

Get Wet: Oozing Oobleck



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Introduction:

As an homage to my childhood, I decided to focus my project on the aesthetic appeal of the “oobleck”. Comprised of a mixture of cornstarch and water, an oobleck is a Non-Newtonian fluid which is a liquid at rest and a solid when disturbed. Originally, my intent was to make the oobleck “dance” by placing it on a thin sheet of plastic wrap over a subwoofer (see Figure 1). As the oobleck responds to the deep vibrations, portions of the resting liquid congeal into solid, finger-like tendrils. These tendrils immediately revert back to a liquid state at the end of the disruption, and fall back into the puddle on the speaker. This happens with each pulse of the speakers, causing the substance to appear to be dancing. Since I did not have a subwoofer available, I attempted to create the same effect, but with regular speakers instead. Unfortunately, the sound vibrations were not strong enough to make the oobleck dance. As a second option, I decided to mix drops of different colored food dyes into the oobleck to observe how the substances all mixed together.



Figure 1

Setup:

I created my oobleck by hand tossing approximately 60% cornstarch with 40% water until the mixture was consistent. I then covered the bottom of an empty, foil pie tin with a thin layer of this mixture. I experimented by randomly distributing differently sized drops of magenta and teal food dyes into the pan. To control the shape and direction of the streaks formed by the droplets, and to evenly distribute dye throughout, I tilted the pan back and forth slowly--being careful to avoid the mixture spilling over the edge of the pan. As the mixture sat, the dye would diffuse and thus, the edges of the colored streaks would appear slightly blurred (see Figure 2).

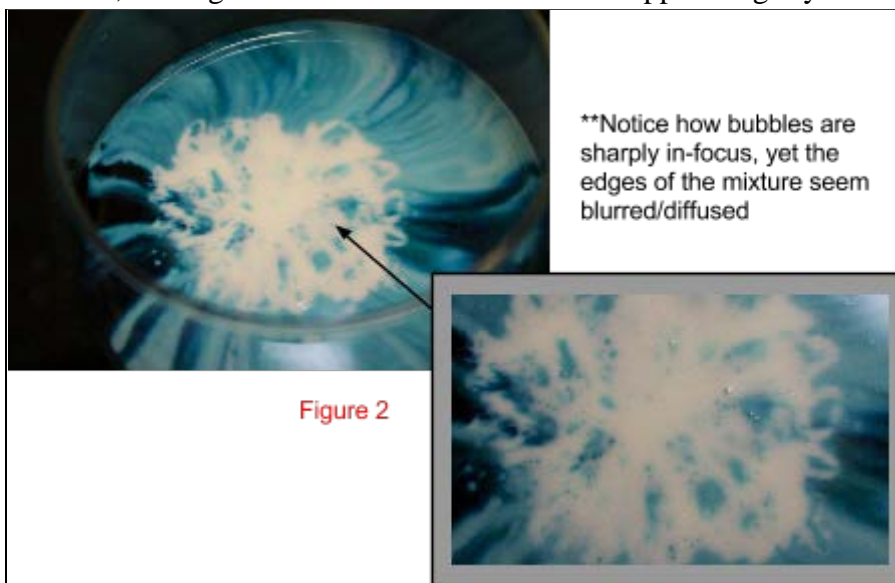
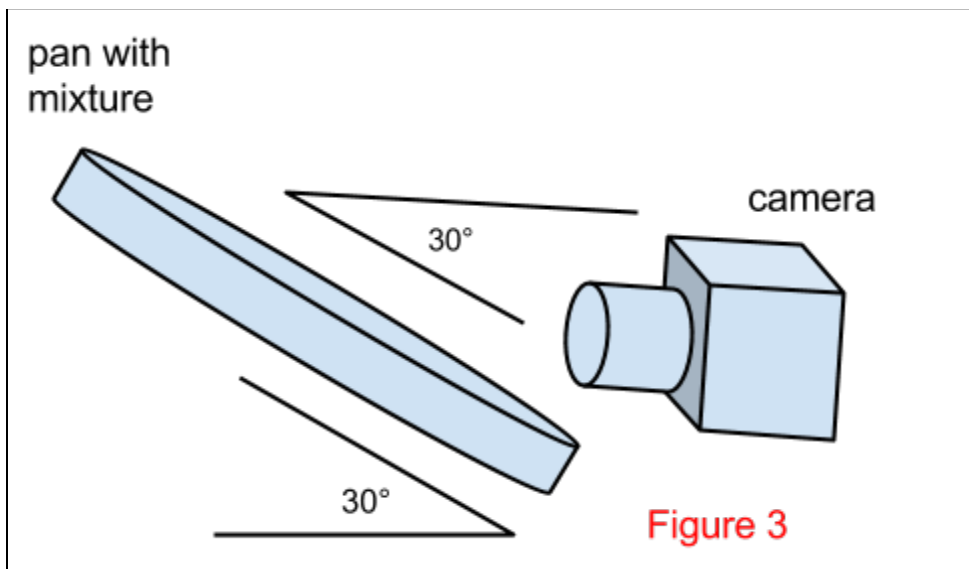


Figure 2

In order to photograph streaks with the sharpest edges possible and avoid allowing the dye to settle and disperse, I had a friend tilt the pan so that the oobleck would flow as I

photographed. Thus, most of my photos were taken at an angle where the pan with the mixture was tilted about 30° from the countertop. This created a lovely Dutch angle shot, which both eliminated most of the glare of the overhead lights, and established a unique perspective of the flow.



Photographic Technique:

The image was taken at night with a mixture of direct, overhead fluorescent and tungsten lighting. I used a Canon Rebel XS 10.1 MP DSLR camera with an image-stabilizing, EF-S 18-55mm standard/wide angle lens. This lens has an aperture range of f/3.5-5.6, and was set to 3.5 at time of use, due to the relatively low lighting and closeness of the subject. The camera was held approximately eight inches away from the center of focus at an angle of about 30° to the flat plane of the tin pan (see Figure 3). The lens was focused with a shallow depth of field, so that only the very middle of the image is in sharp-focus, while the top and bottom are slightly blurry. Since the diffusion of the dye made it difficult to determine whether or not the camera was in-focus, I would either have my partner hover his finger just above the point where I wanted to focus, or I would try to focus on the glossy reflection of the light on the surface of the oobleck.

I framed the image this way for its artistic appeal, as the Dutch angle and narrow depth of field seem to draw the eye to the dramatic swerve of dye in the middle of the flow. The shutter speed was set to 1/15th of a second, which was the quickest that I could use to produce a properly exposed and in-focus image without using a tripod. I had the ISO set to 800 to reduce film grain.

The original image is 2592 x 3888 pixels. Using Adobe Photoshop CS6, I very slightly increased the contrast and saturation of the image, but the colors were vibrant enough that the photo did not require much color correction. Using the clone stamp tool, I whited out the black spot in the upper left corner to remove the visible portion of the edge of the pan.

Conclusion:

In conclusion, this image shows the active, curved flows of magenta and teal food dye throughout a Non-Newtonian mixture. Though ooblecks are most commonly photographed to show off their unique state changing properties, I felt that this substance also works nicely as a canvas for dye; unlike water or oil, an oobleck is opaque and relatively dense, allowing colored dyes to really pop from the contrast. Unlike with water, the dye was not so drastically diluted as it mixed with the oobleck, and it was therefore able to retain its vibrant and intensely saturated colors.

Ideally, I would have preferred to work with a substance in which dye did not so noticeably and quickly diffuse into. However, I feel that the thick density of the oobleck still



Figure 4

served well to visibly swirl the dye into streaks, as opposed to allowing the dye to sink to the bottom of the container as it would in water. In the future, I would love to be able to experiment with adding dye to “dancing” ooblecks (via the use of a subwoofer) in order to observe the way in which the color swirls into the moving mixture (as seen in Figure 4). I would push myself to see what types of vibrations to mix with differently sized droplets of dye in order to create the most appealing color streaks and oobleck formations. I would love to both photograph

and film the results.

Overall, I feel that my image was successful. I like the artistic flair which my framing and depth of field accomplish, and I am amazed with the color palette I was able to create. Though they do not display the unique properties of a stimulated oobleck, I feel that the color streaks formed in appealing shapes, thus creating a beautiful and graceful flow visualization. Having done this project, I feel that I now have the tools and experience I need to create an even more stunning and unique piece of oobleck art in the future.

Citations:

Figure 1:

"Awesome Science : What is a non-newtonian fluid ?." *100 Marks*. 100marks.In, n.d. Web. 10 Feb. 2014. <<http://www.100marks.in/News/awesome-science-what-is-a-non-newtonian-fluid/>>.

Figure 4:

Tammy. "Dancing Oobleck." *Housing a Forest*. N.p., 22 Mar. 2011. Web. 11 Feb. 2014. <<http://www.housingaforest.com/dancing-oobleck/>>.