

CONTRAST

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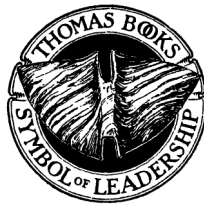
Second Edition

CONTRAST

An Investigator's Basic Reference Guide to
Fingerprint Identification Concepts

By

CRAIG A. COPPOCK



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PREFACE

Contrast is a new approach in the instruction of basic fingerprint identification concepts. Currently, most persons referencing fingerprint information will find out-of-date information or that which only an experienced fingerprint specialist could appreciate. I have compiled the information for *Contrast* during the teaching of fingerprint science to; criminal justice students, new crime scene investigators, and to experienced patrol officers.

While it is easy to write chapters detailing fingerprint identification's history and classification details, it is difficult to present logical arguments for simple identification concepts. *Contrast* is written to present conceptual ideas in context with the basics of fingerprint science. This book is designed to be read in its entirety or to be referenced as a guidebook, as many concepts and information are repeated and cross-referenced. The information helps the reader to understand the relationships, benefits, and limitations of crime scene fingerprint evidence.

Craig A. Coppock

INTRODUCTION

The science of fingerprint identification is fast becoming technology oriented. Gone are the days of simplistic modus operandi, and going is the day of police officer duty rotation that includes fingerprint identification. Most law enforcement agencies are converting their identification bureau's staffing from commissioned officers to full-time civilian operations. Yet, most of these civilian identification bureaus are still managed and funded by the law enforcement agency for which they work. This allows the continuing training of the fingerprint specialist while being able to provide investigative and support services to the agency.

Fingerprint specialists can be found performing fingerprint identification work on crime scenes, jail inmate identification, job applicant criminal background checks, immigration identification, criminal records verification, and routine identification for the public. Fingerprint identification has a reputation for reliability and accuracy. In fingerprint identification, names that mean almost nothing. Many persons have so many alias names they could not possibly remember them all. For most law enforcement documentation purposes, it is only the first name ever given that is used for reference. This first given name in conjunction with fingerprinting is considered a true name. All others would be considered an alias and would be referenced to the true name. The reason for this is that while names may change, the identification value of a fingerprint does not.

The science of fingerprint identification is one of the few scientific disciplines that does not routinely require college-degreed apprentices.¹ However, the fingerprint specialist does rely on a wide variety of related scientific disciplines such as chemistry, physics, biology, mathematics,

1. The science of fingerprints has evolved into an applied science with multiple scientific aspects supporting actual fingerprint identification.

and photography. A good understanding of fundamental statistics is also beneficial.

A fingerprint specialist cannot afford to suffer from innumeracy.² The reason for this is the concept that while no two objects are identical except in source, under some circumstances, items that are sufficiently similar may cause identification difficulties. This concept is later discussed in detail.

On the average, it takes about five years of training and fieldwork to be considered a proficient and experienced fingerprint specialist. One of the reasons for this is most difficult fingerprint identifications demand experience. While it is unnecessary for an expert to have years of experience to make a fingerprint identification, inexperience may result in misidentifications and a higher than average number of *missed identifications*. A *misidentification* is a false positive or false identification. With a misidentification, the compared fingerprint impressions are not of identical origin. A missed identification is simply an unrecognized identification. It is standard practice that any fingerprint identifications made from crime scene fingerprints are verified by another qualified fingerprint specialist. This verification process is the foundation of the high-quality work the fingerprint identification field has bestowed upon itself.

In general, fingerprint specialists pride themselves on being unbiased and ethical in their professionalism. While it may sometimes seem otherwise, fingerprint identifications are founded from the evidence itself, not from suggestions by other investigators. There is no room for guesswork or speculation with fingerprint identifications. If latent crime scene fingerprints were developed, were they identified? If the answer is that no identifications have been made, why not?

The fingerprint specialist carries a considerable amount of responsibility. Most persons, as well as employers, *demand* that he or she be 100% error-free regarding fingerprint identifications. This degree of accuracy is not expected from the vast majority of other professions, both within and outside the judicial system. A fingerprint examiner who is not accurate with his or her fingerprint identifications will find himself or herself immediately unemployable in the field of fingerprint identification.

2. Innumeracy, the lack of mathematical comprehension on its most basic level, was brought to light in John Allen Paulo's book *Innumeracy: Mathematical Illiteracy and Its Consequences*. New York: Hill and Wang, 1988.

This guidebook illustrates the basic concepts involved in the science of fingerprints and fingerprint identification. Contrast is intended for new and experienced crime scene investigators, patrol officers, attorneys, and students who seek to add fingerprint identification to their investigative skills. To understand fingerprint identification, a person needs to see through the confusing generalities to fingerprint identification's underlying concepts.

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I am grateful for the generous suggestions and input by Eric Berg of the Tacoma Police Department's Forensics Unit, and Dorothy Blyton of the Spokane Sheriff's Identification Unit, retired. I have relied on their input to keep *Contrast* focused and effective. I have long known that the more I consult my peers for new perspectives and ideas, the better a project will be. This book is no exception. A special thanks is offered to Michele Triplett for providing the excellent glossary.

It is hoped that *Contrast: An Investigator's Basic Reference Guide to Fingerprint Identification Concepts* will help clarify many of the over simplified generalities that pervade the science of fingerprint identification. Also, it is my intention to highlight the many possibilities and limitations of fingerprint identification. If these goals are achieved, I will have been successful this endeavor.

I dedicate this book to my family.

CONTENTS

	<i>Page</i>
<i>Preface</i>	v
<i>Introduction</i>	vii
<i>Chapter</i>	
1. FINGERPRINTS IN CONTEXT	3
1. Introduction to Fingerprints	3
2. A Brief History of Fingerprint Identification	7
2. FRICTION SKIN	12
1. What Are Fingerprints?	12
A. Basic Fingerprint Pattern Types	15
B. Common Friction Skin Characteristics	18
2. Who Has Friction Skin?	21
3. Infant Footprinting	22
3. FRICTION SKIN CLASSIFICATION	24
1. Fingerprint Classification Schemes	24
2. Palmprint/Footprint Classification	28
4. EXEMPLAR FINGERPRINT IMPRESSIONS	30
1. Inked Fingerprints	30
2. Live-Scan Technology	33
5. LATENT FINGERPRINT DEVELOPMENT AND RECOVERY	37
1. Latent Fingerprints	37
2. Powder Development of Latent Fingerprint Impressions	41
3. Recovering Developed Latent Fingerprint Impressions	44
4. Crime Scene Latent Fingerprint Search	48
5. Postmortem Exemplar Prints	50

6. SPECIAL DEVELOPMENT PROCESSES AND CONDITIONS	51
1. Chemical Development of Latent Fingerprint Impressions ...	51
A. Sample List of Fingerprint Development Chemicals	54
2. Laser/Alternative Light Source (Forensic Light Source)	55
3. Special Conditions	58
A. Firearms	58
B. Human Skin	60
C. Gloves	61
D. Extreme Weather Conditions	62
4. Future of Latent Fingerprint Development	63
7. LATENT FINGERPRINT QUALITY VARIATIONS	65
1. Life Expectancy of Latent Fingerprint Impressions	65
2. No Latent Fingerprint Impressions Found	67
3. Fingerprints with Insufficient Detail for Identification	69
8. FINGERPRINT IDENTIFICATION	71
1. Concepts of Fingerprint Identification	71
A. Common Friction Skin Characteristics	73
2. Incipient Ridges	84
3. Reversals (Negative Fingerprint Impressions)	85
4. Poroscopy, Edgeology, and Creases	88
5. Court Presentations and Qualifications	91
9. FINGERPRINT FABRICATIONS, ERRORS, AND EVIDENCE	94
1. Fabrication of Fingerprints and Identification Errors	94
2. Chain of Custody	98
3. Verification by Outside Expert	101
4. Rates of Error	102
10. PHOTOGRAPHY, IMAGE ENHANCEMENT, AND COLOR	104
1. Photography (Traditional and Digital)	104
A. Common Photographic Optical Filters	108
2. Videography	108
3. Color	109
11. COMPUTERIZED FINGERPRINT DATABASES	112
1. AFIS (Automated Fingerprint Identification Systems)	112
A. AFIS and IAFIS Classification Patterns	113

12. REVIEW OF SCIENTIFIC COMPARISON EVIDENCE . . .	122
1. The Art And Science of Fingerprint Identification	122
2. ACE-V	123
13. LEGAL COURTS AND DACTYLOSCOPY	126
1. Daubert Protocol: Scientific Evidence and the Expert Examiner	126
14. TRAINING AND PROTOCOL OUTLINE FOR 10-PRINT AND LATENT PRINT EXAMINERS	137
1. Training and Protocol Outline for Print Examiners (TPO) . . .	137
2. Training and Protocol Outline	137
A. TPO Mission	137
B. Definitions Reference this Document	138
C. Minimum Formal Instruction	139
D. Supervised Comparison Training Program	139
E. Application of Print Development/Contrast Enhancement Techniques and Technologies	140
F. A Thorough Understanding of the Requirements for the Admission of Expert Testimony and Scientific Evidence in Specific Courts and Its Relevancy to Dactyloscopy	140
G. Update Training	140
H. Verification/Hypothesis Testing Procedure	141
I. Criminal Case Review of Fingerprint Identifications	142
3. TPO Appendix 1	143
4. TPO Appendix 2	143
5. TPO Appendix 3	144
6. TPO Appendix 4	153
<i>Appendix A – Attenuation of Fingerprint Pattern Types</i>	<i>155</i>
<i>Appendix B – Photoluminescence and Chemiluminescence</i>	<i>157</i>
<i>Appendix C – Comparison of Ink and Computer-Generated Fingerprints</i>	<i>159</i>
<i>Appendix D – Palmar Exemplar and Latent Zone Codes (PZ-Codes)</i>	<i>161</i>
<i>Appendix E – Long-Term Study of Friction Skin Ridge Detail</i>	<i>163</i>
<i>Glossary – Abbreviated Glossary of 356 Fingerprint Terms</i>	<i>165</i>
<i>Bibliography</i>	<i>189</i>
<i>Index</i>	<i>191</i>

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Chapter 1

FINGERPRINTS IN CONTEXT

1. INTRODUCTION TO FINGERPRINTS

Welcome to the science of fingerprint identification or *dactyloscopy*.¹ The word fingerprint is a generic term for all the friction ridges located on the palmar surface of the hands and the soles of the feet. Although actual fingerprints only include the friction ridge detail after the last joint on each finger or impressions thereof, it is common to hear the term fingerprint used as an all-encompassing generality. The term fingerprint is also being used as a generality for other types of identification as well. This may include such unusual wordage as DNA fingerprint identification. Of course, the actual meaning is that a DNA identification is an effective means of identification as is fingerprint identification. This kind of generality is not an acceptable practice by fingerprint experts when giving court testimony. A properly trained fingerprint identification specialist must give specific details as to the location and nature of the fingerprint evidence while speaking in layman's terms.

While certain genetic impairments can prevent the formation of friction ridges during the embryonic development stage, this kind of impairment and other ridge development problems, such as dysplasia, are very rare. Dysplasia is a defect in the development of the friction skin ridge detail that is noticeable as fragmented friction ridges.

Most all *Homo sapiens* exhibit friction ridge detail on the gripping surfaces of the hands and feet. Other primates can also have these friction ridges on their gripping surfaces. Some primates are even known to

1. Dactyloscopy is a term used for the science of fingerprint identification. Its origin is from the Greek word "daktulos" or finger.

have friction ridges on the underside of the tail near the base (Berry, 1991). The genetic aspects of friction ridges are obvious, though the genetics have not been studied in great detail.

Fingerprinting as a means of identification is a relatively recent phenomenon. Only in the last 100 years have inked fingerprint impressions been recorded routinely en masse as a positive means of identification. Each method of identification utilizes the differences found when comparing two items or persons. Some alternate means of identification, both historical and modern, can include the following sample list.

Alternate forms identification:

- Tattooing
- Photography
- Anthropometry²
- Deoxyribonucleic acid (DNA)
- Retinal scans (via computer imaging)³
- Ear identification (ear impressions)
- Dental records (x-ray images containing teeth characteristics)

Yet, unlike these options, fingerprinting a person with regular printer's type ink is simple, efficient, and standardized. Checking a person's identification against a previously recorded fingerprint impression halfway around the world is as simple as sending a high resolution fax or other digital image over a phone line.

A fingerprint specialist is a person who is trained in the science of fingerprint documentation, crime scene fingerprint development, and fingerprint identification. A fingerprint specialist can compare friction skin impressions for specific likeness to determine if the separate impressions were made by one and the same source. Persons in the scientific field of fingerprint identification are labeled with a variety of names such as fingerprint examiner, identification officer, identification technician, forensic specialist, latent print examiner, or fingerprint specialist.⁴ The actual job titles vary regionally and even locally, among agencies. Since this book

2. Anthropometry is a body measurement system developed by Alphonse Bertillon (1853-1914).

3. Eyeglass prescriptions are also noted to be very unique to each individual. However, in large populations the uniqueness may not be statistically sufficient due to the specific increments used in corrective adjustments.

4. While criminal investigation may be an "art," fingerprint identification is a statistically-based, applied science.

is intended to be a general fingerprint concept reference book, the generalized name of *fingerprint specialist* will be used as opposed to other specific titles. Note that a fingerprint specialist may also be competent in other related fields such as crime scene evidence processing, photography and videography documentation, tool mark, shoe, and tire tread examination, as well as other forensic specialties such as chemistry.

The concept of fingerprint identification is twofold. First, is no two fingerprint impressions are identical, except possibly, in their source. Second, the relative positions of the friction skin characteristics do not change over the course of a person's life.⁵ To quote the poet Elliott Allen Baade, "Identical, when not one in the same, is similar" (Baade, 1998, p. 78), the idea being that the closer you look at two or more tangible objects or persons, the more differences you will find.⁶ For a forensic identification application, this can be translated to: no two tangible objects are identical except in source. A forensic identification requires that certain words must be qualified in meaning to ensure that any scientific conclusion is not misunderstood. Thus, identical cannot mean similar and similar cannot possibly mean identical. Many forms of identification are based on this concept.

Imagine blue and white aluminum soft drink cans rolling off the assembly line by the thousands. From a distance they all look the same; yet, on closer inspection, we see many differences, such as the drink opening lines up with the label differently on each can. Look closer and we notice the aluminum surface has variations; it is not perfectly smooth. If you were to take one of these soft drink cans and empty its contents into two different glasses, we could say that the liquid in each glass is identical regarding its source. The cola originated from an identical cola can and from an identical secret formula. For the aluminum cans themselves, we could say that all the cans originated from the same assembly line. The soda cans originated from an identical source.

The concept that no two tangible objects are identical can even be taken down to near the quantum physics level to Heisenberg's uncertainty

5. Scarring or other permanent damage to the friction skin of the hands or feet does not generally pose problems for fingerprint identification.

6. Nontangible items such as letters or numbers are indeed identical. A number 7, for example, is always a number 7. In reality, the word "identical" could have several inferred meanings; however, for fingerprint identification, the word identical is meant in reference to a source for friction skin impressions. Also, the spatial relationships of specific points of identification may also be identical, meaning that they originated from an identical source.