

- What is evidence?
- What “counts” and what doesn’t?
- How does evidence *work*?
- How can evidence be used reliably to better understand what happened in unknown circumstances?
- How can evidence be misinterpreted, misunderstood, or manipulated?
- What are the impacts and implications of evidence and how it is used?



Evidence in Forensic investigations

- What is evidence?
- What “counts” and what doesn’t?

Locard’s “Principle of Exchange:”

“Wherever he steps, whatever he touches, whatever he leaves, even unconsciously, will serve as a silent witness against him. Not only his fingerprints or his footprints, but his hair, the fibres from his clothes, the glass he breaks, the tool mark he leaves, the paint he scratches, the blood or semen he deposits or collects. All of these and more, bear mute witness against him. This is evidence that does not forget. It is not confused by the excitement of the moment. It is not absent because human witnesses are. It is factual evidence. Physical evidence cannot be wrong, it cannot perjure itself, it cannot be wholly absent. Only human failure to find it, study and understand it, can diminish its value” (Kirk).

- How is evidence and how it is used?

What is evidence? Why is it important?

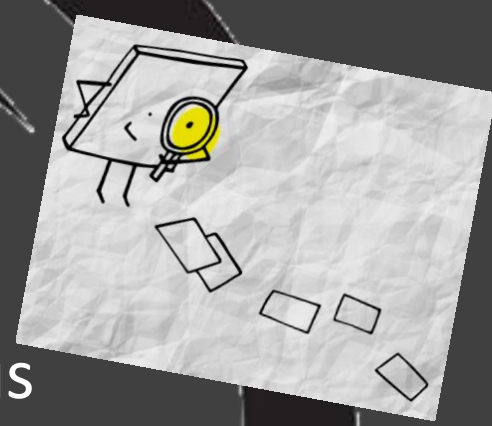
Evidence is data. It is information.

In the context of investigating the unknown details of a mysterious situation, evidence is the “stuff” that helps fill-in the missing pieces.

“[Evidence is] ‘anything that can make a fact or proposition more or less likely than it would have been without the evidence.’” Evidence is “anything that helps prove or disprove something about the [situation] being investigated” (Siegel). It is something that *tends to prove or disprove a fact*.

Evidence can take many forms, and have many uses in an investigation.

Evidence might be physical objects, circumstances and details about a situation, or testimony, ideas, assumptions, and opinions. The type of evidence and how directly it is connected to the events in question determines how it can be analyzed, interpreted, and applied to the investigation.



What is evidence? Why is it important?

Evidence is the key to building a reliable case – this is true in legal and criminal investigations, as well as Scientific and Historical research, and even argumentative or informational speaking and writing. **Evidence is the tool you need in order to *prove* your point.**

The problem, however, is that *proof* doesn't actually exist in most situations. So, instead, **gathering, presenting, and connecting evidence together is the way we can try to convince others that our way of thinking is the closest thing to “true” as possible.**

The “burden of proof” is the responsibility of anyone making an argument to provide enough meaningful evidence to change someone else's mind. This includes confirming your own perspective as well as refuting possible alternatives; using evidence that shows the reliability of your argument and negating evidence that would show your argument to be unreliable.



Categorizing Evidence

“Evidence can be classified in a number of ways and a given piece of evidence can fall into more than one category” (Siegel).

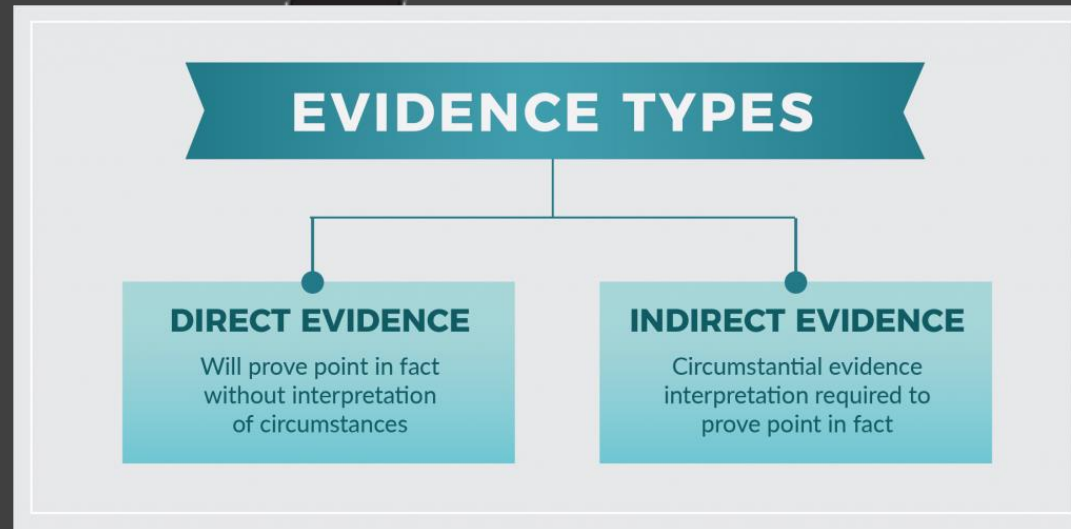
The type or category a piece of evidence fits into determines how it might be recognized, collected and preserved, documented, analyzed, interpreted and understood, and explained. By understanding how these different categories work, we can better understand the nature of evidence, and how to best use it to try to figure out what actually happened, how, and why.

We can also use this same understanding to find the ways in which different types of evidence are most likely to be misinterpreted, misunderstood, and manipulated.



Direct and Indirect Evidence

Direct evidence shows a fact or idea (the point you're trying to make) **without needing to infer or interpret** any details or aspects about the evidence and its connection to the situation in question.



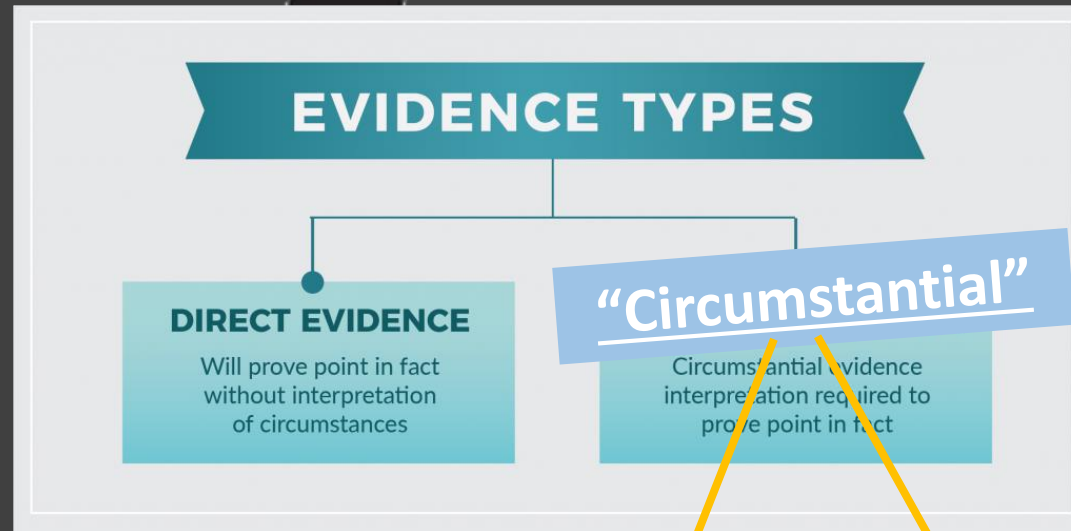
Indirect evidence shows information or details related to a fact or idea (the point you're trying to make), but **requires additional inference or interpretation** in order to fully understand how it connects to the situation in question.

Example: A surveillance camera records a person walking up to a bank teller and using a weapon to threaten them and steal money. The video footage is clear enough so that the person's face, physical characteristics, and actions can be easily seen. The assailant is identified and arrested and charged for robbery.

Example: (Cont.) After their arrest, a gun is found at the suspect's home that matches the video footage from the bank robbery. A fingerprint is taken from the gun and matched to the suspect, and also compared to fingerprints found at the crime scene. The fingerprint analysis is used to further show the connection between the suspect, the gun, and the crime scene.

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"Circumstantial"

Indirect evidence shows information or details related to a fact or idea (the point you're trying to make), but **requires additional inference or interpretation** in order to fully understand how it connects to the situation in question.

Error
Interpretation
Perspective
Bias
Prejudice
Manipulation

"Reasonable Doubt"

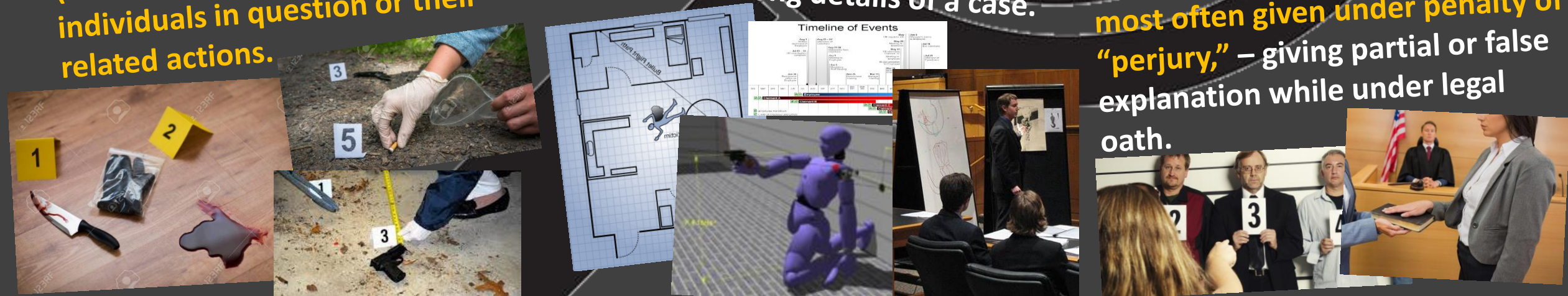
Example: (Cont.) After their arrest, a gun is found at the suspect's home that matches the video evidence. A fingerprint is found on the gun, and the suspect is identified at the crime scene. The connection between the suspect, the gun, and the crime scene is further strengthened.

Real, Demonstrative, and Testimonial Evidence

Real evidence is also called “**physical evidence**” or “**material evidence**” because it is most often found in the form of physical, observable objects and conditions. This category includes evidence that is **directly linked to the act that is being investigated** and the people involved. It is **tangible, observable, or measurable**, and was **produced (or left behind) by the situation or individuals in question or their related actions**.

Documentary evidence (“demonstrative evidence”) is not produced by the original situation, but is **produced by the investigators as they try to communicate their understanding** of what most likely occurred. This category includes **photos, sketches, diagrams, and maps** that can be used to show **information** learned from the analysis of real evidence and the connections among details of a case.

Testimonial evidence is **written or spoken** by people directly involved in the act that is being investigated, or indirectly connected through relationships or past experiences. This category includes a **legal record of the words of a person who has relevant knowledge of the situation, the people involved, or the impacts of the acts** in question. Testimonial evidence is **most often given under penalty of “perjury,”** – giving partial or false explanation while under legal oath.



Understanding more about Physical Evidence

There are many types of physical (“real”) evidence, and some are more tangible than others. **Since most physical evidence is indirect evidence, reliable analysis is an important part of connecting these different types back to the situation being investigated.** “In the evaluation of physical evidence, the most important question is: *what or who is the source of this evidence?*” (Siegel).

At the *time it is found* and documented, if the **source of the evidence is clearly identifiable**, it is considered **“known evidence.”**

At the *time it is found* and documented, if the **source of the evidence is not clearly identifiable**, it is considered **“unknown evidence.”**

Example: Several small drops of blood are found in a crime scene. After they are thoroughly documented, a sample of the blood is collected using sterile gauze and sent for blood type and DNA analysis. The individuals who are suspected of possibly being involved in the crime are each asked to provide a blood sample for analysis and comparison to the blood found at the crime scene.

Which of these samples are “*knowns*” and which are “*unknowns*?”

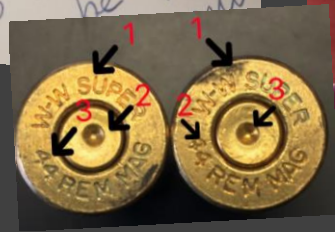
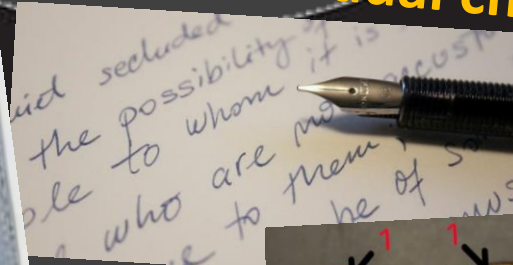
Understanding more about Physical Evidence

Identifying the source of unknown evidence can be complicated, especially if you don't have any "knowns" to compare it to. In order to reliably identify a piece of unknown evidence's source, its **class** and **individual characteristics** need to be analyzed.

Details about a piece of evidence that are **generic to a group of similar objects or individuals** are considered "class characteristics."



Details about a piece of evidence that are **unique to this particular object or individual** are considered "individual characteristics."

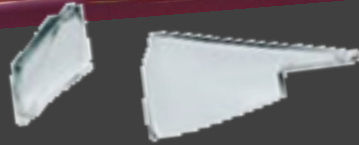
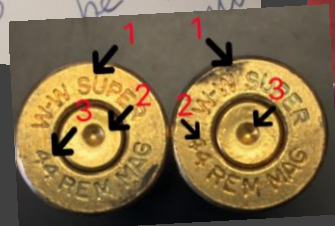
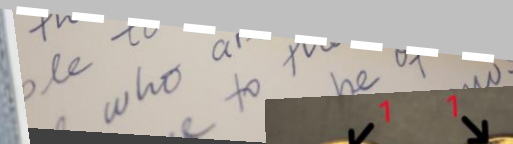
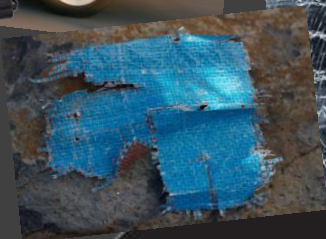


Understanding more about Physical Evidence

Identifying the source of unknown evidence can be complicated, especially if you have no known source to compare it to. In order to reliably identify a piece of evidence, you must look for unique characteristics.

“Individualization”

“Class evidence cannot be associated with one particular object or person. Individual evidence can be compared with an object from a known source and, if there are sufficient unique characteristics in common, it can be concluded that the evidence arose from the source. This conclusion is based upon the premise that the unique characteristics reduce the probability of it coming from another source to a level that can be considered to be insignificant” (Siegel).



Understanding more about Physical Evidence

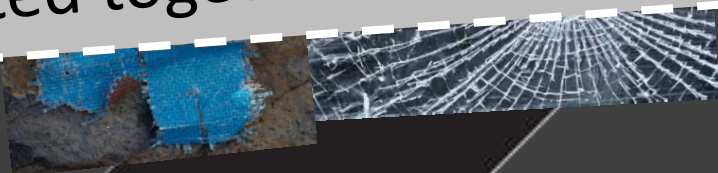
Identifying the source of

Example:

A victim has been shot. Analyzing the bullet, the type of gun can be determined. However, every handgun on the planet that matches that type could possibly be the weapon used in the shooting.

If later a suspect is identified using eyewitness testimony, and a matching weapon is found in their home, and this gun has the suspect's fingerprints on it, it can be inferred that this particular gun, to the exclusion of all others, was the weapon used in this shooting.

Further, if the found bullet's unique markings can also be matched to this gun using special analysis, the weapon and its owner can be all connected together to this crime.



Unclassified About Physical Evidence

Example:

“In December 1981, [Wayne] Williams was tried for the Atlanta Child Murders based largely on class fiber evidence. Multiple fibers, 28 different types in all, were found on several of the victims. These fibers chemically and optically matched fibers taken from Williams’s home and cars. Blue, yellow, white, and yellow-green fibers of various synthetic types were similar to fibers taken from Williams’s kitchen and backroom carpets, bedspread, throw rug, and car liner. Hairs matching those of his dog also were found. Williams was convicted” (Lyle).

While individualized evidence allows reliable connections to be drawn between individuals, evidence, and the situations being investigated, a wealth of class evidence can also be used to build a reliable case.

Understanding more about Physical Evidence

Locard's Principle of Exchange introduced the concept that tiny pieces of matter could serve as meaningful evidence of actions and interactions in unknown circumstances to the field of Forensics and investigations of all types. **These microscopic and small "traces" are left behind and carried away in everyday actions as well as violent or illicit actions that occur during crimes.** "The physical contact between a suspect and a victim can result in the transfer of trace materials. **The identification and comparison of these materials can often associate a suspect to a crime scene** or with another individual" (FBI.gov). These small fragments are referred to as **"trace evidence."**



Example: human and animal hair, textile fiber and fabric, soil and minerals, glass fragments, pollen and spores

Understanding more about Physical Evidence

There are several more specific types that are useful in understanding the use and analysis of physical evidence. These include **associative evidence, pattern evidence, conditional evidence, transient evidence, and transfer evidence.**

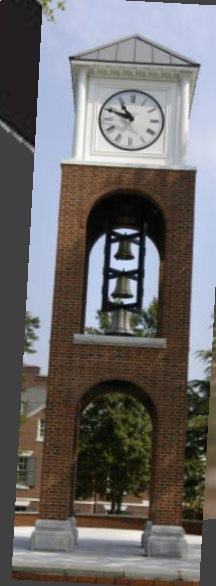
Associative evidence includes information that directly and **explicitly connects to a specific person**, most often without further analysis and inference.



Understanding more about Physical Evidence

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Conditional evidence includes **aspects of the location** where the situation in question occurred **at the time it happened.** These characteristics **could change** depending on the moment or time when the location is observed.



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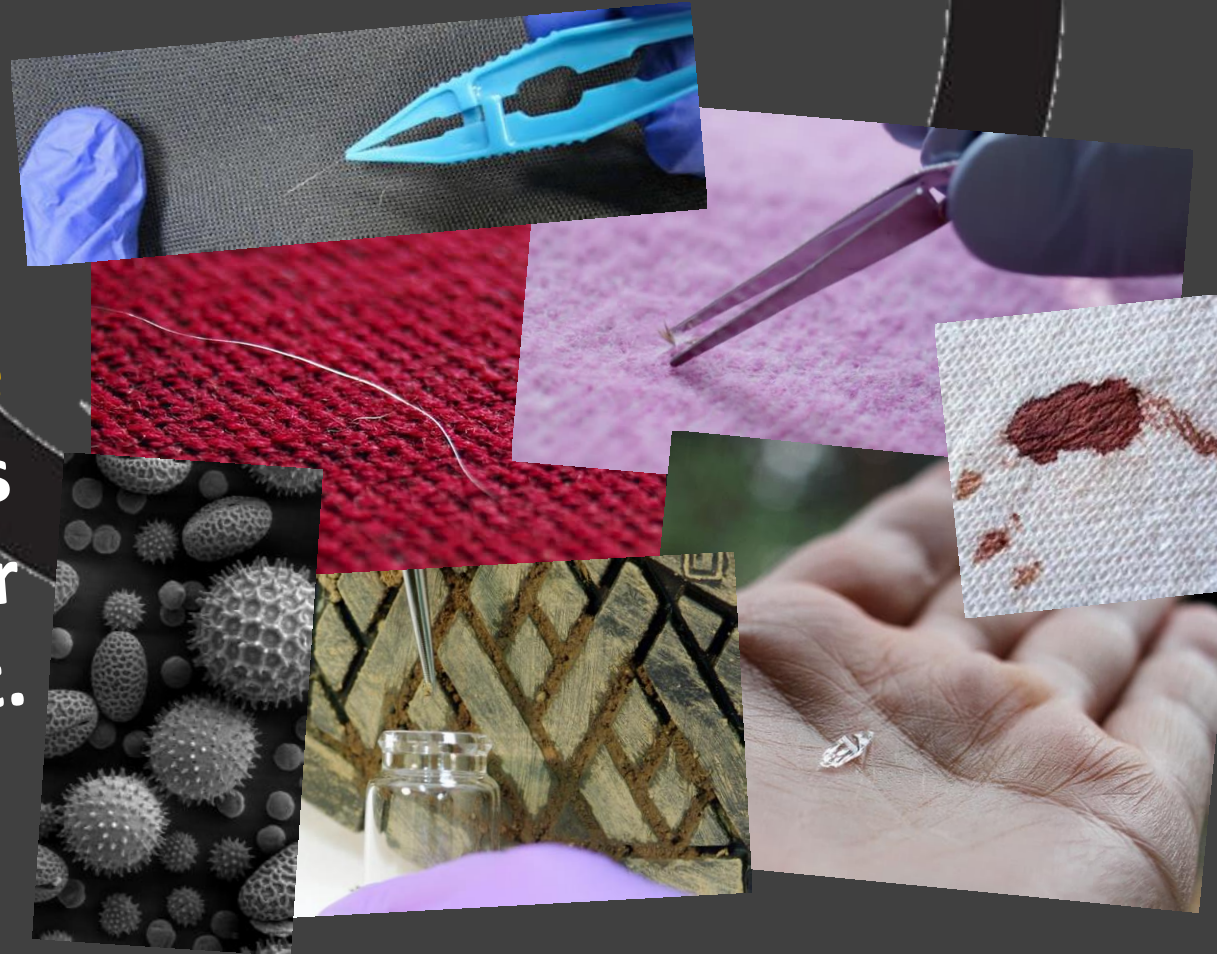
Pattern evidence includes information that can be determined **based on empirical and interpretive analysis** of objects or items left behind by mysterious situations. These conclusions are drawn based on **known patterns and characteristics** from past scientific research.



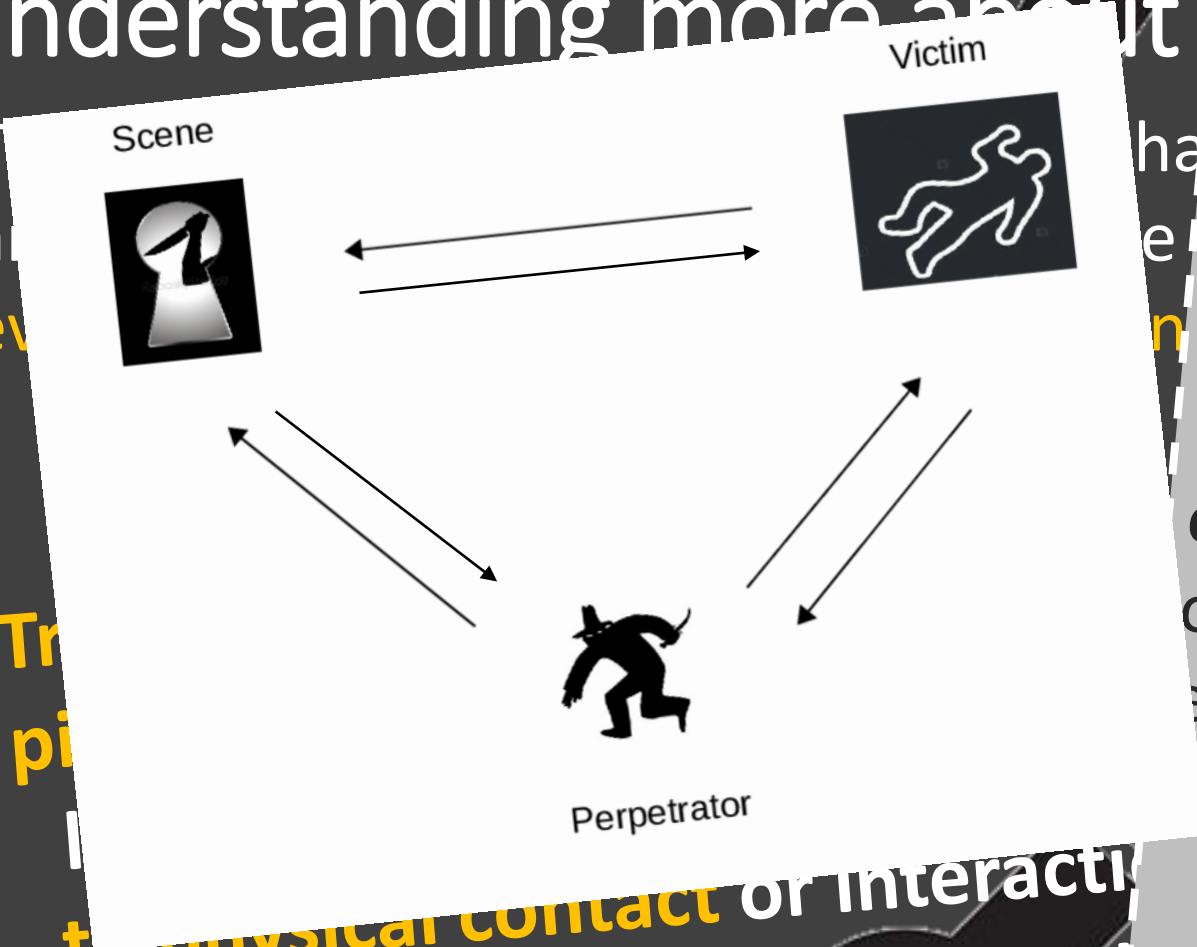
Understanding more about Physical Evidence

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Transfer evidence includes **physical pieces, fragments, or traces** – most likely very small – **left behind due to physical contact** or interactions between a person and another person, or a person and an object.



Understanding more about Physical Evidence

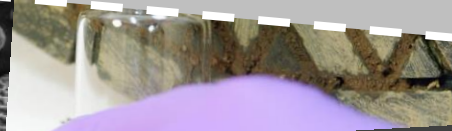
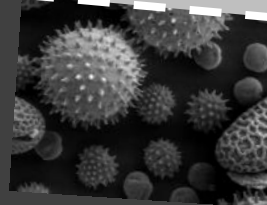


Locard's "Principle of Exchange:"

There is no better example of this core idea of Forensic evidence collection than the **transfer of trace evidence** that almost universally occurs in all criminal circumstances, especially violent scenarios.

- suspect to victim
- victim to suspect
- into crime scene
- out of crime scene

to physical contact or interaction between a person and another person, or a person and an object



Understanding more about Physical Evidence

There are several more specific types that are useful in understanding the use and analysis of physical evidence. These include **associative evidence**, **pattern evidence**, **conditional evidence**, **transient evidence**, and **transfer evidence**.

Transient evidence includes **aspects of the location** where the situation in question occurred **that are vulnerable or likely to change quickly**. These characteristics are difficult to preserve, so they must be recognized and documented as quickly as possible.



Pieces of evidence that are particularly **in danger of damage or contamination** are also considered **"transient."**

Inculpatory, Exculpatory, and Corroborative Evidence

Inculpatory evidence links the suspect to the situation being investigated, directly or indirectly. This is evidence that **includes the person in question as a relevant suspect**, connected to the investigation.

Example: A suspect's fingerprints are found at the scene of a crime, but the suspect claims that they were somewhere else at the time the crime is thought to have occurred. The suspect explains their fingerprints by saying that they often visit the location where the crime occurred. Video surveillance footage is later found that shows the suspect at the other place at the time of the crime, thus affirming their alibi. The suspect is excluded from the investigation moving forward.

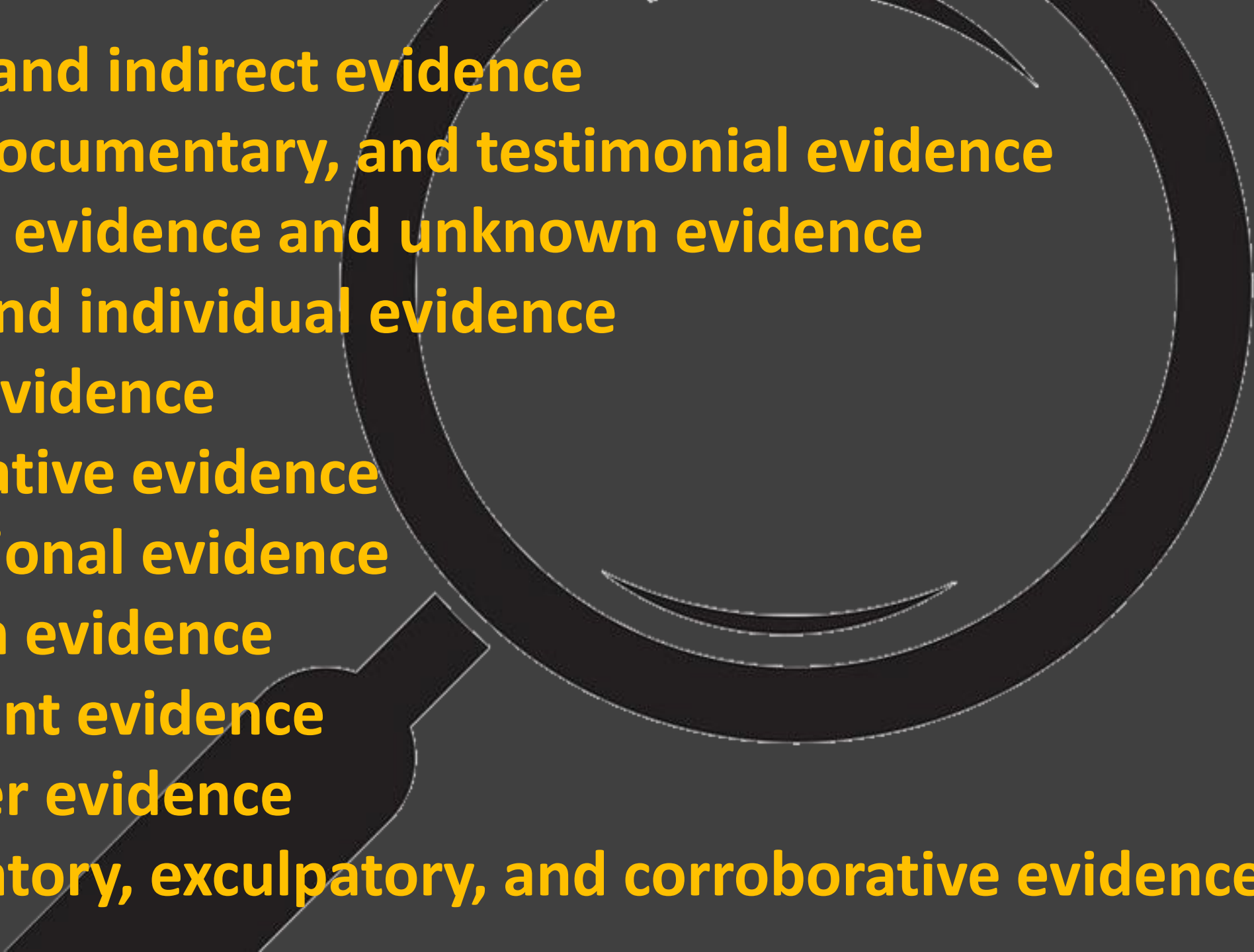
Exculpatory evidence shows the suspect cannot be (or is less likely to be) connected to the situation being investigated. This is evidence that **excludes the person in question as a relevant suspect**, no longer connected to the investigation.

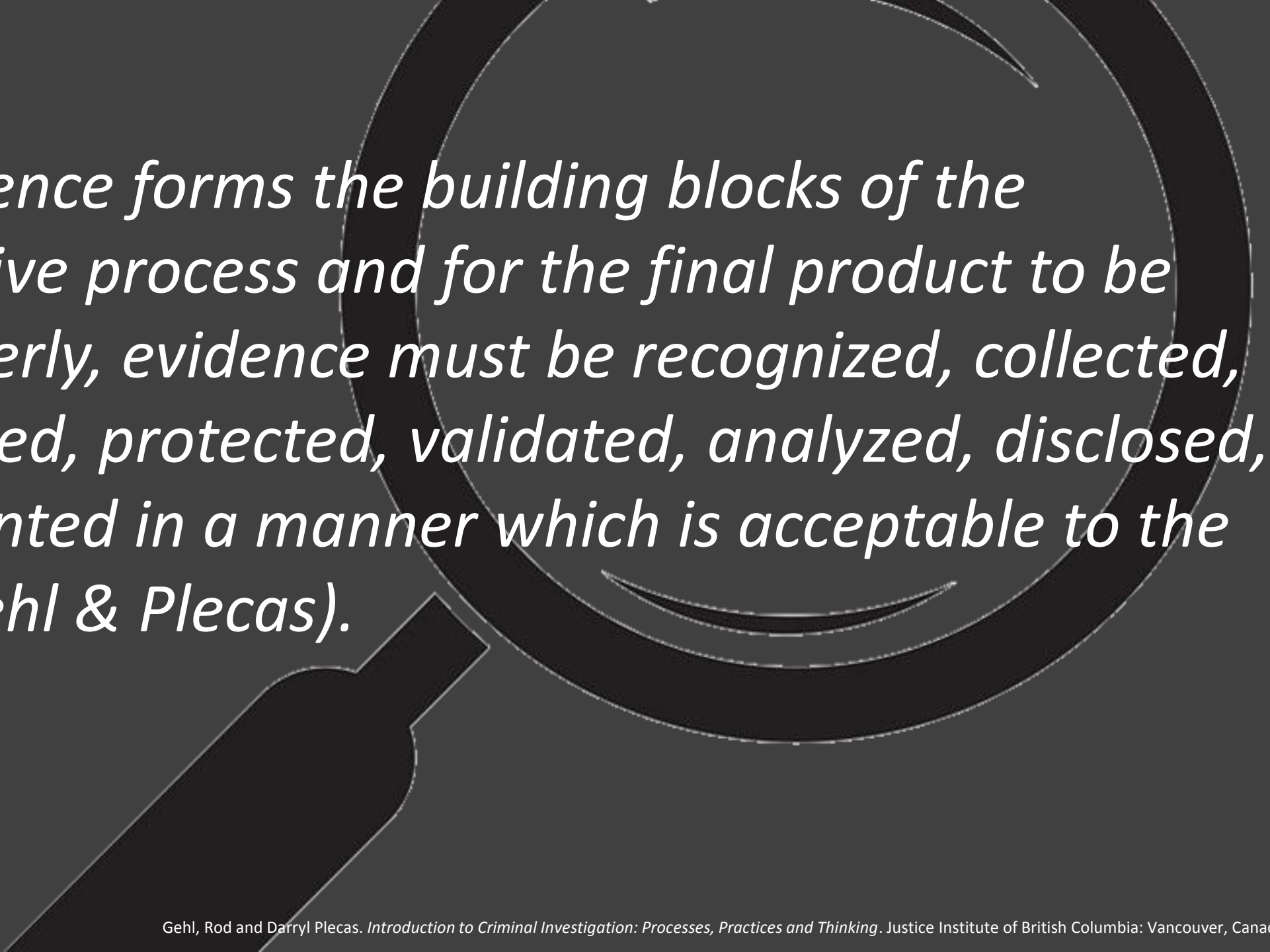
Corroborative evidence supports (or reaffirms) other evidence in order to build a stronger, more reliable case. This could be inculpatory or exculpatory evidence, but it **helps to show what is more likely to be true because it aligns multiple pieces of evidence together** toward the **same conclusion(s)**.



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- Fingerprints
 - Blood and DNA
 - Human bodies and bones
 - Toxins and poisons
 - Human and animal hair
 - Textiles and fibers
 - Documents and handwriting
 - Art and historical artifacts
 - Criminal psychology
 - Interrogation and profiling

- 3D impressions and tool marks
- Glass shattering and fragments
- Soils and minerals
- Plants, pollen, and spores
- Bugs and insects
- Paint and other traces
- Firearms and bullets
- Arson and explosives evidence
- Cyberforensics (digital evidence)
- Vehicles and auto evidence

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- **Direct and indirect evidence**
 - **Real, documentary, and testimonial evidence**
 - **Known evidence and unknown evidence**
 - **Class and individual evidence**
 - **Trace evidence**
 - **Associative evidence**
 - **Conditional evidence**
 - **Pattern evidence**
 - **Transient evidence**
 - **Transfer evidence**
 - **Inculpatory, exculpatory, and corroborative evidence**



“Evidence forms the building blocks of the investigative process and for the final product to be built properly, evidence must be recognized, collected, documented, protected, validated, analyzed, disclosed, and presented in a manner which is acceptable to the court” (Gehl & Plecas).