Exploring the role of contextual information in bloodstain pattern analysis: A qualitative approach

Nikola K.P. Osborne [a,b], Michael C. Taylor [b], Rachel Zajac [a,*]

[a] Department of Psychology, University of Otago, PO Box 56, Dunedin 9054, New Zealand
[b] The Institute of Environmental Science and Research (ESR) Ltd, PO Box 29181, Christchurch 8540, New Zealand

ARTICLE INFO

ABSTRACT

During Bloodstain Pattern Analysis (BPA), an analyst may encounter various sources of contextual information. Although contextual bias has emerged as a valid concern for the discipline, little is understood about how contextual information informs BPA. To address this issue, we asked 15 experienced bloodstain pattern analysts from New Zealand and Australia to think aloud as they classified bloodstain patterns from two homicide cases. Analysts could request items of contextual information, and were required to state how each item would inform their analysis. Pathology reports and additional photographs of the scene were the most commonly requested items of information. We coded analysts' reasons for requesting contextual information—and the way in which they integrated this information—according to thematic analysis. We identified considerable variation in both of these variables, raising important questions about the role and necessity of contextual information in decisions about bloodstain pattern evidence.

The potential for contextual information to influence—or *bias*—conclusions in Bloodstain Pattern Analysis (BPA) has received attention in recent years [1–4]. Although contextual information may be helpful in guiding analysts in their interpretation, there are also situations in which it could lead to error [1,2]. Addressing the potential for bias in BPA is a complex issue because much of the contextual information encountered seems both unavoidable and necessary for a complete analysis. That is, removing contextual information entirely is likely to be impossible, and could reduce the efficiency with which analysts can process a crime scene. As a result, bias minimization procedures in BPA should be focused on the *management* rather than elimination of contextual information, and should also acknowledge when contextual information can *assist* analysts. The success of contextual information management for the discipline is likely to rest on analysts' ability to recognize which contextual information is—and which isn't—relevant to the task. In the present study, we explore *which* sources of contextual information are considered important to analysts, *why* they are considered important, and *how* the information is integrated into the analysis of a bloodstain pattern.

1. Method

1.1. Participants

Participants were 15 practicing bloodstain pattern analysts from New Zealand and Australian forensic institutes. Analysts' experience in the field of BPA ranged from 1.5 years to 23 years. All analysts had advanced BPA training (Level 3)[1], and stated that they routinely presented BPA findings in court. Thirteen of the analysts routinely attended crime scenes and conducted laboratory-based BPA. The remaining analysts were involved in laboratory-based BPA (predominantly on fabric or other physical evidence) or conducted BPA through photographs. While all participants specialized in BPA, they also had other roles within their institute (e.g., biologists, crime scene staff, police staff).

---

[1] Although forensic agencies can determine their own training standards for BPA, those in Australia and New Zealand refer to levels ranging from "awareness" (Level 1) to "basic" (Level 2) to "advanced" (Level 3). In most cases, basic and advanced training each consist of a 40 hour training course followed by an examination. Advanced training is developed further in Level 3 with specialised components (e.g., fluid dynamics, BPA on fabrics). Qualification as a Level 3 analyst also requires crime scene experience and supervised BPA reporting.

* Corresponding author.
   E-mail addresses: nosborne@psy.otago.ac.nz (Nikola K.P. Osborne), michael.taylor@esr.cri.nz (M.C. Taylor), rachelz@psy.otago.ac.nz (R. Zajac).

1.2. Procedure

Two New Zealand homicides were selected from Institute of Environmental Science and Research (ESR) case files. Permission to use each case was obtained from the relevant ESR case manager and the New Zealand Police officer in charge of the investigation. High quality photographs and contextual details from each case were compiled from the case files and media searches. Any information that could identify a victim, suspect, or ESR/Police staff member was removed. Analysts were asked to immediately inform the interviewer if they recognized any details of the case during the interview; none did so.

Bloodstain pattern analysts were interviewed individually at their place of work, away from the operational environment. Interviews were audio recorded. The two cases were presented in counterbalanced order. Analysts were told that there were no right or wrong answers and that there was no deception or bias manipulation involved. It was made clear to analysts that the experimenters simply wanted to understand their BPA methodology and their associated thought processes. Analysts were instructed to treat the case as they would a real one. They were informed that the interviewer held several items of contextual information that analysts were likely to encounter in their BPA casework. Analysts were not informed of the specific nature of the information but were told that, later in the task, they would be able to request any information that they believed would assist with their analysis, and that it would be provided if available (see Table 1 for available items).

First, analysts were asked to look at a coloured photograph of the bloodstaining (15 × 20.5 cm) and state how they thought the stains were deposited. While 'thinking aloud,' the analysts were required to give a working hypothesis as to the mechanism of stain deposition and to detail their reasons for including or excluding potential mechanisms.

Next, analysts were given the opportunity to request any specific information that might help with their analysis. Analysts could request one item at a time. Before receiving each item, analysts described how they thought that particular information would assist their decision-making. After receiving the information, analysts gave an updated working hypothesis. This process continued until either a) an analyst was satisfied with her/his conclusion and required no further information, or b) no further information was available.

2. Results

2.1. Which items of contextual information were requested?

Analysts requested an average of 4.05 (SD = 2.5) items of contextual information (Case 1: M = 4.40, SD = 2.92; Case 2: M = 3.73, SD = 2.08). Thirteen analysts in Case 1 requested at least one item of contextual information; in Case 2, this figure was 14. For both cases, the most frequently requested items were the additional scene photographs and the pathology report. No analyst requested the media or toxicology reports for either case. Table 1 displays the available items and the number of analysts that requested them for each case.

Analysts were generally reluctant to conduct their analyses based solely on the bloodstain pattern itself. Across the two cases, only one analyst did not request any contextual information to assist with analysis. Upon being offered contextual information, this analyst responded:

"It's probably a bit old school here but, to me it's trying to keep things fairly objective. It's about the pattern; it's not about the context or anything else which may have occurred around it necessarily. Unless, a [witness/suspect], for example, gave a clear explanation for what he believed explained [the pattern]. Often the bloodstain pattern interpretation evidence can be strengthened or, if it's refuting or corroborating such allegations, can be a strong part of bloodstain pattern interpretation, but without that I probably wouldn't take it any further... The way I see it, obviously my expertise is bloodstain pattern interpretation. To go to court, yes there's a lot of other information, context information, but really it's up to the court to put that together in context with my information. So I don't think it's a really good thing to go necessarily asking too many questions." Analyst E, Case 1

It is notable that even this analyst acknowledged that, if it was available, s/he would use information provided by an informant to refute or corroborate a proposed version of events.

In contrast, the majority of analysts viewed context as a necessary part of their analysis:

"Pretty much before I go into a scene I try and get as much information I can as to what the police have been informed... Where is the body? Who is the body? What happened? Was there a fight? How many people were involved? How many

Table 1
The Items of Available Contextual Information Requested by Each Analyst (Case 1 | Case 2).

Analyst	Additional scene	Pathology	Witnesses	Weapon	DNA	Briefing	First responder	Weather	Toxicology	Media	**Total**
A	1 | 1	1 | 1	1 | 0	1 | 1	0 | 0	0 | 0	0 | 0	0 | 0	0 | 0	0 | 0	**4 | 3**
B	1 | 1	1 | 0	1 | 0	1 | 0	1 | 0	0 | 0	0 | 0	0 | 0	0 | 0	0 | 0	**5 | 1**
C	1 | 1	1 | 1	1 | 0	1 | 1	1 | 0	1 | 0	1 | 0	0 | 0	0 | 0	0 | 0	**7 | 3**
D	1 | 1	1 | 1	1 | 0	0 | 1	1 | 1	0 | 0	0 | 0	0 | 0	0 | 0	0 | 0	**4 | 4**
E	0 | 0	0 | 0	0 | 0	0 | 0	0 | 0	0 | 0	0 | 0	0 | 0	0 | 0	0 | 0	**0 | 0**
F	1 | 1	1 | 1	0 | 0	0 | 0	0 | 1	0 | 0	0 | 0	0 | 0	0 | 0	0 | 0	**2 | 3**
G	1 | 1	1 | 1	1 | 0	1 | 1	1 | 0	0 | 0	1 | 0	0 | 0	0 | 0	0 | 0	**6 | 3**
H	1 | 1	1 | 1	1 | 1	1 | 0	0 | 0	1 | 1	0 | 0	1 | 0	0 | 0	0 | 0	**6 | 4**
I	0 | 1	0 | 0	0 | 0	0 | 0	0 | 0	0 | 1	0 | 0	0 | 0	0 | 0	0 | 0	**0 | 2**
J	1 | 1	1 | 0	0 | 0	0 | 0	1 | 0	1 | 0	0 | 0	0 | 0	0 | 0	0 | 0	**4 | 1**
K	1 | 1	1 | 1	1 | 0	0 | 0	0 | 1	0 | 1	1 | 0	1 | 0	0 | 0	0 | 0	**5 | 4**
L	1 | 1	1 | 1	0 | 0	0 | 0	0 | 0	0 | 0	0 | 1	0 | 0	0 | 0	0 | 0	**2 | 3**
M	1 | 1	1 | 1	0 | 0	0 | 0	0 | 1	0 | 1	0 | 0	0 | 0	0 | 0	0 | 0	**2 | 4**
N	1 | 0	1 | 1	0 | 0	0 | 0	0 | 0	0 | 0	0 | 0	0 | 0	0 | 0	0 | 0	**2 | 1**
O	1 | 1	1 | 1	1 | 1	1 | 0	0 | 0	1 | 0	0 | 0	0 | 0	0 | 0	0 | 0	**5 | 3**
Total	**13 | 13**	**13 | 11**	**8 | 2**	**6 | 4**	**5 | 4**	**4 | 4**	**3 | 1**	**2 | 0**	**0 | 0**	**0 | 0**	

Note: A small number of analysts requested items that were not available. These items were bloodstained clothing (n = 1 in Case 1; n = 2 in Case 2) and photographs of the deceased (n = 3 in Case 1; n = 3 in Case 2).