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**TOPIC:   SEARCHING EVIDENCE IMPRESSIONS**

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**Rationale:**

Forensic Identification Officers search fingerprint files in an attempt to locate a match for unknown impressions from scenes of crime and unknown deceased persons.

**Learning points**

- pattern recognition
- digit determination
- ulnar/radial trends
- thumb impressions
- ridge tracing
- is it an evidence impression
- obtaining elimination impressions
- the searching technique
- seven places to search the impressions

**Objective:**

Given written material, lecture, discussion, demonstration and practice, at the end of the session each student will search fingerprint impressions to the extent that the student will describe and/or demonstrate: determination of the pattern type of the crime scene impression; determine the digit; the searching technique; the need to obtain elimination impressions; files or collections against which evidence impressions can be searched, as evaluated by the facilitator.

## FINGERPRINT PATTERN RECOGNITION

Fingerprints are divided into a number of groups or pattern types simply to enable the use of a formula for filing fingerprints on paper forms or storing them electronically on computers. One could, theoretically, search any fingerprint in any fingerprint file without any filing system.

In practical terms, however, to do that searching on a regular basis in a file containing anywhere from several hundred to several million forms collected and stored randomly would obviously be an impossible task.

Although impractical, the above comments are intended to illustrate that it is not necessary to determine the pattern type to be able to individualize a fingerprint. The only reason for doing so is to limit the search to only those patterns having the same basic characteristics.

This would be similar to ignoring all other makes of vehicles when you are searching for a Ford product.

To that end you must have at least a basic knowledge of the patterns. It is unnecessary to memorise the concise definitions required for classification and filing purposes but general descriptions, such as those given below, will assist your efforts to narrow the search parameters.

It is also well to remember that, because all fingerprints are different, there will be many impressions that do not resemble the following diagrams and appear to be somewhere between two or more different pattern types. For these you will proceed from the most to the least likely choices as you check several different pattern types.

Before we discuss the overall pattern types there are some terms with which you should become familiar. The areas of the fingerprint impressions to which these terms refer are major landmarks in any fingerprint and help in orienting yourself or others to an impression that you may be examining or to which you may be referring.

*NOTE: The illustrations below are adapted from those found in an undated series of RCMP texts entitled Fingerprints.*

### The Core

The Core is simply the central area of a fingerprint pattern.

In the loop pattern below it is the area where the ridges turn 180° and reverse direction. These are known as **recurving ridges**.

Recurving ridges.



The impression below is a different type of pattern, a whorl, but the central area is still called the core.

In whorl patterns the ridges may spiral outwards from the centre, either clockwise or counterclockwise.

Recircuiting ridges (spiral core)



or they may be concentric in shape.

Recirculating ridges (concentric core)



In either case these are known as **recirculating ridges**. In both types a ridge or a combination of ridges will make a 360° circuit.

### The Delta

The delta has the appearance of ridges flowing along together and then separating with each half of the flow going in the opposite direction around the core area.

Loop patterns have only one delta.

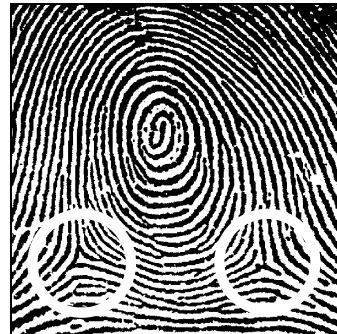
Left side delta



Right side delta



The whorl pattern will have two deltas, fairly symmetrically placed on either side of the core.



The Central Pocket loop also has two deltas, asymmetrically placed with one high and close to the core, the other lower and further away.



Accidental patterns may have up to four deltas



## THE PATTERN TYPES

### The Arch (Symbol A)

The ridge paths in this pattern can be followed as they flow smoothly in from one side of the impression up and over the central area of the pattern and then down and out on the other side.



### The Tented Arch (Symbol T)

The ridge paths are similar to the Arch except that there will be an upthrust or angular formation in the central pattern area which causes a disruption in the smooth flow.



In the above impression there is a large upthrust. In the following example the disruption is much shorter.



### The Loop (Symbol U or R)

In the Loop pattern the ridge paths can be followed from one side of the pattern area to the central pattern area where they recurve 180° and exit the impression on the same side as they entered.

The downward slope of the recurving ridges may be right or left. Approximately 93% of right sloping loops will be right hand and vice versa.

#### Right sloping Loop



#### Left sloping Loop



### The Whorl (Symbol W)

The ridge paths have a generally circular arrangement in the central pattern area. The core is usually symmetrically located between the two deltas.

#### Spiral core Whorl



Concentric core Whorl



**The Central Pocket Loop (Symbol C)**

Looking like a lopsided whorl, the central pocket loop is asymmetrical, one delta usually being higher and closer to the core than the other.

Left- sloping Central Pocket Loop



Right-sloping Central Pocket Loop



**The Double Loop (Symbol D)**

As the name suggests the Double Loop consists of two loop patterns combined in one impression. There will be two deltas and two cores.

There are two different-looking types but although they have different names according to classification rules they can both be described

under the general heading of double loop. The symbol 'D' refers to both types.

**Twinned loop**

This pattern has two loops which are intertwined and have the appearance of originating from opposite sides of the impression.



In the following impression the two loops are very small and tightly coiled but it is also a twinned loop type of double loop pattern.



**Lateral pocket Loop**

The two loops in the lateral pocket loop group appear to originate from the same side of the impression. Usually one of the loops will overhang the other



### The Composite and the Accidental (Symbol X)

In large collections these patterns may be separated into two distinct groups. They occur so rarely that it is not usual to do so in small collections. Both types use the same symbol 'X'.

The Composite pattern contains two or more separate and different patterns, not including the Arch. This means that if one pattern were removed there would be another complete pattern remaining. It could have from one to four deltas depending on the combination of patterns involved.

The Composite



The Accidental differs from the composite in that the patterns are combined rather than being separate. If one of the patterns was removed there would not be a complete pattern, exclusive of an Arch, remaining.

The Accidental



#### Use of symbols.

The symbols noted above, (A,T,R,U,W,C,D,X), are those used when classifying fingerprints by

the Henry System or modifications of that system.

You will likely come across references to these symbols when you are looking at fingerprints that have been classified or perhaps when reading some of the literature on fingerprinting

Although this method of manual classification is rapidly becoming obsolete in Ontario it is still convenient to continue the use of the symbols. The meaning of most of the symbols is obvious but the R and U symbols, which both refer to loop patterns, needs further explanation.

In the section of the study guide dealing with Digit Determination you will find a complete explanation of the R (radial) and the U (ulnar) designations.

On fingerprint forms that have been classified, however, you may find a simple stroke sloping down and to the right (\), on impressions of the right hand, or down and to the left (/) on impressions of the left hand (/) marked beside a pattern.

These strokes are simply indicating the slope of an ulnar loop. The one sloping to the right indicates an ulnar loop on the right hand and vice versa. (Radial loops slope the opposite way and are usually marked with an R to avoid confusion)

### Keep an open mind

You must be mentally flexible as you attempt to determine the pattern type of a crime scene impression.

Look at this example of a simulated crime scene impression. It appears to be a loop pattern.



If you now look at the rolled impression in the following diagram you can see that there is an additional looping formation over the top of what had initially looked like a complete pattern.



If you were quickly glancing over a number of suspect inked fingerprints, looking for the simple loop pattern, it would be easy to overlook the fact that the formation is really only part of a larger, more complex pattern.

Such an error could then perhaps cause you to elimination of a suspect from the fingerprint search process.

Sometimes, as perhaps with the first illustration above, the impression appears so straightforward that it is very difficult to imagine anything else.

The ability to allow your mind to include all the possibilities, whether immediately obvious or not, is what separates the skilled searcher from the merely adequate.

Naturally you will search the most likely possibility first. In the case of the above crime scene example you would probably first search against any loop patterns in your suspect group.

If you did not find a matching impression in the loop patterns you would then apply your imagination and perhaps search for a small double loop.

Examine any impression that could contain the pattern shape for which you are searching. The example above shows that the crime scene 'loop' is contained within a much larger and more complex pattern.

It is vital that you exhaust every possibility, however remote, before you finally state that you cannot make an individualisation.

## DETERMINATION OF THE DIGIT

To minimise searching time you need to determine which digit to search in the files. This is also one of the questions that you will be required to answer when making a submission for search through an AFIS system.

It is perhaps not quite so important when searching against the inked fingerprint forms of one or two suspects since it takes little time to check all ten impressions on each form.

The first thing to settle is the question of which hand left the impression.

Location of the impression at the crime scene will often indicate whether it is likely to be from a left or a right hand. To make that determination simply imagine what the actions of the culprit must have been at the time the impressions were made.

Adjacent impressions, even if smeared and unsuitable for identification by themselves, can be an excellent aid in determining the hand and digit.

In the first illustration the impressions could just as easily be right index, middle and ring or left ring, middle and index (reading from left to right). There is no way from the relative position of the digits to tell whether this is a right or left hand. (We'll look at other clues later.)



The only difference in the following impression is that the little finger is included in the photograph.



Simply by including that smeared little finger in the photograph or lift, even though it is actually of no value for comparison, means that you can be absolutely sure that they are the impressions of a right hand.

This is particularly important when you are submitting the impressions for an AFIS search. Having that information cuts down on search time for that submission which, in turn, means that more searches can be performed in a given amount of computer time. Ultimately this can result in a better success rate for you.

For this reason, smeared adjacent impressions should always be photographed and lifted along with the identifiable impressions.

### **Impressions Found Singly**

When the impression of a single digit is found alone it becomes more difficult to specify which finger it may be. The first thing to do is to determine the pattern type. Then by checking the percentages of occurrence of that particular pattern type you can choose the statistically most likely digit to search first.

The following percentages should be considered when planning your search.

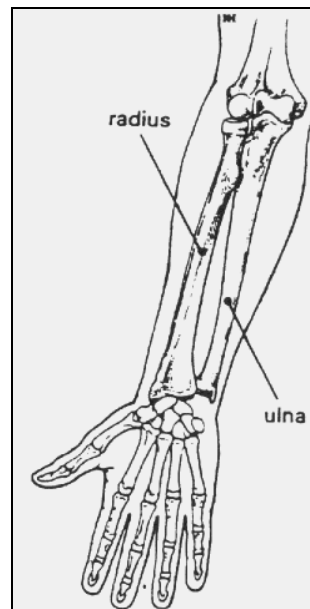
Tented arches	54% are on the index 28% on middle
Loops	93% are ulnar
Radial loops	85% on index
Central pocket loop	45% on ring
Double loop	60% on thumb
Accidental	70% on index.

In addition to these probabilities, it is frequently possible to determine left or right hand by examining the general trend of the pattern.

### **Ulnar/Radial Trends.**

The pattern area of most fingerprint patterns has a definite slope one way or the other. For convenient reference this slope has been related to the two bones in the forearm, the ulna and the radius. The ulna is the bone on the outside of the arm and the radius is the bone on the inside.

The diagram below shows the palm side of the right hand and the inner side of the arm.



The positions of the bones remain constant relative to one another on each arm; i.e., the ulna is on the outside and the radius is on the inside.

If you place your hands on the desk in front of you, you will see that the ulna bone of your right arm is on the right side and that in the left arm it is on the left.

This means that patterns that slope down and to the right on the right hand or down and to the left on the left hand will be described as having an ulnar trend. Vice versa for the radial trends.

Without information to suggest which hand you may be dealing with it is not possible to

determine whether the pattern has an ulnar or a radial trend. There are, however, some general rules that will allow you to make the most probable first choice.

- There is generally an ulnar trend on all digits except the index  
- the first choice would therefore be to search the hand indicated by the ulnar trend.
- A radial trend is more likely to be an index  
- if you know which hand is involved and you then determine that the trend is radial then you should search index fingers first.

Nutant loops usually have a radial trend and are usually found on the thumb or index finger.

Since nutant loops are relatively uncommon they are always a very short search in any case.



In the nutant loop impression above we ignore the bent-over tip of the formation and trace the trend down and to the left. Since the rule states that this is usually a radial trend, the first choice should be right hand.

Another way to remember is to consider that the bent-over tip of the recurve is pointing to the most probable hand (i.e. in the above example, the tip points to the right = right hand)

### Recognising Thumb impressions

Thumb impressions are often found alone simply because of the way the thumb is positioned in opposition to the other digits.

When you find an impression alone you can often recognise it as a thumb by one or more of the following indicators:

- shape - somewhat pear-shaped compared to impressions from other digits that are usually more oval in shape,
- the central pattern area is lower in the impression, on other digits it is usually more centrally located:



- an impression of the side of a digit is most frequently a thumb. Just placing your hand flat on your desk will demonstrate that the thumb does not lie flat in these situations.



- an impression found alone in a position that would suggest a thumb, as noted earlier, opposing smudges may indicate fingers.

The extreme tip ridges on thumbs are usually sloped in an ulnar direction.

In the following illustration the tip ridges are sloped down and to the left. For this to be an ulnar trend the impression must be that of a left thumb.



### Other General Rules

In double loops the ascending loop is almost always ulnar, except on index fingers.

In the double loop impression below, the slope of the ascending loop is down and to the right.

Because the probability is greater that this is an ulnar slope your first choice should therefore be to search the right hand.



The cores of whorls and central pocket loops will often have an ulnar inclination, except on index fingers.

In addition to the ulnar trend, spiral cores will usually spiral counter-clockwise in the right hand and clockwise in the left hand.

The counter-clockwise spiral and the assumption that the slope of the core is an ulnar trend both suggest that the following illustration s the impression of a right thumb



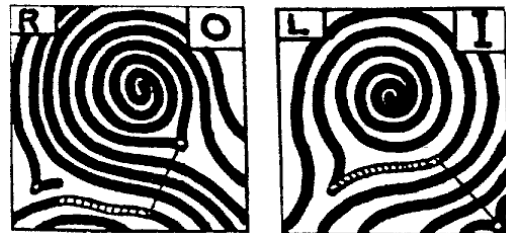
### Ridge Tracing

Ridge tracing is one of the tasks that you would have been required to perform when manually classifying a set of fingerprints for filing in a manual fingerprint collection.

For the purpose of digit determination we use a modified version of ridge tracing.

It consists of following a ridge from the left delta of a pattern towards the right delta. (Note: the trace is always from left to right no matter which hand we may be examining.) When you reach, or are opposite, the right delta you then note whether the ridge you were following is inside or outside the right delta.

If you are outside the right delta it is an outer tracing. If you have ended up inside the right delta it is an inner tracing.



80% of right thumbs have an outer tracing.

80% of left thumbs have an inner tracing.

Note that the index fingers are opposite. 80% right indexes have an inner tracing, while 66% of left indexes have an outer tracing

### Summary

The above suggestions can assist a searcher to examine suspects fingerprints or to enter a filing

system in the place most likely to result in success. If these most likely impressions have been searched without results, you must then widen your search to other digits or hands.

The above information is vital to any AFIS operator whenever you submit crime scene impressions for search in the master file. Using similar rules to those outlined above they can determine some information for themselves but, having been at the crime scene, you are in the best position to make the most accurate determination.

A great deal of patience and perseverance (not to forget imagination) is required for consistent success in searching crime scene impressions. Even with computerized searching it takes knowledge and experience to search all of the possibilities.

Remember that AFIS operators are working for you and are just as keen as you to make individualisations on your crime scene impressions. Make their job as easy as possible by giving them all possible information.

Even though your police service may not maintain a single fingerprint file you will still be expected to compare your crime scene impressions against many other impressions.

These could be suspects or simply other persons whose fingerprints must be eliminated from the crime scene such as, victim, complainant, family members and police officers, The following section describes the conditions, technique and places when searches and comparisons are made.

## **BEGINNING THE SEARCH**

Once a fingerprint impression has been located, collected and preserved, the next task is to attempt to individualize it by searching and then comparing it against other impressions.

Unfortunately chance impressions are most often deposited under conditions that are least favourable for identification purposes. Dirty or uneven surfaces, sweaty or dry skin and too much or too little pressure, are among the factors

that may hinder the deposit of good quality impressions.

It is this lack of quality that can make the searching of evidence impressions such a time-consuming and often tedious task.

You should minimize the length of time spent on the search and thus avoid the fatigue, loss of concentration and potential for errors. This can best be done by first answering the following questions:

- can the pattern type be determined?
- can the digit be determined?

You learned how to make these determinations in the earlier section of the study guide.

We will look at the following two questions.

- is it an 'evidence' print or does it belong to some person who has legitimate access to the item or place?
- where can you obtain impressions against which the crime scene impression should be searched?

### **IS IT AN EVIDENCE PRINT?**

There is no point in wasting valuable time searching a fingerprint only to find that it was left by some person who had legitimate access to the place where the impression was found.

Consequently, one of the first steps in the follow-up investigation should be to obtain 'elimination fingerprints.' These are fingerprints of every person known to have had legitimate access to the place or object upon which an impression has been located.

Your list of persons to be compared should include the following:

#### **The Victim**

A common error is to neglect to obtain fingerprints from the victim.

When the victim is still alive he or she may be emotionally upset and you may not wish to make further demands until they are less agitated.

If they require medical assistance or removal to hospital you cannot interrupt the treatment to take fingerprints.

If the victim is dead it may not be possible to take the fingerprints at the scene because of the danger of contamination or because of the condition of the body.

Even if it must be delayed it is a necessary part of obtaining elimination fingerprints that must not be overlooked.

### **The Complainant**

A request for fingerprints sometimes creates misunderstandings. It should be remembered that most private citizens are not familiar with investigative procedures.

The first thought to cross the minds of many people is that they are under suspicion. The second is that the fingerprints will be filed forever on a computer. An explanation that neither of these is accurate will avoid the problem and usually result in co-operation.

An offer to return the fingerprints as soon as you are finished with them also helps. Use the form C-216C that is for identification purposes only, not for criminal use. (They can be ordered from the RCMP). Then, when you return the form you can suggest that it be kept in a safe place as a positive method of identification in case of emergency.

An approach that seems to cause less concern is to simply dust the fingers of the subject with black powder and then place them on an adhesive backing (self adhesive labels work well) the fix the backing to clear fingerprint lifter. These are more obviously not for filing purposes and perhaps may be readily accepted by the subject.

There is no legal requirement for a person to provide fingerprints for elimination purposes. However, a proper approach will almost always result in co-operation.

### **Relatives, Friends, Visitors**

It is often necessary to question the complainant very carefully to determine the names of all persons who should be printed for elimination. Not understanding the necessity for being exact in this regard, the complainant may not apply his or her mind to the problem unless pressed to do so.

Occasionally, for personal reasons, the complainant may be reluctant to divulge the fact that certain persons have access to the premises. Explaining the necessity of securing this information and giving assurances of the limited use that will be made of it will often result in the necessary co-operation.

Even delivery or service persons should be listed, or at least the company for whom they worked and the date they were on the premises.

### **Police Officers**

In addition to those officers mentioned on reports, there are frequently officers, of all ranks, who visit the scene in the initial stages. They may have had an official capacity or may merely have been sightseeing.

A check with the first officer or recording officer or perhaps with the communications unit will, in most instances, provide the names of these individuals. Departmental files will then provide the necessary fingerprints. Some Services have entered the fingerprints of their officers onto the local AFIS system. This makes eliminating police personnel much simpler.

### **Identification Personnel**

It is well to be very familiar with your own fingerprints and those of your partner. While identification personnel usually acquire the habit of not touching things, it is always possible to do so inadvertently, especially if more than one identification person is examining the scene.

### **Incomplete Eliminations**

On many occasions, it is impossible or impractical to obtain elimination impressions from all of those having access to the area.

In such instances, it may be possible to determine, by investigation or from eyewitness accounts, that the culprit handled only certain items or placed his hands in specific locations.

While not conclusive proof that these impressions belong to the culprit, such information can certainly suggest that these particular impressions might be given a higher priority in the order of searching.

### Physical Conditions

Manually searching and comparing fingerprints is not an easy task. It is one in which you are not permitted any room for error. It makes sense, then, that you should provide yourself with the physical conditions that will enable you to function most effectively and accurately.

Whenever possible the searching process should be conducted under the following conditions:

- in a quiet atmosphere - away from telephones or any other distractions or interruptions.
- while well rested - at the beginning of a work day, when the body is well adjusted to a change in shifts, i.e., not the first day of midnight shift or after spending all day in court and going directly to work on afternoon shift.
- in short blocks of time - alternate searching with other duties, spending only half an hour to an hour searching in each block. Rest your eyes and your neck and shoulder muscles.
- avoid pressure - do not permit anyone to 'hover' while a search is being performed. Many errors have been made when an investigator has asked for a 'quick check' of the prints of his suspect. Every comparison must be performed thoroughly no matter how obvious it may appear.

These conditions, of course, are extremely difficult to provide in a busy office but you should make every effort to do so.

Ignoring any of the above conditions is likely to affect your concentration and thus your accuracy.

Accuracy not only counts, it is absolutely imperative!

### THE SEARCHING TECHNIQUE

In addition to the ability to concentrate for long periods of time and good eyesight there is a special ability that is indispensable for successfully searching fingerprints. That is the ability to retain a mental image of the crime scene impression as you look at hundreds, perhaps thousands, of other impressions.

It is this latter quality which separates the excellent searcher from the mediocre. Regardless of experience, some persons have better image retention than others.

It is not simply a matter of retaining an image as it appears, but of having the ability to imagine it as it might appear due to distortion. As discussed above, you must also be aware that you may be looking at only one part of a more complex pattern; e.g. a loop that is really part of a double loop, etc.

The known inked print is usually carefully recorded with even pressure. The chance print is most often created under far less ideal conditions such as lifting a heavy object or while climbing through a window, or is left on an irregular surface. Any of these factors may distort the shape of the pattern, in some cases to a considerable extent. Consequently, if you base your initial search solely on a similarity of shape there is a high probability that you will overlook the actual matching impression.

The crime scene impression below has a generally circular appearance.



The inked impression has a much more oval appearance but both impressions were made by the same digit.



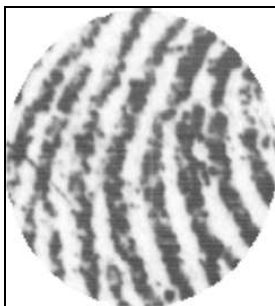
If you were looking only for the general shape of the crime scene impression there is a good chance that you would pass over the inked impression.

To overcome the problem of distortion while searching we employ a technique that helps us to ignore the overall shapes of the impressions.

Pick out a clear area of the crime scene impression and memorize a sequential group of four or five characteristics that appears distinctive to your eye. If there is an unusual configuration, it will make the search even easier.

Then check each impression in the file for the same sequential group of characteristics in the same relative position and pay little or no attention to the overall shape of the crime scene impression.

From the crime scene impression above we have selected an area just to the left of the core of the pattern.



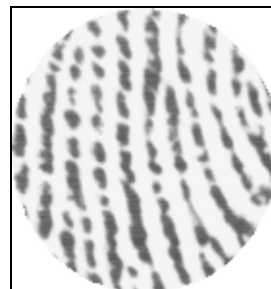
Starting on the left side, at about the eleven o'clock position, there is a ridge ending. Following this ridge path downwards you come to a bifurcation opening downward.

Moving down and to the right from the bifurcation one intervening ridge there is a ridge ending. Moving further to the right with two intervening ridges, at about the five o'clock position there is another bifurcation, also opening downward. Travelling upward along the single ridge from this bifurcation there is another ridge ending. If you move left from this ridge ending, across three intervening ridges, you come to the ridge ending where you first started.

This is now the formation that you will memorize. In your minds' eye you will carry a picture of this small area of ridge detail. At the top are two ridge endings, three ridges apart. At the bottom are two bifurcations with a ridge ending and a couple of other ridges between them. Each of the bifurcations becomes a single ridge and runs upwards to form one of the two ridge endings with which you started.

If you were searching against a large number of impressions it would be well to draw a diagram of those few characteristics. You could then refresh your memory from time to time. If you are only checking against one or two suspects this may not be necessary.

Now turn to the suspect impressions and look for the same arrangement of characteristics in approximately the same place on each impression.



As you did with the crime scene impression look just to the left of the core. What you are trying to locate is an arrangement of ridge characteristics similar to that which we have just described.

You must now allow for distortion, missing areas, incomplete patterns, smearing, dirt particles etc. any or all of which may cause the scene of crime impression to appear a little different than the inked impression.

If you compare the two circular illustrations you will immediately notice that the ridges in the crime scene impression have a fairly pronounced curve while in the inked impression the curve is much less. Don't let that difference distract you.

In these two illustrations the ridges also have a different appearance. The crime scene ridges are wide and continuous while the inked ridges are thinner and somewhat broken.

For the time being you will ignore these apparent differences and note that the characteristics (ridge path deviations) that you sketched correspond in both impressions in their relative positions.

You will now expand the comparison outside these small areas to check for continuity of ridge characteristics across the whole of both impressions.

During the evaluation phase you will take into account the differences that you have noted and attempt to determine the reasons for them.

The actual individualisation is, of course, made after comparison of the whole impression

We will discuss the comparison phase in more detail in the next section of the manual.

## **WHERE TO SEARCH AN IMPRESSION**

### **Persons known to have been at the scene (eliminations)**

It was noted earlier that the first comparisons should be made against fingerprints of anyone having legitimate access to the crime scene, such as the victim, complainants, relatives, friends, neighbours and including all police officers.

Do not fall into the habit of sending all crime scene impressions for search in AFIS without doing the eliminations. The unnecessary searching simply wastes computer search time and degrades the efficiency of the whole AFIS system.

Following is a suggested list of other sources of fingerprints that could be used for comparison.

## **Suspects**

Once elimination comparisons have been completed the obvious next choice is to check known suspects.

A large percentage of crime scene impression individualisations are made as a result of comparison with the fingerprints of suspects. These suspects may be provided by investigators or identification personnel familiar with the local criminals.

One of the difficult tasks for identification personnel is to convince the investigators to pass on lists of names of anyone who might reasonably have had an opportunity to commit the offence.

This is rather different than listing only suspects who might have actually committed the offence. It widens the search and thus gives more chance of identifying a culprit who might not initially be a 'hot suspect'.

## **Local criminal file**

Most large services now rely almost exclusively on AFIS for searches of their crime scene impressions. For a smaller service that does not have instant access to AFIS it is often productive to maintain a small file of fingerprints of local criminals in the identification unit. It is especially useful to keep those individuals who are active in theft, break and enter and auto theft in such a file.

A classification method known as the Del-Core System is ideal for this purpose since the fingerprints can be filed by classification and alphabetically in the same file.

A Del-Core file is simple to set up and maintain and takes up very little room, a file box approximately 8" x 8" being large enough for several hundred individuals. This is as many as you are likely to have in your local, active criminal file.

With this type of file available it is not unusual to be able to collect a fingerprint from a crime scene, return to the office, search and individualize the impression and inform the

investigators who the culprit is before they have even started to work on the occurrence!

### **AFIS**

Almost any identifiable finger impression can be searched in an automated fingerprint identification system file (AFIS) at your own police service or in the national collection at RCMP Ottawa.

While information as to hand, digit and pattern type shortens the search, not having it should not prevent you from making the submission. It is, however, preferred that either the core or a delta be visible, so that the impression can be correctly oriented.

It is also obviously necessary that the impressions submitted must contain sufficient detail to be capable of being individualized.

Detailed submission procedures are covered elsewhere in the course.

### **Reverse search**

Frequently the culprit will have no fingerprints on file at the time the search is conducted. These offenders are often later arrested on other charges and do not mention the offence to which the crime scene impressions belong.

To ensure that such impressions do not remain unidentified, a reverse search system should be implemented.

This simply means that a file is maintained which contains all of the unidentified crime scene impressions. The fingerprints of all first-time offenders are then searched against this file as soon as they are received in the identification unit.

In a unit with a large volume of crime scene impressions it may be advisable to break the file down into pattern types and/or digits. In most identification units, however, it will be adequate to keep clear 1:1 photographs of each impression together in a small file box.

Reverse searching is a very productive method of identifying crime scene impressions and should not be overlooked.

### **Circulate to other police services**

A photograph of the crime scene impression may be sent to a police force in another city or province if any evidence suggests that the culprit may be from that area.

For cities and states in the USA, it is permissible to contact them directly. For other countries, it is necessary to go through the RCMP who will contact Interpol.

In order to avoid becoming a nuisance, the circulation of crime scene impressions to other police forces should not be overdone. It is a procedure that should be reserved for the most serious cases. Overuse may result in the other forces simply ignoring such requests.

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**TOPIC:                   COMPARISON OF FINGERPRINTS**

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**Rationale:**

Forensic Identification Officers compare fingerprint impressions and must be able to give 100% accurate opinions as to the origin of questioned impressions from crime scenes and unknown deceased.

**Learning points**

- the basis of fingerprint identity
- types of ridge characteristics
- the principle of comparison
- differences
- comparison procedures
- preparation and preliminary screening
- first, second and third levels of detail
- the procedure
- the evaluation
- the conclusion
- verification

**Objective:**

Given written material, lecture, discussion, demonstration, practice and the necessary equipment, at the end of the session each student will be knowledgeable of the method of making fingerprint comparisons to the extent that the student will describe and/or demonstrate: the basis for fingerprint individualisation; comparison principles; expected differences and their causes; comparison procedures; the three levels of detail; evaluating the comparison; the scientific need for verification; complete test sets of comparison and individualisations without error, as evaluated by the facilitator.

# THE COMPARISON OF FINGERPRINTS

The following sections detail the 'how to' of comparisons. Other study materials will give you the scientific background information upon which to base your opinion that no two fingerprints can be alike unless they have come from the same digit.

## RIDGE CHARACTERISTICS

When comparing two impressions, we examine and compare the location and shape of the ridge characteristics or, as discussed in the book *Introduction to Basic Ridgeology*, ridge path deviations. They are also referred to as minutiae, especially in the context of computer storage and retrieval.

You may also hear or see them referred to as points of comparison, check points, points of correspondence, points of resemblance or just plain 'points'. In some of the older texts the terms Galton details or morphological peculiarities may be used.

It has been suggested that there are only three types of ridge formations (ridge path deviations), these being; ending ridges, bifurcations and ridge dots, and that all others are simply variations or combinations of these three.

While this argument may have some merit it is much more convenient, when discussing impressions, to assign names to some of the more common variations. Try describing a fingerprint over the telephone using only these three terms and you will quickly understand this rationale!

If we expand the list to five terms we will have covered over 80% of the commonly-occurring ridge formations.

- ridge ending, (RE)
- bifurcation, (BIF)
- ridge dot, (RD)
- short ridge, (two RE's connected by a short length of friction ridge)

- enclosure, (two BIF's close together, opening towards each other with the two legs of one joining the two legs of the other)



- Ridge Ending
- Bifurcation
- Ridge Dots
- Short Ridges (Islands)
- Enclosure (Lake)

Other formations can also be described with relation to the basic ones. For example:



Spur. BIF in which one leg is a continuing ridge while the other is very short.



Crossover or bridge. Two BIF's on adjacent ridges which open in opposite directions, the 'inside' leg of each being common to both.



Trifurcation. Two BIF's side-by-side, emanating from the same point, opening in the same direction with the 'inside' leg common to both.

You will probably agree that it is easier to use the definitive term rather than trying each time to describe the feature relative to the basic three formations.

A minor difficulty with the terms is that they are not universally used. What is called an enclosure in one bureau may be referred to as a lake in another or a crossover may be called a bridge. It is therefore important to define the terms when talking to someone from a different identification office. Once that is done, however, describing features found in any fingerprint pattern is a relatively easy exercise.

The frequency with which the various types of feature appear may be the subject of questioning

in court when defence is attempting to minimise the weight of your evidence.

For instance, if your comparison consists entirely of ridge endings the defence may try to use the fact that they are the most common ridge feature to suggest that therefore the individualisation is not really as strong as it would be with other, less common features.

The less common formations may certainly make the initial search easier but, once an individualisation has been made, they do not make it any stronger.

Despite the fact that the suggestion is untrue, a persuasive defence counsel could influence a jury unless you are able to present your evidence convincingly.

You should therefore be familiar with the frequency of occurrence of the various ridge features.



The remaining 3.73% consists of other, very infrequent, features such as overlaps, crossings and pinches, all of which are only variations on the basic ones.

## COMPARISON PRINCIPLES

There are many versions of the basic principle dealing with fingerprints. You can use any one you come across in any text if you understand and agree with what it states.

This is a simplified version;

***Individualisation is established through the agreement of friction ridge characteristics in sequence***

It is extremely important that you understand and be able to explain the statement, not simply have

it memorized and be able to recite it in court. You must expect that defence counsel will ask you what it means.

We will examine the statement closely so that you will have no doubt as to the intended meaning. You should then be able to paraphrase the principle. An understandable explanation, given in your own words, will limit the opportunity for defence to attack you or to confuse the jury on this point.

**"Individualisation..."** simply means being able to positively connect the unknown impressions to a single individual and no other.

**"... agreement of friction ridge characteristics..."** states that the corresponding characteristics on both impressions must match

**"...in sequence."** means that no matter in which direction you move, starting from any characteristic common to both impressions, the relative position, number, type, and shape of every other characteristic must match in both impressions.

## Differences.

Note that the word 'identical' is not used in the above principle. The Oxford dictionary gives one meaning for the word as "...agreeing in every detail."

It is important that you understand that you will always find differences, therefore we can never say that they are identical. Even if you ink and roll the same finger twice in succession and then compare them closely you will find some differences. These are explainable as differences caused by inking, pressure, grip and rolling technique.

## Crime scene vs inked impressions.

When you are comparing a crime scene impression with the inked impression the differences become even more striking. Obviously the crime scene impression was not inked and rolled. It may therefore have a different overall shape from the inked impression.

The substance deposited by the digit is unknown and may be natural secretions or a combination of those with a wide variety of foreign materials.

Development methods may be anything from powdering, fuming, liquid chemicals or fluorescence, or a combination. The impression will then obviously differ in appearance from the inked impression.

The total size of the impressions will also be different. Crime scene impressions are not rolled and, in fact, often more closely resemble the plain impressions on the fingerprint form than they do the rolled impressions.

All of these differences can be expected to occur during the normal processes of touching objects or depositing inked fingerprints. Should the defence ask if you found any differences, therefore, the answer is obviously "Yes, there will always be differences".

Differences in area or in appearance (i.e. ink vs powder or chemical development) are easy to explain and no cause for concern.

The differences that interest us are those that may be apparent in the ridge paths or the ridge path deviations.

When these are present you must attempt to determine a reason why they exist so that you can be prepared should you be asked in court to explain the reasons for those differences. This may not always be an easy task.

### **Causes of differences.**

Let's look at possible explanations for observed differences.

The crime scene substrate is often dirty. A small particle of dirt or foreign material may have been positioned exactly in the space between a ridge ending and an adjoining ridge. When the impression was then developed the particle may have been recorded along with the impression then giving the appearance of a bifurcation.

Similarly, shreds of paper towel or other dirt on the inking plate or other equipment when the inked impressions were taken could cause a similar problem.

Dirt or foreign materials on the digit that left the impression may be developed in a similar fashion. Again, this would also apply to dirt on the hands at the time the inked impressions were taken. This, of course, is the reason that it is important for the subject to wash before being fingerprinted.

On inked impressions excessive ink on the fingers may have filled in the space between the ridges. This is often the case when several sets of impressions are taken without washing the hands in between sets.

Friction ridge skin is more or less flexible depending on the softness or firmness of the hands. Lateral pressure on soft hands can cause a ridge ending to bend sideways far enough to touch an adjacent ridge and, as an example, change the appearance of a ridge ending to that of a bifurcation. This could occur on either the crime scene or the inked impression.

Slippage of the digit while the impression is being made, whether at the crime scene or when inked, could change the appearance of one characteristic while leaving the others intact.

A very small, new, temporary or permanent injury could change the appearance of the ridge in that location without the injury itself being particularly noticeable.

Any of the above conditions, and probably many others, could cause apparent differences on otherwise clearly recorded impressions.

When we consider that most crime scene impressions and, sad to say, many inked impressions are not recorded clearly, you can appreciate that there could be many reasons for an apparent discrepancy in the continuity of ridge detail.

Look at the following diagram. Just left of centre near the top you will see a characteristic labelled number 5. From previous discussion you should be able to identify it as an enclosure or lake. The upper ridge is somewhat broken but appears to curve down at both ends to touch the ridge below it.



Now look at the following diagram. You will notice that the characteristic that is labelled number 5 does not look like the number 5 in the previous diagram. It now appears to be a spur or short bifurcation.



Check the remainder of both diagrams. They agree with that one exception.

Can you tell which of the conditions discussed above (or any other) is responsible for the variations in these impressions? Despite the demands of defence counsel you will probably not be able to give a definite answer and will simply have to explain that one or more of the conditions, listed above, could have caused the apparent discrepancy.

*(The above diagrams were made 28 years apart by Sir William Herschel during his persistency tests. Note that numbering the features directly on the diagram is not now recommended when you are making an illustration for court.)*

To give opinion evidence of an individualisation you must be certain in your own mind that, despite the perceived difference, the impressions were made by the same digit. This confidence will come through experience. When you have looked at many thousands of impressions you will become familiar with the types of differences you can expect to see on a regular basis.

### Differences with less obvious explanations.

Occasionally, during a comparison, you may come across an impression having an extra characteristic that cannot be immediately explained by any of the above reasons.

Very careful study will sometimes suggest a reason for the apparent discrepancy. At other times, however, there is no obvious explanation.

In some of these cases there has been an injury to the digit and, on healing, the ridges have been realigned in a different position without any scarring being noticeable.

How, then, can we explain in court that this type of variance in the two impressions is not sufficient to negate the individualisation? (A position that is sure to be taken in an aggressive cross-examination by defence counsel.)

Look at the delta area of the following diagram.



Now compare that with the delta area of the following diagram.



*(The above comparison came from Bruce Ferguson F.F.S., Royal Hong Kong Police. Published in Fingerprint Whorld, July 1992.)*

You will see that there is a short ridge just below the delta on the second diagram that does not appear on the first. Everything else matches.

In these two impressions there is a large number of corresponding characteristics.

It would make no sense to ignore the continuous agreement of all of these other minutiae and state that, because there is one discrepancy for which we have no definite explanation, there cannot be an individualisation.

In fact it would be worse than that. It would call into question most of the millions of individualisations made over the last 90 years that have historically been based upon a minimum number of characteristics, be it ten, twelve, sixteen or some other number.

Using the above illustrations as an example: If we were to cut off the delta area of the impression we would be left with more than enough information with which to conclude that we have an individualisation no matter what number or method we used.

If that was the way we had originally found the crime scene impression we would not be aware of the discrepancy. We would then happily form a positive opinion about the individualisation.

Yet in the present case we know that there is a discrepancy. If we were to accept an argument that the individualisation cannot be accepted because of that single anomaly then the field of individualisation has a serious problem.

The logical extension would be to say that we cannot form an individualisation unless we have seen and examined every single minutia that exists on the digit, not just those that were recorded in the fingerprint.

We never record every single ridge characteristic on a digit even when taking inked impressions, let alone find them at a crime scene. It would therefore be impossible to ensure that any impression did not have a discrepancy just off the recorded area. Accordingly this would therefore completely negate all fingerprint comparisons.

Careful study of the above illustrations will show that the discrepancy could have been caused by an injury to the digit. This moved three ridges (on the first diagram, the one below the delta, the delta ridge and the one above the delta) up and to the right exactly the amount of one intervening ridge. The effect was much like the points on railroad tracks except in this case there were three 'tracks'. A short piece of the ridge below the delta was not affected and thus remained in place, giving the appearance of a short ridge.

Can we prove that explanation? Not likely. Chances are good that you will not be able to pinpoint the exact reason for a dissimilarity in some of your own comparisons. You will then only be able to say that it could be due to one of the reasons outlined above. What you will have to be able to say with confidence is that despite the variance there can be absolutely no doubt that the two impressions were made by the same digit.

You will only be able to do this when you have sufficient additional detail to satisfy yourself and any other competent FIO beyond any reasonable doubt.

Given that you have used sound procedures when comparing the impressions and forming your opinion, you should have no difficulty in defending your conclusion.

## **Comparison Procedures**

The procedure laid out in the following section is not the only way in which comparisons may be accomplished. It is, however, proven to work well and to preclude, or at least minimize, the

questions that could be asked by defence to attack you on cross examination.

It still remains for you to explain to the court during your testimony just how these procedures help you to maintain your objectivity.

This, combined with your training and experience, should provide the court with the confidence in your opinion that it requires to assign the appropriate weight to your evidence.

In the textbook *Individualisation: Principles and Procedures in Criminalistics*, by Harold Tuthill, you will find a complete discussion of comparison and individualisation of all types of impressions.

This text will give you much vital information that will help you to understand the rationale behind the scientific method employed in making comparisons.

It is absolutely essential that you read and understand the concepts that are discussed in the book. With this understanding you will be adequately prepared to present your evidence to the best possible advantage in court.

For the present, read Chapters 3 and 4 (pages 16-73)

**NOTES:** As you read the two chapters keep the following comments in mind:

Ch. 3 We will later be discussing the concepts espoused by David Ashbaugh under the title of Ridgeology which replace the old 'numbers game' when making individualisations.

Ch. 4 We will add Verification as a mandatory step in the scientific process, thus making it a four step process.

*NOTE: In the following section the concept of three levels of detail is adapted from the work of David Ashbaugh who was perhaps the first to put into writing what has long been standard working practice.*

## Preparation

We are starting this discussion with the assumption that you have already performed the Analysis phase as per Chap. 4 (pp. 30-49) of Tuthill's book.

You now should be familiar with all of the visible detail in the unknown impression. If it is a poor quality impression, you will have made a sketch of the characteristics that you can readily see to avoid the danger of seeing things that are not really there after you look at the known impression.

The next step is to pick a small group of ridge characteristics on the unknown impression that you find easy to memorize, four or five is usually sufficient. This group does not need to be something especially unusual although that will, of course, make the group easier to spot as you search through a number of impressions.

Make a sketch of those few characteristics, noting generally where they lie on the impression relative to the core or a delta. This will minimise the clutter of ridges that you must mentally disregard each time you refer back to the group as you search through the suspect impressions.

Note that this group is not what your individualisation is based upon, it is only for the purpose of narrowing the search. It will direct you quickly to those impressions having similar formations and eliminate the need to examine every single impression. Once you find a similar group of minutiae you must then widen your examination to the whole of the impression

*(Refer to the diagrams in the section on Searching Evidence Impressions)*

## Preliminary Screening

Now you can actually start to look at the known impressions against which you will be comparing the unknown. Usually these will be inked impressions of suspects or of persons whose impressions are to be eliminated such as the victim, complainants, relatives, neighbours or police officers. Don't forget to eliminate your own!

**a) First level of detail.**

The first thing you will look for in the sets of comparison impressions is fingerprint patterns that are similar to that of the unknown.

This initial screening by pattern type is actually sorting by class characteristics. There is no point in searching against an arch or a whorl if you have identified an impression as being definitely a loop.

Keep in mind the earlier discussion in this manual that deals with partial fingerprints and the possibility that what you see is only part of a larger, more complex pattern.

After you have performed a sort based on the first level of detail, each of the impressions remaining in your comparison set will have a pattern, or partial pattern, that is similar to that of the unknown digit. You will now move on to a search of the second level of detail

**b) Second level of detail**

The second level of detail is the type and placement of the actual ridge characteristics. It is at this point that you really begin making comparisons.

Now you will refer to the sketch of the small grouping of ridge characteristics that you made during the analysis phase of your examination.

For the initial stage of this search it is usually easier to refer to your sketch and to use one magnifying glass for looking at the comparison impressions.

Then, when you find something that you want to examine more closely, use the second magnifying glass on the actual unknown impression.

**Fingerprint glasses.**

This is a good point at which to discuss the type of magnifying glass that is most appropriate for the task.

It should be of about 4X magnification with a flat field. This latter term means that there should be no distortion at the edges of the magnifying glass. Cheap magnifiers will show distortion at the edges. Such distortion will not prevent you from seeing the impressions but it will certainly make your eyes ache if you have a long search.

Buy the best you can afford, in the long run you will find that they are worth the price. Also, if you will be using two simultaneously, ensure that both glasses are the same type and magnification so that you minimise eyestrain.

Unless you will be classifying fingerprints you do not need to buy the reticle discs that clip or screw into the foot of the magnifiers. These have lines or circles, or a combination of both, etched onto them and are used for the various types of fingerprint classification systems. They are expensive and are of little or no value for comparison work.

Let's assume that you have found a fingerprint with a formation that appears to have some similarity to your unknown.

Now set up the two impressions closely side-by-side with one magnifying glass on each so that you can look through them both simultaneously.

**Ridge pointers.**

The next thing you need is a pair of ridge pointers. These can be made of almost anything with a fine point. The fingerprint suppliers have several types, including some with retractable points. Those with extremely fine sharp points should be slightly rounded off to prevent damage to your exhibit or lift.

We have found that a convenient, and inexpensive, pointer can be made using a retractable drafting pencil by removing the lead and replacing it with a round toothpick. These have points sharp enough to indicate small characteristics but will not easily damage your photograph or lift. If you bend or break the tip you can simply reverse it in the holder and, of course, they are very cheap. You could use the toothpicks without the lead holder but they are less comfortable to grip for long periods of time.

## The final stage of the comparison.

Having narrowed the search to one of the known impressions with an apparently similar configuration of characteristics you will move on to the final stage of the comparison

### c) Third level of detail.

In this stage you will use the third level of detail, that is, the actual shape of the ridge characteristics or ridge path deviations.

The following diagrams give you an introduction to the differences you will find as you closely examine ridge characteristics.

For example it is not sufficient to merely find a ridge ending in a certain location. That ridge ending must have the same specific attributes as the one on the unknown impression.



For example; a ridge ending may be fat or thin, pointed or rounded;

It may be centred between ridges, curve to one side, or be between two narrowing ridges.



A bifurcation may join at a narrow tapering angle or a more "U" shape or may be offset to one side or be perfectly symmetrical.



Ridge dots may be centred between the ridges, close to one side or the other or the ridge may bulge at that point to make room for the ridge dot.

These are just a few of the possible variations with only three types of ridge features. The differences within these variations are endless and there are many other types of ridge features to consider.

Just looking at a piece of a continuous ridge at this level of detail also reveals variations. They are not simply straight, parallel-sided lines. When the minutiae are examined at this level of detail it becomes more and more obvious that the chances of finding two matching impressions having different donors is impossible.

Most experienced examiners will have found, or been shown, impressions from different digits with four or five or six characteristics that are purported to match. In these impressions there are second level details such as ridge endings and bifurcations in approximately the right relationship to one another.

When they are examined, however, using the third level of detail, it becomes immediately apparent that they are not from the same digit.

## Procedure.

To examine the impressions closely it is easiest if you set up a magnifying glass over each impression so that you look through both glasses simultaneously. You can then look from one impression to the other very quickly without having to adjust the magnifiers each time.

Orient the two impressions the same way, i.e. with reference to a clock face, ensure that the slope of the impressions is in a similar direction.

Place the tip of one ridge pointer on a prominent characteristic on the unknown impression and hold it there. Now look for a similar

characteristic in the same relative position on the inked impression. If you find it, place the tip of the other pointer on it and hold that one in place.

Now go back to the unknown and move the first pointer to the next adjacent feature, noting the direction you moved and across how many intervening ridges, if any. Hold the first pointer in that new location. Next look again at the inked impression and move the second pointer the same number of ridges in the same direction as you did on the unknown. There should be similar characteristic at this point.

If there is, you simply continue the process until you have checked all of the ridge details (ridge path deviations) that are common to both impressions.

If there is not a matching characteristic in the new location do not give up the comparison immediately. Go back to the starting point on the unknown impression, move in a different direction and check again on the inked impression for a similar characteristic. Having done this several times you can then be sure that you do not have a matching impression and can move on to the next suspect.

As you perform this comparison you must observe the shape of each of the individual characteristics. When the impressions are clearly recorded it will be a simple matter to see the third level of detail of each of the noted features. You can then determine whether or not they have the same appearance.

Apart from any smeared or unrecorded areas you must be able to match every feature that is common to both the crime scene impression and the inked or known impression. To be able to meet this obligation you must have examined every single ridge characteristic that appears on the unknown impression.

## **MAKING THE EVALUATION**

Although we discuss evaluation as if it is a separate process you will, in fact, most often be making the evaluation simultaneously with the comparison. It is not necessarily a conscious process. If you have completed the comparison steps according to the method outlined above you

will have formed an opinion, whether positive or negative.

As a beginner you can expect that it will take some time before you are able to confidently state your opinion about a comparison. This is not only to be expected but actually to be encouraged. It takes practice and experience before you learn exactly what to look for and there is no way to gain this experience but to make comparisons of thousands of fingerprints.

At first, even with very clear impressions, it will seem like a very slow process. If you are performing the task properly it should be a slow, deliberate consideration of the whole impression during which your opinion is gradually formed.

### **Pressures**

Do not allow yourself to be rushed because that is when errors are made. At your office you will face pressures from investigators who will have a variety of reasons why they want you to hurry your comparison. You cannot afford to make an error that could result in them arresting the wrong person. No matter what the urgency may be, you need the time and the proper conditions in which to do the job accurately. It is essential to maintain your credibility with the investigative branch as well as in court.

### **Your conclusion.**

Some impressions take a great deal of study before you can reach a conclusion, while others may take only a few seconds. However, every impression must be fully examined and checked no matter how obvious the individualisation may initially appear to be.

No matter how long that part of the process takes you must always complete the comparison by checking the whole impression. You cannot afford to jump to swift conclusions in the field of fingerprint individualisation.

With fingerprint comparisons there can be only three possible outcomes;

- the two impressions definitely have the same source
- they definitely do not have the same source

- there is insufficient detail to be able to make a comparison.

There cannot be any conclusions of probability or possibility with fingerprint comparisons.

### **Courtroom presentation.**

*This subject is covered in detail elsewhere. This section merely reminds you of your responsibilities with respect to presentation of your conclusions about the fingerprint comparison.*

You must know the impressions completely before you present them in court. Following this rule prevents any unpleasant surprises during cross examination. Remember that defence counsel will be attempting to attack your credibility.

If defence is able to point out features on your illustration that you have to admit that you had not previously noticed the repercussions would be very serious. Your credibility would be lessened as would the weight given to your evidence.

As an expert witness you have a responsibility to the court to show that your work was performed as scientifically and as completely as possible. This includes explaining or demonstrating the procedures you used in forming your conclusion.

It is then the task of the court to assess whether you have used procedures that could be expected to provide accurate conclusions.

The question of what methodology was actually used and whether established procedures were followed is a field in which defence counsel is beginning to take a great interest.

They have found that proven procedures are frequently not followed by various expert witnesses, not just identification officers. As a result, they tend to hammer away at that point until the jury is unable to determine whether the procedures that were used would guarantee the formation of an accurate opinion.

All defence counsel has to do is raise a reasonable doubt in their minds and the jury may

well downgrade the weight given to your evidence.

Your aim, as an expert, is to appear to be as objective as possible. One of the things you can do to demonstrate that objectivity is to show that you checked every single ridge feature that is common to both impressions.

It must be stressed that, providing you follow the scientific procedure to the letter, there is very little chance of error. The greatest single cause of incorrect individualisations is failure to follow a set, scientifically modelled procedure. Taking shortcuts through ignorance, carelessness, laziness, boredom or a know-it-all attitude will inevitably lead to errors.

To avoid even the remote possibility of error we include the final step in the process:

### **VERIFICATION**

As a beginner in the field of comparison you will, as a matter of course, have your work checked by a supervisor who wants to be assured that you are capable of performing comparisons with 100% accuracy. That is one of the everyday tasks of a supervisor. You will learn from these senior identification officers and build your own confidence as you gain experience.

However, some examiners, having gained experience and having successfully presented evidence in court, resent the perceived implication that their work needs to be checked.

What they have failed to appreciate is that at this stage in their careers the reason for the checking is no longer to determine whether they are capable. Now the checking is simply part of the overall scientific method and is called Verification.

Papers have been written by experienced examiners who completely miss this point. Their argument is that if they admit that they had their work checked it will be suggesting that they were unsure of themselves.

They could not be further from the truth. To show that you have been ultra-careful in your work and that you have had an independent verification of your conclusion is merely a

further illustration of your attempt to maintain a scientific detachment.

To make the verification process valid you must choose someone who is well experienced in making fingerprint comparisons. (Similarly if it is a footwear impression the checker must have had experience with footwear comparisons). It is obviously not satisfactory to ask someone with no experience to perform the task.

In some cases this will mean a long drive to meet with the closest FIO to your unit. If you decide to ship items to a distant FIO do not send the original lifts. Don't forget that you should be prepared to prove the continuity of possession of the evidence. You must also guard against the possibility of loss or accidental damage. The originals are your evidence and must be preserved for court under the 'best evidence rule'.

On the other hand it would not be appropriate to merely hand over your completed illustration to your verifier. This will probably have the characteristics marked that you will be using to explain the conclusions of your comparison.

In this case it would be difficult for your verifier to ignore those marked features and perform a full, independent, objective comparison.

Whenever possible provide good quality unmarked photographs of the two impressions. The verifier can then demonstrate, if asked, that the comparison had been performed under conditions that would not have tainted the final opinion

This brings us to the final point.

Once the court illustration is completed it is well to have someone look it over to see that it has been done accurately. It would be embarrassing to have the defence point out that a feature that is indicated on one photograph does not match one marked as a corresponding feature on the other photograph.

While perhaps not technically part of the verification process, having somebody check your illustration could certainly help to avoid having to explain to the court a mistake in preparation.

In such a situation your credibility as an expert is immediately placed in question no matter how innocently the error was made.