

## Bloodstain Pattern Analysis

(Guest Lecture : Sumiko Polacco)

### **Blood Pattern Analysis (BPA)**

Study of blood found on crime scenes, their shape, location and distribution of bloodstains. (SWGSTAIN)

We also do it know how it came on scene/origin

Also, for research/advancing field, underlying mechanics

Don't use person bleeding, use **blood source** – where the blood in the pattern originates from

**Bloodletting event** – action or cause which gave rise to the mechanics used to create the pattern

**Target surface** – the surface bloodstain pattern is already present on

Rabbit were used as experiment models in history

Rabbit because easily available and their skeleton is kind of bigger compared to rats which are also used for experimentation because of their easy availability

In 1895, Dr Edmund Piotrowski said “**The formation, shape, and distribution of bloodstains follow specific rules and that these, allowing for many modifications considering the nature of the case, are not to be underestimated and are of great value in the judgment**”

1902, Dr John Glaister - “**As has already been pointed out, in every case in which a dead body with wounds upon it is examined in situ , examinations should be carefully made for the presence of blood-stains and their incidence upon the body and in its vicinity. The examiner must expect to meet every possible variety of stains, both in respect to character, incidence and magnitude...**”

1904 – Hans Gross -

**Handbook fur Untersuchungsrichter Als System Der Kriminalistik**

**Detailed discussion of evaluating bloodstains, their collection & documentation**

**30 pages of his book was about BPA; it was THE reference at the time & republished in English in 1924**

1939 – Balthazard et. Al

•**Wrote: “Edute Des Goutes De Sange Projecte”**

•**Emphasised the necessity not only to look at stains at crime scenes, but to understand (research) the mechanisms which gave rise to their origin; includes:**

- Trajectories**
- Fluid dynamics**
- Target Surfaces**
- Movements**
- Limitations & Variations**

Wrote paper – projections of bloodstain

Bloodstain looks different depending on the target surfaces

Target surface movements also matter, not only blood movement

We have to recognise what we can and what we can't say because of the nature of the field

BPA :

→ helps us build a good foundation

→ fill in the gaps, don't make accusations directly

→ one piece of evidence don't build your case, all evidences build up the case foundation and lead towards the conclusion

→ analysis can be objective

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## **Part 2 Pattern Classification**

7.26m/s-velocity of blood

- Bloodstain analysts have classified patterns & developed terminology (SWGSTAIN)

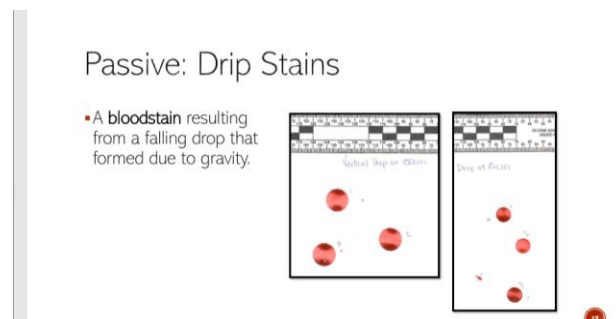
Things to consider:

- Gravity & Air Resistance
- Surface texture
- Height
- Angle
- Blood source (human vs. analogues)
- If it's actually blood Carpet is absorbent, for example and hence we will see smaller stains

**Passive Stains** – blood can be passively dripped onto a surface

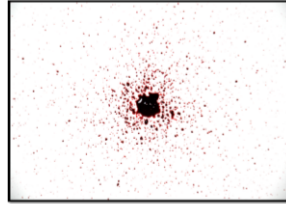
**Transfer Stains** – Blood can be transferred from one surface to another

**Projected and Impact Stains** – Blood can be set into motion and impact a surface in a variety of ways



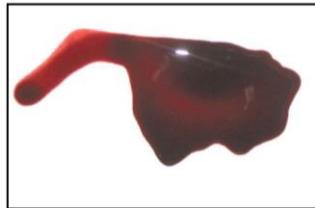
## Passive: Drip Pattern

- A **bloodstain pattern** resulting from a liquid that dripped into another liquid, at least one of which was blood.



## Passive: Pool Pattern

- A **bloodstain** resulting from an accumulation of liquid blood on a surface.



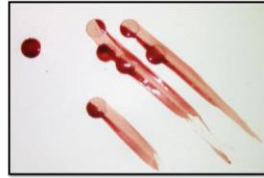
## Transfer: Transfer Pattern

- A **bloodstain** resulting from contact between a blood-bearing surface and another surface.



## Transfer: Wipe Pattern

- An **altered bloodstain pattern** resulting from an object moving through a preexisting wet **bloodstain**.



First drip then was swiped

## Transfer: Swipe Pattern

- A **bloodstain pattern** resulting from the transfer of blood from a blood-bearing surface onto another surface, with characteristics that indicate relative motion between the two surfaces.



Gloved hand uses to create this pattern. There can be any other object that might have created such a pattern. Thus keep mind and options open as an analyst

## Projected & Impact: Projected/Arterial Pattern

- A **bloodstain pattern** resulting from the ejection of a volume of blood under pressure.



Neck, artery down by your leg,

The blood was projected onto the wall, projections=extra energy pushing it out of the body

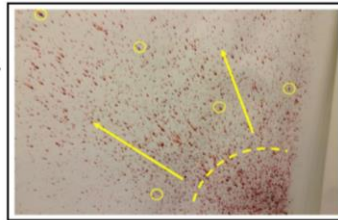
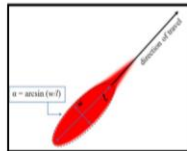
## Projected & Impact: Splash Pattern

- A **bloodstain pattern** resulting from a volume of liquid blood that falls or spills onto a surface.



## Project & Impact: Impact Patterns

- A **bloodstain pattern** resulting from an object striking liquid blood.



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21

### Where was the blood source?

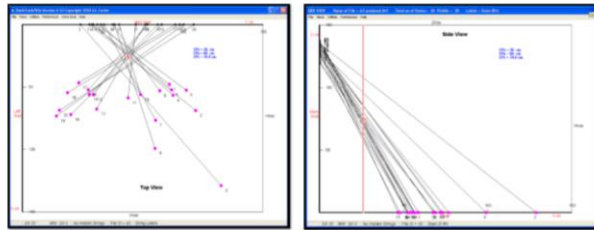
- 1) **Area of convergence** : The area containing the intersections generated by lines drawn through the long axes of individual stains that indicates in two dimensions the location of the blood source
- 2) **Area of origin** : The 3-D location from which spatter originated

## Finding the Blood Source: Stringing

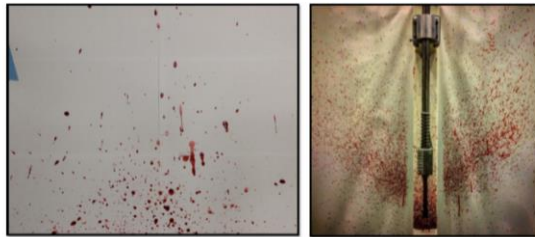


rdiner, 2008.

## Finding the Blood Source: Software



More than one Pattern? It's complex.



Complex patterns requires training to understand what pattern, what might have occurred and stuff

### Part 3 : Research and Trends in BPA

For research, need:

- ➔ Behaviour of blood of blood outside the body
- ➔ Bloodstain Pattern Classification
- ➔ Bloodstain Pattern Analysts (Bias, Experience)
- ➔ Bloodstain & Surfaces