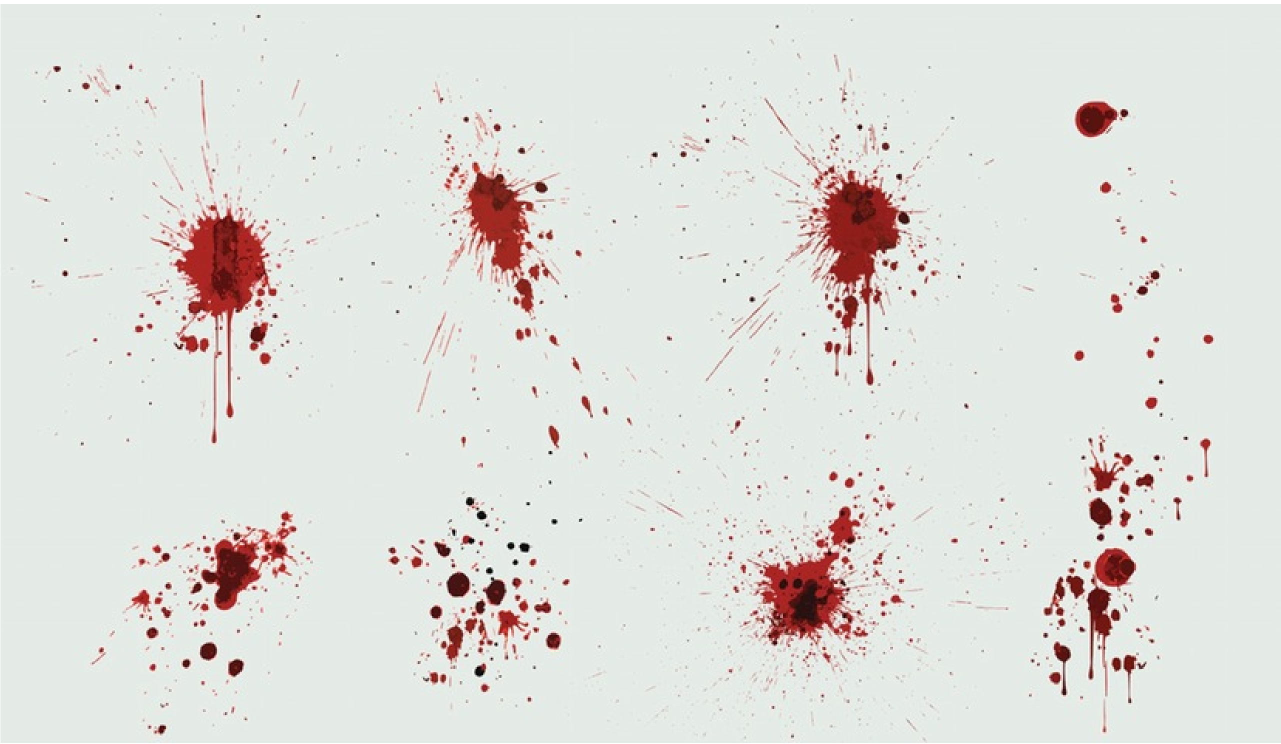
New blood spatter models will better reconstruct crime scenes

Current calculations don't take air resistance and gravity into account. But an American team hopes to fix that, writes Richard A. Lovett.



Forensic teams reconstruct a crime scene using, among other cues, patterns of blood sprayed on walls and furniture. New modelling makes this process more accurate.
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Blood spatter patterns used to reconstruct crime scenes may not be as accurate as criminologists want to believe, American scientists at a meeting of the **American Physical Society's Division of Fluid Dynamics <https://www.aps.org/units/dfd/>** , in Portland, Oregon said.

But their new modelling, which takes factors such as gravity and air resistance into account, will help rectify that.

When someone is shot, forensics will see blood sprayed as forward spatter (if the bullet goes all the way through) and back spatter, in which blood drops spray back in the direction of the shot.

Back spatter is important for two reasons. Blood can splash on the shooter’s clothes and the pattern of blood droplets on walls and floors can pinpoint the exact location of the victim at the time of shooting.

There’s just one problem, says Alexander Yarin from the University of Illinois, Chicago: models used for such calculations assume that as droplets spray outward from the victim, they fly in a straight line, unaffected by gravity or air resistance.

Nor do the models “ask the key question: what determines the size of the droplets and what is their initial velocity?”

Not that police aren’t aware that gravity and air resistance exist and that it would be useful to take them into account. “Police aren’t dumb,” Patrick Comiskey, also from the University of Illinois, Chicago, says.

“They’ve been doing this a long time, and they certainly understand that there’s a discrepancy [between their models and reality].”

But until now, there’s been no way to take such factors into account.

To fill that gap, Yarin, Comiskey and Daniel Attinger, from Iowa State University, Ames, Iowa, calculated how blood droplets form during a bullet impact, and the speed and direction at which they spray backwards and disperse.

Based on this, they modelled how these droplets would move under the influence of gravity, testing their model by firing bullets at a blood-soaked sponge.

“This was the first study that has a physical description of how the bullet creates blood drops and how they fly,” Attinger says.

The work needs to be conducted over many impact angles and bullet shapes, Comiskey says.

Future research might include forward spatter and how blood sprays from other types of attacks, such as beatings with a hammer or baseball bat.

Corpse-eating bacteria a forensic tool

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“An additional issue is the effect of muzzle gases,” Yarin says. “Shooting from close range it might be that the gas deflects the [blood].”

It’s important research, says Marc Smith, a mechanical engineer from Georgia Institute of Technology in Atlanta, Georgia. He measures the shape of bloodstains created by flying droplets when they hit an angled surface, in the hope that such stains will reconstruct a droplet’s speed and impact angle.

“The whole purpose is to put forensic analysis on a more scientific basis,” he says. “If you want to have a firm scientific basis for the courtroom, you have to have good data to support it, and right now the data is not as good as it should be.”

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