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Short Communication

Comparing the Inking Method and the Dusting-Lifting Method for Recording Exemplar Fingerprints

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Abstract

Background: Fingerprints are scientifically sound and reliable means of human identification. Exemplar fingerprints can be recorded from dead bodies. Two current and widespread methods are the inking method and the dusting-lifting method for recording exemplar prints from dead bodies. **Objective:** To measure the speed and the quality of the results of the two methods, conducted by less experienced and more experienced participants. **Methods:** This paper proposes an experiment where less-experienced and higher-experienced participants tried the two different methods on the same hand, while the time was measured, and the resulting exemplar prints were evaluated. **Results and discussion:** Despite the Author's null hypothesis, the inking method was not slower than the dusting-lifting method, and from a living human's hand, it yielded acceptable results. **Conclusion:** the fastest and most effective operation for fingerprinting was teamwork, where two experienced participants worked together on the same hand. The dusting-lifting method is recommended for casework, especially in teamwork, although the inking method is also acceptable.

1. Introduction

The volar skin of the palmar and plantar surface of the human skin has friction ridges, which form the fingerprints, palm prints, and sole prints.¹ The function of these ridges is not entirely clear, but they probably increase sensitivity to touch, the strong attachment of the skin layers, and the anti-slip of the grasping and stepping surfaces of the body.² Fingerprints are scientifically based and reliable means of personal identification, and have been used for one hundred and thirty years in forensic science.³

The fingerprint features can be divided into three levels: Level 1, Level 2, and Level 3.⁴⁻⁶ Level 1

details are the basic patterns that can be used for classification, sorting the fingerprints into a database efficiently. By the Level 1 details, the fingerprints can be sorted into three general categories based on their pattern type: loop, arch, and whorl. All three can have sub-categories as well, forming nine basic types,⁷ or even ninety-five.⁸ The ridges are not continuous; they can end, diverge, or converge. Many small details can be observed in the ridge flow; these are called "minutiae". Minutiae can also be called Level 2 detail, a continuation of the nomenclature from the Level 1 general patterns. Genetics plays a role

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in the formation of the Level 1 details, but the exact Level 2 details are mostly based on environmental conditions.⁹ In this connection, studies have been carried out to identify dermatoglyphic traits that can be associated with different types of diseases and conditions.¹⁰⁻¹¹ However, the basic whorl, arch, and loop patterns may be similar between siblings; the Level 2 details of the pattern are practically unique to everyone, even between monozygotic twins.¹²⁻¹³ The Level 3 details are the dimensional attributes of the ridges, which can only be used to support identifying individuals.

Ridgeology is also suitable for the identification of dead bodies since ridge details can persist after the individual's death. As long as the body has its skin, the ridge details can be recorded. Putrified cadavers can lose the epidermis and dermis in days, but for mummified bodies, the skin can last for years or even decades. Researchers could obtain fingerprints from a 2,500-year-old Egyptian mummy.^{14,15} After a mass fatality incident, the victims have to be identified by scientifically sound means. The international police organization, Interpol, has a Disaster Victim Identification (DVI) Working Group, which issues and regularly reviews the Interpol DVI Guide.^{16,17,18,19,20}

Fingerprints can be utilized for victim identification after mass fatality incidents as well. Interpol accepts ridgeology as a primary identifier, along with odontology and genetics. During a victim identification after a mass fatality incident, the speed of the fingerprinting process and the quality of the resulting exemplar prints are crucial. From a disaster victim identification perspective, PM (*post-mortem*, after death) prints need to be obtained from the dead body: as many fingers as possible, both palms, sometimes the soles and toes as well. The post-mortem samples from a dead body are needed to compare with the ante-mortem (AM) fingerprints, gathered from databases or the missing person's belongings and environment.

This paper covers a short experiment, which aimed to compare the inking method and the dusting-lifting method from a disaster victim identification point of view, however, focusing only on the PM fingerprinting techniques.

2. Materials and methods

Post-mortem fingerprinting has some different methods, like the inking method, described by F. Galton himself, in the very first scientific book, "Finger Prints" from 1892. The equipment that is

needed to record prints by inking includes a rubber roller, an inking plate made of glass or smooth metal, such as stainless steel or spelter, paper cards for recording the inked prints, and a quality black ink formulated for this purpose.²¹ Recently, forensic suppliers have offered many different types of fingerprinting inks.

Another well-known method is the so-called dusting-lifting method, when regular fingerprint powders are used, and the dusted fingertip is covered with a regular latent fingermark lifting tape. Powdering is the most common, easy-to-use, and oldest method to develop latent fingerprints from crime scenes.²² After the dusting, the lifting adhesive side of the tape will yield the dusted friction.²¹ For this purpose, almost every type of latent print powder can be used, but usually, black powders with transparent lifters are the best. The transparent lifter should be attached to a white background card or directly to the fingerprint card. It is worth noting that in this case, the prints would be a mirrored image of the original patterns.

The right hand of a living human (Author 1) was printed, five fingers only, but not the palm. Time was measured with a stopwatch for the inking method, and, similarly, time was measured for the dusting-lifting method too. Two people experimented; the first one was a newbie for crime scene investigation, just after the cadet years, without any real experience in post-mortem fingerprinting. The second one (Author 2) has 18 years of experience in crime scene investigation and 6 years of experience in disaster victim identification and post-mortem fingerprinting.

After the sets of different methods, Author 2 and Author 3 together conducted a dusting-lifting method in teamwork. Author 3 is a qualified fingerprint expert with sound and comprehensive experience in post-mortem fingerprinting. For the inking method, the Disposable Inked Strips (Sirchie, Youngsville, NC, US; catalog number: SIS610C) were used, where the ink is sandwiched between two thin sheets of plastic film. Each finger was printed to Printover Tabs (Sirchie, Youngsville, NC, US; catalog number: FPT108R), making the preparation much faster. Using Printover Tabs, it was not necessary to cut a fingerprint card into pieces, which is perhaps the most time-consuming part of the method (**Fig. 1**).

For the dusting-lifting method, black fingerprint powder (Regular Silk Black Fingerprint Powder; Sirchie, Youngsville, NC, US; catalog number:

BPP0916) was used with „SEARCH Regular Powder Brush” (Sirchie, Youngsville, NC, US; catalog number: 118L). Prints from the fingertip were lifted with 1.5-inch wide Sirchie fingerprint lifting tape (Fig. 2).

Fig. 1: The inking method with the inked strips and the paper tab. A thin layer of ink is applied to the finger from a plastic film. A self-adhesive piece of paper is used to transfer the fingerprint. The piece of paper is later to stick on a regular fingerprint card.



Fig.2: The dusting-lifting method, fingerprint powder, and brush. A thin layer of latent print development powder is applied to the finger by a crime scene brush. A latent print lifter is used to transfer the fingerprint. The lifter is later to stick on a regular fingerprint card.



3. Results

Results are summarized in Table 1-2.

Table 1. Comparing the less experienced participants and the more experienced participants in applying the inking method. Results are in seconds.

Attempts	Less experienced participant (seconds)	More experienced participant (seconds)
1	530	125
2	514	123
3	522	118
4	527	121
5	524	124

Mean and standard deviation for the less experienced participants: 523.4 ± 5.7 s

Mean and standard deviation for the more experienced participants: 122.2 ± 2.5 s

Table 2: Comparing the less experienced participants and the more experienced participants in applying the dusting-lifting method. Results are in seconds.

Attempts	Less experienced participant (seconds)	More experienced participant (seconds)
1	405	343
2	399	321
3	392	326
4	402	332
5	395	340

Mean and standard deviation for the less experienced participants: 398.6 ± 4.7 s

Mean and standard deviation for the more experienced participants: 332.4 ± 8.9 s

The dusting-lifting method in teamwork took 3 minutes and 12 seconds the first time, and 3 minutes and 16 seconds the second time. The quality of the exemplar prints can be measured by the clarity of the print, the sharpness of the ridge details, the blurred parts of the prints, or, conversely, the lack of blurred parts. From this point of view, the dusting-lifting method yielded a slightly better result, while the inking method was also suitable, and had far enough clear details for identification (Fig. 3).

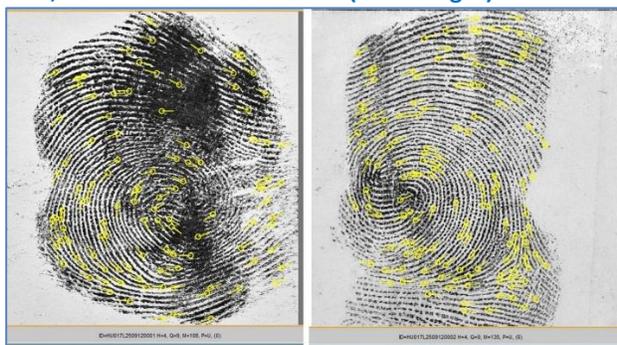
In order to objectively determine the quality, the prints were loaded into AFIS, where the automatic marking of minutiae was chosen. In each case, the dusting-lifting method proved to be better. Fig. 4 shows that the number of minutiae automatically found by AFIS is 108 for the inking and 135 for the dusting-lifting method. Since all results were above 100 minutiae, and in practical work, a value around 20 is considered perfectly acceptable, we did not consider the qualitative differences to be significant.

Fig. 3: Right thumbprint with the inking method (on the left) and with the dusting-lifting method (on the right. It is a reversed image of the fingerprint.)



Fig. (4). Right thumbprint with the inking method uploaded to the AFIS, 108 minutiae were found (on the

left), and with the dusting-lifting method, uploaded to the AFIS, 135 minutiae were found (on the right).



4. Discussion

Anecdotal evidence claims that the dusting-lifting method is faster, cleaner, and yields better quality than the inking method. Knowing this, it was surprising that the experienced participant was much faster, almost three times faster with the inking method than with the dusting-lifting method. This was probably due to the use of the Printover Pads, instead of cutting off the fingerprint card and attaching the paper pieces to another card, which is a time and energy-consuming process.

The difference between the speed of the two participants was something foreseen and expected. The result is that even a less experienced person can easily be taught the methods, and after that, would be able to apply them, with acceptable results, despite the slight slowness. The so-called teamwork, when author 2 and author 3 conducted the dusting-lifting method together, sharing the tasks, was the fastest. Approximately two times faster than the less experienced participant, and more than one and a half times faster than author 2 alone.

Regarding the quality, the living human as the donor of the exemplar can be considered the most significant limitation of the experiment. Not only anecdotal evidence but also comprehensive practical experiences prove that on dead bodies, especially the not very fresh ones, the dusting-lifting method yields much better results.²³⁻²⁴ After some days, despite the refrigeration, the body starts to lose water, which would make the fingertips wrinkled or the skin flaccid. Another factor behind the surprisingly good results may be the usage of the inked strips, instead of the rubber roller and the inking plate. The inked thin films evenly distribute just the right amount of ink on the fingertip.

5. Conclusion

The main conclusions are about the speed, the training, the material, and the operation. For a

well-trained and experienced person, the inking method is not slow. Surprisingly, it was faster than the dusting-lifting method. Being so fast, however, required the ink strips rather than the rubber roller, and the sticky tabs rather than the cutting of the fingerprint cards. Without these comfortable solutions, the inking method would be much slower. Even a less experienced crime scene investigator can be taught both fingerprinting methods very quickly. The more the experience, however, the faster the fingerprinting, and the better the quality of the results.

The teamwork, when two participants worked together, was the fastest. It is recommended to form postmortem fingerprinting teams, instead of single fingerprinting individuals. Usually, during postmortem investigations, there is more than one crime scene investigator or fingerprint specialist, so this cannot be an obstacle. Concluding this experiment, the dusting-lifting method should be preferred during casework, but in teamwork. The inking method, however, can also be suitable for fresh bodies or living people, with the preparation of adequate hand-cleaning.

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Author's contribution:

Author 1: Conceptualization, designed and performed the experiment, supervision, writing – review & editing.

Author 2: Designed and performed the experiment, photo documentation & visualization, and data collection.

Author 3: Conceptualization, data evaluation, validation, writing – original manuscript.

Abbreviations

Interpol: International Police Organization.

DVI: disaster victim identification

AM: Ante mortem, before death

PM: Post mortem, after death

AFIS: Automated Fingerprint Identification System

Ethics Approval: Ethics approval was not relevant to this study because there were no human subjects involved. To experiment, Author 1 was a donor for fingerprinting, which is not invasive, dangerous, or poses any health risk.

References:

1. Cummins H, Midlo C. *Finger Prints, Palms and Soles: An Introduction to Dermatoglyphics*. Dover: New York;1943.
2. Stiefel C. *Fingerprints. Dead People Do Tell Tales*. Enslow Publishers, Inc: Berkeley Heights, NJ, USA;2012.
3. Ashbaugh DR. *Quantitative-Qualitative Friction Ridge Analysis: An Introduction to Basic and Advanced Ridgeology*. CRC Press: Boca Raton, FL; 1999.
4. Champod C, Lennard C, Margot P, Stoilovic M. *Fingerprints and Other Ridge Skin Impressions*. CRC Press:Boca Raton, FL US; 2004.
5. Daluz H M. *Fundamentals of Fingerprint Analysis*. CRC Press:Boca Raton, FL USA;2015.
6. Hawthorne MR. *Fingerprints – Analysis and Understanding*, CRC Press:Boca Raton, FL, USA; 2009.
7. Henry ER. *Classification and Uses of Finger Prints*. George Routledge and Sons: London; 1900.
8. Okros S. *The Heredity of Papillary Patterns*. Akademiai Kiado:Budapest; 1965.
9. O'Brien G, Murphy K. *Fingerprint Patterns Through Genetics*. *J Emerg Investig*. 2020;11(2):1-5.
10. Alberti A,Traebert J, Traebert E, Nodari Junior RJ, Comim CM. Association Between Gestational Period and Obesity in Children with the Use of Dermatoglyphic Traits: A Preliminary Study. *PLoS One* 2021;16(9): e0257153.
11. Sharma BK, Walia M, Sharma SC, Dhillon D, Mishra NK. *Fingerprint Science. A Review on Historical and Contemporary Forensic Perspectives*. *Bull Environ Pharmacol Life Sci*. 2022;12(5):57-61.
12. Hefetz I, Pasternak Z, Liptz Y, Bet-Yosef M. Preliminary investigation of the ability of fingerprint examiners in detection of sib-sib relationships based upon finger and palm prints similarities. *Forensic Sci Int*. 2022;337:111381.
13. Srihari SN, Srinivasan H, Fang G. Discriminability of Fingerprints of Twins. *J Forensic Identif*. 2008;58(1):109-27.
14. Knaap W, Turner J, Gallant A, Knaap L. Fingerprinting a 2,500-Year-Old Egyptian Mummy. *J Forensic Identif*. 2011: 61(1):4-15.
15. Rice KA. The Re-Hydration and Printing of Mummified Fingers. *J Forensic Ident*. 1988;38(4):152–6.
16. Disaster victim identification guide Interpol DVI guide review schedule Content Responsible Member Approved by and date New INTERPOL DVI Guide. Part 1 -Guide Part 2 - Annexures [Internet]. 2023. [Cited on 29 July 2025] Available from: https://www.interpol.int/content/download/589/file/DVI_DVI%20Guide%202023.pdf
17. Shribhagwan, Singh M, Agarwal HS. Fingerprint Pattern Distribution In A Cohort of Southeastern Haryana. *J Forensic Med Sci Law*. 2022;31(2):4-10.
18. Rathod P, Powalkar P. Sexual Dimorphism in Fingerprint Ridge Density. *J Forensic Med Sci Law*. 2024;33(2):22-6.
19. Sree H, Raju Y, Varma MR, Krishna PR, Deepika I. Dermatoglyphics of medical students of a tertiary teaching hospital in Srikakulam District, Andhra Pradesh. *J Forensic Med Sci Law*. 2023; 32(2):14-9.
20. Garg P, Mustaria PS, Kumar N, Bansal MK, Yadav M. Analysis of Primary Fingerprint Patterns in Medical Students of Banda District Uttar Pradesh. *J Forensic Med Sci Law*. 2022;31(1):28-32.
21. Cutro BT. Recording Living and Postmortem Friction Ridge Exemplars. In: McRoberts, A. editor. *The Fingerprint Sourcebook*. National Institute of Justice:Washington, D.C., USA; 2012. 4-1– 4-18.
22. Omar MY, Ellsworth L. Possibility of Using Fingerprint Powders for Development of Old Fingerprints. *Sains Malays*. 2012;41(4):499–504.
23. Farid A, Farkas CB, Petretei D. DVI 2022. *Vedelem Tudomany*. 2022;7(3):204-14. [In Hungarian]
24. Nemedi G, Petretei D, Restas A. The DVI Hungary and Its First Deployment. *Vedelem Tudomany*. 2021;6(3):459-73.