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CSI: Liquid Lie

The purpose of this investigation was to see the effect of surface angle and velocity on the splatter patterns of Newtonian and Non-Newtonian fluids. It was hypothesized that as the velocity increased, the diameter of the drops would decrease and that the closer the surface angle was to 0° the closer the splatter would be to a perfect circle. Non-Newtonian splatters were predicted to be more conformed.

The experiment involved dropping cooking wine or diluted tempera paint from a pipette (a total of 150 ml each) at different heights and onto a plane with different surface angles. Ten trials were conducted at each angle (20°, 40°, 60°, 80°) and each height (1m, 2m, 3m, 4m, 5m), for a total of 500 trials. The major to minor axis ration was then taken.

The data collected partially supported the hypothesis. The Non-Newtonian drops were more conformed and the higher the angle the more elliptical the drops became (with outliers in the 80° tests). However, with respect to velocity, there was little change in the Non-Newtonian splatters, the average ratio at 80° were, in decreasing order of height, 5.99, 6.65, 5.26, 5.34, and 6.50. In the Newtonian samples the diameter increased with velocity. The average of trials at 80° in decreasing order of height, 4.49, 5.22, 5.25, 7.50, and 8.60.

These findings lead me to believe that there could be some error in estimating velocity of splatter patterns, particularly if the person's blood is Newtonian.