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The Physics of Jackson Pollock

Study by researchers in Mexico explores the complex fluid dynamics of paint dripping techniques employed by the famous American abstract expressionist artist

EMBARGOED until 10:00 a.m. PT on Monday, November 24, 2014

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WASHINGTON, D.C., November 24, 2014 -- Jackson Pollock, one of the greatest American artists of the 20th century, revolutionized abstract expressionist painting in the mid-20th century with his unique "drip" technique -- masterpieces of densely tangled lines of color that Pollock often created from thinned household enamel paints. Now, an experimental technique developed by fluid dynamicists at the Universidad Nacional Autónoma de México in Mexico City may help reveal exactly how Pollock produced certain features in his paintings.

The procedure and some preliminary findings will be described today in a talk at the American Physical Society's Division of Fluid Dynamics (DFD) meeting in San Francisco, Calif.

Created by mechanical engineering professor Roberto Zenit, his undergraduate student Bernardo Palacios and their colleagues, the technique generates paint drippings in a controlled manner. With it, Zenit said, "We can vary the speed and the height at which the paint is ejected onto a horizontal plane," mimicking the unusual technique used by Pollock.

As anyone who has seen the selfsame 1998 biopic starring actor Ed Harris knows, Pollock worked by pouring, dripping, flicking or splattering paint onto, for example, an unstretched canvas laid flat on the floor. Pollock sometimes poured straight from a can of paint, or used sticks or stiffened brushes to drizzle the paint onto the surface.

"In our lab we have the inability to say 'no' to an interesting fluid mechanics problem," Zenit said, "and fluid mechanics can be used to understand painting, since it is essentially a flow problem."

In particular, Zenit, Palacios and their colleagues are interested in how the properties of paints themselves influence artworks such as Pollock's.

Fluids can be either Newtonian or non-Newtonian, depending on whether or not their viscosity (a measure of their resistance to flow) changes in response to an applied stress. In a Newtonian fluid, such as water, the viscosity does not change when the fluid is under more or less stress. However, in a non-Newtonian fluid, the viscosity varies. "For instance," said Zenit, "the viscosity of blood changes if it flows in large or small capillaries. Saliva can go back after it has left the mouth of a child; this characteristic is only possible because it is a little bit elastic."

Paint falls into the latter category: it is what is known as a viscoelastic shear-thinning non-Newtonian fluid. That is, it becomes thinner and flows more freely when stress is applied.

To investigate the importance of such properties in creating drippings like those in Pollock's work, the Zenit lab is using its technique to generate patterns using both Newtonian and non-Newtonian paints, while, for example, keeping the rate of the flow of the paints fixed. "One particular property of viscoelastic fluids is that they oppose a large resistance to being stretched," Zenit said. "Our preliminary results indicate, that, indeed, some of the blobs in the patterns result from this particular property of non-Newtonian fluids, although we still have many more tests to conduct."

"We are planning to extend this type of painting analysis to other artists," he said. "We are currently studying the effect of fluid properties on the pattern created by brush strokes, and we are also looking into hydrodynamic instabilities in water color paintings."

The presentation, "Dripping like Pollock," is at 10:43 am on Monday, Nov. 24, 2014 in the Moscone (West) Convention Center, Room 3000. ABSTRACT:

<http://meetings.aps.org/Meeting/DFD14/Session/H1.2>

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MEETING INFORMATION

The 67th Annual Division of Fluid Dynamics Meeting will be held at Moscone West Convention Center in San Francisco, Calif. from Nov. 23-25, 2014. More meeting information: <http://apsdfd2014.stanford.edu/>

REGISTERING AS PRESS

Any journalist, full-time or freelance, may attend the conference free of charge. Please email: jbardi@aip.org and dfdmedia@aps.org and include "DFD Press Registration" in the subject line.

ONSIGHT AND ONLINE PRESS ROOMS

Workspace will be provided on-site during the meeting. The week before the meeting, news, videos and graphics will be made available on the Virtual Press Room: <http://www.aps.org/units/dfd/pressroom>

LIVE MEDIA EVENT

A press briefing featuring a selection of newsworthy research talks will be webcast live from the conference at 1:00pm PST on Monday, November 24 in room Foothill F of the San Francisco Marriott Marquis. For more information, email jbardi@aip.org

ABOUT THE APS DIVISION OF FLUID DYNAMICS

The Division of Fluid Dynamics (DFD) of the American Physical Society (APS) exists for the advancement and diffusion of knowledge of the physics of fluids with special emphasis on the dynamical theories of the liquid, plastic and gaseous states of matter under all conditions of temperature and pressure. DFD Website: <http://www.aps.org/units/dfd/index.cfm>