and additional research might address this issue. If failure to understand the presumption instruction and its application are to blame for noncompliant verdicts, then revision and simplification of the wording of the instructions may prove useful. Although analyses of overall verdicts did not show that presumption instructions had differential effects on verdicts for defendants who vary with respect to culpability, more detailed analyses of correct and incorrect applications of the presumption instructions clearly show that the operation of presumptions did interact with culpability. Future research should therefore examine the effects of presumptions at various levels of culpability in order to maximize the generalizability of results. As noted earlier, due to methodological features of the experiment discussed above (i.e., having subjects respond to the questions pertaining to the production and persuasion criteria), our estimate of unacceptable verdicts is probably conservative. Had we not encouraged subjects to first determine the status of the production and persuasion criteria and to refer to these judgments when rendering verdicts, these criteria would probably have played less of a role in determining guilt, and greater numbers of inappropriate verdicts would have been obtained. Concurrently, investigators should examine alternative methods to communicate presumption instruction information to the jury and perhaps avoid the use of presumption instructions altogether.

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