Do evidence submission forms expose latent print examiners to task-irrelevant information?

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Gardner, Brett O.; Kelley, Sharon; Murrie, Daniel C.; and Blaisdell, Kellyn N., "Do evidence submission forms expose latent print examiners to task-irrelevant information?" (2019). *CSAFE Publications*. 36.  
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Abstract

Emerging research documents the ways in which task-irrelevant contextual information may influence the opinions and decisions that forensic analysts reach regarding evidence (e.g., Dror and Cole, 2010; National Academy of Sciences, 2009; President's Council of Advisors on Science and Technology, 2016). Consequently, authorities have called for forensic analysts to rely solely on task-relevant information—and to actively avoid task-irrelevant information—when conducting analyses (National Commission on Forensic Science, 2015). In this study, we examined 97 evidence submission forms, used by 148 accredited crime laboratories across the United States, to determine what types of information laboratories solicit when performing latent print analyses. Results indicate that many laboratories request information with no direct relevance to the specific task of latent print comparison. More concerning, approximately one in six forms (16.5%) request information that appears to have a high potential for bias without any discernible relevance to latent print comparison. Solicitations for task-irrelevant information may carry meaningful consequences and current findings inform strategies to reduce the potential for cognitive bias.

Keywords

Task relevance, Contextual effects, Cognitive bias, Latent print analysis, Human factors

Disciplines

Forensic Science and Technology

Comments

This is a manuscript of an article published as Gardner, Brett O., Sharon Kelley, Daniel C. Murrie, and Kellyn N. Blaisdell. "Do evidence submission forms expose latent print examiners to task-irrelevant information?." Forensic science international 297 (2019): 236-242. Posted with permission of CSAFE.
Do evidence submission forms expose latent print examiners to task-irrelevant information?

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ABSTRACT

Emerging research documents the ways in which task-irrelevant contextual information may influence the opinions and decisions that forensic analysts reach regarding evidence (e.g., Dror and Cole, 2010; National Academy of Sciences, 2009; President’s Council of Advisors on Science and Technology, 2016). Consequently, authorities have called for forensic analysts to rely solely on task-relevant information—and to actively avoid task-irrelevant information—when conducting analyses (National Commission on Forensic Science, 2015). In this study, we examined 97 evidence submission forms, used by 148 accredited crime laboratories across the United States, to determine what types of information laboratories solicit when performing latent print analyses. Results indicate that many laboratories request information with no direct relevance to the specific task of latent print comparison. More concerning, approximately one in six forms (16.5%) request information that appears to have a high potential for bias without any discernible relevance to latent print comparison. Solicitations for task-irrelevant information may carry meaningful consequences and current findings inform strategies to reduce the potential for cognitive bias.

1. Do evidence submission forms expose latent print examiners to task-irrelevant information?

In 2009, the National Academy of Sciences (NAS) released their congressionally-mandated report, Strengthening Forensic Science in the United States: A Path Forward. Detailing problems in the wide-scale practice of forensic science, this influential report prompted media attention and ongoing calls for reform (e.g., Ref. [25]). One primary concern in the report was that forensic science findings may be influenced by contextual effects, or extraneous data and pressures that are unnecessary and potentially biasing to specific scientific analysis of fingerprints, firearms, DNA, or other evidence. For example, forensic scientists who perform circumscribed procedures like analyzing latent prints may receive details about the suspect or crime scene that are unnecessary to the task of comparing fingerprints, but nevertheless carry the potential to bias the examiner towards a particular finding. Other, broader contextual influences such as the location of crime laboratories (i.e., within police departments or prosecutor’s offices) may also create subtle contextual influences that pull forensic scientists away from strict neutrality and towards findings more influenced by the parties they serve. The NAS report warned that such a “lack of independence” could hamper the objectivity of forensic science.

There is no shortage of anecdotal evidence to support concerns about contextual bias in forensic science procedures. Scholars and advocacy groups (e.g., www.innocenceproject.org/causes-wrongful-conviction/unvalidated-or-improper-forensic-science) have detailed examples that appear to reflect forensic science procedures biased by contextual information or pressures. Moreover, concerns about contextual effects are consistent with a rich body of research in cognitive and social psychology (e.g., Ref. [26]). For example, confirmation bias is the well-documented phenomenon in which persons selectively attend to information that confirms their pre-existing belief or theory [2,3]. Many other cognitive biases, such as the anchoring effect [4] – in which decision making is overly influenced by an initial piece of information or suggestion – are based on the premise that certain types of information systematically affect subsequent reasoning [5].

Regarding forensic science procedures specifically, several seminal studies demonstrate that contextual information can influence forensic analysts’ decisions (see Ref. [1,6] for a review of early studies). For example, studies examining latent print analysis have found that contextual effects can influence virtually every aspect of the analysis, from identifying print minutia to making a final conclusion. Specifically, Dror et al. [20] found that examiners

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analyzed individual latent print marks differently depending upon whether a comparison print was presented or not, with examiners often identifying less minutia when a comparison print was present. A subsequent study [22] demonstrated that matching prints’ ranking on an Automated Fingerprint Identification Systems (AFIS) list influenced examiners’ decision making and conclusions regarding a latent print. In 2006, Dror and Charlton [21] presented six latent print examiners with prints that they had previously identified as either individualizations or exclusions, but added biasing contextual information such as statements that the “suspect confessed to the crime.” When the same prints were presented to the same examiners, two thirds of the examiners changed one of their conclusions, typically in the direction of the biasing information. Moreover, the results from concurrent forensic analyses can influence latent print conclusions. In one study, knowledge of DNA test results significantly changed examiners’ conclusions, especially for particularly difficult latent prints [7]. Recent studies have also demonstrated that findings from other forensic analyses (e.g., handwriting analyses, blood-stain pattern analysis) are similarly susceptible to contextual effects (e.g. Refs. [8–10]). In sum, a growing body of research suggests that many stages of the forensic analysis process are vulnerable to influence by contextual information that is not essential to the forensic analysis itself. Although limited to date, this body of research has substantial implications for policy and justice, such that many advocates have already urged substantial reforms to minimize the role of task-irrelevant information (e.g., Refs. [11,23,25]).

In response to the growing literature demonstrating the influence of contextual effects, the National Commission on Forensic Science [24] issued a statement detailing their views on the proper evidentiary basis for forensic science conclusions. In it, they state that “forensic science service providers should rely solely on task-relevant information when performing forensic analyses” (p. 1). Further, “forensic laboratories should take appropriate steps to avoid exposing analysts to task-irrelevant information through the use of context management procedures detailed in written policies and protocols” (pp. 1–2). The commission went on to acknowledge that task-relevance may vary according to personnel, type of forensic analysis, and phase of criminal investigation (i.e., preliminary, analytic, or evaluative phase). Regarding the specific task of analyzing evidence, the commission opined that information is only task-relevant if it is necessary to draw conclusions: (1) about the propositions in question, (2) from the physical evidence that has been designated for examination, and (3) through the correct application of an accepted analytic method by a competent analyst (p. 3). If a piece of information does not meet all three criteria, then it is considered task-irrelevant. As examples of task-irrelevant information in latent print examinations, the authors identified information about a suspect’s criminal history, a suspect’s confession, implications of guilt by other evidence at the crime scene (e.g., DNA evidence), and information relating to another latent print examiner’s conclusions regarding the latent prints found on another item at the crime scene.

1.1. Current study

The NAS report urged the forensic science community to identify potential sources of bias and develop appropriate “countermeasures” (2009, p. 185) [23], and other authorities have offered similar recommendations [25]. Therefore, in this study, we examined one potential source of bias: evidence submission forms, i.e., the forms that referring agencies (e.g., police departments) use to submit evidence and requests for analysis. Because these forms are one of the primary ways that referring agencies communicate with labs and forensic analysts, it is important to understand the range of information they solicit. Specifically, we sought to identify any task-irrelevant, or potentially biasing, information that is routinely requested when latent print comparisons are conducted in forensic laboratories via a two-step process. We first conducted a broad audit of evidence submission forms used when requesting latent print comparison to clarify the nature and quantity of requested information. We then examined the types of information requested to determine whether such information may be potentially biasing. We focus on laboratories accredited in latent print analysis in this study for simplicity, clarity, and due to recent research demonstrating significant contextual effects in latent print analyses specifically (e.g., Refs. [7,12]).

2. Method

2.1. Crime laboratories included in current study

We identified 183 individual crime labs that were accredited by the American Society of Crime Laboratory Directors/Laboratory Accreditation Board (ASCLD-LAB) for the analysis of latent prints at the time of initial data collection (May 2017). Six related laboratories have since voluntarily withdrawn from accreditation but the one form used by all six laboratories was still included in the current study. An additional 24 laboratories accredited by ANSI-ASQ National Accreditation Board (ANAB) for latent print analysis were also identified. Finally, we identified an accredited laboratory that recently stopped conducting latent print analyses and identified one unaccredited laboratory through a Google search. In total, we identified 209 crime laboratories that conduct (or recently conducted) latent print analysis, 201 of which are currently accredited in latent print analysis.

2.2. Procedure

2.2.1. Data collection

We first emailed all identified crime laboratories requesting the blank evidence submission form that they collect with latent print analysis requests. Three weeks later, we emailed all laboratories that had not responded to our initial request and again asked them to provide a blank form. In total, 76 laboratories responded to our email requests. Approximately two months after our second email request, we attempted to contact all remaining non-responsive laboratories via telephone. We ultimately received responses from 113 laboratories; because many laboratories use the same processes and forms, these initial responses reflected procedures used by 173 laboratories. However, some laboratories responded with very little information (e.g., indicating that their laboratory uses an electronic Laboratory Information Management System [LIMS] and were therefore unable to supply an evidence submission form; indicating that their laboratory did not use submission forms). Thus, in total, we received information regarding 97 evidence submission forms used by 148 laboratories when referring agencies request latent print analyses. The large majority of identified crime laboratories in America responded to our requests (82.8%), and the final sample of evidence submission forms are used by 70.8% of identified crime laboratories in America.

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1 A unified list of accredited laboratories was not available at the time of data collection because ASCLD-LAB and ANAB had recently merged operations.

2 The evidence submission forms used by these two laboratories do not differ substantially from other forms in the current sample and do not contain prompts for information that appeared task-irrelevant and potentially biasing.
2.2.2. Coding

We coded all evidence submission forms for types of information requested relating to the offense, suspect, victim, and organization of the form. Regarding the offense, we coded whether the form requests information about: (a) offense type, (b) offense location, (c) case description, (d) investigating officer, or (e) a copy of offense report. Regarding suspect characteristics, we coded whether the form requests information about a suspect’s: (a) name, (b) race/ethnicity, (c) sex, (d) age, (e) physical Attributes, (f) death, (g) arrest/custody status, or (h) criminal history. Regarding victim characteristics, we coded whether the form requests information about a victim’s: (a) name, (b) race/ethnicity, (c) sex, (d) age, or (e) death. We also coded for formatting and organization characteristics that might influence examiners’ approach to analyses. Specifically, we coded whether the form (a) uses a generic template to accommodate analysis requests of all types, (b) contains a prompt for additional comments or information, (c) is integrated into a LIMS, or (d) requests information regarding a previous latent print analysis. Using one evidence submission form as an exemplar, the authors decided on the majority of variables to code a priori, or before coding procedures began. After reviewing additional forms, we added formatting and organizational variables (e.g., use of generic template; prompts for additional information) as common trends became apparent among forms.

Finally, we coded whether the form: (a) requests information that appears task-irrelevant and potentially biasing to the scientific analysis of latent prints or (b) requests potentially biasing information regarding other analyses due to its generic, shared format (i.e., because it solicits information for various types of analyses on the same form). Due to the more subjective nature of these coding items, another coder who was well-versed in latent print analysis and task-relevance (second author) reviewed all forms identified by the first coder to request such information. The coders disagreed on two evidence submission forms (92% agreement) containing ambiguous, potentially biasing prompts. After reviewing both disagreements and coding criteria, both forms were coded as not containing biasing prompts to preserve a conservative estimate of the number of forms with potentially biasing content.4

3. Results

3.1. Laboratory characteristics

In total, 113 laboratories representing 47 American states and the federal jurisdiction responded to our request. Three laboratories reported that they did not use evidence submission forms for latent print analysis requests. Of these, one laboratory indicated that they used an internal records management system for internal requests and informal guidelines encouraging external agencies to include certain information (e.g., description of the case) when submitting requests. Another laboratory also used an internal system for internal requests and only requested police reports for external requests. Finally, one laboratory indicated that they did not use any form to submit requests for analysis. A fourth laboratory reported that they did not have a standard form and instead used the forms submitted by the referring agency when receiving a request for analysis. Another laboratory indicated similar practice although they provided their own form as well.

We ultimately obtained data on 97 evidence submission forms representing 148 laboratories in 42 states, with 5 additional forms representing federal jurisdictions. California (n = 10) and Ohio (n = 7) were most represented in the forms, accounting for approximately 15% of all received forms. The vast majority of collected forms were used by ASCLD-LAB-accredited laboratories (87.5%), while fewer were used by ANAB-accredited laboratories (10.3%).

Of the sample that we contacted via phone, we asked a subset (n = 24) whether the actual examiner conducting the requested latent print analysis viewed the completed evidence submission form. All laboratories indicated that the examiner views the information requested by the form in some manner (e.g., through LIMS, physical paperwork). No laboratory indicated that any aspects of the evidence submission form were restricted from an examiner’s view. One laboratory even reported that certain accreditation requirements mandate that performing examiners view the evidence submission form before completing the analysis.

3.2. Case characteristics

As demonstrated in Fig. 1, of the 97 evidence submission forms we received, the vast majority (94.8%) request information regarding the type of offense committed (e.g., name of criminal charge). Most forms also request a description of the submitted evidence (88.7%) and the name of the arresting or investigating officer (70.1%). While almost half of forms request a description of the case (45.4%), a smaller number of forms specifically request a copy of the offense report (15.5%). A small, but meaningful, minority of forms request information regarding a suspect’s arrest or custody status (13.4%).

3.3. Suspect characteristics

Fig. 2 shows that most evidence submission forms request the suspect’s name (94.8%) and age (79.4%). Slightly more than half of forms request information regarding the suspect’s sex (55.7%) whereas slightly less than half request the suspect’s race or ethnicity (45.4%). A significant number of forms (42.3%) request information regarding the suspect’s criminal history (e.g., a state identification number, FBI number). Importantly though, only one form requests information regarding a suspect’s criminal history beyond asking for a state identification number or FBI number. Few forms request information regarding physical characteristics (2.1%) of the suspect or whether the suspect was deceased (4.1%).

3.4. Victim characteristics

Evidence submission forms collected in the current study request information about the victim at similar, albeit slightly

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3 We coded requests for SID and FBI numbers as requests for information about criminal history given that their presence typically (but not always) denotes the existence of a criminal history or prior involvement with the criminal justice system.

4 One evidence submission form requests “disposition” for each piece of submitted evidence. The other form requests “associated individuals” for each piece of submitted evidence.
lower, rates to the number of forms requesting suspect information. Fig. 2 demonstrates this pattern with two exceptions. No forms request information regarding a victim’s criminal history or physical characteristics.

3.5. Form characteristics and organization

Of the 97 evidence submission forms collected, most employ a generic, shared format (87.6%) and are used to request various types of forensic analysis (i.e., latent prints and/or other evidence analysis). Relatedly, of the 113 laboratories that responded in the current study, approximately one third (31.9%) indicated that they use an electronic LIMS to some extent. This percentage has likely increased since data collection; several laboratories indicated that they were transitioning, or intended to transition, to a LIMS to manage forensic analysis requests.

Regarding other form characteristics, a minority of forms (8.2%) request information regarding previous forensic analyses that have been conducted on the submitted evidence. Additionally, almost half of evidence submission forms (47.4%) contain a broad prompt requesting additional information, considerations, or comments. The current data cannot comment on the nature of information typically provided in response to such prompts (forms in this study were blank). However, some submission forms suggest responses to these broad prompts such as “known court dates, which items are more probative,” or “Additional names of suspects, defs, victims, deceased.”

3.6. Requests for potentially biasing information

As previously mentioned, most collected evidence submission forms employ a generic, shared format and are used for all forensic analysis requests. In this manner, many forms contain prompts relating to different forensic science disciplines that appear task-irrelevant to latent print analysis. While many irrelevant prompts appear benign (e.g., description of items submitted for other forensic analyses), some appear to request information that is irrelevant to latent print analysis (e.g., race of suspect and victim) and some request information that is potentially biasing to latent print examiners (“What are you trying to establish with the evidence?” or whether the suspect was considered a “serious violent felon”). In total, approximately one quarter of evidence submission forms (n = 23; 23.7%) request what appears to be task-irrelevant and potentially biasing information for latent print analysis. Of these forms with potentially biasing prompts, approximately one third (n = 7; 30.4%) request such information only if additional forensic analyses are requested beyond latent print analysis. However, this means that 16.5% (n = 16) of all forms in the present study contain what appear to be biasing prompts regardless of whether additional forensic analyses are requested. Table 1 lists the potentially task-irrelevant and biasing prompts coded in this study.

3.7. Do evidence submission forms with biasing prompts differ from those without such prompts?

To explore whether there are meaningful differences between forms that prompt for biasing information and forms that do not, we compared the number of forms that requested various types of information. As Fig. 3 demonstrates, a trend emerged in which forms that contain biasing prompts appear more likely to also request specific information about wide-ranging topics regarding the offense, suspect, and victim. A series of chi square analyses revealed that only three types of information achieved formal significance (Arrest/Custody Status $\chi^2 [1, N = 93] = 14.11, p < .001$; Suspect age $\chi^2 [1, N = 93] = 4.05, p = .04$; Victim age $\chi^2 [1, N = 93] = 7.84, p = .01$), although a similar pattern was observed across all types of information. This pattern suggests that some evidence submission forms simply request more information (some of which may be biasing) than other forms.

4. Discussion

We were ultimately able to examine the evidence submission forms used by almost three-fourths of all identified crime laboratories in the United States that conduct latent print analyses. Overall, there were some consistencies across forms, but also variability with respect to task-irrelevant information. For example, while virtually every form requests information regarding the type of offense and the name of the suspect and victim, forms are evenly split among those that request information regarding the location of the offense and the race and sex of the victim, and those that do not.

Some types of information requested by evidence submission forms appear obviously necessary (e.g., description of the evidence). Other types of information may be potentially biasing but task-relevant such as where or how evidence was collected (e.g., a latent print lifted from a deceased body). In other cases, information may be essential for administrative purposes such as establishing case priority and analysis timelines or record keeping (e.g., offense type, suspect and victim name), but unnecessary to the task of latent print examination. Information in these latter categories raises important questions about who sees the evidence submission forms and when in the process they are seen; these issues are discussed further below.

Much of the suspect information seems to fall in the category of task-irrelevant and potentially biasing. For instance, information regarding a suspect’s criminal history was explicitly identified as task-irrelevant by the National Commission on Forensic Science. Although only one form explicitly requests descriptive information regarding a suspect’s criminal history (“serious violent felon”), almost half of forms (42.3%) request information that is commonly associated with prior involvement with the criminal justice system. We recognize that having an FBI or state identification number does not always equate to a criminal history and may have important administrative purposes. Similarly, forms that ask whether the suspect is considered a “serious violent felon” or a “flight risk” or whether the evidence is from an “officer involved shooting” may have some legitimate administrative purpose (e.g., requiring analysis on a tighter timeline), but they also risk biasing forensic analysts such as latent print examiners.
Additionally, almost half of the forms request information regarding the race and gender of both the suspect and the victim. Such information provides no added value to latent print examinations, but has a high potential for bias, considering the voluminous psychological research demonstrating that race influences legal decision making. For example, research with mock juries suggests that African-American defendants are more likely to be found guilty [13] and given lengthier sentences [14] than Caucasian defendants. Further, a separate body of research suggests that people, including trial judges, hold implicit racial biases that have the potential to influence behavior such as sentencing decisions [15]. Beyond the forensic domain, discrepancies in medical treatments have also been attributed to racial biases characterized by individuals’ tendencies to have more empathy for in-group races (e.g. Ref [16]). We know of no reason that a latent print examiner could better perform their work by knowing suspect race, but research suggests many reasons knowing suspect race might bias their work.

Approximately one in six forms (16.5%) request information that appears to have a high potential for bias without any discernible relevance to the task of latent print analysis. For example, one form asks, “What is the significance of this item to the investigation/crime?” and another asks, “What are you trying to establish with this evidence?” These seem likely to evoke an expectancy effect [17] or other forms of cognitive bias [5] among the examiners who then inevitably approach the latent print comparison with a clear statement of what the referring party is hoping to find. Using the definition of task-relevance provided by the National Commission on Forensic Science, it appears that such information (1) does not inform the proposition in question, (2) does not originate from the physical evidence that has been designated for examination, and (3) does not originate through the correct application of an accepted analytic method by a competent analyst. Consequently, such requests are essentially requesting task-irrelevant information. Reviewing Fig. 3 suggests that forms containing prompts for potentially biasing information may have been created under the philosophy that “more is better.” However, 

<table>
<thead>
<tr>
<th>Form</th>
<th>Potentially biasing prompt</th>
<th>Bias due to shared format</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>“Information should include where crime occurred (victim’s home, suspect’s car); if the suspect and victim were husband &amp; wife, dating, or frequented each other’s home or vehicle if the crime occurred in one of those locations. Describe known details of how the crime occurred, e.g., how access gained to property, was deceased bound or moved after death? Was victim stabbed, shot, beaten, and strangled? A written officer’s report may be attached rather than filling out this field.”</td>
<td>–</td>
</tr>
<tr>
<td>B</td>
<td>“Check this box if evidence is a Probable Cause item”</td>
<td>–</td>
</tr>
<tr>
<td>C</td>
<td>“If this case involves a sexual assault – Was there a consensual sexual act within the past 96 hours?”</td>
<td>–</td>
</tr>
<tr>
<td>D</td>
<td>“Serious Violent Felon?”</td>
<td>–</td>
</tr>
<tr>
<td>E</td>
<td>“Type of Case: Fatality; Serious Injury; Warrant Coll.; BAC ___g%”</td>
<td>–</td>
</tr>
<tr>
<td>F</td>
<td>Evidence “Details . . . Examples: To whom does the item allegedly belong? Why do you believe this item belongs to a perpetrator and NOT a victim or unrelated individual?”</td>
<td>–</td>
</tr>
<tr>
<td>G</td>
<td>“Is it likely that prints of the victim(s) may be on the evidence or on the life?”</td>
<td>–</td>
</tr>
<tr>
<td>H</td>
<td>“Officer involved shooting?”</td>
<td>–</td>
</tr>
<tr>
<td>I</td>
<td>“Please indicate if item was the Probable Cause (PC) evidence for your case.”</td>
<td>–</td>
</tr>
<tr>
<td>J</td>
<td>“Suspect is flight risk?” &amp; “What is the significance of this item to the investigation/crime?”</td>
<td>–</td>
</tr>
<tr>
<td>K</td>
<td>“What are you trying to establish with this evidence?”</td>
<td>–</td>
</tr>
<tr>
<td>L</td>
<td>“Breath Test Given? Result ___”</td>
<td>X</td>
</tr>
<tr>
<td>M</td>
<td>“Presumptive Field Test, Select a Kit, Drug and Result”</td>
<td>X</td>
</tr>
<tr>
<td>N</td>
<td>“Trace Evidence Analysis: Is perpetrator known to frequent scene? How often?” &amp; “Serontology/DNA Analysis: Has victim had sexual relations within 3 days of incident? Did perpetrator use a condom? Did ejaculation occur outside the body?”</td>
<td>X</td>
</tr>
<tr>
<td>O</td>
<td>“Blood Alcohol/Toxicology Analysis: Substantial Injury?...Portable Breath Test (PBT) administered? If yes, list result . . . Are drugs suspected?”</td>
<td>X</td>
</tr>
<tr>
<td>P</td>
<td>“For body fluid/DNA cases: In sexual offense cases answer the following . . . Was the alleged assailant known to the victim?” &amp; “For DWI Blood Chemistry Cases Only: Have the suspect(s) and victim(s) lived at the same residence or shared a common environment?”</td>
<td>X</td>
</tr>
<tr>
<td>Q</td>
<td>“DNA Exam: Can evidence be associated with any nonsuspect individuals?”</td>
<td>X</td>
</tr>
<tr>
<td>R</td>
<td>“Codis Entry Only: Are you reasonably sure that the item was left at the scene by the suspect?”</td>
<td>X</td>
</tr>
<tr>
<td>S</td>
<td>“Forensic Biology Unit: In sexual cases only, please answer the following questions. Was the alleged assailant known to the complainant? Have the suspect(s) made any statement that the act was consensual?”</td>
<td>X</td>
</tr>
<tr>
<td>T</td>
<td>“For all cases: Is this case a District Attorney’s Office request?” &amp; “For DWI Blood Chemistry Cases Only: Was any drug evidence submitted in this case? Is death or serious injury to a victim involved? Is an impairing substance other than alcohol suspected?”</td>
<td>X</td>
</tr>
<tr>
<td>U</td>
<td>“Was this evidence collected from the suspect’s person or possession?”</td>
<td>X</td>
</tr>
<tr>
<td>V</td>
<td>“Please associate evidence with appropriate individuals and indicate collection location”</td>
<td>X</td>
</tr>
</tbody>
</table>
| W    | “Trace Evidence: Were the suspect and victim acquainted with each other? Did the suspect have legitimate access to the scene?” & “Alcohol and/or Toxicology: Were there any witnesses? If yes, summarize witness account” & “Drug Evidence: Does the associated individual have a previous drug conviction? Are there any aggravating factors or special circumstances regarding this case?” & “Footmarks: Has the tool been linked to an

Fig. 3. Percentage of evidence submission forms with and without biasing prompts requesting information. We included forms that request a state identification number or FBI number in this percentage.
recent, extensive research demonstrating the influence of contextual effects on analytic decision making suggests that “less is more” if the goal is to minimize contextual bias.

There are some indications that crime laboratories are becoming more aware of the influence of contextual information. For example, a few forms acknowledge that less information is required for some types of forensic analyses (typically drug/toxicology analyses but occasionally latent print analyses) than others. These forms generally instruct the referring agency to only complete a subset of all listed questions if only requesting a toxicology analysis or latent print analysis. Although limiting the amount of information requested for specific types of analyses will likely limit the amount of task-irrelevant information received, task-irrelevant and potentially biasing information may nevertheless persist if multiple forensic analyses are requested using the same form. Indeed, the frequency of requests requesting seemingly irrelevant and biasing information increases to one in four (23.7%) if multiple analyses (e.g., latent print comparison and toxicology results) are requested using the same form.

A primary limitation of the current study is that we did not examine completed evidence submission forms. Approximately half of forms (47.4%) contain broad, open-ended prompts for additional information, but we do not know typical responses to such prompts. While the current study sheds light on the types of information that crime laboratories actively seek, we do not know the full extent of information that laboratories (and latent print examiners) actually receive, particularly in these broad, open-ended prompts for more information. Thus, the current findings likely underestimate the degree of task-irrelevant and biasing information that analysts may receive in evidence submission forms. For example, one crime laboratory submitted a completed (but redacted) submission form regarding a “print lifted from passenger rear sliding door.” Following a simple, broad prompt of “Please briefly describe case circumstances;” the respondent indicated, “commercial auto burglary. Suspect seen forcing entry into passenger rear sliding door of vehicle. Surveillance footage indicates print is probative. Victim is owner of tools taken during incident.” Although the current study cannot indicate whether such a response is typical, it provides a clear example of additional biasing information that is not explicitly requested. Still, other forms contain suggested topics to address when responding to broad prompts, including, “crime scene sketches/photographs;” “Additional names of suspects, def, victims, deceased;” or “The time frame of the incident, description of the person or vehicle of interest.” Future research may extend the current results by systematically examining the responses that referring agencies provide on evidence submission forms.

Another limitation of the current study is that we do not know whether examiners routinely view all information included on evidence submission forms before conducting analyses. Responses from a subsample of 24 laboratories all indicated that most examiners review all information in the evidence submission forms; one laboratory even suggested that analysts within all accredited laboratories review such information. Thus, it seems quite likely that most examiners do review the forms requesting task-irrelevant information, but we cannot definitively conclude that all examiners are exposed to such information.

To be clear, we do not claim that the potentially biasing information in these forms is unnecessary for all purposes. We acknowledge that certain potentially biasing information may be necessary to prioritize case processing or influence timelines (e.g., whether suspect is in custody or is a flight risk). Other information may be necessary to help an investigator or prosecutor understand the significance of forensic analysts’ findings. For instance, understanding whether the suspect had “legitimate access to the crime scene” is useful contextual information for an individual whose task is to interpret the significance of a “match” between a latent print and suspect print. Thus, information that is relevant to other tasks in the lab or investigation process may nevertheless bias forensic analysts, for whom the information is entirely task-irrelevant.

4.1. Implications for countermeasures

The current findings suggest several implications for future efforts to minimize contextual bias in latent print analyses. First, it may be easiest (and in some cases appropriate) to simply remove prompts for task-irrelevant and biasing information; for example, we know of no reason analysts need to know victim and suspect race. Second, we acknowledge that some information, irrelevant to the specific task of latent print analysis, is necessary for other aspects of the criminal investigation or for administrative purposes. Indeed, some contextual information may be required to determine what types of analyses are needed in a case.

Case managers may be one solution to limit the exposure of task-irrelevant to latent print examiners. As conceptualized by multiple experts (e.g., Refs. [18,19]), forensic analysts who serve as case managers review all case information and are responsible for providing forensic analysts with only task-relevant information required for analyses. In this system, case managers would continue to have all necessary information for administrative and recordkeeping purposes, but would be selective in which personnel reviews which pieces of information. Even in smaller labs that cannot afford designated case managers, forensic analysts could alternately serve as a case manager wherein they screen all case information and deliver only relevant information to the acting latent print examiner. In this manner, crime laboratories would not need to alter their evidence submission forms but limit the access of the examiner conducting the analysis.

Several scholars (e.g., Ref. [11]) have proposed another solution that would not require altering evidence submission forms. Through a systematic process coined linear sequential unmasking, the scholars propose that crime laboratories sequentially expose examiners to increasingly biased but task-relevant information only as needed. In this process, examiners are first presented with minimal information (e.g., only the latent print in question) and receive additional information only as needed (e.g., known prints) to complete the analysis. While the process does not eliminate task-relevant biasing information, it would present it to examiners as late in the process as possible and require examiners to document all changes in evidence appraisal after exposure to potentially biasing information. At least three laboratories in our sample use similar procedures to control for bias [24].

Finally, the increasing adoption of LIMS in crime laboratories across the United States (31.9% in current sample) holds great potential for limiting examiners’ exposure to task-irrelevant information. There are no formal studies exploring the types of information commonly requested by LIMS-driven laboratories before latent print analyses are conducted and, in the current study, laboratories that used LIMS appeared to request similar information to laboratories that did not. However, computer-managed systems have the potential to better limit access to information according to personnel and phase of investigation. In this way, LIMS can be used to provide examiners only with task-relevant information while also providing case managers or other personnel with more comprehensive information. Moreover, LIMS may be crucial in facilitating linear sequential unmasking techniques that systematically grant examiners access to certain information as the analysis proceeds.

4.2. Conclusion

Although we do not know the full extent of task-irrelevant information presented to latent print examiners via evidence
submission forms, the current study reveals that most laboratories actively request at least some information that is task-irrelevant to latent print analysis. Further, a meaningful proportion of laboratories request information that appears both irrelevant and potentially biasing. This is concerning in light of recent calls for laboratories to rely only on task-relevant information and to actively avoid task-irrelevant information (e.g., Refs. [23,25]). Given the current findings, appropriate countermeasures to limit contextual effects likely include minimizing active requests for task-irrelevant information and minimizing examiner access to such information after it is requested.

Funding

This work was partially funded by the Center for Statistics and Applications in Forensic Evidence (CSAFE) through Cooperative Agreement #70NANB15H176 between NIST and Iowa State University, which includes activities carried out at Carnegie Mellon University, University of California Irvine, and University of Virginia.

Declarations of interest

None.

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