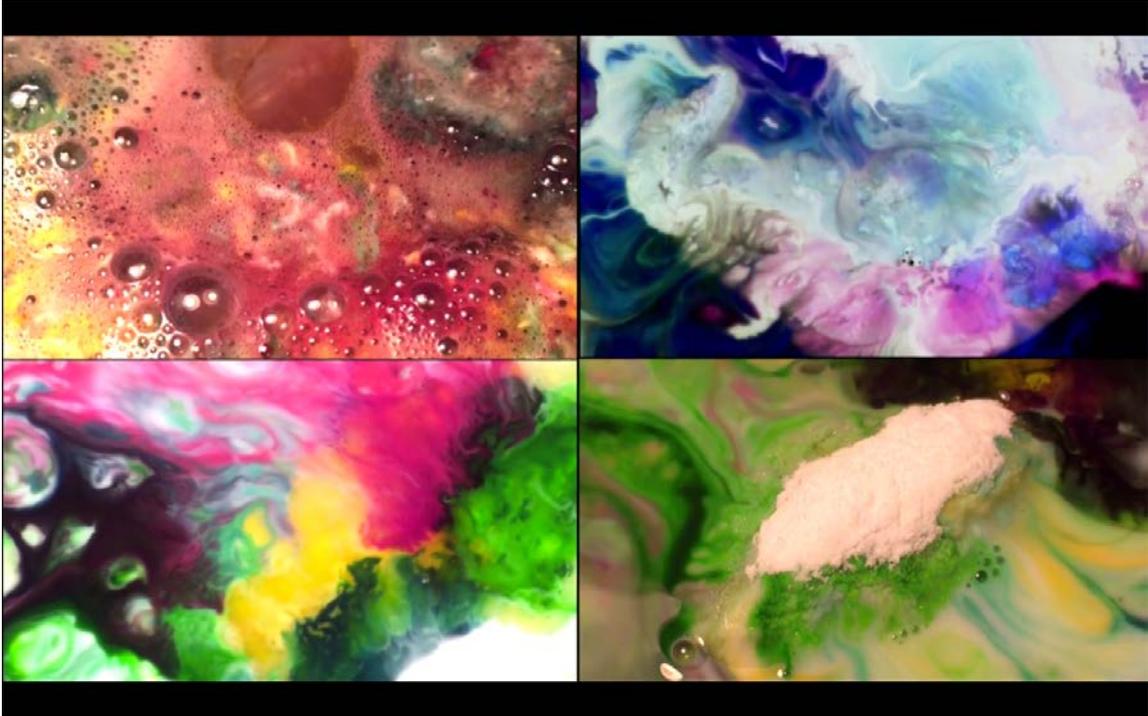


Textural Flow Investigation #1: Milk, Dish Soap, Dye,
Vinegar, and Baking Soda,

Ryan Lumley

Get Wet Assignment Flow Visualization

February 9th, 2014



Purpose of Image:

For our Get Wet Assignment we were asked to “get our feet wet.” We needed to produce an image that demonstrated the flow of air, water, gas, liquid, or any combination of fluids. So in my project, I wanted to create a colorful flowing texture that had a bubbling oozing quality to it. Thanks to my 1st grade science class, I knew a good place to start would be the ol’ milk, dishwashing soap, and food dye trick. That chemical reaction would provide a good swirl of flowing colors that I was looking for. Though, it had a wonderful flow of colors, it provided no bubbly oozing movement. So I started to investigate by experimenting with a series of household items to see if they would provide that fizzy bubbling reaction. I tried Emergen-C”, salt, flour, and bath soap, none of things provided

any sort of bubble flow. Later I found on the Internet an experiment where they were combining vinegar, food dye and Bicarbonate soda to make an oozing fizz of colorful bubbles. (1) This was the catalyst that produced the exact texture flow I was looking for.

Flow Apparatus:

The setup and development for this experiment was straightforward and fairly simple. I filled a standard cereal bowl with a half-cup of milk, dropped into the bowl four drops of standard red, green, blue, and yellow food coloring dye into separate sections of the bowl, squirted two pumps of dishwashing soap, waited for about 15 seconds to allow the colors to swirl and mix together. Then I dropped a tablespoon of bicarbonate soda, and immediately after that I poured about 2 tablespoons of vinegar into the bowl.

Flow Discussion:

Milk is made up of water, vitamins, minerals, proteins, and fat. The fats and proteins inside the milk are sensitive to fluctuations in the milk solution. The exploding flow that happens inside the milk is due to the chemistry of the dishwashing soap when added. Dishwashing soap possesses bipolar features its hydrophilic end dissolves into water, and its hydrophobic end attaches to the fat in the milk. When the soap tries to join with the fat particles, these molecules begin to swirl, twist, and burst in all directions. The food coloring demonstrates to the human eye this movement of the soap trying to join with the fat molecules. (3)

When bicarbonate soda and vinegar are then added to the solution a burst of bubbles are created. This is because the acetic acid in the vinegar reacts with the baking soda's sodium bicarbonate, which then forms carbonic acid. The instability of carbonic acid allows it to separate into carbon dioxide and water. The burst of bubbles that the viewer sees are from the carbon dioxide fleeing the milk and dish soap solution. The oozing of bubbles and the swirling of colors eventually slows down because the soap becomes evenly mixed within the milk and the carbon dioxide escapes the solution and rises into the air. (2)

Visualization Technique:

In order to fully visualize the flow that was occurring, food coloring was added to the milk. Also, in order to fully perceive this flow a standard reading tungsten lamp was mounted as close as possible to the bowl without being seen within the camera's frame.

Photographic Technique:

I had a Canon 5D Mark 2 with an EF 100mm f/2.8 Macro lens mounted about 3 inches above the center of the bowl. I had an ISO of 500, an F-Stop of 5.6, and a shutter speed of 1/500. In Final Cut Pro I inverted the top right image in order to enhance the viewers perception on the fluid flow that was occurring. I divided the frame into four separate videos that simultaneously played the same experiment but different trials. I did this because I wanted the viewer to

simultaneously observe the flow phenomenon at different stages. Also, within each trial there was a unique reaction to the created mixture so this allowed the viewer to observe the similarities and differences of each attempt.

Conclusion:

My image reveals a sequence of flowing textures. The video texturally investigates the bursting of colors and the oozing of bubbles. I am happy with my outcome, I have wanted to create this sort of texture for a while now and this was exactly what I had envisioned. I am satisfied with my video though there are a few aspects that I am disappointed about. First off, the video on the top left goes out of focus for a period of time. This is because I had my focus dialed on the milk and the food dye, and when I put the vinegar and baking soda into the solution the bubbles were created. This made the solution rise which made the image blurry because it rose closer to the camera, which threw off the focus. Also, since the lamp was so close, and I did not have anything to bounce the light off with, the viewer could see the light's reflection inside the bubbles. If I were to develop this idea further I would get a bigger bowl and have at least three cameras' set up in order to capture different sections of the same trial. I would get a fluorescent lighting kit and have a bounce so the light was not reflecting onto the bubbles.

Works Cited:

1. "Easy bubbly colours experiment." *Kids Spot*. N.p., n.d. Web. 9 Feb. 2014.
<[http://www.kidspot.com.au/funzone/
Experiment-Easy-bubbly-colours-experiment+11950+570+sponsor-activity.htm](http://www.kidspot.com.au/funzone/Experiment-Easy-bubbly-colours-experiment+11950+570+sponsor-activity.htm)>.
2. "Vinegar + Baking Soda Explanation." *Think Quest*. Oracle, n.d. Web. 9 Feb. 2014.
<<http://library.thinkquest.org/3347/vinegar+bsoda4.html>>.
3. Spangler, Steve. "Color Changing Milk." *Steve Spangler Science*. N.p., n.d. Web. 9 Feb. 2014.
<<http://www.stevespanglerscience.com/lab/experiments/milk-color-explosion>>.