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Latent Fingerprints of Insufficient Value Can be Used as an Investigative Lead

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Abstract

The evidential and investigative value of a latent fingerprint with insufficient characteristics to identify can sometimes be an issue of debate. In this report the authors present the case of a latent fingerprint bearing details in agreement with no visible discrepancies, but with insufficient information to identify. This raises well-examined issues of decision making. In this case each expert in the laboratory who examined the latent fingerprint independently was not able to identify the suspect, who was on the list of candidates presented by the AFIS, even though there was information about a matching DNA profile. The authors suggest that in cases of latent fingerprints where there is insufficient minutiae for individualization, the fingerprints may be still be used as a searching tool and investigative aid for potential suspects. Latent fingerprints in these cases will not serve as evidence, but they can be a potentially useful tool for investigation purposes and intelligence units.

Keywords: Latent Fingerprint; Investigative Lead; Decision Making; AFIS; Insufficient Value

Background

In March 2012 a group of young teenagers began a violent fight by using knives and guns. One of them was badly injured and the others escaped. Police arrived at the scene and collected evidence such as a knife, a cigarette box and several beer bottles. By using cyanoacrylate fuming three latent fingerprints were developed on the cigarette box. This case of attempted murder was placed on a fingerprint examiner's desk. Analysis of the latent fingerprints led the examiner to evaluate two latent fingerprints as having value for identification and one as insufficient. From a list of fifteen candidates displayed by the Automated Fingerprint Identification System (AFIS), one person was notated as a potential source. The examiner processed comparative fingerprints and enlarged both the fingerprint image from the crime scene and the corresponding image of the AFIS record to size of 20X30 cm, but he could not reach a conclusion due to an insufficient number of details; only 6-7 minutiae with no contradiction were found, as presented in Figure 1.

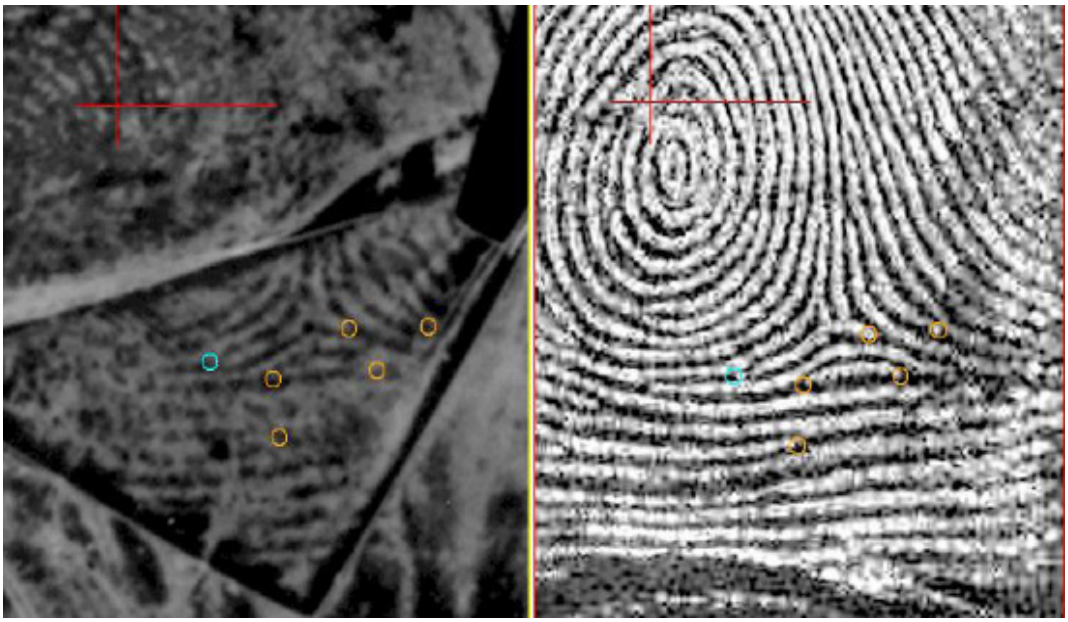

Figure 1: Compared fingerprints with minimum number of details (Ridges are white-colored)

The fingerprints were shown to an expert for his examination, but he as well could not reach a conclusion. Two other experts, independently, were asked to examine the print and the record. After marking several minutiae but not enough to positively identify the suspect, the three experts could not reach to a conclusion.

At this stage the examiners involved in the case inquired as to what other investigative procedures were being carried out in this attempted murder case. It was discovered that a DNA profile from the scene of the crime matched the same suspect. It was also discovered that the name of this suspect was identified in a list of suspects provided by the investigation unit.

Given the contextual information in this case in the form of a combination of other evidence, what should the fingerprint experts do? Should they declare a "hit"?

Decision Making

Perception, judgment and decision making are cognitive issues that have been well examined by researchers in the domains of the human brain and cognitive sciences. A well-established area of research regarding the cognitive issues mentioned above is the decision making of forensic sciences experts. Forensic science experts are expected to perform with high ability and skills and with indisputable accuracy, since errors and mistakes can lead to the arrest of an innocent person. Empirical studies have shown, however, that the decisions of forensic science experts can be affected by a variety of factors. Emotions, time, pressure and over-motivation can interfere with an expert's decisions in fingerprint examinations and increase biasing effects [1-3]. Context bias, which can be described as an extraneous information and confirmation bias, which can be explained as the tendency to ignore disconfirming information, are well-established as causes for a fingerprint examiner to reach decisions different and inconsistent with those they had made earlier on the same pair of fingerprints. These biases can also influence an expert's decision making behavior, causing him/her to reach inconclusive opinions or identification opinions that may be found to be erroneous [4-8].

Evaluation of the accuracy and reliability of latent print examiners has revealed that sometimes there is no consensus in decision making that can influence verification [9], and the rate of repeatability of an examiner's decisions is affected especially in borderline cases in which latent prints are of insufficient value [10].

One of the most essential high-profile cases which motivate researchers to investigate the decision making of fingerprints examiners is the positive, but erroneous, identification of Brandon Mayfield in the Madrid train bombing case, implicating him as the bomber [11]. The supervisory fingerprint examiner encoded seven characteristics for the high-resolution image of latent fingerprint #17 and misidentified Subject #4 from a list of 20 candidates presented by AFIS.

The ACE-V Methodology

The methodology followed by fingerprints examiners for the examination process of an unknown fingerprint against a known fingerprint is described as ACE-V (analysis, comparison, evaluation and verification). The first stage of this process is analysis, in which the examiner determines the quantitative (number of ridge details) and the qualitative (pattern type, edges of ridges and pores) factors in the fingerprint. The second stage is comparison, in which the two fingerprints are compared side by side, looking at fingerprint features in the unknown impression and those in the known impression, regarding location, orientation, type and spatial relationship. The third stage is evaluation, in which the examiner has to evaluate and make a decision if there are sufficient details in agreement to conclude that the two impressions come from the same source (identification) or not (exclusion). Finally, if identified, the fingerprint comparison is verified by at least two experienced examiners. The ACE-V methodology described above is well-explained and summarized by Champod *et al.* [12].

In the Mayfield case it was concluded that the ACE-V methodology is appropriate. However, the application of ACE-V by the examiner was in error, resulting in the erroneous decision of "identification" [11].

A major component of the ACE-V methodology which deals with decision making is the evaluation stage. The examiner's decision is reliant upon the quality of the latent print. The greater the clarity, the stronger the certainty.

Number of Minutiae Required

A frequent decision making question faced by examiners is, "How much friction ridge detail is considered sufficient to declare an identification?"

In an international conference of fingerprint experts hosted by the Israel Police in 1995, a statement known as "Ne'urim Declaration" [13] was approved:

"No scientific basis exists for requiring that a pre-determined minimum number of friction ridge features must be present in two impressions in order to establish a positive identification."

Pursuant to this declaration many countries (e.g., UK, Australia, US and Canada) abandoned any numerical standard, and identifications were assessed based upon a lower number of minutiae than previously. The Israeli law enforcement system moved away from the 12-point standard and, like other countries, adopted the above statement; hence, in practice latent prints can be identified upon eight minutiae, for example.

While there is no scientific basis for requiring a predetermined minimum number of features to conclude "identification" experienced fingerprint examiners have developed a general understanding of when a decision of identification is warranted based on their cumulative knowledge, training, and experience of comparing many thousands of impressions under the supervision of senior examiners until they are given expert authorization. Since an expert's decisions are based on his/her training and experience, "the opinion of individualization and identification is subjective" [14]. Taking into consideration, however, the quantity and quality of ridge details and the relationships between the known and unknown fingerprints, experts often defend their opinion of "identification."

Regarding an examiner's subjective decisions, Ulery *et al.* (2014), showed that the minimum number of corresponding minutiae that each examiner reported when individualizing varies [15]. Research to quantify and assess the weight of fingerprints as evidence examined the range of 3 to 12 minutiae. This yielded a statistical method that contributed to the understanding of the strength of a minimal number of minutiae in the process of identification [16-17].

Significant Matters

Returning to the question in the case presented in this article, given the additional information, should the examiners declare a "hit" for the fingerprint on a minimal amount of detail? Despite DNA matching with the suspect and his appearance in the suspect list, all three experts were not influenced by this additional information. When bound to conclusions of either "identification", "exclusion" or "inconclusive," the examiners should not re-adjust their decision based upon extraneous information. In an effort to avoid such contextual and confirmation biases, latent fingerprints must be considered independently by the experts, regardless of other considerations that might interfere with a valid conclusion.

In the Israeli judicial system, the fingerprint conclusion submitted as evidence must stand by itself as independent forensic evidence, based upon the assumption that the fingerprint expert reached his expert testimony independently of any other information. In the case presented in this paper, however, three experts each with over 25 years of experience, concluded, that the latent fingerprint could not be identified to the suspect due to insufficient details. All three experts, however, acknowledged that the two impressions shared information in agreement without contradiction.

While fingerprints may have limited evidential value in that they lack sufficient details for experts to conclude an "identification" between two impressions, they may retain value for investigative and intelligence purposes. The authors of this paper suggest searching the fingerprint through AFIS. When comparison of two impressions cannot be excluded from a source (but lack sufficient details to be identified), that information can be communicated to investigators for intelligence purposes only. While the information does not have evidential value and not be presented in court, it may be a useful means of assisting the investigative process by identifying potential suspects in a case lacking other evidence or information. Hefetz *et al.* (2012) demonstrated that the ability of AFIS to include the correct source of a latent fingerprint on the candidate list based upon 6 minutiae is very high. In 86% of the trials of fingerprints and in 61% of trials of palm prints the correct sources of the prints were included on the AFIS candidate list [18].

Applying surveillance techniques and other investigative activities after the potential suspect has been identified may reveal his/her relation to the committed crime, initiating a search for other evidence and cross-checking. In such cases an expert opinion will not be submitted to court. Latent fingerprint with minimal details will not serve as evidence, but they can be used only as a tool for investigators and intelligence units.

Conclusion

Latent fingerprint should be examined independently by following the ACE-V methodology. However, technology plays an effective tool in solving crimes and should be utilized to its full potential. Latent fingerprints, even if sometimes observed as insufficient for identification, may be used in a search against an AFIS database. Although, such fingerprints with insufficient minutiae will cause "noise" in the system and suggest potential suspects who are later determined to be unrelated to the crime under investigation, the cases in which potential suspects are identified and later found to be the true perpetrator of the crime will be greater than any "noise". Although in some cases AFIS may assist in finding a potential suspect based on latent fingerprints with limited value of quantitative and qualitative details, it must not be considered as evidence by itself but only as an investigative tool that may assist the detective.

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