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Clothing damage analysis in alleged sexual assaults—The need for a systematic approach

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Abstract

Clothing damage analysis is an integral part of the examinations carried out in sexual assault type cases. This analysis can be used to corroborate different versions of events and is at its most powerful in elucidating false allegation cases and consent cases. The purpose of this study was to determine to what extent people with varying levels of forensic awareness, experience and training could correctly carry out damage analysis.

Two participant groups were asked to take part in this study. Group A ('forensic group') comprised participants at a forensic science conference, and Group B ('student group') comprised students undertaking a degree course in Forensic Science. Each group was given a practical workshop consisting of a lecture outlining common fabric types and general features observed in different damage types. Each participant was subsequently shown 25 pieces of 'damage' and asked to identify both the type of fabric construction (knit or weave) and the type of damage (cut, tear, rip, wear and tear). The ability to identify fabric construction and damage types varied within the two groups studied and across the groups. The forensic group performed better both in fabric and damage assessment than the student group.

This paper suggests a systematic approach to clothing damage analysis to maximise the benefits that can be obtained from this area of forensic science and to minimise the subjectivity within the field.

Keywords: Forensic science; Sexual assault; Damage; Clothing; Training

1. Introduction

The fundamental role of a forensic scientist is to help those who address the burdensome issue of guilt or innocence in a court of law. Did he rape her? Did she murder him? Were they supplying drugs? A large proportion of our work is quantifiable: a DNA profile can be reported along with a match probability, narcotics can be identified using longstanding techniques such as HPLC and mass spectroscopy. However, an equally large proportion of our work is subjective. Histological semen identification, footmark identification and even fingerprint identification are techniques, which are at least in part, subjective. They are robust subjective techniques, which we all accept as accurate and discriminating. Damage interpretation certainly does not enjoy the same accolades.

As forensic scientists, we often find ourselves in situations, where the most pertinent information can only be gleaned using subjective testing. A large percentage of crimes against the person, dealt with by forensic science laboratories, are crimes of sexual assault. In Ireland, this constitutes approximately 56% of the cases received in the Biology section (approx. 450 cases per year). The majority of these cases either begin with or acquire a consent defence by the time they reach our courts. In these cases, finding semen and in fact getting a matching DNA profile, may offer no additional evidential value to the case. Other examinations, such as damage interpretation, possibly indicating a struggle or that force was used, may be critical. This analysis may be used to corroborate or refute a particular scenario and indeed, in a small, but significant number of cases, damage interpretation may be critical in preventing false allegations proceeding to prosecution [1]. We believe that the potential usefulness of clothing damage analysis requires us at least attempt to measure our ability to correctly assess damage and propose a systematic approach to damage analysis to minimise the subjectivity within the field.

Previous work has shown the benefits of capturing the features specific to cuts and tears in different fabrics [2]. This information can be used to help ascertain if the damage was

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Table 1
Blank form for damage identification

	1A	2A	3A	3B	4A	4B	5A etc
Knit							
Weave							
Cut							
Tear							
Rip							
Wear/ Tear							
Don't Know							

recent and if one can tell what type of implement may have caused the damage [3,4]. These theories have been applied to casework studies [5,6], which have highlighted the huge potential of damage analysis and interpretation in crime investigation.

The aim of our study was to address the issue of whether or not trained professionals had greater competency in clothing damage analysis, and further, to devise guidelines, which might aid less subjective interpretation.

2. Materials and methods

Two participant groups were asked to identify damage types, which included cuts, tears, rips and wear and tear in 25 damage test areas on different items of clothing. In addition, the groups were asked to designate the damaged test fabrics as either knit or weave for each sample fabric.

2.1. Participants

2.1.1. Forensic group (N = 46)

This group comprised attendees at a forensic science conference. The group included a range of professionals including forensic scientists, pathologists and police officers. About 41% of this group indicated they assessed clothing damage, while 24% indicated they reported it. Only 37% of the group indicated that they had any specific training. The range of professional experience for the group was from none (26%) to over 10 years (20%).

2.1.2. Participant group B (N = 35)

This group comprised students in their second, third and fourth year of a forensic science degree course. None of the students had previous exposure or training in damage analysis. The general age profile of the group was 18–22 years.

Table 2
Proportion (%) of each group's ability to identify the construction type of the fabric (knit or weave) in the test pieces

	%Fabric ID correct			
	0–24	25–49	50–74	75–100
Forensic group (%)	9	19	37	35
Student group (%)	3	43	37	17

2.2. Workshop

Each participant group was given identical workshops in terms of content and time allocation. Workshops were two and a half hours in total. These consisted of a lecture detailing the background and significance of damage analysis. Different types of fabric construction were introduced before outlining the main types of damage encountered in casework, i.e., cuts, tears, rips and wear and tear. For each type of damage, the specific features for the different damage types were explained. This took approximately 1 h in total. The remainder of time was allocated to participants to assess test damage presented. The definitions given to the participants were as follows; cut: a severance with neat edges caused by a sharp implement; tear: a severance in the fabric caused by pulling with some force leaving ragged or irregular edges; rip: broken or unravelled sewing thread stitches (e.g., at hems and seams); wear and tear: the general damage seen on clothing from day to day wear and use.

2.3. Types of test damage

A total of 25 test pieces of damage were shown to each participant. Of these, 14 were made with knit fabrics, and eleven were made of weave construction. Within these test pieces, there were a total of five cuts, seven tears, six rips and six areas of wear and tear. Some test pieces had more than one type of damage present and the participants were not told which ones (e.g., a cut and a tear along one severance). Each area of test damage was marked and given an identifying number.

2.4. Survey

Each person completed a questionnaire to capture information about previous experience and training with special reference to damage training. In order to keep the damage identification uniform and to make interpretation of the survey simpler, the participants were asked to fill in a check box form containing all the options required per item of damage (see Table 1).

3. Results

3.1. Fabric identification

The total number of test pieces was 25 and of these 14 were constructed by a knit method and 11 by a weave method. Each score was included if the correct identification was made but was not subtracted for selecting the incorrect fabric. The mean correct over all the fabric pieces is shown in Table 2 and Fig. 1 for the two groups.

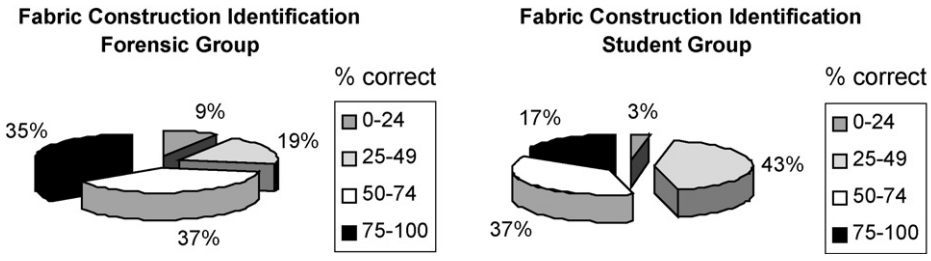

Fig. 1. Graph of the correct identification of fabric construction as a knit or a weave.