**When Self-Report Trumps Science:**

**Effects of Confessions, DNA, and Prosecutorial Theories on Perceptions of Guilt**

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**Abstract**

For many wrongfully convicted individuals, DNA testing presents a new and invaluable means of exoneration.  In several recently documented cases, however, innocent confessors were tried and convicted despite DNA evidence that excluded them. In each of these cases, the prosecutor proposed a speculative theory to explain away the mismatched confession and exculpatory DNA.  Three studies were conducted that pitted confessions against DNA test results.  Study 1 showed that people in general trust DNA evidence far more than self-report, including a defendant's confession. Using student and adult community samples, Studies 2 and 3 showed that in cases in which the defendant had confessed to police but was later exculpated by DNA, prosecutorial theories spun to reconcile the contradiction attenuated the power of exculpatory DNA, significantly increasing perceptions of the defendant's culpability, the rate of conviction, and the self-reported influence of the confession.  Implications and suggestions for reform are discussed.

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In an article entitled "The Prosecution's Case Against DNA," *New York Times* writer Andrew Martin (2011) described a number of cases in which suspects were induced to confess during a harsh police interrogation, were subsequently excluded by DNA testing, and were nevertheless tried and convicted at trial when a prosecutor spun an implausible theory, lacking parsimony, to reconcile the contradiction. This article featured the case of Juan Rivera, in Lake County, Illinois, who was convicted for the rape and murder of an 11-year-old girl after he confessed—even after DNA testing of semen at the scene excluded him. The state's theory of why DNA belonging to someone other than the defendant was found in the victim was that the young girl had prior consensual sex with an *unknown* male, after which time Rivera raped her, failed to ejaculate, and then killed her. Three days after Martin's article was published, an editorial opinion appeared in the *Chicago Sun-Times* entitled "The Evidence is in: These DNA Theories are Just Stupid." Two weeks later, the Illinois Appellate Court described the state's new theory as "highly improbable," expressed remorse for Rivera's "nightmare of wrongful incarceration," and overturned his conviction. Shortly thereafter, Rivera's prosecutor announced his early retirement. On March of 2015, Rivera was awarded a settlement of $20 million—the largest ever for an individual wrongful conviction (Hinkel & Mills, 2015).

The foregoing series of events may seem highly atypical in a legal system that purports to contain numerous safeguards to protect the falsely accused. It is clear, however, that confession evidence in criminal law, while fallible, is common, potent, and highly regarded (see Kassin et al., 2010 for a review). Dating back to the Salem witch trials of 1692, countless numbers of people have been wrongfully prosecuted, convicted, imprisoned, and sometimes sentenced to death after confessing to crimes they did not commit. In fact, false confessions and admissions are a contributing factor in more than 25% of all DNA exonerations reported by the Innocence

Project—68% in cases of homicide (www.innocenceproject.og).  On the basis of recent research, the dispositional and situational factors that put innocent people at risk to confess are now generally known (for reviews of this literature, see Kassin, et al., 2010; Kassin, Perillo, Appleby, & Kukucka, 2014).  But are confessions, mere self-report evidence, often extracted under pressure, so powerful as to trump the pretrial discovery of scientific evidence in the form of exculpatory DNA?  For people who are wrongfully accused, DNA testing of biological evidence is often presumed to be the ultimate safeguard to prevent wrongful convictions.  Cases like that of Juan Rivera, however, suggest that confession evidence–even when false—may be persuasive enough to overpower exculpatory DNA.

Confession evidence is so persuasive that once a suspect confesses, even if he or she immediately recants that confession, additional investigation often stops and the suspect is prosecuted and convicted (Leo & Ofshe, 1998).  Research on the impact of confession evidence is unequivocal.  Mock jury studies have shown that confessions have more impact on verdicts than eyewitnesses and character testimony (Kassin & Neumann, 1997), and that people do not adequately discount confessions even when they were retracted and perceived to have been coerced by police (Kassin & Wrightsman, 1980; Kassin & Sukel, 1997; Redlich, Ghetti, & Quas, 2008), even when jurors are told that the confessor suffered from psychological illness or interrogation-induced stress (Henkel, Coffman, & Daily, 2008), and even when the confessions are provided not by the defendant himself but by an informant who is incentivized to falsely implicate the defendant (Neuschatz, Lawson, Swanner, Meissner, & Neuschatz, 2008). This broad-based reliance on confession evidence at trial afflicts not only lay juries but judges as well (Wallace & Kassin, 2012).

There are two reasons why people trust confessions. One is that people in general tend to trust the self-reports of others, exhibiting a "truth bias" independent of the actual veracity of a statement (Bond & DePaulo, 2006; Levine, Kim, Park, & Hughes, 2006; Zuckerman, DePaulo, & Rosenthal, 1981; Vrij, 2008). This effect occurs even when there is no evidence to support the claims made within a statement (Arkes, Hackett, & Boehm, 1989; Gilbert, 1991) and even when a statement is clearly labeled as false (Gilbert, Krull, & Malone, 1990; Wegner, Coulton, & Wenzlaff, 1985). In the case of confessions, this truth bias is magnified by a strong tendency in attribution—as noted by Heider (1958), Jones and Davis (1965), and other attribution theorists— for people to especially trust statements against self-interest. Hence, research shows that people are far more likely to believe a suspect's admissions of guilt than his or her denials (Levine, Kim, & Blair, 2010).

A second reason why people trust confessions is that these statements often contain content cues commonly associated with truth telling. In an examination of 38 false confessions derived from the Innocence Project's DNA exoneration cases, Garrett (2010) found that 36 contained accurate details about the crime, crime scene, or fact relayed by the victim. In fact, most contained *non-public* details that became a centerpiece for the prosecution—information, according to detectives who testified at trial, that only the perpetrator could have known. Furthermore, in a content analysis of twenty false confessions, Appleby, Hasel, and Kassin (2013) found that most false confessions contained vivid story elements—including sensory details about the crime and how it was committed; the time and location of the crime; a description of the victim's appearance and behavior; statements of motivation and justification for committing the crime; assertions that the confession was voluntary; and apologies and expressions of remorse. A follow-up mock jury study showed that elaborate narrative

confessions in which the defendant recounted in detail how and why he or she committed the crime increased confidence in guilty verdicts relative to simple admissions of guilt. Thus, confessions, while mere self-reports, often contain cues that enhance perceptions of their credibility (Appleby et al., 2013).

In recent years, advances in DNA technology have helped both to expose the reality of false confessions and to reverse wrongful convictions in rape and murder cases in which blood, semen, hair, skin, and other biological traces of the perpetrator were deposited and collected at the scene of the crime (Garrett, 2012; Scheck, Neufeld, & Dwyer, 2000). These cases, which represent a mere fraction of an unknown total, have been reported for almost a quarter of a century now. Founded in 1992, the Innocence Project assists prisoners who could be proved innocent through DNA testing. To date, 330 people in the United States have been exonerated in this way, including a number who served time on death row (http://www.innocenceproject.org).

The persuasive power of DNA on criminal justice outcomes is also unequivocal. Surveys show that 85% of people rate DNA evidence as reliable, with 58% rating DNA as "very reliable;" and 27% as "completely reliable" (Carlson, 2005). Additional surveys show that 89% to 93% of people believe DNA to be the most persuasive evidence of guilt (Henkel et al., 2008; Lieberman, Carrell, Miethe, & Krauss, 2008). Measuring the effects of these beliefs, laboratory research shows that the presentation of incriminating DNA increases guilty verdicts more than incriminating forensic hair evidence, victim testimony, and eyewitness testimony—which led Lieberman et al. (2008) to suggest that jurors use DNA as a heuristic cue when reaching their verdicts. By all accounts, DNA has become the gold standard to which other physical means of proof are compared (Saks & Koehler, 2005; Thompson, 2006). Although the manner in which statistical information regarding the uniqueness of a particular DNA sample affects how jurors

evaluate DNA evidence (Koehler, 2001; Schklar & Diamond, 1999), mock jurors as a general rule exhibit reasonable levels of comprehension of DNA evidence when described by an expert in court (Hans, Kaye, Dann, Farley, & Albertson, 2011).

If people find inculpatory DNA evidence to be persuasive proof of guilt, then exculpatory DNA should also provide persuasive, if not unimpeachable, proof of *innocence*. When semen found inside a rape-and-murder victim excludes a defendant, often while identifying a specific other person, suspicion should be shifted away from the defendant. But what if the excluded defendant had confessed? In 2010, The Center for Wrongful Convictions identified 19 cases in which confessors to rape and/or murder were tried and convicted despite having been excluded by DNA tests of key biological materials. Currently there are no data on how often prosecutors decline to prosecute confession cases in which exculpatory DNA is discovered (cases dropped prior to trial typically receive little scrutiny) or agree to overturn convictions when post-conviction DNA excludes a confessed defendant (strength of evidence is a key factor in a prosecutor's decisions to file charges and prosecutors rate confessions and DNA highly; see Frederick & Stemen, 2012). Yet there is no systematic research on prosecutorial decision-making in disputed confession cases where the DNA exculpates the defendant. Anecdotal data from The Center for Wrongful Convictions suggests when such cases do proceed to trial, jurors may not weigh DNA evidence in the same way when it exculpates the defendant than when it inculpates him.

The following two stories illustrate this phenomenon. In one case, 16 year-old Jeffrey Deskovic confessed to the rape and murder of a high school classmate after a lengthy and manipulative interrogation. Subsequent DNA testing of the semen recovered from the victim excluded Deskovic. Yet he was prosecuted and convicted by a jury. At trial, prosecutors

theorized that the victim had prior consensual sex with an *unknown and unidentified boyfriend* and that Deskovic, who had confessed to rape and murder, killed her after failing to ejaculate. Deskovic was convicted in 1991 and released 15 years later when the DNA was matched to a convicted murderer who eventually pled guilty (Santos, 2006). A second example comes from New York's infamous 1989 Central Park Jogger case, wherein five teenage boys confessed to the assault and rape of a woman after lengthy and intense interrogations. Subsequent DNA testing of the semen recovered from the victim unequivocally excluded all the boys. Yet, they were still prosecuted and convicted by two juries. At their trials, the prosecuting attorney theorized that there was a sixth unidentified accomplice that the boys either could not, or would not, identify. The boys were exonerated 13 years later when the real perpetrator, an imprisoned serial rapist, made an accurately detailed admission of guilt—a confession that was supported by DNA (Burns, 2011).

In some instances, the DNA not only excludes the confessor before trial, but also identifies the perpetrator. The 2004 case of South Carolina against Billy Wayne Cope is one such example. Cope woke up one morning to find his 12 year-old daughter strangled to death in her bed. Police identified Cope as the perpetrator and interrogated him for several stressful hours during which time they told him that he failed a lie-detector-test and used other interrogation tactics that put innocent people at risk (see Kassin et al., 2010 for a review). After two and a half days, Cope eventually confessed in a statement that was filled with contradictions and factual errors. Shortly thereafter, it was revealed that Cope's daughter was also sexually assaulted. Subsequent DNA tests revealed that the semen and saliva found on the girl's body did not match Cope, but it did match James Sanders, a serial sex offender who had broken into other homes in the area as well. One would think from this series of events that Cope would have been released

from jail, freed, and compensated. Instead, however, the prosecutor—armed with a police-induced confession that did not match the facts of the crime, and with *no evidence* of a link between the two men—charged Cope with conspiracy and theorized that he had pimped his daughter out to Sanders. On the basis of this theory, the jury convicted both Cope and Sanders. Cope's conviction was recently affirmed at the state level; in 2014, the U.S. Supreme Court refused to grant Cope's request for an appeal (Dys, 2014).[1]

Are these cases and others in which confessions have trumped exculpatory DNA anomalous or do they tell us something about the power of confession evidence within juries? What tends to happen when DNA, the most potent form of scientific evidence, excludes the defendant, consequently contradicting a confession—the most potent form of self-report evidence? Although a number of studies have examined how jurors process scientific and non-scientific evidence, few have pitted one against the other. The research findings that exist thus far have been mixed. In one study, jurors were influenced more by physical evidence than by eyewitness testimony (Skolnick & Shaw, 2001). In a second study, in which the presence of inculpatory DNA yielded a high conviction rate, the presence of an exculpatory alibi witness placing the defendant elsewhere at the time of the crime reduced guilty verdicts (Golding, Stewart, Yozwiak, Djadali, & Sanchez, 2000). A third study tested the ability of DNA to attenuate verdicts in confession cases in which a psychologically disturbed suspect voluntarily confessed. When presented with a voluntary confession and inculpatory DNA, mock jurors convicted 72% of the time; however, when presented with voluntary confessions and exculpatory

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[1] There is also anecdotal evidence that this refusal to discount confessions in light of exculpatory DNA also happens in other stages of the legal process. In a 2001 rape case in West Virginia, for example, DNA not only excluded Joseph Buffey, a confessor who pled guilty, but matched a convicted sex offender. Yet rather than agree to vacate Buffey's conviction, the prosecutor's office proposed the new theory that Buffey and the sex offender were co-accomplices—a theory flatly contradicted both by the confession taken from Buffey, which makes no mention of an accomplice and by the victim's own lucid account of a harrowing hours-long ordeal involving a single perpetrator (www.innocenceproject.org/cases-false-imprisonment/joseph-buffey). Finally, on November 10, 2015, the West Virginia Supreme Court granted Buffey's request to withdraw his guilty plea (Eckholm, 2015).

DNA, the conviction rate dropped to 22% (Moffa & Platania, 2008). Taken together, these findings suggest that the relationship between competing self-report and scientific evidence is complicated and in need of further investigation.

In particular, it is important to test the phenomenon described by Martin (2011), whereby jurors are presented with not only a confession and exculpatory DNA, but also with a prosecutorial theory designed to reconcile the contradiction. Successful trial lawyers have long advocated for the persuasive value of storytelling in court (Mauet, 2005; Schrager, 1999; for an overview, see Findley & Sales, 2012). Psychology and law researchers have also weighed in, as articulated in the story model of jury-decision making in which Pennington and Hastie (1994) proposed that jurors try to create a story about their case—consisting of a chronological series of purposeful, causally linked events—in order to make sense of the evidence and reach a verdict. Self- or other-generated stories are persuasive because they enable jurors to give commonsense meaning to evidence that would otherwise appear disconnected and ambiguous if viewed in isolation (Finkel, 1995). By offering jurors a story, the prosecution provides a means of reconciling contradictory items of evidence (note that defense attorneys in these cases also offer an explanation of the contradiction – namely, that the defendant was coerced into confessing to a crime he did not commit).

When multiple stories can serve as a framework, what makes one more acceptable and persuasive than another? The story model argues that effective stories offer (1) comprehensive coverage of the evidence; (2) coherence (e.g., plausibility in relation to common sense); and (3) uniqueness in their coverage or coherence in relation to other possible stories (Groscup & Tallon 2009; Pennington & Hastie, 1992). Although the theories offered by the prosecutors in these cases may not seem plausible, research shows that most people do not believe as a matter of

common sense that an innocent person would confess to a crime he or she did not commit (Henkel et al., 2008). Moreover, research shows that people are not aware of the dispositional and situational factors that may lead an innocent suspect to confess (Blandon-Gitlin, Sperry, & Leo, 2010; Henkel et al., 2008; Leo & Liu, 2009). In sum, although both confessions and DNA constitute powerful forms of evidence, the story each side presents to the jury may well tilt the balance of their relative influence.

In three studies, we directly assessed people's decision-making in cases in which DNA testing excluded a defendant who had confessed during a police interrogation. This research was designed with two goals in mind: (1) to examine decision-making when inculpatory or exculpatory DNA evidence is accompanied by inculpatory or exculpatory self-report evidence from a defendant, and (2) to examine the effects of attorneys' explanatory theories designed to reconcile the contradictory evidence. In light of anecdotal evidence derived from actual cases, we sought to test the hypothesis that when evaluating disputed confession cases accompanied by exculpatory DNA, the relative power of the confession will be enhanced by a prosecutorial theory designed to explain why the DNA testing excluded the defendant.

## STUDY 1

Study 1 was designed to examine people's perceptions of guilt when presented with contradictory scientific and self-report evidence. Within the body of a single case, we independently varied whether self-report evidence was presented from the defendant or an eyewitness, whether that report was incriminating or exculpatory, and whether accompanying scientific evidence - in the form of DNA testing - matched or excluded the defendant. Our primary goal was to assess people's judgments when self-reports in the form of a defendant's confession or eyewitness's identification are pitted against DNA. Confessions and eyewitness

identifications are both common forms of self-report evidence presented at trial that often result in wrongful convictions (www.innocenceproject.org). Confessions, however, are more potent than eyewitnesses (Kassin & Neumann, 1997) and thus may be more difficult to overcome with exculpatory evidence. Hence, when the DNA exculpated the defendant, we predicted that participants would be more willing to concede that the eyewitness had made a mistake than that the defendant had given a false confession.

<p align="center">**Method**</p>

**Participants and Design**

A snowball sample of 147 participants was obtained via email and the social networking site Facebook.com. It was not possible to calculate a response rate because the number of people who received the study link is unknown. Forty-two people began the study but did not finish it; their data was not included in analyses. The final sample thus consisted of 105 U.S. participants (73 female, 32 male) A majority of the sample was White (88.6%). Participants ranged in age from 19-51, ($M = 33.59$, $SD = 11.55$). For the 73.33% participants for whom education data were collected (this question was added after 29 participants had already provided data), 83.1% had obtained at least a bachelor's degree. Participants were offered entrance into a lottery to win one of four $50-75 gift cards in exchange for their time.

Participants were randomly assigned to one of eight cells produced by a 2 (self-report type: eyewitness vs. defendant) x 2 (self-report culpability: exculpatory vs. incriminating) x 2 (DNA: excludes vs. incriminates) factorial design ($n$s = 10-15 per cell).

**Procedure**

All data were collected online through psychsurveys.org. Invited to take part in a jury decision-making study, participants were instructed that they would read a summary of a

criminal case, evaluate the evidence, and answer a series of questions. To incentivize participants to read carefully, they were told that following the presentation they would be tested for their recall of the facts and entered into a second lottery for $75 gift card if they correctly answered all of the fact questions. Participants were forewarned that they would not be able to return to the case summary once they finished reading it. On average, the study took participants approximately 35 minutes to complete.

In each condition, participants read a one-page single-spaced case summary about the rape and murder of a 16-year-old girl, found dead in a McDonald's where she worked, and the subsequent police investigation. Within the case summary, participants read a statement from either the eyewitness or the defendant that was either exculpatory or incriminating of the defendant. They also read about the presence of DNA in the form of semen that either matched or excluded the defendant. Afterward, participants completed a questionnaire, and then on a new page a series of manipulation checks. Then they provided demographic information, read a debriefing statement, and were thanked for their time.

**Stimulus Materials**

The case summary was entitled *State v. Wilson*. This fictional case pertained to the rape and murder of a 16-year-old girl who was found dead after her closing shift at McDonald's. All participants read that the police had questioned the defendant in a prior similar case and again in this investigation. At trial the state maintained that the defendant raped and murdered the girl, cited as circumstantial evidence the fact that he could not account for his whereabouts during the time of the attack, and noted that he had a history of problems with excessive drinking.

**Manipulations.** In the *eyewitness* conditions (i.e., those in which the self-report evidence originated from an eyewitness), participants read that a female eyewitness came

forward to police make a statement (94 words). The witness claimed to be walking through the McDonald's parking lot when she saw a man attacking a girl in the doorway. She said she was unable to contact the police at the time because of a dead cell phone battery. In the *exculpatory* self-report condition, participants read that police showed the witness a "showup" picture of the defendant and that she was "reasonably confident" he was not the perpetrator. In the *incriminating* self-report condition, the witness gave the same statement, but participants read that the witness was "reasonably confident" that the defendant was the perpetrator.

In the *defendant* conditions (i.e., those in which the self-report evidence originated from the defendant), participants read that the defendant was interrogated during which time he denied involvement (87 words) or signed a confession (93 words). In the *exculpatory* self-report condition, the defendant said that he was at a party that afternoon ("We drank some beers and smoked some pot"), that he was there for a certain period of time ("I only stayed at the party for about 4-5 hours"), that he left for a reason ("I think I left around 11:00 at night…because I had an early morning construction job in the city"), and that he was home alone at midnight, not in the vicinity of McDonald's, at the approximate time the crime was committed. In the *incriminating* self-report condition, the defendant confessed to the rape and murder, provided details about the victim's appearance ("brown hair, blue sweater, and this hot red tattoo on her neck") and the crime itself ("I tried to kiss her but she started screaming and hitting me and I lost it and pushed her. She fell and hit her head on the counter and was unconscious. That's when I raped her").

With regard to the *DNA* manipulation, participants read that investigators performed DNA testing on semen recovered from the victim, as DNA testing can be performed on blood, saliva, semen, or other appropriate fluid or tissue found at the crime scene. In the *exculpatory*

condition, participants read that the lab results indicated that the DNA excluded the defendant (41 words). In the *incriminating* condition, they read that the DNA matched the defendant (40 words).

## Dependent Measures

Participants rendered a verdict (*guilty* or *not guilty*) rated their confidence in that verdict on a 10-point scale (1 = *not at all*, 10 = *very*), and estimated the likelihood that the defendant committed the crime (0-100% scale, in intervals of 5). Next participants explained in their own words what the single most convincing piece of evidence was—and why. Finally, they rated how convincing of guilt they found the following items of evidence: (1) the defendant's history of excessive drinking, (2) the defendant's lack of an alibi, (3) the eyewitness's/defendant's statement (condition dependent), and (4) the physical evidence (all ratings were made on a 10-point scale, where 1 = *not at all* and 10 = v*ery*).

## Results

### Manipulation Checks

Participants were asked a series of multiple-choice manipulation check questions to ensure that they had read, understood, and recalled the information in the case summary. The results confirmed the effectiveness of our manipulations. In the confession (incriminating-defendant) conditions, 100% of participants correctly recalled that the defendant had confessed. In the denial condition (exculpatory-defendant), significantly more participants recalled that the defendant denied committing the crime (96.67%) than any of the other answer options (refused to speak, confessed, was not questioned) (3.33%), $\chi^2(1, N = 30) = 26.13$, $p < .001$. In the eyewitness-identification (incriminating eyewitness) condition, more participants correctly recalled that the eyewitness identified the defendant than failed to identify the defendant (87.5%

vs. 12.5%, respectively), $\chi^2(1, N = 32) = 18$, $p < .001$. In the eyewitness-rejection (exculpatory eyewitness) condition, more participants correctly recalled that the eyewitness did not identify the defendant than did (75% vs. 25%, respectively), $\chi^2(1, N = 28) = 8$, $p = .008$. Finally, more participants in the incriminating-DNA condition correctly recalled that the DNA matched rather than excluded the defendant (96.36% vs. 3.63%, respectively), $\chi^2(1, N = 55) = 47.29$, $p < .001$. In the exculpatory-DNA condition, 100% of participants correctly recalled that the DNA did not match the defendant. Analyses that excluded participants who missed one or more manipulation check questions showed the same pattern and significance of results.

**Verdict-Confidence Scores**

Analysis of verdicts showed a strong main effect for DNA, with 80% of participants favoring conviction when the DNA incriminated the defendant compared to only 3.64% favoring conviction when the DNA exculpated the defendant, $\chi^2(1, N = 105) = 63.64$, $p < .001$, Cramer's $V = .79$. Due to the low conviction rates in the Exculpatory DNA conditions, traditional statistical analyses could not be conducted on binary verdicts. A scalar variable was thus created by multiplying each participant's confidence rating by -1 for a not guilty verdict or +1 for a guilty verdict (scores could range from -10 to +10). A three way ANOVA revealed a significant main effect for DNA culpability; participants were more likely to favor conviction when the DNA matched the defendant ($M = 5.92$, $SD = 5.26$, 95% CI [4.88, 6.96]) than when it excluded the defendant ($M = -6.95$, $SD = 3.02$, 95% CI [-7.53, -6.37]), $F(1, 97) = 233.01$, $p < .001$, $\eta_p^2 = .71$. There was no significant main effect for self-report type $F(1, 97) = .95$, $p = .332$, $\eta_p^2 = < .001$; nor was there a main effect for self-report culpability, $F(1, 97) = .58$, $p = .45$, $\eta_p^2 = .04$. There were also no significant interactions, (all $p$s > .060). See Table 1 for all mean verdict-confidence scores.

**Probability-of-Commission Estimates**

Participants estimated the likelihood that the defendant committed the crime on a scale of 0 to 100% (continuous probability of commission rating provide a more sensitive measure of guilt perceptions than verdicts, which are also influenced by subjective standards of proof). Notably, verdict-confidence scores and probability-of-commission ratings were highly correlated, $r = .89$, $p < .001$. A three way ANOVA thus revealed a significant main effect for DNA culpability $F(1, 97) = 225.62$, $p < .001$, $\eta_p^2 = .70$. Participants rated the defendant as significantly more likely to have committed the crime when the DNA incriminated him ($M = 83.40$, $SD = 16.73$, 95% CI [80.16, 86.64]) than when it exculpated him ($M = 23.57$, $SD = 19.76$, 95% CI [19.75, 27.39]). There was not a significant main effect for self-report type, $F(1, 97) = 1.14$, $p = .283$, $\eta_p^2 = .01$, or for self-report culpability, $F(1, 97) = .35$, $p = .555$, , $\eta_p^2 = .004$, and no significant interactions (all $p$s > .283).

**Ratings of the Evidence**

Participants rated how convincing of guilt they found the various items of evidence (the statement, the eyewitness, physical evidence, lack of alibi, history of drinking), each on a 1 to 10 scale (1= *not at all convincing,* 10 = *very convincing*). Listed in order from most to least convincing of guilt, participants rated the physical evidence, namely the DNA, as the most convincing of guilt ($M = 6.20$, $SD = 4.07$), followed by the defendant's statement ($M = 5.26$, $SD = 2.64$), the defendant's lack of an alibi ($M = 4.83$, SD = 2.31), the eyewitness evidence ($M = 4.09$, $SD = 2.44$), and the defendant's history of excessive drinking ($M = 2.90$, $SD = 2.17$). Separated by whether each type of evidence was incriminating (DNA-match, defendant-confession, eyewitness-lineup identification) or exculpatory (DNA-exclusion, defendant-denial, eyewitness-lineup rejection), these mean ratings appear in Table 2.

**Open-Ended Responses**

Participants were asked to describe and explain in their own words the single most convincing evidence (12.5% cited two items and 1.3% cited three items; because we asked for the *single* most convincing piece of evidence, only the first item listed in these instances was coded as the most important). Answers were coded by two independent raters ($\kappa$=.93 for the first piece mentioned; disagreements were resolved by discussion). Across conditions, 84.8% of participants cited the DNA as the most convincing evidence. Only 10% of participants in the defendant self-report condition cited the confession; only 5.5% in the eyewitness self-report condition cited the eyewitness.

## Discussion

The results of Study 1 showed that when contradictory self-report and DNA evidence are presented, regardless of which evidence was incriminating and which was exculpatory, participants based their decisions on the DNA evidence. This preference was exhibited in verdicts, confidence ratings, probability-of-commission estimates, and open-ended self-reports of what evidence proved most convincing. In sum, participants relied on DNA far more than self-report—even when the self-report evidence consisted of the defendant's detailed, albeit subsequently retracted, confession. These findings thus raise an important question: If people rely on DNA evidence more than confessions, why do juries informed of exculpatory DNA tests often convict innocent confessors at trial? In Study 1, we presented the contradictory evidence to participants without an explanation for the contradiction or argument from the attorneys, leaving the participants to resolve the evidentiary inconsistencies on their own.

This study was limited in two ways. First, our snowball sampling method yielded a sample that was largely female and college educated. Second, in actual trials both the

prosecution and defense attempt to explain away unfavorable inconsistencies during witness examinations and closing arguments. Using a different sample, Study 2 was designed to replicate Study 1 and to extend it by varying the presence and absence of explanatory theories from the attorneys.

## STUDY 2

Study 1 showed that participants relied on DNA evidence more than confessions and eyewitness identifications when determining culpability, suggesting that science trumps self-report. Still, there are numerous innocent confessors on record who have been convicted at trial despite the presence of exculpatory DNA. In these cases, prosecutors faced with contradictory confessions and DNA evidence have offered explanatory theories designed to preserve the jury's judgment of guilt even though the DNA had excluded the defendant. As previously described, these theories have included blaming an unidentified co-conspirator, prior consensual sex on the part of the victim, and a host of other explanations (Martin, 2011). In Study 2, therefore, participants were presented with a confession case where we manipulated the DNA test results and the presence or absence of an explanatory theory from the attorneys.

Although attorneys' arguments do not constitute evidence, research shows that they are persuasive (Linz & Penrod, 1984; Pyszczynski, Greenberg, Mack, & Wrightsman, 1981). Mock jury studies show that extensive opening statements affect both verdicts and jurors' interpretations of evidence by providing them with a framework within which subsequent trial information is processed (Pyszczynski & Wrightsman, 1981). Closing arguments can also exert influence (Geiselman, et al., 2002)—even when accompanied by a judge's cautionary instruction that these arguments are not evidence (Geiselman & Mendez, 2005). On the basis of anecdotes from actual cases and the foregoing empirical research, we thus hypothesized that when a

confession is contradicted by exculpatory DNA, and whereas the DNA will prevail in general, perceptions of guilt and consequently the conviction rate will increase when the prosecutor provides a theory to reconcile the contradiction.

## Method

### Participants and Design

Participants were 89 introductory psychology students from a small liberal arts college recruited to participate in exchange for course credit. Nine people began the study but did not finish it, so their data were excluded from analyses. The final sample thus consisted of 80 U.S. participants (44 female, 34 male, $n = 2$ missing). A majority of the sample was White (63.7%), ranging in age from 18 to 23 ($M = 19.31$, $SD = 1.31$). Participants were randomly assigned to one of four cells in a 2 (DNA: exculpatory vs. incriminating) x 2 (attorney theories: absent vs. present) factorial design ($n$s = 18-21 per cell).

### Procedure

This study was conducted online via psychsurveys.org and took approximately 15 minutes to complete. First, participants were told that they would read a summary of a criminal case, evaluate the evidence against the defendant, and answer a series of questions. Participants were forewarned that they would not be permitted to return to the case summary once they finished reading it. After giving informed consent, participants read the same base case summary described earlier about a 16-year-old girl who was found raped and murdered at McDonald's. In this study, however, the self-report evidence was present in all conditions and always came in the form of a confession. After reading the case summary, participants completed a questionnaire, and, on a new page, a series of manipulation checks. Then they

provided their demographic information, read a debriefing statement, and were thanked for their time.

**Materials**

Participants read the same case summary of *State v. Wilson* from the confession condition of Study 1. The DNA manipulation was the same as before: In one condition, the DNA matched the defendant, thereby discrediting the defense's case; in a second condition, the DNA excluded the defendant, thereby discrediting the prosecution's case. In the *theory* condition, the attorneys offered closing explanations for the DNA findings. As in the Deskovic case described earlier, when the DNA *excluded* the defendant the prosecutor argued that "The DNA test does not mean that Wilson is innocent—only that he failed to ejaculate and that [the victim] may have had consensual sex with some other person earlier that day" (in contrast, the defense attorney argued that the defendant's confession was coerced and that he is innocent). When the DNA *incriminated* the defendant, the defense attorney argued that the confession was coerced and that "the DNA shows only that Wilson and [the victim] had consensual sex earlier that day" (in contrast, the prosecutor argued that the confession and DNA provide ample proof of guilt). In the *no theory* condition neither attorney explained the DNA results unfavorable to his case. With regard to dependent measures, participants answered the same questionnaire as in Study 1.

<center>**Results**</center>

**Manipulation Checks**

Participants were asked a series of multiple-choice manipulation check questions to ensure that they had read, understood, and recalled the information in the case summary. The results confirmed the effectiveness of our manipulations. Almost all participants accurately recalled that the defendant confessed to the crime rather than denied it (93.75% vs. 6.25%,

respectively), $\chi^2$(1, *N* = 80) = 61.25, *p* < .001.  Similarly, almost all participants in the incriminating-DNA condition recalled that the DNA matched the defendant than did not match (97.44% vs. 2.56%, respectively), $\chi^2$(1, *N* = 39) = 35.10, *p* < .001.  In the attorney theory conditions, almost all participants correctly answered at least one of two manipulation-check questions (open ended, then multiple-choice) about whether or not the prosecution provided an explanation for the DNA results, (94.74% vs. 5.26%, respectively), $\chi^2$(1, *N* = 38) 30.42, *p* < .001. Similarly, most participants correctly answered at least one of two manipulation-check questions about whether or not the defense provided an explanation for the DNA results (89.74% vs. 10.26%, respectively), $\chi^2$(1, *N* = 39) = 24.64, *p* < .001. As in Study 1, analyses that excluded participants who missed one or more manipulation check questions showed the same pattern of significance and results.

**Verdicts**

A binary logistic regression was performed with dichotomous verdict as the dependent variable and DNA culpability, attorney argument, and the interaction term as the independent variables.  The model was significant -2LL = 64.00, $\chi^2$(3, *N* = 80) = 46.10, *p* < .001.  DNA was a strong and significant predictor of verdict *β* = 2.30, SE = .78, Wald's $\chi^2$(1, *N* = 80) = 8.63, *p* = .003, Ex(B) = 10.00.  When the DNA incriminated the defendant, participants were more likely to convict (89.74%) than when the DNA excluded the defendant (21.95%).  There was also a marginally significant DNA x Attorney Theory interaction, *β* = 2.89, SE = 1.49, Wald's $\chi^2$(1, *N* = 80) = 3.76, *p* = .052, Ex(B) = 18.00, *OR* = 4.50. When the DNA excluded the defendant, participants were more likely to vote guilty when the attorneys presented a theory (33%) than when they did not (10%).  When the DNA incriminated the defendant, however, there was no

difference in conviction rates when attorneys presented a theory compared to when they did not (83% vs. 95%, respectively; see Figure 1).

**Verdict-Confidence Scores**

To obtain a more sensitive measure of verdict preferences, a scalar variable was created by multiplying each participant's confidence rating by -1 for a not guilty verdict or +1 for a guilty verdict (scores could thus range from -10 to +10). A two-way ANOVA revealed a main effect for DNA, $F(1, 76) = 80.95$, $p < .001$, $\eta_p^2 = .52$. Participants exhibited significantly more confident guilty verdicts when the DNA implicated the defendant ($M = 6.85$, $SD = 4.63$, 95% CI [5.82, 7.88]) than when it excluded the defendant ($M = -3.45$, $SD = 5.78$, 95% CI [-4.74, -2.16]). There was no main effect for attorney argument, $F(1, 76), = .07$, $p = .797$, $\eta_p^2 < .001$. However, there was a significant DNA x attorney theory interaction, $F(1, 76) = 6.94$, $p = .010$, $\eta_p^2 = .08$. When the DNA implicated the defendant, there was no difference between the attorney theory ($M = 5.39$, $SD = 5.71$, 95% CI [4.12, 6.66]) and no-theory conditions ($M = 8.10$, $SD = 3.00$, 95% CI [7.43, 8.77]). When the DNA exculpated the defendant, however, participants were significantly less confident in their not-guilty verdicts when the prosecutor provided a theory for the contradictory evidence ($M = -1.86$, $SD = 6.13$, 95% CI [-3.22, -.50]) than when he did not ($M = -5.15$, $SD = 4.98$, 95% CI [-6.26, -4.04]), $F(1, 76) = 4.30$, $p = .042$, $d = .59$, 95% CI [.13, 6.46].

**Probability–of-Commission Estimates**

Participants estimated the likelihood that the defendant committed the crime on a scale of 0 to 100%--a rating, unlike verdicts, that is not subject to a "beyond a reasonable doubt" threshold (verdict-confidence scores and probability–of-commission estimates were highly correlated, $r = .84$, $p < .001$). There was a significant main effect for DNA, $F(1, 76) = 82.60$, $p < .001$, $\eta_p^2 = .52$. Participants rated the defendant as more likely to have committed the crime

when the DNA implicated him ($M$ = 86.28, $SD$ = 13.89, 95% CI [83.19, 89.39]) than when it excluded him ($M$ = 43.17, $SD$ = 28.27, 95% CI [36.88, 49.46]. There was not a significant main effect for attorney theory (1, 76) = 1.81, $p$ = .182, $\eta_p^2$ = .02. As with verdicts, there was also a significant DNA x attorney theory interaction $F$(1, 76) = 9.96, $p$ = .002, $\eta_p^2$ = .12. When the DNA implicated the defendant, there was no difference between the theory ($M$ = 81.67, $SD$ = 17.92 95% CI [77.82, 85.52]) and no-theory conditions ($M$ = 90.24, $SD$ = 8.73, 95% CI [88.30, 92.18]). When DNA excluded the defendant, however, participants rated the defendant as more likely to have committed the crime when the prosecution provided an explanatory theory ($M$ = 53.57, $SD$ = 27.35, 95% CI [47.48, 59.66]) than when no theory was provided ($M$ = 32.25, $SD$ = 25.52, 95% CI [26.57, 37.93]), $F$(1, 76) = 10.42, $p$ = .002, $d$ = .80, 95% CI [8.17, 24.48] (see Figure 2).

**Ratings of the Evidence**

Participants were asked to rate how convincing of guilt they found the various items of evidence in the case (statement, physical evidence, alibi, history of drinking) on a 1- to 10-point scale (1 = *not at all convincing*, 10 = *very convincing*). A 2 (DNA: exculpatory vs. incriminating) x 2 (attorney theories: absent vs. present) ANOVA revealed a significant main effect for DNA on ratings of the confession. Overall, participants found the confession to be significantly more convincing of guilt when the DNA implicated the defendant ($M$ = 7.90, $SD$ = 1.89, 95% CI [7.48, 8.32]) than when it exculpated him ($M$ = 6.68, $SD$ = 2.47, 95% CI [6.13,7.23]), $F$(1, 76) = 6.18, $p$ = .015, $\eta_p^2$ = .08. There were no other significant findings on these measures. A complete breakdown of participants' ratings of the evidence can be found in Table 3.

**Open-Ended Responses**

Participants stated in their own words what evidence they found the most convincing. Although we asked for a *single* selection, 11.3% of participants cited at least two items of evidence; 1.3% provided 3 items. As in Study 1, only the first items listed were analyzed. Answers were coded by two independent raters ($\kappa = .92$); disagreements were resolved by discussion. Across all conditions 70% of participants cited the DNA as the most convincing piece of evidence, 20% cited the confession, 3.5% cited circumstantial evidence, 2.5% cited the attorney theory, and 3.8% cited miscellaneous items (those not mentioned or non-specific statements). A binary logistic regression was performed with type of evidence (DNA vs. confession) as the dependent variable and DNA culpability, attorney theory, and the interaction term as independent variables ("other" types of evidence were removed from this analysis). The model was significant -2LL = 62.15, $\chi^2$ (3, $N = 72$) = 14.13, $p = .003$. Attorney theory was a significant and important predictor of the evidence cited as most convincing. B = -2.94, SE = 1.13, Wald's $\chi^2$ (1, $N = 72$) = 6.80, $p = .009$, Ex(B) = .053. In the no-theory conditions, 92.68% of participants cited the DNA compared to only 7.32% who cited the confession. In the theory conditions, however, 46.15% of participants cited the DNA while 33.33% cited the confession. DNA culpability was not a significant predictor of which evidence participant cited as most convincing B = -.81, SE = .76, Wald's $\chi^2$ (1, $N = 72$) = 1.13, $p = .288$, Ex(B) = 4.44. The DNA culpability x attorney theory interaction was also not a significant predictor of the evidence cited as most convincing, B = 1.50, SE = 1.48, Wald's $\chi^2$ (1, $N = 72$) = 1.03, $p = .309$, Ex(B) = 4.50.

## STUDY 3

Study 2 confirmed that participants overwhelmingly perceived guilt and voted for conviction when DNA tests incriminated the confessor. When DNA excluded the confessor, however, participants did not uniformly vote for acquittal. Instead, their verdicts were

influenced by whether or not the prosecutor provided a theory to explain away the contradiction (i.e., that the victim had prior consensual sex with an unidentified man and that the defendant had failed to ejaculate), which yielded an increased estimate that the defendant committed the crime, greater self-reported influence of the confession, and a threefold increase in the rate of convictions—from 10% to 33%. In short, it appears that although DNA is considered the gold standard in forensic evidence (Saks et al., 2005; Thompson, 2006) and a heuristic cue that jurors both comprehend (Hans et al., 2011) and use in reaching their decisions (Lieberman et al., 2008), the formidable power of DNA evidence is significantly attenuated when the defendant had confessed, the DNA results were exculpatory, and the prosecutor proposed a theory to explain away the contradiction. In light of the implications for jury decision-making in cases involving wrongful convictions, we conducted a third study that focused on the confession-DNA exclusion pattern of evidence and sought to replicate and extend our key findings within an in-person sample of community adults.

## Method

### Participants and Design

Participants were 60 United States citizens from New York City recruited through advertisements on craigslist.com. The sample was 58.3% male ($n = 35$) and 41.7% female ($n = 25$), and ranged in age from 20 to 66, ($M = 36.20$, $SD = 12.80$). The sample was sample was older and more racially diverse (45% White non-Hispanic, 30% African-American, 8% Hispanic, 7% Asian) than that in Study 2. A majority had obtained at least a bachelor's degree (63.3%). Participants were paid $10 for their time; all participants who began the study completed it. Participants were randomly assigned to one of two confession-exculpatory DNA groups (Theory, No Theory) or to a denial-exculpatory DNA, no theory control group ($n$s = 20 per group).

**Procedure**

Live sessions were conducted in small groups ranging in size up to 10. Sessions lasted between 20 and 30 minutes. Participants were told that they would read a summary of a criminal case, evaluate the evidence against the defendant, and answer a series of questions. To incentivize careful reading, we told participants that they would be asked to recall the facts of the case and entered in a $50 lottery if they answered all the questions correctly. Participants were warned they could not return to the case summary once they were finished reading. We used the same base case summary that was used in Study 2. In all conditions, the DNA was said to have excluded the defendant. After reading the case summary, participants completed a questionnaire about the case. On a separate questionnaire, they then completed a series of manipulation checks and provided demographic information. When they were finished, participants were debriefed and thanked for their time.

Participants in the *theory* and *no theory* conditions read the same case summary that was used in the confession/DNA exclusion conditions of Study 2. Because all participants read a summary in which the defendant had confessed but was excluded by DNA, the explanatory theory created to reconcile the exculpatory DNA came *only* from the prosecutor. As in Study 2, the defense attorney argued that the confession was coerced. Participants in the *denial,* no theory condition read that the defendant had denied committing the crime in place of the confession. All dependent measures were the same as Studies 1 and 2.

## Results

**Manipulation Checks**

As before, results confirmed that participants accurately recalled our manipulations. In the confession conditions, 95% recalled that the defendant confessed, $\chi^2(1, N = 40) = 32.40$, $p <$

.001; in the denial condition, 100% of participants recalled that the defendant denied involvement; 91.67% correctly recalled that the DNA excluded the defendant, $\chi^2(1, N = 60) = 41.67$, $p < .001$. In the attorney theories condition, 90% of participants correctly recalled that the prosecution had explained the unfavorable DNA results (i.e., that the victim had prior consensual sex), $\chi^2(1, N = 20) = 12.80$, $p < .001$; 95% recalled that the defense attorney had also explained the unfavorable self-report evidence (i.e., that the confession was coerced), $\chi^2(1, N = 20) = 16.20$, $p < .001$. In the no-theories condition, 89.47% of participants correctly indicated that the defense did not explain the DNA results, $\chi^2(1, N = 19) = 11.84$, $p = .001$; though only 63.16% similarly recalled that the prosecutor gave no explanation, $\chi^2(1, N = 19) = 1.31$, $p = .25$. In the denial control group, 90% indicated correctly that neither the prosecutor, $\chi^2(1, N = 20) = 12.80$, $p < .001$, nor defense, $\chi^2(1, N = 20) = 12.80$, $p < .001$, explained the DNA results. As in Studies 1 and 2, analyses that excluded participants who missed one or more manipulation check questions showed a similar pattern of results.

**Verdicts**

Overall, there was a significant difference in verdicts among the three groups, $\chi^2(2, N = 60) = 6.40$. $p = .041$, Cramer's $V = .34$. Participants convicted at a threefold higher rate when the prosecutor offered an explanation for the confessor's exculpatory DNA (45%) than when he did not offer an explanation (15%). In the latter condition, acquittal rates were equal to that of the condition in which the defendant had denied any involvement to police (see Figure 3).

A one-way ANOVA on verdict-confidence scores (which ranged from -10 to +10) also revealed a significant difference, $F(2, 57) = 3.22$, $p = .047$, $\eta^2 = .10$. LSD post hoc comparisons indicated that participants were less confident in their not-guilty verdicts when the prosecutor offered an explanation for the exculpatory DNA ($M = -.70$, $SD = 8.16$, 95% CI [-4.51, 3.12])

than when he did not (*M*= -5.10, *SD* = 5.83, 95% CI [-7.83. -2.37]), *p* = .047, *d* = .60, 95% CI [-.03, 1.23]. There was no significant different in verdict confidence ratings between the no theory group (*M*= -5.10, *SD* = 5.83, 95% CI [-7.83. -2.37]) and the control group (*M* = -5.75, *SD* = 6.33, 95% CI [-8.71. -2.79]), *p* = .765, *d* = .07, 95% CI [-.70, .54].

**Probability-of-Commission Estimates**

As in the previous studies, participants rated the likelihood that the defendant committed the crime on a scale from 0 to 100%. These ratings were highly correlated with verdict-confidence scores, *r* = .77, *p* < .001. Across groups, the overall mean probability estimate was low, at 41.82% (*M* = 48.73 for the two confession groups)—a number that falls well short of the certainty needed to prove guilt beyond a reasonable doubt. A one-way ANOVA revealed a significant difference on this measure, $F(2, 57) = 4.31$, *p* = .018, $\eta^2 = .13$. A post-hoc LSD tests showed that despite the presence of exculpatory DNA, participants in the Attorney Theory group rated the confessing defendant as somewhat more likely to have committed the crime (*M* = 56.95, *SD* = 32.33, 95% CI [41.82, 72.08]) than did those in the confession group (*M* = 40.50, *SD* = 28.88, 95% CI [26.98, 54.01]), *p* = .102, *d* = .54, 95% CI [-.09, 1.17], and as significantly more likely to have committed the crime than those in the denial no-theory group (M = 28.00, SD = 32.46, 95% CI [19.61, 36.39] *p* = .005, *d* = .41, 95% CI [-1.03, .22].

**Open-Ended Responses**

Participants indicated what single item of evidence they found most convincing (for the 20% of those who cited more than one item, as in Studies 1 and 2 the first listed was used in our analysis). Answers were coded by two independent raters (*k* = .93, first piece; disagreements were resolved by discussion). Across all conditions, 71.66% cited the DNA, 15% cited the confession, 13.33% cited circumstantial evidence, and 1.7% cited other evidence. This pattern

was consistent; there were no significant differences between groups. Indeed, despite their 45% conviction rate, 75% of participants who were presented with a confession, exculpatory DNA, and the prosecutor's explanatory theory went on to cite the DNA as the most convincing evidence.

## Discussion

Using only the contradictory conditions in which the defendant confessed but was later excluded by the DNA, Study 3 replicated the results of our second experiment in a sample of community adults.  Once again, we found that although people overall are more likely to trust exculpatory DNA more than confessions and vote for acquittal when both forms of evidence are presented, prosecution theories that seek to explain away the exculpatory DNA increase perceptions of the defendant's culpability and the rate of guilty verdicts. Indeed, when prosecutors offered an explanatory theory – speculating that the victim had prior consensual sex with an unidentified third party and that the defendant had failed to ejaculate – participants voted to convict 45% of the time, compared to only 15% when no theory was offered or when there was no confession.  In sum, although participants viewed exculpatory DNA as persuasive proof of innocence, the prosecutor's explanatory theory significantly attenuated this effect.

## General Discussion

Inspired by actual events, we sought to assess people's reactions to a rape-murder case containing contradictory self-report and DNA evidence.  Specifically we sought to examine how people assess a case containing both a police-induced confession later recanted by the defendant and DNA results that excluded that same defendant as the source of semen found inside the victim.  In 2010, the Center for Wrongful Convictions published a report detailing 19 known cases in which an innocent defendant had confessed to police; after which exculpatory DNA was

collected, tested, and presented at trial; and the defendant was convicted anyway. Since that time, additional cases have been reported and critiqued (Drizin & Riley, 2014; Goode, 2011; Martin, 2011).

Previous research shows that both confessions (Kassin et al., 1980; Kassin & Neumann, 1997; Kassin & Sukel, 1997) and DNA (Lieberman et al., 2008; Saks et al., 2005; Thompson, 2006) are highly persuasive forms of incriminating evidence. Yet, little research has compared these forms of evidence in the same trial, and, when it has, the results have been mixed. Given that pretrial DNA testing of blood, hair, saliva, semen, and other biological traces is becoming increasingly commonplace, and is considered a valuable safeguard against wrongful convictions, it is important to know the extent to which confessions can trump DNA in court. Thus, we designed a series of studies to test people's perceptions of guilt in cases where scientific evidence (in the form of DNA) and self-report (in the form of eyewitnesses and confessions) contradict each other, a contradiction sometimes accompanied by a prosecutor's explanatory theory.

Study 1 varied the type of self-report (defendant statement or eyewitness), whether that self-report was incriminating or exculpatory, and DNA that was either incriminating or exculpatory. On the basis of archival case information, we predicted that when the DNA excludes a defendant, participants would be more likely to convict him if he had previously confessed and that a confession would prove more influential than an eyewitness identification. The initial hypotheses were not supported, however, as participants were overwhelmingly influenced by the incriminating or exculpatory DNA results. In short, science trumped self-report—even in the contradictory situation where the defendant had confessed but was later excluded by the DNA results.

Studies 2 and 3 next examined how people react to the same evidentiary contradiction between a confession and DNA exclusion when this evidence is accompanied by a prosecutorial theory. In these studies, the prosecutor sought to reconcile the DNA exclusion of a defendant who had confessed by arguing that the victim had consensual sex prior and that the defendant had failed to ejaculate during his rape of the victim, which is why his DNA was not found. Using a sample of college students, Study 2 showed that when the defendant confessed but was exculpated by DNA, the introduction of a prosecutorial theory that sought to reconcile the apparent contradiction significantly increased the conviction rate from 10% to 33%. Using a sample of community adults, Study 3 replicated these findings: the introduction of a prosecutorial theory increased the conviction rate from 15% to 45%. Study 3 also included a denial condition in which the suspect was interrogated but denied any involvement – a statement that was supported by the DNA. Importantly, there was no difference in conviction rates between the confession-no theory and denial groups. Without a prosecutorial theory, a confession with exculpatory DNA may have the same effect on jurors as a case in which the defendant has never confessed. Although the conviction rate in response to a confession followed by exculpatory DNA did not constitute a majority of participants, the pattern across three studies was unmistakable: in the case of a defendant who had confessed, the prosecutor's theories significantly attenuated the effect of otherwise compelling exculpatory DNA.

In demonstrating that confessions can trump exculpatory DNA when prosecutors present theories to reconcile the contradiction, the present studies reinforce previous research showing not only that confession evidence strongly influences juries and judges (e.g., Kassin & Neumann, 1997; Redlich et al., 2008; Neuschatz et al., 2008; Wallace & Kassin, 2012), but that it is potent enough to corrupt other evidence in a case, such as the judgments of experienced polygraph

examiners (Elaad, Ginton, & Ben-Shakhar, 1994), eyewitnesses (Hasel & Kassin, 2009), and individuals judging handwriting samples (Kukucka & Kassin, 2014), often resulting in an array of forensic confirmation biases (Kassin, Dror, & Kukucka, 2013) and creating the appearance of corroboration (Kassin, Bogart, & Kerner, 2012; for a review, see Kassin, 2012). Apparently, under some circumstances, even exculpatory DNA cannot fully safeguard innocent suspects who confessed to crimes they did not commit.[2]

Overall, our results did show that when contradictory self-report and scientific evidence are present in the same case, and no prosecutorial theory is spun to reconcile the contraction, people do discount the confession and base their judgments of guilt or innocence on the DNA results. In actual trials, however, individual items of evidence do not appear in a vacuum; rather, they appear through the presentations of attorneys and the theories they espouse in their opening statements and closing arguments. As to why the accompaniment of a prosecutorial theory proved so important, research shows that storytelling in particular presents a potentially important contextual influence on the inferences that people draw from evidence (Findley & Sales, 2012). As discussed earlier, successful trial lawyers often stress the value of a causal narrative to help jurors understand complicated trial information (Schrager, 1999). Pennington and Hastie's (1994) research on the story model for juror decision-making supports these assertions. It is interesting to note that there is also a basic tendency in social perception for people to accept new information at face value (Gilbert, 1991). In part, as a result of this tendency, deception detection researchers have observed that people are notoriously gullible, exhibiting a "truth bias" that contributes to poor performance at detecting deception (Levine, Park, & McCornack, 1999; Bond et al., 2006). Bringing together both (1) the preference for

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[2] It is important to note that although the prosecutor in the current studies did not present evidence to support its new theory, neither did those in the real world cases described earlier (i.e., the Central Park Five, Rivera, Deskovic, Cope, and Buffey).

stories that provide coverage, and (2) the fact that people tend to accept new information as true, it is not terribly surprising that a prosecutorial theory which permits acceptance of all the evidence, including items that are contradictory, will often prove persuasive relative to an alternative in which jurors must make the effortful critical judgment to accept one strong item of evidence and reject another. Particularly in light of the inherent power of confessions and DNA identifications, it may be "easier" to accept a theory, no matter how implausible it may seem, that enables jurors to trust both the confession and the DNA exclusion than to reject either of the two. Supporting this idea, we found that when these two potent forms of evidence do not contradict each other (i.e., confession and matching DNA), judgments of guilt were not affected by a defense attorney's theory. This effect of the prosecutor's theory, we should add, was found even though it did not contain key elements of vivid detail (e.g., there was no story to suggest with whom the victim might have had consensual prior sex—as the prosecutor in the case of Juan Rivera did when he implied that the 11-year old victim, who was a virgin, was sexually active; nor was a story presented about the makeup or mental health background of the defendant that would have suggested his disposition to rape a young girl and then fail to ejaculate upon doing so). At this point, further research is needed to examine the process by which people reconcile these contradictions in the evidence.

The present studies are limited in two ways. The first is that our participants were not exposed to the complement of processes that appear in a full jury trial—from voir dire through lengthy opening statements, the direct and cross examination of prosecution and defense witnesses, closing arguments, and judge's instructions. Participants were also not asked, nor did they anticipate, that they would form a group and deliberate to a unanimous verdict. Although these core aspects of the trial experience were not captured in the paradigm we used, and

although this is an important objective for additional research, it is worth noting that the basic pattern of results that we observed both in student and community samples—that prosecutorial theories can lead jurors to prefer confessions over exculpatory DNA—was modeled after numerous actual cases resulting in the same outcomes. Further research is needed to examine whether the addition of other trial elements—such as opening statements, expert testimony, or judges' instructions—will ameliorate the persistent effects of confession evidence in exculpatory DNA cases.

A second limitation concerns the nature of the prosecutorial theory that can be spun to reconcile a confession with exculpatory DNA. In our studies, all of which involved the crime of rape and murder, the prosecutor offered the theory that the victim had had prior consensual sex with an unknown lover after which point the defendant confessor raped her, failed to ejaculate, and then killed her to evade detection. "Prior consensual sex" is the story presented in the Illinois case of Juan Rivera and in the cases of other DNA exonerees who were initially convicted (e.g., the New York state convictions of John Kogut and Jeffrey Deskovic). In other instances, prosecutors have argued that the defendant, who did not ejaculate, had an accomplice, unnamed in his confession, whose DNA was present (i.e., the "unindicted co-ejaculator" theory articulated in the Central Park Jogger case, where DNA excluded all five confessors and later matched a serial rapist; and in the South Carolina trial against Billy Wayne Cope, where the prosecutor theorized that the defendant had invited his daughter's rapist into the family's home). We have tested only one of these two common scripts, albeit one that has been suggested as a matter of speculation in a number of cases.

At this point, additional research is needed to address questions unanswered by our research. First, it is important to examine the influences and limitations of other more or less

plausible tales spun by police, prosecutors, and post-DNA exoneration civil defendants in cases where DNA was present but excluded the confessor (e.g., in various cases, the prosecutor suggested that the victim was raped twice, by two separate sets of perpetrators; that the victim may unwittingly have come into contact with semen while playing in the woods, where couples have sex; and that pubic hairs found on the victim's bed, which did not match the defendant, could have been left by movers who brought furniture into the bedroom a week earlier; see Martin, 2011). Second, it is important to consider whether the source of a particular "confession-but-exculpatory DNA" theory moderates its persuasive effect (e.g., whether the source is not a partisan prosecutor but a judge, juror, or other neutral communicator). Third, research is needed to test  the effectiveness of counterarguments that defense attorneys might use to refocus attention on the raw data provided by the DNA tests.  In the current studies, the defense argued that the confession was coerced, but it did not critique the prosecutor's theory concerning the exculpatory DNA (e.g., by explaining the law of parsimony, i.e., the scientific principle that the best explanation requires the fewest assumptions).

Across two different samples, results showed that prosecutors' explanatory theories can attenuate the relative power of exculpatory DNA evidence in disputed confession cases. Although it could be argued that our studies are limited by the "absolutist" presentation of the expert's conclusions (e.g., stating that the biological sample "matched" vs. "did not match" the defendant as opposed to the use of random match probability language), in actual practice an expert's testimony requires no statistical probabilities when the sample does not match the defendant (National Research Council, 1996; Thompson & Krane, 2003). Nevertheless, because the framing of DNA results (e.g., .1% v. 1 in 1,000) can affect its perceived value (Koehler,

2001; Koehler & Macchi, 2004) we replicated Study 3 using Random Match Probability (RMP) language and obtained the same pattern of results.[3]

As a result of advances in DNA technology, which enabled the 1992 founding of the Innocence Project, 330 wrongfully convicted individuals in the U.S. have been exonerated to date and set free through new forms of DNA testing of biological materials (e.g., blood, hair, semen, skin) previously collected and preserved. DNA evidence has become the new "gold standard" in the forensic sciences and is now commonly used to exonerate innocent confessors. Our finding that laypeople can be persuaded to draw incriminating, non-innocent conclusions from exculpatory DNA results in cases involving defendants who had confessed has troubling implications for the continued use of DNA as a safeguard in cases involving confession. As such, our results reinforce the AP-LS White Paper recommendation that the video recording of the processes of interviewing and interrogation in their entirety remains an important mean of protecting innocent suspects in the interrogation room (Kassin et al., 2010).

Finally, we believe that the present studies contribute to the growing literature on how psychology can be used to recommend evidence-based policies and practices aimed at preventing wrongful convictions (Cutler, 2012). Over the years, research has compelled a number of proposals for reform that would protect vulnerable suspect populations and limit the use of deceptive police interrogation practices that put innocent people at risk to confess (for a review, see Kassin et al., 2010). In highlighting the power of confession evidence in court—even, at times, despite exculpatory DNA evidence—the current studies punctuate the need for two

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[3] The DNA expert testified, "There was approximately a 1 in 6.8 trillion chance that the DNA found at the crime scene would match a random person's DNA, meaning that a match was possible, but that Wilson's profile did not match." When the DNA excluded a defendant who had denied involvement, only 11.2% of participants voted for conviction. When the DNA excluded a defendant who had confessed, however, 61.1% voted to convict when the prosecutor offered a theory to explain away this exculpatory evidence–compared to only 35.3% when no theory was provided, $\chi2(2, N = 52) = 9.20$ p = .010, Cramer's V = .42.

additional safeguards that would enable juries to become more critical fact finders of confessions. First, a consensus has emerged that police should be required to record the entire process of interrogation—from start to finish (e.g., see American Bar Association, 2004; The Justice Project, 2007; Kassin et al., 2010; Sullivan, Vail, & Anderson, 2008). These recordings will provide a more accurate factual record for judges and juries needing to assess the voluntariness and credibility of the confessions that were produced. A second means of countering the inherent power of confession evidence is to admit testimony from experts. At present, U.S. courts differ in their willingness to admit such testimony. Our studies add to the literature cited by the American Psychological Association (APA) in amicus briefs recently submitted to state supreme courts (e.g., *Rivera v. Illinois*, 2011; *Michigan v. Kowalski*, 2012; *People of New York v. Thomas*, 2013). In these briefs, APA has argued that judges and juries have difficulty assessing confession evidence; that false confessions, though counterintuitive, do occur; that scientific research on dispositional and situational risk factors is reliable; and that psychological experts would assist the trier of fact.

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Table 1

*Study 1: Participants Scaled Verdict Confidence Scores*

| | Self-Report Type | | | | | | |
|---|---|---|---|---|---|---|---|
| | Defendant | | Eyewitness | | Overall | | |
| Self-Report Culpability | Exculpatory | Inculpatory | Exculpatory | Inculpatory | Exculpatory | Inculpatory | Overall |
| DNA Culpability | *M (SD)* | *M (SD)* | *M (SD)* | *M (SD)* | *M (SD)* | *M (SD)* | *M (SD)* |
| Exculpatory | -7.00 (4.38) | -6.07 (2.43) | -7.93 (1.91) | -6.69 (1.65) | -7.50 (3.26) | -6.37 (2.67) | -6.95 (3.02)[a] |
| Inculpatory | 4.54 (5.58) | 4.70 (5.96) | 6.92 (5.21) | 7.13 (4.24) | 5.68 (5.57) | 6.16 (5.03) | 5.92 (5.26)[a] |

[a] Indicates a significant difference at the p < .001 level

*Note. Possible score range -10 to 10 (-10 = very confident Not Guilty, 10 = very confident Guilty)*

Table 2

*Study 1: Participants' Perceptions of Case Evidence by Culpability*

| | Evidence Culpability | | |
|---|---|---|---|
| | Incriminating | Exculpatory | Overall |
| Evidence Type | *M (SD)* | *M (SD)* | *M (SD)* |
| DNA (*n* = 105) | 9.43 (1.45)[a] | 3.35 (3.53)[a] | 6.20 (4.06) |
| Defendant Statement (*n* = 55) | 5.83 (2.78) | 4.73 (2.44) | 5.26 (2.64) |
| Eyewitness Report (*n* = 50) | 4.46 (2.68) | 3.70 (2.60) | 4.09 (2.44) |

[a] Indicates a significant difference at the p < .001 level
*Note*. Values are on a 10-point scale (1 = *not at all convincing of guilt*, 10 = *very convincing of guilt*).

Table 3

*Study 2: Participants' Perceptions of Case Evidence by Culpability*

| | Attorney Argument | | | | | | |
| | Absent | | Present | | Overall | | |
| DNA | Exculpatory | Inculpatory | Exculpatory | Inculpatory | Exculpatory | Inculpatory | Overall |
| Evidence Type | *M (SD)* | *M (SD)* | *M (SD)* | *M (SD)* | *M (SD)* | *M (SD)* | *M (SD)* |
| Confession | 6.10 (2.51) | 7.95 (2.01) | 7.24 (2.36) | 7.83 (1.79) | 6.68 (2.47)[a] | 7.90 (1.89)[a] | 7.28 (2.28) |
| DNA | 4.05 (3.91) | 9.52 (0.81) | 3.14 (2.57) | 8.83 (1.82) | 3.58 (3.29)[a] | 9.20 (1.40)[a] | 6.32 (3.79) |
| Lack of Alibi | 4.65 (2.13) | 5.33 (2.35) | 5.38 (3.01) | 5.67 (2.45) | 5.02 (2.61) | 5.49 (2.37) | 5.25 (2.49) |
| History of Drinking | 4.20 (1.94) | 4.23 (2.60) | 4.00 (2.81) | 4.72 (2.27) | 4.10 (2.40) | 4.56 (2.43) | 4.32 (2.41) |

[a] Indicates a significant difference at the $p < .05$ level (across rows)

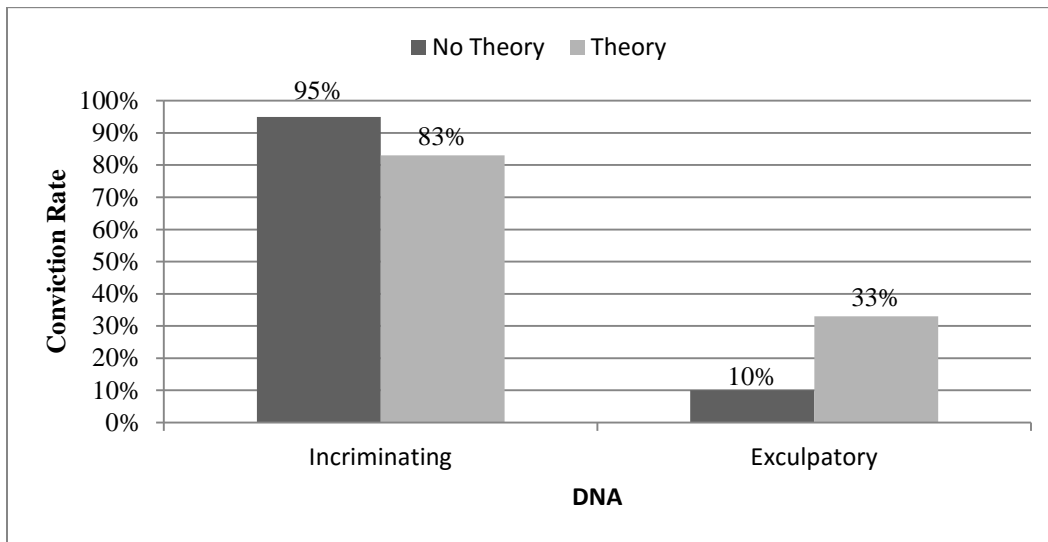*Note.* Values are on a 10-point scale (1 = *not at all convincing of guilt*, 10 = *very convincing of guilt*).
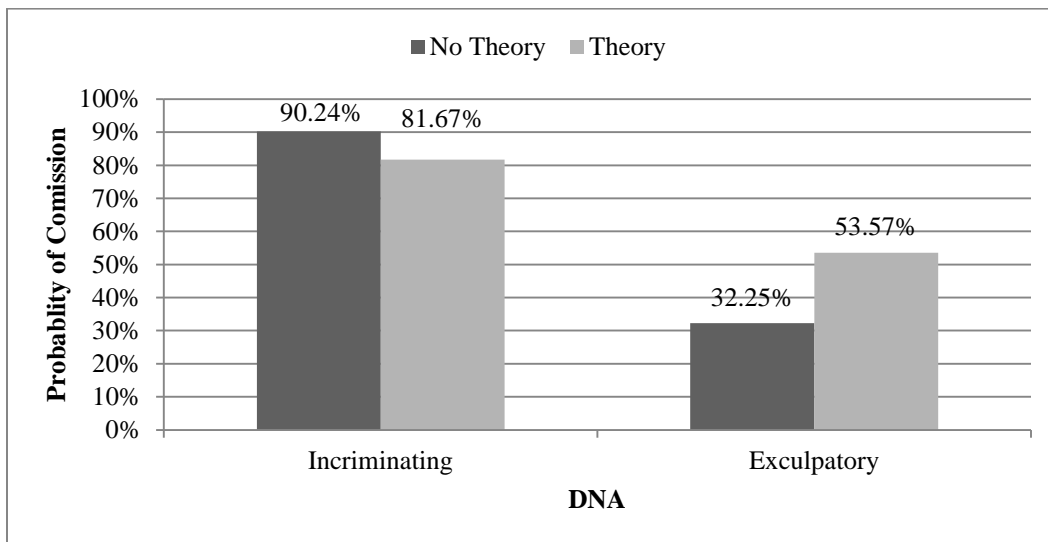
*Figure 1*.  Conviction rates in Study 2.



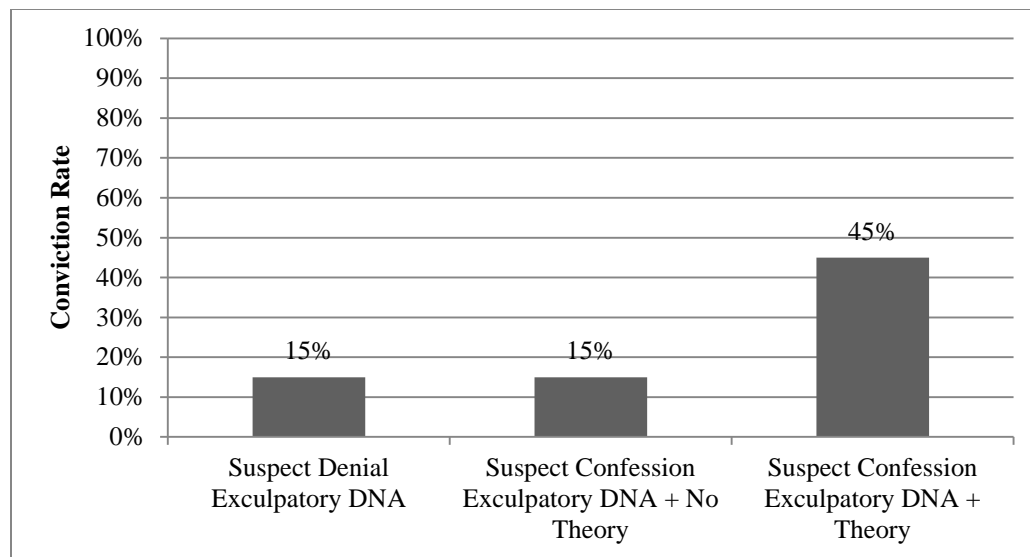*Figure 2*.  Probability-of-commission ratings in Study 2.

*Figure 3*. Conviction rates in Study 3.

### *People v. James Wilson*

On November 10, 2004, 16-year-old Mary Summers did not come home from her job at McDonald's. Her parents were worried and called the police. When officers arrived at McDonald's they found Summers dead on the floor near the restrooms.

The medical examiner determined that Summers had been raped. Vaginal swabs taken during the autopsy revealed the presence of sperm - evidence that she had been sexually assaulted.

Nassau County Police were under pressure to solve this crime, particularly since there had been other rapes of young girls in the area. The defendant, James Wilson, was interrogated as part of an investigation into the disappearance of another girl even before the police were focused on this case.

*{Study 1: Self-Report manipulation here} {Studies 2 & 3: Confession manipulation here}*

The interrogating detective typed up Wilson's statement and Wilson signed it.

Upon questioning, police noted that Wilson could not account for his whereabouts during the hours of night when the girl was attacked and that he had problems with excessive drinking.

Investigators performed DNA test on the semen recovered from Mary Summers (DNA testing can be performed on blood, saliva, semen, or other appropriate fluid or tissue found at the crime scene). The lab results indicated that the DNA *{was/was not}* Wilson's.

On the basis of all the evidence, the District Attorney tried Wilson for rape and murder.

The defendant pled not guilty.

*{Attorney Argument manipulations here}*

**Self-Report Manipulations**

**Defendant**

Denial
Shortly afterward, Wilson was brought back to the police station. Wilson strongly denied—in writing—that he had anything to do with this crime, and gave the following statement about his whereabouts that night:

> "I went to a party that afternoon. We drank some beers and smoked some pot for most of the evening. I only stayed at the party for about 4-5 hours. I think I left around 11:00 at night. I left early because I had an early morning construction job in the city. Although I will admit that sometimes I drink too much and can black out, I definitely did not black out that evening, and I was definitely nowhere near the McDonald's on Merrick Rd. that night."

Confession
Shortly afterward, Wilson was brought back to the police station. After being interrogated, Wilson broke down and gave the following confession:

> "I was driving home near midnight and saw lights on at McDonald's. There was a girl working there alone, closing up. She was 17 or 18, brown hair, blue sweater, and this hot red tattoo on her neck. I asked her to go drinking and she kept saying no. I was pretty drunk so I tried to kiss her but she started screaming and hitting me and I lost it and pushed her. She fell and hit the back of her head on the counter and was unconscious. That's when I raped her."

**Eyewitness (Used Only in Study 1)**

No-Identification
Shortly afterward, an eyewitness named Denise Hall came forward and gave the following statement:

> "I was on my way home from work around midnight last night when I decided to cut through the McDonald's parking lot. I saw a man and a girl arguing in the doorway of the McDonald's. The man was about average height, average weight, with short brown hair. He was dressed in jeans and a dark t-shirt. He seemed drunk. He tried to kiss her and that's when she started screaming and hitting him. He got angry and pushed her. She fell and hit her head on the counter. That's when he raped her."

The police showed Hall a picture of Wilson. After looking closely, Hall said she was reasonably confident that Wilson was not the man she saw in the McDonald's that night.

Positive-ID:

Shortly afterward, an eyewitness named Denise Hall came forward and gave the following statement:

> "I was on my way home from work around midnight last night when I decided to cut through the McDonald's parking lot. I saw a man and a girl arguing in the doorway of the McDonald's. The man was about average height, average weight, with short brown hair. He was dressed in jeans and a dark t-shirt. He seemed drunk. He tried to kiss her and that's when she started screaming and hitting him. He got angry and pushed her. She fell and hit her head on the counter. That's when he raped her."

The police showed Hall a picture of Wilson. After looking closely, Hall said she was reasonably confident that Wilson was in fact the man she saw in the McDonald's that night.

**Attorney Argument manipulations used in Studies 2 and 3**

**<u>Attorney Argument – DNA *Exculpates*</u>**
At trial, the prosecutor noted that Wilson had confessed to the crime in full and accurate detail.

The prosecutor argued that the DNA test does not mean that Wilson is innocent—only that he failed to ejaculate and that Summers may have had consensual sex with some other person earlier that day.

The defense argued that police had coerced Wilson during his interrogation into confessing to the rape and murder.

The defense also noted that the DNA tells a different story, indicating Wilson's innocence.

**<u>Attorney Argument – DNA *Implicates*</u>**
At trial, the prosecutor noted that Wilson had confessed to the crime in full and accurate detail.

The prosecutor also noted that Wilson's DNA provides all the physical evidence needed to prove that he is the guilty rapist and murderer.

The defense argued that police had coerced Wilson during interrogation into confessing to the rape and murder.

The defense also argued that the DNA shows only that Wilson and Summers had consensual sex earlier that day.