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Facts Only the Perpetrator Could Have Known? A Study of Contamination in Mock Crime Interrogations

Fabiana Alceste, Kristyn A. Jones, and Saul M. Kassin
John Jay College of Criminal Justice and the City University of New York

Objective: This paper examines contamination in interrogations: the process by which an interrogator divulges privileged information to a suspect. ***Hypotheses:*** In Experiment 1, we predicted that mock investigators would communicate critical crime details when they interview mock suspects about a crime—and that innocent and guilty suspects alike would later produce confessions that contained these details. In Experiment 2, we hypothesized that observers who listened only to the confessions would exhibit a greater guilt bias than those who also had exposure to the eliciting interview. ***Method:*** Experiment 1 ($N = 59$) used student participants in a mock crime scenario to test whether contamination is natural to communication even in the absence of external incentives. In Experiment 2, MTurk participants ($N = 499$) listened to audio-clips from Experiment 1 to test whether presenting observers with the full interview decreases guilt ratings for false confessors. ***Results:*** Investigators divulged crime information to both innocent and guilty suspects, and even false confessions later included accurate details. Although Experiment 2 observers exhibited a guilt bias, exposure to the interview (not just the confession) attenuated this effect for innocent confessors. ***Conclusions:*** The information disclosure associated with contamination is a normal cognitive process that occurs even without external incentives to secure a confession. Experiment 2 showed that seeing contamination in action may decrease judgments of guilt for innocent suspects. Interrogations should be recorded in their entirety to provide fact finders with an objective record of the source of crime details contained within narrative confessions.

Public Significance Statement
These results provide a preliminary understanding of how contamination occurs as part of a natural communicative process. Importantly, they suggest that lay observers can become sensitive to false confessions given the right information. This is a significant finding because contaminated false confessions often appear to indicate the suspect's guilt, even when the suspect is truly innocent.

Keywords: interrogation, confession, false confession, contamination

> Because . . . confessions are dialogically constructed, they bear the imprint of not only the suspect but also the interrogator, and the end product must be analyzed in that light. (Shuy, 1998, p. 9)

In 1984, David Vasquez confessed to sexually assaulting and then murdering a woman in Virginia. His confession included a description of how he cut the cord from a Venetian blind in the victim's house to use as a noose (Garrett, 2010). In 1996, Doug Warney confessed to stabbing a man that he knew in Rochester, NY. His confession detailed what the victim was wearing and preparing for dinner before he was murdered and how Warney used a paper towel to clean his own blood after cutting himself with the murder weapon (Dwyer, 2011). Then there was Barry Laughman of Pennsylvania, whose confession contained strikingly precise details that an innocent person could not have produced—for example, the precise positioning of the victim's body, that she was injured from a blow to the head, that her bra was pulled up to her neck, and that she suffocated on pills stuffed into her mouth (Kassin, 2012). All of these men were convicted and years later DNA exonerated (https://www.innocenceproject.org/all-cases/).

How is it possible for an innocent person to insert verifiable and true crime details into a false confession? In an analysis of the first 38 DNA exoneration cases involving false confessions, Garrett (2010) found that 36 of the statements contained accurate details about the crime that were not in the public domain: details that only the perpetrator (and police) could have known (for a subsequent analysis of 66 cases yielding the same result, see Garrett, 2015). To explain these cases, the most plausible hypothesis is that

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Fabiana Alceste, Kristyn A. Jones, and Saul M. Kassin, Department of Psychology, John Jay College of Criminal Justice, and the Graduate Center, City University of New York.

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Correspondence concerning this article should be addressed to Fabiana Alceste, who is now at Department of Psychology, Butler University, 4600 Sunset Avenue, Indianapolis, IN 46208. E-mail: falceste@butler.edu

the police, purposefully or inadvertently, informed the innocent confessor about the facts of the crime through a process of contamination (for a first-hand law enforcement account of how this occurred in an actual case, see Trainum, 2007, 2014). Contamination can be difficult to detect, especially if an objective record of the interrogation, such as a video-recording or transcript, does not exist. Without a recording, an innocent confessor would be hard-pressed to prove to prosecutors, defense lawyers, judges, juries, and appeals courts that the information in their confession came from the investigator and not their own guilty knowledge. Even with such a recording, however, it is yet unclear whether jurors would even notice instances of contamination or be able to grasp the implications of contamination on their own.

Even investigators have trouble detecting contamination in their own interrogations. The confession of an innocent suspect who gleans details about the crime through leading questions, photographs, a visit to the crime scene, and other secondhand sources may reaffirm an investigator's belief in the suspect's guilt and "corroborate" in a circular manner the facts contained in the police report. To avoid providing crime details to innocent suspects and ensuring that guilty knowledge originates independently from the suspect, police are specifically trained to withhold nonpublic facts about a crime. Inbau, Reid, Buckley, and Jayne (2013) advised that ". . . the investigator must be certain that the details were not somehow revealed to the suspect through the questioning process . . ." (p. 306), and many officers are adamant that they do not release critical details through questioning. Indeed, Garrett's (2010) analysis found that in 27 of 38 false confession cases, the police testified that they did not leak facts to the suspects and that the suspects independently provided the crime details.

The extent to which contamination occurs purposefully or inadvertently, and with or without awareness, remains an open empirical question. On the one hand, history provides numerous instances of what appear to be purposeful contamination. In 1963, in Brooklyn, New York, detectives questioned George Whitmore, a 19-year-old African American man, for 26 unrecorded hours, yielding a chronological, vividly detailed 61-page confession to the high profile "Career Girl murders." Whitmore immediately recanted the statement (his solid but ironic alibi was that he was on the Jersey shore with friends watching Reverend Martin Luther King's "I Have a Dream" speech). After spending nearly three years in jail and a decade on bond, Whitmore was ultimately exonerated. His false confession, plainly authored by police, was of historic significance. In the U.S. Supreme Court's landmark opinion in *Miranda v. Arizona* (1966), the Court cited Whitmore's case as a "conspicuous" example of police coercion in the interrogation room (see Kassin, 2017; this infamous case is fully described by English, 2011; Shapiro, 1969).

On the other hand, there are times when the contamination of an innocent person's confession can occur without intent or awareness. This danger was inadvertently realized by D.C. detective James Trainum (2007) who—in an article entitled "I Took a False Confession - So Don't Tell Me it Doesn't Happen!"—described a case in which a suspect he interrogated and had taken a confession from was later exonerated by her ironclad alibi:

> Years later, during a review of the videotapes, we discovered our mistake. We had fallen into a classic trap. We believed so much in our suspect's guilt that we ignored all evidence to the contrary. To demonstrate the strength of our case, we showed the suspect our evidence, and unintentionally fed her details that she was able to parrot back to us at a later time. It was a classic false confession case, and without the video we would never have known. (see also Trainum, 2008)

Interrogations as Conversations

Disclosure and Reciprocity in Interpersonal Exchange

Research on conversational disclosure provides some insight into how contamination can occur even though police detectives are advised against leaking privileged crime details during an interrogation. One benevolent possibility is that investigators reveal crime details because interrogation has the characteristics of a conversation, and disclosure is a natural part of conversation (Shuy, 1998). Indeed, communication research on reciprocity of verbal self-disclosure indicates that disclosure of information begets additional disclosure by one's conversational partner (Jourard, 1959; Jourard & Landsman, 1960). People self-disclose verbal information because they feel obligated to reciprocate their partner's self-disclosure, which leads to positive social consequences (Altman, 1973). Thus, self-disclosure must be met with positive social outcomes, such as social approval and understanding, if it is to continue (Taylor & Altman, 1973; Thibaut & Kelley, 1959). Moreover, situational factors can promote or hinder greater self-disclosure. For example, Taylor and Altman (1973, as cited in Altman, 1973) found that self-disclosures varied as a function of reward and cost consequences. In the context of interrogations, suspects may be more willing to disclose information when an interrogator is also disclosing information and is understanding and approving (e.g., building rapport or employing the Reid Technique's minimization themes) and when there are perceived consequences to not disclosing information (e.g., the Reid Technique's maximization tactics).

Building upon the notion of verbal self-disclosure, researchers have found that a "modeling" phenomenon may account for the finding that disclosure leads to subsequent disclosure between conversational partners (Chittick & Himelstein, 1967; Himelstein & Kimbrough, 1963; Matarazzo, Weitman, Saslow, & Wiens, 1963). Modeling means that by disclosing information about themselves before asking a question, interviewers demonstrate how they would like the interviewee to respond. In one experiment, for example, research participants who were paired with a highly disclosing interviewer engaged in more self-disclosure than those paired with a low-disclosing interviewer, even on highly personal topics (Jourard & Jaffe, 1970). A more recent series of experiments found that the length of conversational partners' e-mail responses mirrored the length of the sender's original message (Stocks, Mirghassemi, & Oceja, 2018).

One question that arises from this research is whether an interviewee's reciprocal disclosure occurs because of the disclosing behavior of the interviewer or that interviewer's higher social status or some combination thereof. In a study that controlled status by having college student peers interview each other, participants who self-identified as low-disclosers divulged more when paired with high-disclosers than when paired with other low-disclosers (Jourard & Resnick, 1970). Interestingly, self-identified high-disclosers did not speak less when paired with low-disclosers—

only low-disclosers modified their behavior and offered more information when paired with someone who was more willing to share. Thus, in the context of an interrogation, investigators might disclose information (a) as a part of the conversation, hoping that the suspect will open up and reciprocate, or (b) to model the type of information the investigator wants the suspect to include in a confession.

Establishing Common Ground

Language philosopher Paul Grice proposed four maxims that adhere to what he called the "cooperation principle" or the rule that one should "make your conversational contribution such as is required" (Grice, 1975, p. 45). The quantity, quality, relation, and manner of conversational contributions are all essential aspects of effective communication. The maxim of quantity states that one should make a conversational contribution as informative as is necessary, but not more so. Oversharing may be seen as a waste of time; undersharing leads to confusion and ineffective communication. Relatedly, linguistic theorists and researchers have noted the importance of tailoring one's speech to match the intended recipient's knowledge (e.g., Grice, 1975; Stalnaker, 2002). In order to do so, conversational partners must first establish common ground by assessing the information that is shared between them for the purposes of the conversation. One theory is that speakers automatically judge what is (not) common ground through retrieval of information in long-term memory (Horton & Gerrig, 2016). The receiver serves as a retrieval cue for information that is common ground. If the process is automatic, then in the context of interrogations, detectives may sometimes inaccurately deem information about the crime as common ground and disclose certain details that are not in fact shared information. Detectives may be even more prone to disclose information that is not common ground because of the guilt-presumptive nature of interrogations.

Consistent with training on how to use behavioral cues to discern when a suspect is lying (Inbau et al., 2013), research indicates that police tend to make prejudgments of guilt, with confidence, that are often in error (e.g., Elaad, 2003; Garrido, Masip, & Herrero, 2004; Leach, Talwar, Lee, Bala, & Lindsay, 2004; Meissner & Kassin, 2002). As a consequence, interrogation becomes a guilt-presumptive process, a theory-driven social exchange led by a detective who holds a strong belief about the suspect and who single-mindedly seeks to extract a confession (Kassin, Goldstein, & Savitsky, 2003). Also as a consequence, the guilt-presumptive investigator may well believe that the suspect already has access to privileged crime information and hence shares the critical details to establish common ground. In other words, investigators who overshare may simultaneously violate Grice's quantity maxim and make incorrect assumptions about common ground—these can be dangerous when an innocent person learns privileged information about a crime. This problem may be exacerbated when investigators are motivated to believe that the suspect they are questioning is guilty.

Investigators may also disclose details in an effort to help a suspect recall information about the crime. Research in social communications has shown that people tend to incorporate their beliefs about what others know into their speech production, a process known as message formation (Horton & Gerrig, 2005, 2016). In seeking to craft a message that their audience will understand, speakers use a level of detail that is calibrated to their estimation of how readily available the information is for the listener. In the interrogation of David Vasquez, for example, when it became clear to investigators that he could not bring to mind a Venetian blind cord central to the murder, they proceeded to describe the windows and blinds in the sunroom toward the rear of the house. Their message contained not only the crucial detail about how the victim died but a description of the victim's house, which Vasquez could have included in his confession, giving the appearance of independent guilty knowledge (Garrett, 2010).

In addition to understanding the process by which contamination occurs, an important question concerns whether people can identify contamination in confession cases. Recent research suggests that lay observers can indeed differentiate between contaminated and uncontaminated confessions. Participants in two studies were less likely to judge a confessor as guilty when crime details in the statement were first disclosed by the interrogator than by the suspect (Alceste, Crozier, & Strange, 2019). When the details did not originate with the suspect, lay observers were more likely to report that the suspect confessed as a result of coercion, rather than to his actual guilt, which decreased overall guilty verdicts associated with contaminated confessions. This result was reversed when the suspect served as the source of the details produced, indicating that the suspect had a perpetrator's first-hand guilty knowledge.

Present Studies

In summary, research suggests that disclosure, shared information, and message formation are present in everyday conversations—and that these occurrences are influenced by other people. These elements of communication, although useful in everyday life, can put innocent people who are interrogated at risk to produce artificially credible false confessions. Previous research suggests that laypeople may associate inappropriate information disclosure by the police with coercion and appropriately discount contaminated confessions.

With these findings in mind, we conducted two experiments to answer the following questions. Experiment 1 examined whether (a) interrogations induce a natural process of contamination by which mock investigators informed about a crime communicate facts to an uninformed mock suspect, (b) an incentive to elicit a believable confession increase an investigator's tendency to do so, and (c) naïve suspects who are thereby exposed to accurate crime facts insert those facts into their confessions. Experiment 2 tested whether an independent group of participants who listened to the interrogation and resulting confession would be more discerning of the suspect's confession than those merely exposed to the confession alone. Protocols for both studies were reviewed and approved by the institutional review board of John Jay College of Criminal Justice.

Overview of Experiment 1 and Hypotheses

We randomly assigned participants to one of the eight experimental cells produced by a 2 Role (suspect vs. investigator) × 2 Suspect guilt (guilty vs. innocent) × 2 Investigator incentive (high vs. low) between-subjects factorial design. Each laboratory session consisted of two participants randomly assigned to the role of suspect or investigator. An experimenter was assigned to each

participant. The suspect was then randomly assigned to commit or not commit a mock theft. After investigating the crime scene, investigators (who were or were not financially incentivized to produce a believable confession) conducted an initial questioning of the suspect over the phone, during which time suspects were instructed to deny involvement in the incident. After the interrogation, a research assistant instructed all suspects—guilty and innocent alike—to provide a detailed confession to the crime. Finally, investigators and suspects completed a factual questionnaire about the details of the crime as well as their perceptions of guilt and contamination. Both the interview and confession of each suspect were audio-recorded.

We hypothesized that interrogations induce a natural process of contamination by which interrogators informed about a crime communicate the facts to a noncooperative suspect. As such, we predicted that investigators would contaminate mock crime information, especially when they were incentivized to produce a believable confession. Importantly, Experiment 1 sought to determine whether naïve suspects learned details about the crime through the interview and whether mock investigators who revealed facts about the crime were aware that they were doing so.

Method

Participants. This study was conducted in 59 experimental sessions with dyads of undergraduate participants from a large northeastern university. Of the 118 participants, 92 were female, and the average age was 20.85 years ($SD = 3.79$). Overall, 21.19% ($n = 25$) identified as White, 16.95% ($n = 20$) as Black, 34.75% ($n = 41$) as Hispanic/Latino, 15.25% ($n = 18$) as Asian/Pacific Islander, and 11.02% ($n = 13$) as other ($n = 1$ missing). Students from a variety of majors and class years participated in exchange for $12 in cash.

Procedure.

Suspects. Fifty-nine participants were randomly assigned to the role of suspect. Twenty-eight were directed to commit the mock theft; 31 remained innocent and naive of the incident. After providing informed consent, the 28 guilty suspects were instructed by an experimenter to "break into" a room in the laboratory and steal a $100 bill from a briefcase. After entering (designated Room 1), the guilty suspects followed a detailed list of steps to commit this mock theft (bolded items are the key crime details):

1. Locate the **briefcase** on the table behind the partition.
2. Find a golden **key** hidden among a **cup** of various office supplies.
3. Use the key to open a **filing cabinet drawer** which contained a **note** with the **combination** to the briefcase.
4. Open the briefcase.
5. Locate and open a **folder** within the briefcase.
6. Open the **envelope** contained in the folder.
7. Take the **money** from the envelope, and
8. Put everything in the room back to the way it was before they entered.

The purpose of these elaborate and detailed crime directions was to ensure that enough details existed for a fruitful interrogation and the construction of a narrative confession. In contrast, innocent suspects were directed to engage in unrelated tasks around the laboratory (e.g., sorting a deck of playing cards by numerical value), one of which required them to merely crack open the door to Room 1 and toss a piece of paper in a trash can near the door. As in Kassin et al. (2003), this instruction aimed to familiarize innocent participants with the layout of the laboratory without providing intimate information about the crime or crime scene.

Before the interrogation, experimenters introduced all suspects to the upcoming task:

> You are playing the role of someone who has been apprehended as a suspect for an incident that occurred in this building. A mock student investigator will be asking you some questions . . . No matter what happens, do not confess to any crime. Imagine yourself in the role of a real suspect and consider how much could be lost by confessing.

This final instruction was adapted from Kassin et al. (2003; p. 192).

Investigators. Fifty-nine participants were randomly assigned to the role of investigator. After providing informed consent, these participants engaged in an unrelated mathematical task to allow the suspect time to complete his or her activities (during the investigation, all suspects engaged in the same unrelated mathematical task). After the suspect finished with the tasks, a second experimenter administered the following instructions:

> Your role in this study is to play an investigator and examine a crime scene. In real life, police investigate crime scenes, come up with theories about what happened, interview witnesses and suspects, and attempt to find out the truth. Keep this in mind as you play the role of an investigator and as you complete the following tasks.

These participants were informed that a theft had been committed and that they were to examine the crime scene using a list of steps that were taken to carry out the theft (this list was identical to the steps that guilty suspects followed). The investigator was encouraged to interact with the objects in the room and examine the crime scene the way a real investigator would do.

After the investigator examined Room 1, the experimenter handed the investigator copies of two confessions unrelated to the current task (Inbau et al., 2013, pp. 304–305): One was a bare admission of guilt; the other was a narrative confession filled with details, statements of motivation, and an apology (importantly, neither statement included any contaminating statements from the interrogator). After reading both, the investigator was asked to identify which confession was "better" (everyone chose the more detailed statement). Investigators were told to "keep in mind that a believable confession has details about the crime and crime scene." This activity aimed to model the kinds of confessions that real investigators might regard as valuable evidence at trial.

Next, investigators were informed that there was a suspect in an adjacent room that they were to interview over the phone function on Skype. An audio-only interview procedure was implemented rather than a face-to-face one for two main reasons: (a) to minimize the feelings of awkwardness or shyness that come with accusing someone or being accused of a transgression and (b) to allow the investigators to read from the materials they prepared for the interview. For five minutes, investigators created their own

questions to ask the suspect about what happened in Room 1 and typed them onto a desktop computer. Afterward, they chose five questions from a list of 14 questions created by the authors (see Appendix). Seven (50%) of these questions contained details about the crime or crime scene, and thus were contaminating (e.g., "How did you know that the combination to the briefcase was 321?"). The other half contained no information about the crime (e.g., "Tell me everything that you did today step-by-step, starting with coming into the lab").

To examine the moderating role of incentives (i.e. the hypothesis that participants who are incentivized to elicit a credible confession will disclose more crime details than those who are not incentivized), 29 of the 59 participants were offered a monetary inducement to elicit the confession. Before the interview, by random assignment, the experimenter delivered the incentive manipulation as a final instruction:

> Your goal in this interview is to get the suspect to produce a statement like the one that I showed you before. If you produce a statement like this from the suspect, your compensation for participating in this study will go from $8 to $12. Everyone starts the study with $8, but you can get up to $12 if you do your job well.

Investigators not incentivized in this way only heard the first sentence of this instruction. In reality, all participants received the full amount.

All investigators introduced themselves to their suspect as Investigator Johnson and explained that they were investigating an incident that occurred in Room 1. Investigators said that they had examined the crime scene and that a witness had seen someone matching their general description in the area. Investigators then proceeded to ask their interview questions, and suspects responded according to their instruction to deny involvement.

The confession. After investigators asked their original questions and those they chose from the preset list, the experimenter assigned to the investigator terminated the phone call. At this point, the other experimenter told the suspect that the investigator would call back and that the suspect was to give a statement that would convince the investigator of his or her guilt. To mimic the phase of an interrogation during which many suspects choose to acquiesce to the demand for a confession, they were instructed as follows:

> At this time, we would like you to give a statement that will convince the Investigator that you actually committed this crime. If we think that the Investigator does not believe your statement, we're going to need you to come back and do a second session for us on a different day, and we will not be able to pay you for that.

All suspects received $12 regardless of the quality of their confession, and none returned for a second session. When the investigators called again, they reintroduced themselves as Investigator Johnson and asked four standard prods in succession, allowing time for the suspect to respond to each. The prods were open-ended and were created to elicit the greatest amount of details possible from the suspect: (a) Can you tell me what happened here? (b) Okay, let's back up for a second. I need to know what happened in the beginning, I need to know what happened in the middle, and I need to know what happened in the end—where were you, how did you do it, and what did you see? (c) Okay, so you walked in through the door of Room 1 and then what did you do? (d) What did you do when you saw what you wanted? After the suspect answered the last question, the Skype phone call was terminated, and both participants completed a questionnaire about the experience.

Questionnaire. Both investigators and suspects answered a number of questions about their perceptions of the questioning and confession. They were asked matched questions about perceived guilt (investigators were asked if they thought the suspect was guilty or innocent; suspects were asked for their opinion of what the investigator thought), how motivated the investigator was to get a confession (1 = *Not at all*, 10 = *Totally*), and how knowledgeable the suspect was of the crime pre- and postinterview. Regarding the question about the suspect's knowledge, suspects were asked "In your opinion, how knowledgeable were you of the missing money before the interview began?" and "In your opinion, how knowledgeable are you of the situation now?" and answered both of these questions on a scale from 1 = *Not at all* to 10 = *Totally*. Investigators, on the other hand, were asked "In your opinion, did the suspect know details about the missing money before you spoke to them?" and "In your opinion, does the suspect know more about the missing money now?" and answered either yes or no. At the end of the questionnaire, both types of participants rated the extent to which the interview provided the suspect with knowledge of the situation that they did not already know, on a scale from 1 = *Not at all* to 10 = *Totally*. We also asked participants (a) whether they believed the suspect's statement would lead others to think they took the money and (b) to estimate what percentage of the time they and their partner spent talking during the interview. Although we did not make predictions about these exploratory measures or analyze the results, the data are available at https://osf.io/k4r2y/?view_only=69474231a9d8410ebf368bbdf0c08420.

Next, all participants completed a series of open-ended factual questions about the theft: (a) How much money was stolen? (b) What kind of bills was the money in? (c) Where was the money specifically in the room? (d) Was the container where the money was kept locked? (e) How was this container opened? (f) Was something else locked? If yes, what was it? And (g) How was this other thing opened? Before answering demographic questions at the close of the questionnaire, participants were asked to estimate the extent to which the interview provided the suspect with knowledge of the crime scene that the suspect did not already possess (1 = *Not at all,* 10 = *Totally*). All participants were fully debriefed and compensated $12 for their time.

Coding. Two student research assistants not affiliated with the project independently coded three types of data for the nine key crime details described above. These students were blind to both experimental condition and hypotheses. Raters coded (a) the total number of investigator-produced questions, (b) the number of contaminated investigator-produced questions, (c) the number of key details the investigator disclosed in the audiotaped interviews, and (d) the number of details provided by each suspect in their audiotaped statements. In all instances, both raters coded 100% of the cases. These raters agreed substantially on all coding (see Table 1 for Cohen's kappas). Disagreements were resolved by discussion between the two coders.

Table 1
Experiments 1 and 2: Cohen's Kappas for Interrater Reliability in Coding

	Experiment 1			Experiment 2
Detail	Questions	Interviews	Statements	Descriptions
Briefcase	0.97	0.94	1.00	0.96
Money	0.97	0.89	0.95	0.98
Keys	0.97	0.89	0.87	0.99
Combination	0.97	1.00	0.91	0.93
Filing cabinet	0.92	1.00	0.80	0.91
Cup	1.00	0.91	0.89	0.95
Note	0.93	0.97	0.91	0.99
Folder	0.94	0.88	0.88	0.99
Envelope	1.00	0.97	1.00	1.00

Results

The goals of this experiment were two-pronged: (a) to examine the extent to which incentivized and unincentivized investigators leaked privileged information about the crime to innocent and guilty suspects and (b) to determine whether innocent suspects learned information about the crime through their interview with a knowledgeable investigator. Relatedly, we examined whether both investigators and suspects realized that the contaminated interviews could effectively teach suspects about the crime.

Contamination. Before the interview, investigators generated their own interview questions and then chose from a list of existing questions. Across all conditions, investigators spontaneously generated an average of 9.47 questions, (SD = 4.05). On average, 57.76% of these questions were contaminating questions that contained at least one crime detail (e.g., "How did you find the combination to the briefcase?"; "Did you touch the keys at all?"). The remainder did not include any of the critical crime details (e.g., "Why did you break into that office and what was your motive?"; "What were you doing in Room 1?").

Taking all the questions that investigators created combined, these questions contained an average of 3.94 of the nine key details about the crime (SD = 1.96, median = 4, min = 0, max = 7). Of the five questions selected, they chose an average of 2.29 contaminated questions (SD = 1.00, median = 2, min = 0, max = 5), regardless of how many details each question contained. Across these selected questions, there was an average of 3.36 unique details (different contaminated questions contained a different number of critical details; see Appendix; SD = 1.48, median = 3, range = 0 to 7).

Across all conditions, investigators verbally leaked an average of 4.16 out of a possible 9 details in their interviews, as coded in the audiotapes of the questioning (SD = 2.20, median = 4, min = 0, max = 8). Due to technical difficulties or other problems (e.g., recording software malfunctions that only recorded the suspect's voice [n = 2]; recording software malfunction that did not record the session [n = 10]; no permission from participant to use recording [n = 2]), raters only coded 45 of the 59 interview audiotapes. Table 2 displays the frequency with which each detail appeared in the audiotapes of the interviews.

To test the effects of our manipulated variables on the number of details verbally disclosed by investigators, we conducted a 2 Suspect guilt × 2 Investigator incentive instruction between-subjects ANOVA. There was no main effect of suspect guilt on investigator disclosure of details, $F(1, 41) = 2.79$, $p = .10$, $\eta^2 = .05$. Investigators questioning a guilty suspect (M = 3.70, SD = 2.32) did not disclose more details than those questioning an innocent suspect (M = 4.52, SD = 2.08). There was, however, a main effect of investigator incentive, $F(1, 41) = 11.32$, $p = .002$, $\eta^2 = .20$. Interestingly, this effect is the opposite of what we predicted. We hypothesized that those who were incentivized to elicit a believable confession would disclose more details than those who were not incentivized. Instead, results showed that incentivized investigators (M = 3.23, SD = 1.95) disclosed fewer details than nonincentivized investigators (M = 5.04, SD = 2.10). The interaction between the two variables was not statistically significant (for all interaction effects and follow-ups on dependent measures, see Table 3).

Investigator incentive and accuracy. We conducted a t-test between the two groups of investigators on their self-reported motivation to get a statement from the suspect. Interestingly, there was no significant difference in motivation between the induced (M = 7.97, SD = 1.57) and noninduced (M = 8.27, SD = 1.46) investigators, $t(57) = 0.76$, $p = .49$, $d = 0.20$ (95% CI [−0.31, 7.1]), suggesting that even nonincentivized investigators were still highly motivated. Not surprisingly, descriptive results showed that investigators were highly accurate in their factual questions about the crime (M = 89.21%, SD = 14.32%). A t-test examining the difference between the two investigator groups on accuracy in

Table 2
Experiment 1: Percentage of Interviews and Confessions That Contained Each Detail

	Interview			Confession		
Detail	Incentivized (n = 22)	Not incentivized (n = 23)	Total (n = 45)	Guilty (n = 21)	Innocent (n = 24)	Total (n = 45)
Briefcase	72	87	80	100	58	78
Money	55	83	69	90	38	62
Keys	59	70	64	100	29	64
Combination	41	57	49	81	25	51
Filing cabinet	36	48	40	57	13	31
Cup	32	13	20	62	0	29
Note	9	30	20	81	4	40
Folder	14	3	27	52	4	27
Envelope	5	5	29	57	8	31

Table 3
Experiment 1: Means, Suspect Guilt × Investigator Incentive Interaction Effects, Follow-ups on Dependent Measures

Dependent measure	Guilty mean (*SD*)	Innocent mean (*SD*)	*F*	*df*	*p*	*d*	95% CI
Number of leaked details in interview			2.34	1, 41	.13		
Incentivized	2.11 (1.97)	4.00 (1.58)	6.23	1, 20	.02	1.14	[0.44, 1.83]
Not Incentivized	5.00 (1.73)	5.08 (2.47)	.009	1, 21	.93	−0.04	[−0.88, 0.80]
Quantity of details in suspect statement			0.02	1, 41	.90		
Incentivized	7.00 (1.23)	1.62 (1.26)	99.24	1, 20	<.001	−4.52	[−5.02, −4.02]
Not Incentivized	7.42 (2.02)	1.91 (1.45)	55.54	1, 21	<.001	−3.26	[−3.95, −2.56]
Percent correct on factual test (suspect)			0.15	1, 52	.71		
Incentivized	86.70 (17.20)	17.10 (26.00)	66.76	1, 24	<.001	−3.35	[−3.43, −3.27]
Not Incentivized	88.60 (16.10)	23.10 (20.90)	90.85	1, 28	<.001	−3.60	[−3.67, −3.54]
Extent to which interview provided suspects with crime facts (suspect perception)			0.30	1, 55	.58		
Incentivized	3.43 (2.34)	6.33 (3.06)	8.14	1, 27	.008	1.10	[0.14, 2.06]
Not Incentivized	3.79 (2.61)	5.94 (2.41)	5.52	1, 28	.026	0.89	[.023, 1.75]
Extent to which interview provided suspects with crime facts (investigator perception)			0.34	1, 54	.57		
Incentivized	4.69 (2.72)	4.73 (1.71)	0.002	1, 26	.96	0.02	[−0.78, 0.82]
Not Incentivized	4.43 (2.21)	5.69 (2.33)	2.29	1, 28	.14	0.57	[−0.21, 1.36]
Investigator confidence in guilt or innocence			0.83	1, 55	.37		
Incentivized	7.21 (1.85)	7.40 (1.77)	0.08	1, 27	.78	0.12	[−0.53, 0.74]
Not Incentivized	7.64 (1.87)	7.00 (1.51)	1.09	1, 28	.31	−0.39	[−0.98, 0.19]
Suspect confidence in investigator judgment			0.12	1, 55	.74		
Incentivized	7.14 (1.23)	6.80 (1.97)	0.31	1, 27	.58	−0.21	[−0.79, 0.37]
Not Incentivized	7.29 (1.49)	7.25 (2.05)	0.003	1, 28	.96	−0.023	[−0.65, 0.60]

these factual questions showed that the incentive manipulation did not have a statistically significant effect on accuracy, $t(57) = 0.041$, $p = .97$, $d = 0.011$ (95% CI [−0.5, 0.52]).

Suspect knowledge and statements. Innocent suspects' self-rated knowledge of the crime before and after the interview increased dramatically between the two time points. On an increasing scale from 1 to 10, innocents rated their knowledge of the crime before the interview at a mean of 1.26 ($SD = 1.26$). A *t*-test between innocent and guilty suspects' self-rated knowledge shows that innocents' ratings were significantly lower than guilty suspects' preinterview rating of their knowledge ($M = 7.39$, $SD = 3.49$), $t(33.36) = 8.80$, $p < .001$, $d = -2.39$ (95% CI [−3.05, −1.71]). Though a *t*-test on innocent and guilty suspects' postinterview knowledge still showed a significant difference between these two groups, innocent suspects' perceptions increased substantially ($M = 6.77$, $SD = 2.28$) while guilty suspects remained stable ($M = 8.07$, $SD = 2.31$), $t(57) = 2.17$, $p = .03$, $d = -0.57$ (95% CI [−1.09, −0.04]). Put another way, innocent suspects' knowledge ratings increased by 81.40% from pre- to postinterview; guilty suspects' knowledge ratings increased by only 9.20%. A paired samples *t*-test with only innocent participants confirmed that innocent suspects' rating of their knowledge after the interview increased significantly from ratings of their knowledge before the interview (descriptive statistics for each are above), $t(30) = -13.45$, $p < .001$, $d = -2.42$, (95% CI [−3.12, −1.71]).

In addition to suspects' perceived knowledge of the crime, we obtained two objective measures of such knowledge: (a) the number of details featured in their verbal statements and (b) a test of factual questions about the incident. Across all conditions, suspect statements included on average 4.31 ($SD = 3.15$) critical crime details out of 9. To test the effects of our manipulated variables on the number of details in suspects' confessions, we ran a 2 Suspect guilt × 2 Investigator incentive between-subjects ANOVA. As expected, suspect guilt had a significant effect on number of confession details, $F(1, 41) = 138.56$, $p < .001$, $\eta^2 = .77$, as guilty suspects ($M = 7.24$, $SD = 1.70$) included more details than innocent suspects ($M = 1.75$, $SD = 1.33$). There was no significant effect of investigator incentive, $F(1, 41) = 0.59$, $p = .45$, $\eta^2 = .003$, or interaction (see Table 3). As for the second type of objective measure of suspect knowledge, a 2 Suspect guilt × 2 Investigator incentive ANOVA showed that guilty suspects correctly answered a higher proportion of factual questions about the crime than innocent suspects ($M = 87.70\%$, $SD = 16.40$; $M = 20.50\%$, $SD = 22.90$, respectively), $F(1, 52) = 155.61$, $p < .001$, $\eta^2 = .75$. There was no effect of investigator incentive, $F(1, 52) = 0.53$, $p = .47$, $\eta^2 = .003$, and no statistically significant interaction.

Knowledge of contamination. To examine whether participants were aware of the effect of contamination on the suspects' guilty knowledge, both investigators and suspects estimated the extent to which the interviewer disclosed information about the crime that he or she did not already know. These results were analyzed using 2 Suspect guilt × 2 Investigator incentive between-subjects ANOVAs. Regarding suspects' perceptions of learning about the crime via the questioning, suspect guilt had a significant effect, $F(1, 55) = 13.67$, $p < .001$, $\eta^2 = .20$. Those who were innocent ($M = 6.13$, $SD = 2.71$) reported learning significantly more about the crime from the interview than those who were guilty ($M = 3.61$, $SD = 2.44$). We found no effect of investigator incentive ($F(1, 55) < .001$, $p = .98$) and no significant interaction.

Investigators, on the other hand, did not differentiate between innocent ($M = 5.23$, $SD = 2.08$) and guilty ($M = 4.56$, $SD = 2.42$) suspects in their judgments of how much the interview provided them with privileged information, $F(1, 54) = 1.20$, $p = .28$, $\eta^2 =$

.02. There was also no effect of incentive, $F(1, 54) = .34$, $p = .57$ and no interaction.

Judgments of guilt. In a series of exploratory analyses, we tested whether investigators could accurately distinguish between true and false confessions. Across suspect guilt conditions, 62.70% of investigators reported believing that the suspect was guilty of stealing the money. A chi-square analysis showed a significant difference in how investigators judged innocent and guilty suspects, $\chi^2(1, N = 59) = 8.60$, $p = .003$. Specifically, investigators were fairly accurate when judging guilty participants—82.10% of investigators accurately classified guilty participants as guilty—while being almost equally likely to rate innocent participants as guilty (45.20%) or innocent (54.80%). Investigators were, across conditions, highly confident in their guilt judgments ($M = 7.31$, $SD = 1.72$). A 2 Suspect guilt × 2 Investigator incentive between-subjects ANOVA showed that neither suspect guilt, $F(1, 55) = 0.25$, $p = .62$, $\eta^2 = .005$ nor investigator incentive ($F(1, 55) < .001$, $p = .96$, $\eta^2 < .001$) influenced investigator confidence.

Interestingly, results from suspects themselves yielded a similar pattern: Innocent suspects were almost equally likely to report believing that the investigator found them guilty (45.70%) versus innocent (54.30%), while guilty suspects were more likely to indicate that the investigator knew they were guilty (75% vs. 25%). This difference, however, was not significant, $\chi^2(1, N = 58) = 3.28$, $p = .07$. Across guilt condition, suspects were moderately to highly confident in their assessment of the investigators' judgment ($M = 7.12$, $SD = 1.70$). A 2 Suspect guilt × 2 Investigator incentive between-subjects ANOVA showed neither variable significantly influenced suspects' confidence in their judgments of what the investigators thought, $F(1, 55) = 0.18$, $p = .68$, $\eta^2 = .003$; $F(1, 55) = 0.43$, $p = .52$, $\eta^2 = .008$.

Discussion

Guilty suspects possessed greater knowledge of the mock crime and their statements contained significantly more details than innocent suspects. Importantly, however, innocent suspects inserted into their statements an average of nearly two out of the nine privileged crime details. Mimicking a pattern that has drawn attention to real life false confessions, many innocent participants also contrived and inserted "false facts" into their confessions (e.g., one innocent suspect invented a story about being a janitor tasked with cleaning the room from which the money was stolen). Even though investigators often failed to realize their role in contamination, the interview process bolstered innocent suspects' confessions by feeding them privileged details about the crime. Based on participants' estimates of how much they learned about the crime during the interview, innocent suspects noticed that the investigators leaked some details, but the investigators themselves did not realize it. As important as it is to examine the behaviors of investigators and suspects, it is equally important to consider how these behaviors influence the perceptions of lay observers. Experiment 2 tested observers' judgments of the interviews and statements in Experiment 1.

Overview of Experiment 2 and Hypotheses

Previous research has demonstrated that lay observers may differentiate between contaminated and not-contaminated confessions and respond by significantly decreasing their guilty verdicts when the source of the details can be traced to the investigator (Alceste et al., 2019). Thus, Experiment 2 builds upon those findings to examine whether neutral observers are sensitive to instances of contamination during interviews, and thus whether listening to the entire process (i.e. both the interview and confession) increases accuracy in perceptions. Additionally, this study aimed to determine the extent to which uninformed persons can "learn" about a crime from an interview, as Trainum's suspect did during his contaminated interrogation. We predicted that observers would be more likely to judge guilty suspects as having committed the crime (because they inserted more details into their statements) but that some participants would incorrectly incriminate innocent suspects. In other words, previous research indicates a guilt bias toward confessors and a slight decrease in that bias when their confessions are observably contaminated (Alceste et al., 2019; Kassin, 2012).

Additionally, we predicted that participants who heard the contaminating interview compared to those who only heard the final confession would be less likely to see the innocent suspect as guilty, since they should realize that the suspect has little independent guilty knowledge. Additional hypotheses and entire preregistration for Experiment 2 can be found on the Open Science Framework (https://osf.io/k4r2y/?view_only=69474231a9d8410ebf368bbdf0c08420).

Method

Participants. The audiotapes obtained in Experiment 1 were played to participant observers online, each paid $0.75, via Amazon Mechanical Turk (MTurk). An a priori power analysis revealed that $N = 505$ would be sufficient to detect a small effect, Cohen's $f = 0.125$, at 80% power. To account for exclusions due to instructional and manipulation check failures, we recruited 602 MTurk participants. Seventy-five participants reported not complying with instructions, 19 did not correctly identify the crime as a theft, and 9 incorrectly reported the number of recordings they listened to. After excluding these 103 participants, our final sample was $N = 499$. Because of an error in data collection, demographic information was not collected from this sample. Fortunately, numerous surveys have examined MTurk worker demographics. For example, a survey of 39,461 unique MTurk workers from 2015 until 2017 (859 days) showed that 55% of U.S. MTurk workers are female and 80% are born after 1970 (Difallah, Filatova, & Ipeirotis, 2018). MTurk workers are also typically educated and have a college or advanced degree (Ross, Irani, Silberman, Zaldivar, & Tomlinson, 2010), and they are less diverse than the general U.S. population, with the majority identifying as White (Hitlin, 2017). We have no reason to believe that our sample differs significantly from these demographic characteristics.

Materials. Experiment 2 used the interview and confession recordings from Experiment 1. We excluded viable recordings (those with no audio or permission issues) if the suspect refused to admit to taking the money in the confession (i.e. they merely stated that they "found" or "hid" the money, as opposed to "taking" it, $n = 8$) or if the suspect confessed to having guilty knowledge (i.e. admitted to seeing the money or other key details) in the interview ($n = 8$). After these exclusions, stimulus materials consisted of 13 interview/confession recordings of guilty suspects and 16 of inno-

cent suspects. This final sample of 29 audiotapes contained an approximately even number of incentivized ($n = 15$) and not incentivized ($n = 14$) investigators.

Design. The experiment followed a 2 Suspect guilt (guilty vs. innocent) × 2 Audiotape (interview and confession vs. confession only) between-subjects factorial design. Each participant listened to either the full interview and confession or only the confession; the suspects in the tapes were either innocent or guilty.

Procedure. After a standard online consent procedure, participants read and confirmed that they understood instructions they would later be asked if they complied with. These included completing the study in a single session without stopping, not taking notes, completing the study without talking to or receiving help from others, not engaging in other tasks while the study was ongoing, and not refreshing or using the "back" button on their browser.

Next, participants read a short description of the events that transpired in Experiment 1 for context:

> While running a psychology experiment at a university, a theft occurred in a room of an office labeled Room 1. The experimenter called the school's Public Safety office and reported the theft. Soon after, a Public Safety officer named Investigator Johnson questioned someone matching a witness's description of the person who committed the theft.

Participants then read that they would listen to the suspect interview and confession or just the confession. We randomly assigned participants to hear a session taken from one of the four groups of the 2 × 2 design. Once the recording started, participants could not continue forward with the study until the recording had finished playing. Those presented with both recordings always listened to the interview first and then the confession.

Dependent measures. After the audio recording, participants rendered judgment on the suspect's guilt (guilty vs. innocent), the estimated likelihood that the suspect committed the theft from 0–100%, and estimations of the suspect's and investigator's knowledge of the crime facts (1 = *Nothing*; 10 = *A lot*). After these four main dependent measures, participants completed a factual knowledge test regarding the key details of the event.

Prompted recall. Regarding their knowledge of crime facts, participants first completed an open-ended but prompted question about the theft: "A sequence of events occurred in Room 1 involving 8 steps that were necessary to carry out the theft. As best you can, name the 8 steps in the following text boxes." This instruction referred to the procedure that was carried out by all guilty suspects in Experiment 1. Two independent raters, blind to experimental condition and hypotheses, were trained to code participants' open-ended responses—first, both coded a random sample of 51% of the responses ($n = 255$). After reaching acceptable interrater reliability, each rater coded half of the remaining responses individually. For a list of all Cohen's kappas from Experiments 1 and 2, see Table 1.

Item recognition. In the second part of the factual knowledge test, participants received a list of 20 items that either were associated with the theft in Experiment 1 (e.g., cup, key, note, briefcase, etc.) or were not (e.g., computer, window, cell phone, jar, etc.). For each item, we asked participants to identify whether or not it was involved (an "I don't know" option was also included). Each participant earned an "item recognition score" based on the number of items they correctly identified as having been involved in the theft (min = 0, max = 8; due to an error in data collection, the detail "money" was excluded from this test).

Regarding manipulation checks, participants indicated how many recordings they listened to—the correct answer was either one or two depending on their condition in this variable; participants who responded incorrectly were excluded from analyses. Additionally, participants identified the crime in question—those who selected anything other than "theft" from a multiple-choice menu were excluded from analyses.

Compliance with instructions and debriefing. At the end of the study, participants were asked if they complied with instructions. We asked them to answer truthfully and assured them they would be compensated regardless. Those who did not comply with the five key instructions were excluded from analyses. Additionally, we asked participants to report whether they used a search engine to look anything up during the study. Those who indicated that they did were removed from analyses. Finally, all participants were fully debriefed about the purpose of the study and about the dangers of contamination in police questioning.

Results

Judgments of guilt. We performed a logistic regression to determine the effects of guilt, exposure to the interview, and their interaction on the likelihood that participants reported the suspect was guilty. The logistic regression was statistically significant, $\chi^2(3) = 26.17$, $p < .001$; the model explained 8.60% (Nagelkerke's R^2) of the variance in guilt ratings. Observers who were assigned to hear the interview as well as the confession of the innocent suspect had lower odds of judging the suspect as guilty compared to observers who were assigned to hear only the confession of the innocent suspect ($OR = 0.35$, 95% CI [0.19, 0.65], $p = .001$). Interestingly, suspect guilt did not have a statistically significant effect on judgments of guilt, $OR = 1.21$, 95% CI [0.60, 2.47], $p = .60$. However, a significant interaction between suspect guilt and audiotape was obtained, $OR = 4.51$, 95% CI [1.60, 13.36], $p = .005$. The interaction shows that observers had lower odds of judging the innocent suspect as innocent ($OR = 0.22$) and higher odds of judging the guilty suspect as guilty when they received both the interview and statement ($OR = 4.51$).

Estimated likelihood of commission. Participants estimated how likely it was that the observed suspect actually committed the theft, on a scale of 0–100%. We analyzed responses using a 2 Suspect guilt × 2 Audiotape between-subjects ANOVA. This analysis revealed a main effect for suspect guilt, $F(1, 495) = 15.25$, $p < .001$, $\eta^2 = .029$, such that participants believed that guilty suspects ($M = 87.09\%$, $SD = 22.34$) were significantly more likely to have committed the theft than those who were innocent ($M = 79.24\%$, $SD = 25.09$). Although there was no main effect for whether participants listened to both recordings or only the confession, $F(1, 495) = 2.23$, $p = .14$, $\eta^2 = .004$, this analysis revealed a significant predicted interaction (see Table 4 for all Experiment 2 interaction and simple effects). Figure 1 shows that when the suspect was guilty, it did not matter whether participants listened to the interview preceding the confession ($M = 89.15\%$, $SD = 19.17$) or just the confession ($M = 85.25\%$, $SD = 24.77$)—all suspects seemed equally guilty. But when the suspect was innocent, those who listened to the interview process, and thus

Table 4
Experiment 1: Means, Suspect Guilt × Investigator Incentive Interaction Effects, Follow-ups on Dependent Measures

Dependent measure	Guilty mean (*SD*)	Innocent mean (*SD*)	*F*	*df*	*p*	*d*	95% CI
Estimated likelihood of commission			11.20	1, 495	<.001		
Both recordings	89.15% (19.17)	73.88% (27.30)	24.73	1, 234	<.001	−0.65	[−3.65, 2.35]
Confession only	85.25% (24.77)	84.04% (21.93)	0.17	1, 261	.69	−0.05	[−2.87, 2.77]
Perception of suspect knowledge			12.23	1, 493	<.001		
Both recordings	9.04 (1.79)	6.95 (2.99)	42.42	1, 233	<.001	.085	[0.54, 1.17]
Confession only	8.83 (2.14)	8.22 (2.38)	4.77	1, 260	.03	−0.27	[−0.54, 0.002]
Perception of investigator knowledge			0.31	1, 495	.58		
Both recordings	7.45 (2.51)	7.20 (2.44)	0.62	1, 234	.43	−0.10	[−0.42, 0.21]
Confession only	6.67 (2.70)	6.66 (2.46)	<.001	1, 261	.99	−0.004	[−0.32, 0.31]
Recall of crime facts			0.10	1, 495	.75		
Both recordings	4.82 (1.96)	2.43 (1.33)	119.79	1, 234	<.001	−1.43	[−1.65, −1.22]
Confession only	4.46 (2.17)	1.98 (1.06)	139.48	1, 261	<.001	−1.46	[−1.66, −1.25]
Recognition of crime facts			5.22	1, 495	.023		
Both recordings	5.12 (1.95)	3.17 (1.75)	70.34	1, 234	<.001	−1.10	[−1.34, −0.87]
Confession only	4.96 (1.91)	2.22 (1.23)	190.68	1, 261	<.001	−1.71	[−1.90, −1.52]

heard the leaking of the crime details, deemed the suspect less likely to have committed the theft (M = 73.88%, SD = 27.30) than those who heard only the confession (M = 84.04%, SD = 21.93).

Estimates of suspect and investigator knowledge. Participants rated how much the suspect knew about the theft on a scale from 1 to 10. Overall, these ratings were generally high across conditions. A 2 Suspect guilt × 2 Audiotape ANOVA further revealed two main effects and an interaction. Actual guilt significantly influenced estimates of knowledge such that guilty suspects (M = 8.93, SD = 1.98) were judged to have more guilty knowledge than innocent suspects (M = 7.62, SD = 2.76), $F(1, 493) = 40.67$, $p < .001$, $\eta^2 = .074$. Importantly, participants who heard only the confession (M = 8.53, SD = 2.28) estimated that the suspect had significantly more knowledge than those who also heard the interview (M = 8.00, SD = 2.67), $F(1, 493) = 6.28$, $p = .013$, $\eta^2 = .011$. This analysis also revealed a significant interaction (see Table 4). When the suspect was guilty, interview exposure did not significantly impact estimates of guilty knowledge (M = 9.04, SD = 1.79; M = 8.83, SD = 2.14; Figure 2). When the suspect was innocent, however, participants estimated that the suspect had more guilty knowledge when they heard only the confession (M = 8.22, SD = 2.38) versus the preceding interview as well (M = 6.95, SD = 2.99).

Regarding participants' estimates of the investigators' knowledge, as expected, suspect guilt had no effect, $F(1, 495) = 0.32$, $p = .57$, $\eta^2 = .001$. However, a main effect for recording condition was obtained, $F(1, 495) = 8.38$, $p = .004$, $\eta^2 = .017$. Participants who heard the interview (M = 7.32, SD = 2.47) estimated that the investigator had significantly more knowledge than those who heard only the confession (M = 6.67, SD = 2.56). This result was to be expected, as investigators did not disclose any details during the second confession-taking stage. The interaction of guilt and exposure was not significant (see Table 4).

Recall of crime facts. Across conditions, participants free-recalled 3.42 (SD = 2.09) of the nine crime-related items. A 2 Suspect guilt × 2 Audiotape ANOVA on the total number of details recalled revealed a significant effect of guilt such that participants who listened to a guilty suspect (M = 4.63, SD = 2.06) recalled more details than those who listened to an innocent suspect (M = 2.19, SD = 1.21), $F(1, 497) = 256.37$, $p < .001$, $\eta^2 = .34$. There was also an effect of audiotape exposure condition: participants who listened to the interview (M = 3.63, SD =

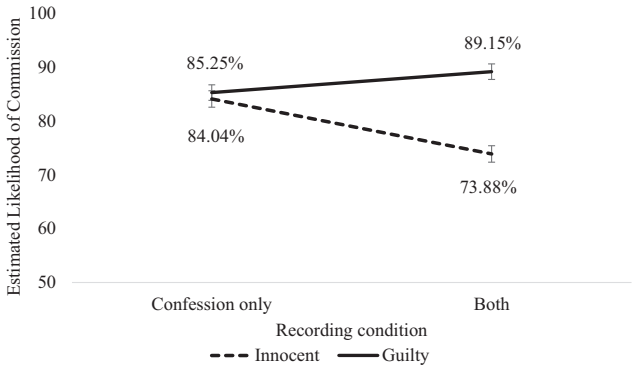

Figure 1. Experiment 2: Significant interaction of recording condition and suspect's guilt on estimated likelihood that the suspect committed the crime. *y*-axis scale is truncated for presentation purposes—the true scale ranged from 0–100%. Bars represent standard errors.

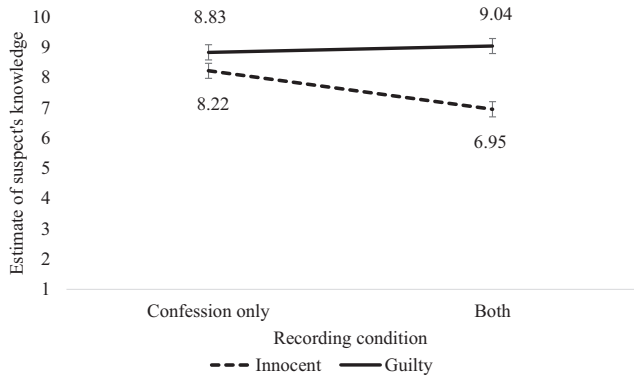

Figure 2. Experiment 2: Significant interaction of recording condition and suspects' guilt on estimates of the suspect's knowledge of the crime. Bars represent standard errors.

2.13) recalled more items than those who listened only to the confession ($M = 3.22$, $SD = 2.11$), $F(1, 497) = 4.64$, $p = .032$, $\eta^2 = .009$. The two-way interaction was not significant.

Recognition of crime facts. Across conditions, participants recognized 3.87 ($SD = 2.13$) of the items displayed on the recognition test. Through a 2 Suspect guilt × 2 Audiotape ANOVA on total recognition scores, which ranged from 0 to 8, we found a significant main effect of suspect guilt ($M = 5.07$, $SD = 1.93$, and $M = 2.67$, $SD = 1.57$, in the guilty and innocent conditions, respectively), $F(1, 495) = 235.92$, $p < .001$, $\eta^2 = .31$. We also found that participants who heard the interview ($M = 4.18$, $SD = 2.11$) correctly identified more items than those who heard only the confession ($M = 3.59$, $SD = 2.11$), $F(1, 495) = 14.72$, $p < .001$, $\eta^2 = .02$. These main effects were qualified by a two-way interaction that closely followed the pattern of other dependent measures (see Table 4). When the suspect was guilty, exposure to the interview had almost no effect on item recognition scores ($M_{\text{both}} = 5.12$, $SD = 1.95$; $M_{\text{confession}} = 4.96$, $SD = 1.91$). When the suspect was innocent, however, participants correctly recognized significantly more items when they heard the interview and confession ($M = 3.17$, $SD = 1.75$) than when they heard only the confession ($M = 2.22$, $SD = 1.23$).

Summary of results. The results of Experiment 2 were consistent with our hypotheses. Participants' perceptions of guilty suspects were not significantly impacted by whether they listened to the interview that preceded the confession. But perceptions of innocent suspects were influenced in a noteworthy fashion: Participants who heard only the confession misperceived innocent suspects to be just as culpable as truly guilty suspects. Importantly, those who heard the interview as well as the resulting false confession were less convinced of the innocent suspects' guilt, estimated that the suspect knew less about the theft, and themselves were less able to recognize key details. Though probability-of-commission and knowledge estimates were reduced among participants who heard the interview, this decline represents a mere attenuation of the incriminating effects of a confession, not a return to a presumption of innocence.

General Discussion

False confessions have contributed to over one quarter of the wrongful convictions that have been resolved by DNA exoneration (https://www.innocenceproject.org/all-cases/). In light of the empirical findings that many false confessions contain accurately detailed descriptions of the crime (Garrett, 2010, 2015) and other narrative credibility cues (Appleby, Hasel, & Kassin, 2013), we created a laboratory paradigm to examine the process of contamination through which innocent people learn critical facts about a crime and produce false confessions that appear corroborated by guilty knowledge.

In Experiment 1, mock investigators communicated crime facts to both guilty and innocent participants at the same rate, demonstrating that contamination occurred naturally in the information-gathering interview. Without receiving an instruction that they should not leak key details, these participant investigators spontaneously selected and created questions that directly related to the crime scene they investigated. Presumably they expected that asking more specific questions would elicit more incriminating statements. For example, by providing suspects with a verbal picture of the room and critical objects (e.g., "On which side [of the room] was the briefcase located, the side near the light or the back wall?"), investigators modeled the types of responses that were desirable (e.g., Chittick & Himelstein, 1967). Indeed, some contaminating questions contained the presupposition that the suspect would provide an incriminating response (e.g., "Was there a *white envelope* in the briefcase? If so, where in the *briefcase* did you find the *envelope*?"; emphasis added for critical details).

Unlike our mock investigators, who were not given specific instructions about whether to disclose critical details, all suspects were told that they should not admit to knowing about any crime details. Yet even when suspects responded with denials in the interviews, investigators did not hesitate to overshare and provide more details. Like Grice's (1975) quantity maxim would predict, undersharing would have violated conversational norms more than oversharing and failed to move the interview toward the goal of a confession. As a result, the investigators asked questions embedded with specific crime details, enabling factually naïve innocent suspects to include on average almost two accurate details in their confessions. Although guilty suspects provided more accurate details, it is practically significant—and often devastating in court—that individuals lacking first-hand knowledge of the theft recounted accurate details after the interview. Research has shown that confessions containing factual details appear more incriminating than those lacking in detail (Appleby et al., 2013). Vividness is a cue in general that increases perceptions of credibility (Bell & Loftus, 1989; also see Johnson, 2006). In court, two details consistent with the crime could convince a detective, prosecutor, judge, jury, and the public of an innocent suspect's guilt, leading to a wrongful conviction (Garrett, 2010). This is the scenario that played out in the wrongful convictions of David Vasquez, Doug Warney, and Barry Laughman cited earlier.

In Experiment 2, we examined whether people are potentially sensitive to the process of contamination and whether exposure to it can mitigate false perceptions of guilt. Consistent with our hypothesis, lay observers in Experiment 2 were more likely to accurately identify innocent confessors as innocent when they were exposed to both the confession and the preceding contaminating interview. This finding is supported by previous research showing that when the interrogator is the source of the crime details in a confession, the suspect appears less guilty than when the suspect independently supplies those details (Alceste et al., 2019). Nonetheless, our observers in general judged both innocent and guilty suspects to be culpable—a result that is consistent with the robust finding that confessions are a potent form of evidence—even when accompanying details can be traced to the interrogator and even when contradictory evidence is present (see Kassin, 2012). That the presentation of the contaminating interview attenuated but did not eliminate the observer's guilt bias is consistent with previous research showing that observers routinely commit the fundamental attribution error (Ross, 1977), perceiving a defendant to be guilty even when the confession was coerced (e.g., Kassin & Sukel, 1997; Wallace & Kassin, 2012). In light of the pervasiveness of the fundamental attribution error, the attenuation of guilt ratings in the present studies is significant because it suggests that observers can become more discerning of confession evidence when they see the contaminating interview.

Limitations and Future Research

The present studies are not without limitations. First, although we had a total of 59 participants assigned to each role in Experiment 1, and a post hoc analysis showed that to have 80% power to detect a medium effect ($f = .25$) requires 128 participants, this experiment was underpowered to test for interaction effects. Future research aimed at testing the interactive effects of contamination and other factors should strive to adequately power their analyses.

The present research also did not address the question of whether contamination is typically purposeful or inadvertent. Indeed, although we varied the investigator's incentives to produce a credible confession in Experiment 1, police looking to solve high-stakes crimes are often subject to the kinds of public and departmental pressure and scrutiny that we did not model and which can lead even the best-intentioned investigators astray. In *Police Chief Magazine,* Trainum (2014) put it this way:

> Contamination during an interrogation is seldom, if ever intentional. It's usually found in cases where, due to the investigator's sincere belief in the suspect's guilt, tunnel vision and the accompanying verification bias kicks in. In other words, the interrogator begins to focus on signs of guilt, ignoring or explaining away any evidence to the contrary. This, combined with a poor understanding of how interrogation contamination can occur, is a recipe for disaster.

Our results support Trainum's conclusion that sharing information is a natural part of the communicative process in investigative settings. Moreover, the guilt-presumptive nature of interrogations may make it difficult to curb the disclosure of crime details among investigators who assume that a suspect is guilty and thus knowledgeable about the crime.

An additional limitation is that Experiment 1 used mock student investigators, not police officers trained to withhold nonpublic details from suspects. Though this should be addressed in future research, it is important to realize that contamination is present in the vast majority of proven false confessions elicited by trained detectives. This is the real-world genesis of our research. Hence, Experiment 1 aimed to determine whether contamination can occur naturally, even among people who are naïve, lacking both prior knowledge and incentives. Future research should also examine whether varying an investigator's beliefs about the suspect's guilt influences rates of contamination. As the results of Kassin et al. (2003) suggest, a guilt-presumptive approach to interrogation elicits confirmatory behaviors in interrogators, which might include asking pointed or leading questions that disclose critical crime details. As a result of expectations, investigators who are certain of a suspect's guilt might assume that the suspect has guilty knowledge and freely disclose crime details that were previously unknown to an innocent suspect.

We also predicted that varying financial incentives to produce a believable confession would elicit greater contamination among incentivized investigators, but the only significant difference between incentive conditions was in the number of details leaked during the interviews—in the direction opposite of what we had predicted. Because our incentive manipulation did not produce a statistically significant difference in motivation to obtain a confession between participants who received $8 and participants who received $12, this unexpected finding warrants further examination.

Future research should explore alternative methods of manipulating investigator motivation, to the extent that they are realistic incentives that a real investigator might face, such as emphasizing the intrinsic rewards of solving a case, substantially increasing the size of the financial incentive, or offering a reward that is relevant to the task (e.g., by providing investigators with additional evidence that might help solve the case). Researchers should also examine whether certain interviewing tactics are more likely than others to lead to contamination. For example, police who practice investigative interviewing and use rapport-based approaches based on relationship building and trust (see Bull & Soukara, 2010; Shepherd & Griffiths, 2013; Vrij, Hope, & Fisher, 2014) may be more or less prone to include crime details in their questions than those who use the Reid technique and other more confrontational approaches directly aimed at confession (e.g., see Inbau et al. (2013)).

Future research could also examine how tactics, such as direct confrontation or minimization, used in interrogations lead to more or less investigator contamination and whether observers take note of contamination. The positive confrontation, the first step in the Reid technique, might certainly lend itself to contamination (e.g., "Everything in the investigation, from *eyewitnesses* to the *forensics* on the *knife*, points to the fact that you *stabbed* Bob in the *bar* on *Friday* night." [emphasis added for potentially leaked details]). Regarding minimization tactics in which interrogators present moral justification for why the suspect may have committed the crime, investigators may find it useful to build minimization themes on critical crime details, which may also contribute to contamination (e.g., "The fact that Bob was *stabbed* leads me to believe that this was a crime of passion; not a cold-blooded, planned murder. You didn't purposely bring a gun to the bar looking for trouble. You just had a *pocketknife*, which is a perfectly normal thing to carry around at all times. Hell, I even have one in my pocket now."). To our knowledge, no empirical research studies have tested the effects of these techniques on the incidence of contamination.

Another important line of research involves practical implications for how to train investigators to avoid providing critical details in suspect interviews and interrogations. Can investigators become more careful when instructed not to leak privileged details? Does the existence of a "hold-back list" containing crime information that the investigator is prohibited from divulging influence the way investigators create questions? Does such a list influence how suspects respond to questions and construct statements? In addition, it would be important to determine how the gatekeepers of confession evidence—police, prosecutors, and judges—perceive contaminated versus noncontaminated statements.

Policy Implications

Experiment 1 showed that contamination can occur naturally during the processes of interviewing and interrogation—at least in a low-stakes laboratory paradigm involving mock investigators and suspects. These results help to explain the prevalence of accurate crime details within the narrative body of false confessions. At the same time, Experiment 2 suggests the encouraging possibility that lay observers have the ability to differentiate more accurately between true and false confessions if exposed to the

entire interview process and the contamination that it reveals. This is an especially important finding given that previous research has shown that warning laypeople to pay close attention to the source of key details in a confession and instructing them that only details that originate from the suspect are valuable is not enough to make contaminated confessions appear less reliable (Alceste et al., 2019). If lay observers can differentiate between guilty and innocent suspects to a greater degree when exposed to the questioning that preceded a confession, then recording interrogations in their entirety is the best way to ensure that people determine the source of information. In short, the present research—by showing that laypeople are aware of contamination, such that hearing the process of contamination reduces people's guilty verdicts of innocent people—adds to a growing empirical literature demonstrating why it is important that all suspect interrogations be recorded from start to finish (e.g., Kassin, Kukucka, Lawson, & DeCarlo, 2017; Lamb, Orbach, Sternberg, Hershkowitz, & Horowitz, 2000).

To sum up, the present studies provide the first controlled demonstrations of how investigators might communicate and thereby elicit contaminating details during suspect interviews and interrogations. With regard to policy and practice, these results bolster the argument that all interrogations should be recorded in their entirety because "Justice demands it" (Kassin & Thompson, 2019).

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(*Appendix follows*)

Appendix

Experiment 1 Investigator Question List

The following is the list of questions that investigators chose from after creating their own interview questions. Investigators were instructed to select five of the 14 questions to include in their interview. Even-numbered questions are contaminated—the critical crime details in each contaminated question are in boldface.

1. What did you see when you walked into Room 1?
2. Did you see any **money** at all in Room 1?
3. Was there anything particularly noticeable about Room 1?
4. That partition was blocking the silver **briefcase** from view . . . how did you see it?
5. Is there any reason we would see you in Room 1 via surveillance cameras?
6. I already know that you found the **key** to the **filing cabinet** . . . **I just need you to tell me where it was.**
7. How far into Room 1 did you walk?
8. How did you know that the **combination** to the **briefcase** was 321?
9. Tell me everything that you did today step-by-step, starting with coming into the lab.
10. Was the **$100 bill** in that white **envelope**, or was it somewhere else in the **briefcase**?
11. Have you ever done something like this before, or is this the first time?
12. Those fans in Room 1 were blowing pretty hard. Are you sure nothing fell out of the **briefcase** and got blown away?
13. Have you ever been in a situation where you had to choose between right and wrong? What did you do?
14. Did you see the yellow **folder** in the **briefcase**?

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