



Mack Brazelle

CLPE

Whorl Pattern Analysis: Determining Directional Flow

To analyze something is to separate it into its fundamental parts and determine its elements, essential features, or its value.[1] The process of latent print identification always begins with the analysis phase. The analysis is not only the first step, it is arguably the most important aspect of the identification process.

In latent print examination, the analysis phase can be segmented into two parts, observation and interpretation. The first part (observation) is a thorough gathering of the visual information contained in the latent print. The second part is taking the observable information and interpreting it. The purpose of interpreting the information is to reach some logical conclusions about the information gathered. One type of logical conclusion that can be reached after analyzing a latent print is its anatomical origin.

It is common knowledge that a loop pattern that flows down and to the right (away from the core) is most likely to originate from the right hand. In fact, any loop pattern that flows down and to the right away from the core has a 94% likelihood of being from the right hand.[2] This information is so widely understood that examiners often refer to loops as either right slanted or left slanted. This statistically significant data would lead any examiner to search the right hand first when trying to locate a right slanted loop. Whorl pattern prints, just like loops, can be quickly and accurately classified as either right or left slanted by determining directional flow.

This article (and the subsequent *visual guide*) will review one specific aspect of analyzing whorl patterns that is often over looked or underutilized by latent print examiners. This analysis technique is called *Whorl Pattern Directional Flow*. Whorl pattern directional flow are clues that can be used to predict if a whorl pattern most likely originated from a right or left hand. These visual clues can be separated into five (5) key elements titled: Axis, Whorl Flow, Bottom Loop, Funnel Effect and the Inside Delta. Detecting and correctly interpreting these clues will enable a latent print examiner to be more efficient by narrowing the initial search area.

The following pages will outline the five elements of *Whorl Pattern Directional Flow*. Mastering these five elements will allow examiners to confidently predict what hand a whorl print most likely originated from.

If you would like to test your ability to determine directional flow and predict what hand a print originated from after reviewing the elements, you can contact the author for a worksheet and test at mackbrazelle@gmail.com.

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References

1. www.thefreedictionary.com/analysis
2. Di Palma, E., Fingerprint Patterns and Subcategories: A Visual Guide, *Identification News*, Vol. 43 No. 4, 2013.
3. www.thefreedictionary.com/axis

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Mack Brazelle is a Fingerprint Specialist with the Treasury Inspector General for Tax Administration Forensic Science Laboratory. He is recognized by the IAI as a Certified Latent Print Examiner and Crime Scene Investigator. Mack is a Certified Instructor with the State of North Carolina and has taught latent print analysis since 2007.

Whorl Pattern Directional Flow

Determining directional flow is a technique latent print examiners can use to accurately predict if a whorl pattern originated from the right or left hand. There are five key elements that can be utilized to identify which hand (right or left) a whorl pattern most likely originated from. Understanding how to quickly and accurately interpret this information is critical for latent print examiners who want to narrow the search area. The five elements for determining directional flow in whorl patterns are: the Axis, Whorl Flow, Bottom Loop, Funnel Effect and Inside Delta. The rules for each element are outlined below with a concise definition and accompanied with visual examples to help illustrate the information. Each rule is distinctive and can stand on its own in helping examiners determine directional flow; however, it is important to note that not all the rules have equal value. The axis rule is the most important, accurate, and often the easiest to observe. Therefore, if a whorl pattern has a noticeable axis all the other rules should be ignored in favor of the directional flow of the axis. The one commonality among the five elements is that the directional flow will always point towards the hand that it most likely originated from.

Axis

The word **axis** can be defined as a straight line about which a body or object rotates or may be conceived to rotate.[3] The axis of a whorl pattern is similar, and can be described as “the imaginary center line of the print”. Rarely is the axis perfectly vertical (straight up and down). The axis most often flows to the right or left. This directional flow will accurately predict which hand the whorl originated from.

Locating the axis of a whorl pattern and following the directional flow of the axis down will indicate which hand it originated from. A down and to the right flow indicates right hand while a down and to the left indicates left hand.

The axis rule always trumps the other rules outlined in this article. For example, if two of the directional flow rules appear in the same print and one of them is the axis, disregard the other rule if it contradicts the directional flow of the axis.



The globe (left image) shows the axis of the globe. Using the axis you can see how the globe would rotate around this axis if it was turned.

The two fingerprints (middle and right image) illustrate the axis of each whorl pattern. One simple way to visualize the axis is to imagine how the prints would rotate if it was turned in the same way the globe would.

Another way to locate the axis is to look for overall directional flow in the whorl pattern. Both of these whorl patterns have a right slanted directional flow. Just like all the directional flow rules outlined in this article, the flow is down and towards the hand it most likely originated from.

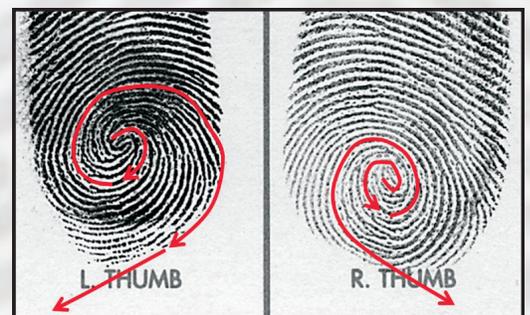
If a whorl pattern has an overall symmetrical shape (right image) examine the core to find the directional flow of the axis. The axis can sometimes be a single ridge in the center of the pattern.

Whorl Flow

The flow of the overall pattern in a whorl can indicate what hand it originated from. If the ridges inside the pattern area have a distinctive circular coiling movement the directional flow of the whorl can be established.

Not all whorls have a distinct directional flow, but when directional flow is present it is often easily observed. **Whorl flow** often looks like the ridges are coiling around themselves like a snake.

If you observe whorl flow, follow the ridges from the core outward until it leaves the pattern area. The direction that it leaves the pattern area will indicate what hand it originated from.



These two whorl patterns illustrate how the flow of the ridges coil away from the core until they flow down and out of the pattern area. The direction (right or left) that the ridge flow leaves the pattern indicates what hand it most likely originated from. In this example, the print on the left originated from the left hand and the print on the right originated from the right hand.

Bottom Loop

The **bottom loop** rule applies to double loop whorl patterns or patterns that have or appear to have two loops but do not meet the classic definition of a double loop whorl. It is common knowledge that 94% of all loops are ulnar loops. Ulnar loops have patterns that flow from the core towards the little finger (or the ulnar bone).

The same principle holds true for double loop whorl patterns. By locating the bottom loop (the loop that flows down from the core) you can predict what hand the double loop whorl most likely originated from by following the ridge flow away from the core. If the ridges flow from the core down and to the right the print most likely originated from the right hand. If the ridges flow from the core down and to the left it is most likely from the left hand.



This double loop whorl illustrates that the bottom loop is flowing from the core down and to the right. Just like a loop pattern the directional flow indicate that this print most likely originated from the right hand.



This whorl illustrates that without meeting the definition of a double loop whorl the visible bottom loop can still be used to determine the directional flow is to the right.

Funnel Effect

The **funnel effect** is a visual clue that can help examiners predict what hand a whorl pattern originated from when the entire pattern area is not available, as is often the case when working with latent prints.

The funnel effect can be observed in the area above the core (finger tips) on whorl patterns by observing the overall flow of the ridges. The funnel effect takes place when the overall flow of the ridges appear to be forcing the pattern into a smaller area, much like a funnel forces water into a smaller area. If a noticeable funneling of the ridges from a large area to a smaller area can be seen above the core, the direction that the ridges are funneled towards will indicate which hand the print most likely originated from. If the ridges are funneling down and to the right the print is most likely from the right hand. A down and to the left funneling ridge flow will indicate that the print is most likely from the left hand.



This fingerprint shows the directional flow of the funnel in the area above the core. Notice how the overall ridge flow starts out large on the left side but gradually funnels into a small area as it moves down and to the right, indicating that this print most likely originated from the right hand.

Inside Delta

By definition all whorl patterns have at least two deltas. Locating the **inside delta** can indicate which hand the whorl most likely originated from.

The whorl pattern that is considered to have an inside delta are those type of patterns that have one delta that is obviously closer to the core than the other delta. The best example of an inside delta are those type of patterns that are defined by the Henry System as Central Pocket Loop Whorls.

If the inside delta is located to the right of the core the whorl pattern is most likely from the right hand, and if the delta is located left of the core the print most likely originated from the left hand.



This whorl illustrates an obvious inside delta because the delta on the right is notably closer to the core than the delta on the left. In this example, an arrow is drawn from the core towards the inside delta (pointing down and to the right) indicating that the print most likely originated from the right hand.