Every Contact Leaves A Trace

Topic

Locard's Exchange Principle

Introduction

This experiment tests Locard's Exchange Principle – the principle put forward by Dr. Edmond Locard, director of the world's first crime laboratory. It states the principle that when a suspect and a victim come into contact at a scene of crime, the suspect, the victim, and the scene of crime are all changed, and every contact leaves a trace. In the first part of this experiment, you will remove, identify, and record traces of materials adhering to the surface of clothes. From this information, you should be able to identify contacts made by the wearer of the clothes. You should be able to deduce, for example, if the wearer keeps pets (hairs should be found), if he has been walking through woodland areas (leaves and possibly plant seeds should be found), or if he is a messy eater. In the second part of this experiment, you will identify different surface conditions (asphalt, soil, grass) in the schoolyard or its immediate vicinity, and identify which area was visited by your fellow student.

Time required

Part A: 30 minutes
Part B: 1 hour

Materials

For Part A:
outer garment (sweater, wrap, pants) that has been worn at least once since being washed
translucent tape
hand lens
spatula
tweezers
Petri dishes or similar transparent containers
flashlight
labels
marker pen
30 cm ruler

For Part B:
old socks (to be worn outside over shoes)
2 sheets of white unlined paper (8½ × 11 inches)
3 index cards
pen
spatula
hand lens

Safety note

Before starting this experiment, make sure your hands are clean to prevent contamination of any traces. Wash your hands after completing Part B.

Procedure

You will need a partner for this experiment.

Part A: Sorting "clues" into groups

1. Place all the objects (the "clues") in the center of a table.
2. Discuss the evidence with your partner, and decide which objects should be grouped together. If necessary, use the magnifying glass to look more closely at the objects.
3. Sort the objects into these groups.

Part B: Looking at the members of a group

1. Look at the penny and observe its color. Check the column in the data table below that best describes its color.
2. Observe the finish on the edge of the coin. Is it plain or reeded? Check the relevant column in the data table.
3. Repeat steps 1 and 2 for the other three coins.

DATA TABLE

Coin	Color		Edge	
	Copper	Silver	Plain	Reeded
Penny				
Nickel				
Dime				
Quarter				

Analysis

Part A: Sorting "clues" into groups

1. Look at the group of leaves and examine the individual leaves. Are they all the same?
2. Look at the group of pieces of paper and examine the individual pieces. Are they all the same?
3. Look at the group of fabric samples and examine the individual samples. Are they all the same?

Part B: Looking at the members of a group

1. The data table groups the coins into sets (a collection of distinct objects), i.e., copper colored, silver colored, plain edged, and reeded edged. A Venn diagram uses overlapping circles to represent sets so that the combinations of properties are represented by overlaps between the circles. Draw a Venn diagram to show how a set of copper colored coins and a set of silver colored coins relate to a set of plain edged coins and a set of reeded edged coins. Use the colored pencils to denote the different coins. Identify the coins sharing characteristics where the circles overlap.

Want to know more?

See Section 10: Our Findings

General procedure

Three methods are used in this experiment to separate traces of materials adhering to garments.

(1) *Lifting*: Press lengths of translucent tape onto the surface of the garment, taking care not to allow materials stuck to the tape to fall off by overloading the tape. Place the tape lifts in a transparent container such as a Petri dish, where they can be studied with a hand lens.

(2) *Picking*: Use clean forceps or tweezers to lift traces of materials from the garment onto a clean sheet of paper (to avoid loss of sample). Transfer the traces of materials to a transparent container such as a Petri dish, where they can be studied with a hand lens.

(3) *Scraping*: Use a clean spatula or similar tool to dislodge the traces of materials adhering to the garment's surface directly onto a clean sheet of paper. Transfer the traces of materials to a transparent container such as a Petri dish, where they can be studied with a hand lens. (This technique is particularly useful for dried splatters of liquids.)

Label all traces of materials removed from garments with the identity of the garment's owner.

Procedure

You will need a partner for this experiment.

Part A: Examining clothes

1. Observe the surface of the garment and identify any traces of materials adhering to the surface. If necessary, use a flashlight to illuminate the surface of the garment (traces of materials can be shown in greater detail if light is shone on the surface obliquely).
2. Remove traces of materials from the garment using the techniques described above, starting with lifting. If materials are found that cannot be removed in this way, move to picking. If the material adheres more strongly to the garment, use scraping.
3. Using a hand lens, identify the fragments of material found as far as is possible. For example, you should be able to identify hairs, threads of fabric, leaves, and seeds.
4. Identify the garment and its owner in data table A on the next page. Record the technique(s) used to remove the fragments of material and the part of the garment from which it was removed. If the traces of materials were in the form of stains (e.g., milk), use the ruler to measure the approximate area of the stain.

DATA TABLE A		
Type of garment		
Owner of garment		
Date		
Evidence found		
Identification of fragment (hair/thread/leaf/seed)	Method of collection (lifting/picking/scraping)	Number of traces of this type found (for fragments) Area covered (if splashes or stains)

Part B: Identifying ground conditions

Decide between you who is going to act as the "observer" and who as the "experimenter" in this part of the experiment.

1. Tour the schoolyard observing the surface conditions in different areas (e.g., path, grass, running track) and record your observations in data table B below.

DATA TABLE B	
Type of area (e.g., grass, running track, path)	Surface

2. Return to the classroom.
3. Discuss the surface conditions of different areas in the schoolyard and identify three areas with different surfaces.
4. Invite the "observer" to write the names of the three areas identified in data table B on three separate index cards. Place these face down on a table.
5. Invite the "experimenter" to take one of the notes (ensure that the "observer" doesn't see which it is) and to read which area is named.
6. "Experimenter:" taking the pair of old socks, go outside to the location on the note. When you get there, put on the socks over your shoes and walk around in them. Then remove the socks and return to the classroom.
7. "Observer:" take the socks and scrape a sample from the socks onto one of the clean pieces of paper using the spatula. Transfer the sample to a clean Petri dish and observe it using a hand lens. Identify the sample and use the observations made in data table B to deduce where the experimenter has been.
8. Repeat the experiment (from step 5) with the "experimenter" and "observer" changing roles.

Analysis

Part A: Examining clothes

1. Did you find hairs adhering to the surface of the fabric? Did the hairs look like human hair or animal hair? What can you deduce from this?
2. Did you find seeds on the garment? What can you deduce from this?
3. Did you find grass or traces of leaves on the garment? What can you deduce from this?
4. Did you find loose threads on the garment? What can you deduce from this?

Part B: Identifying ground conditions

1. Were you able to identify the places visited by your partner?

Want to know more?

See Section 10: Our Findings