

# HAND PAPERMAKING



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COVER: Joan Hall, large detail of *The New Normal: In with the Tide*, 2018, 70 x 100 x 15 inches, handmade paper of kozo and gampi, mixed media (collagraph printing, glass pins, acrylic, Mylar). Photo by Dan McManus. Courtesy of the artist.



## Breathing Through Paper

AMY RICHARD

*Aside from the cellulose fiber itself, water is the main ingredient when making paper. According to paper experts, water is the limiting factor that fulfills the definition of true paper. FACING PAGE: Could our constant habit of agitating the papermaking slurry be releasing extra oxygen into the air above? All photos courtesy of the author and taken by Joe Richard, Gainesville, Florida, 2018, unless otherwise noted.*

Is it my imagination, or does something *happen* as we stand at the vat, forming sheet after sheet of handmade paper? One might describe it as a state of calm or an elevated sense of well-being. At times, I have even described it as a slight euphoria.

Based on conversations with other papermakers, I realize that I am not alone. Words like *spiritual* and *transformative* have been mentioned more than once, or even *addictive*. The most recent example occurred while teaching a papermaking workshop last spring. A group of students were busy making a few more sheets before it was time to clean up. While doing so, several commented how therapeutic the activities had been. Patting the water in front of her, one student joyfully declared aloud, “I love this so much! It feels like I’ve had a mental vacation for the past two days. I can’t stop!”

It is easy to attribute this response to the exhilaration one gets from transforming raw material into something new—a universal theme in art. And that must certainly be a big part of it. Many creative mediums such as ceramics, painting, printmaking, and fiber arts are acknowledged as therapeutic for their tactile characteristics and accessibility and we can count papermaking as one of them.<sup>1</sup> But is there something more here? What is it that sets hand papermaking apart from these other processes? The obvious answer is water, *the* main ingredient of paper, aside from the cellulose fibers themselves.<sup>2</sup>

By now, the reader may be thinking, “Well, sure. Papermaking uses water and water is calming—a no brainer.” However, it’s not clear *why* water has this effect.



Thanks to collaborations with the Combat Paper Project, Peace Paper Project, and others, a number of healing arts professionals continue to bring us closer to an answer. As art therapist Amy Bucciarelli explained after a Peace Paper workshop: “The use of water in papermaking is self-soothing while also being multi-sensory, providing a connection through touch, sight, hearing, and even smell....It encourages us to follow our natural childlike instincts to play.”

In subsequent conversations, Bucciarelli and colleague Genevieve Skillen-Camp introduced me to the Expressive Therapies Continuum (ETC), a framework that helps illuminate water’s role in papermaking even more. Developed by Vija Bergs Lusebrink, the ETC categorizes creative activities based on their expressive fluidity and/or amount of containment (e.g., the fluidity of finger painting versus the containment of drawing).<sup>3</sup> Bucciarelli and Skillen-Camp agree that papermaking spans the full ETC spectrum, with water offering exceptional fluidity on one end, and the mould and deckle providing structural containment on the other. The result is a medium that is especially versatile and therapeutic.

It all makes sense. And yet, suspicions linger that we are experiencing something outside of the emotional or psychological benefits. After several years of pondering this idea, I recently began an investigation to see if there is any chance our water-dependent papermaking work could be having biochemical influences on us. My progress is described here with hopes that others may be compelled to compare notes or collaborate in the future.

This all started with a question that resurfaces every time I mix a vat of pulp and water: If it is true that oxygen (O<sub>2</sub>) and other gases are entering and simultaneously *leaving* water at the surface,<sup>4</sup> is it also possible that we benefit from such close proximity to this air-water interface? Could our constant habit of agitating the watery slurry, along with the rigors of sheet formation be releasing extra oxygen into the air, resulting in a higher-than-normal dose of O<sub>2</sub>, and as a result, an enhanced sense of well-being?

This theory is dependent on at least two assumptions. First, there should be evidence that increased oxygen induces such a

response. Second, we need evidence that oxygen released at the water’s surface is available to us in concentrations needed to cause this effect.

The first assumption proved easier to confirm. A cursory search of literature produced a number of studies on the positive relationship between oxygen and elevated mood. A few identified an inverse relationship, suggesting low-oxygen conditions (e.g., living at higher altitudes) can cause depression.<sup>5</sup> Other studies documented our ability to absorb oxygen directly through our skin, from the air and also from water. In one paper, researchers proved that soaking one’s feet in water that has been oversaturated with oxygen (for up to 30 minutes) resulted in higher concentrations of oxygen in the skin on the bottom of the feet. According to the authors, these findings have promising medical implications.<sup>6</sup>

Another article entitled “Take A Deep Breath,” published by the American Institute of Stress, struck a chord a little closer to home. As the author explains: “Deep breathing increases the supply of oxygen to your brain and stimulates the parasympathetic nervous system, which promotes a state of calmness.”<sup>7</sup> Perhaps our time at the vat is changing our breathing patterns, increasing oxygen intake, and as a result, providing a calming effect. Or maybe it’s a combination of influences?

Inspired by the possibilities, I invited a handful of volunteers to the studio for a couple of papermaking sessions along with a request that they be willing to help with an informal experiment.<sup>8</sup> Using a finger-pulse oximeter,<sup>9</sup> I wanted to collect biometric data before, during, and after papermaking activities.<sup>10</sup> My intention was not to prove my hypothesis but to look for clues that might encourage and inform further investigation.

During the first session, I collected oxygen saturation (SO<sub>2</sub>) and pulse readings three times within a fifteen-minute period as a baseline. After pulling and couching three consecutive sheets of paper, three more readings were taken from each papermaker. During a second session a few weeks later, we changed the methods slightly. In addition to the three baseline values, we took two readings



Shirley Baker was one of eight volunteers assisting with the author's data-gathering papermaking sessions.



Volunteer papermaker Genevieve Skillen-Camp (left) provides the author with a final oxygen saturation reading after making paper with other volunteers.

immediately after the volunteer pulled and couched three sheets of paper, and again after three more sheets. These were followed by one final reading fifteen minutes later.

For both sessions, the majority of post-papermaking readings showed higher  $SO_2$  readings. In the first session, five out of the eight volunteers had a higher  $SO_2$  with three remaining the same. None were lower. It was also noted that five of the eight volunteers had lower pulse readings after papermaking. In the second session,  $SO_2$  readings were higher or the same for all six volunteers; four were higher; two were the same. None were lower. The pulse readings for post-papermaking were a mixed bag with three showing higher pulses and three lower.

Soon after this exercise I borrowed a dissolved oxygen (DO) meter from a water-monitoring program at the University of Florida, to play with in the studio. It was fun to see physical evidence of how DO concentrations increased in the vat water after agitating the slurry and to learn that the presence of pulp did not interfere with this. In fact, DO concentrations appeared to be higher in freshly beaten pulp. The opposite was true for pulp that been left in the vat for several days. Due to increased bacteria feasting on the pulp as it degraded, DO concentrations were quite low (in the range of 4–5 mg/L) as the bacteria were constantly using up available oxygen in the water. I also noted that oxygen saturation readings increased in the air just above the surface immediately following agitation of the water.<sup>11</sup>

While these results cannot be considered significant, they are promising. My investigation is only the beginning. There is a mind-boggling amount of material to be explored about our complex associations with water and its role in papermaking, whether it is emotional, psychological, or physical. And truth be known, we may never be able to tease out which aspects are responsible for that sense of well-being at the vat. Perhaps, as one colleague points out, it is enough to acknowledge water's extraordinary contribution—to that joyful sense of renewal gained with every sheet of paper—and be grateful.



Using a finger-pulse oximeter, biometric data were collected from a small group of volunteers, before, during, and after papermaking to test a theory.



Dissolved oxygen meter demonstrates oxygen concentrations (in mg/L) before and after mixing of the slurry. All photos courtesy of the author and taken by Joe Richard, Gainesville, Florida, 2018, unless otherwise noted.

#### NOTES

1. Heather L. Stuckey, DEd and Jeremy Nobel, MD, MPH, "The Connection Between Art, Healing, and Public Health: A Review of Current Literature," *American Journal of Public Health*, vol. 100, no. 2 (February 2010): 254–263 <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2804629/> (accessed January 4, 2018). For a discussion about the health benefits of working with clay, see Michal, Sholt, and Tami Gavron, "Therapeutic Qualities of Clay-work in Art Therapy and Psychotherapy: A Review," *Art Therapy: Journal of the American Art Therapy Association*, vol. 23, no. 2 (2006): 66–72. <http://www.hebpsy.net/files/mrxujbchrsv8makszww1.pdf> (accessed December 3, 2017). Also see Jane E. Brody, "The Health Benefits of Knitting," *New York Times*, posted January 25, 2016, <https://well.blogs.nytimes.com/2016/01/25/the-health-benefits-of-knitting/> (accessed December 3, 2017).
2. Paper specialist Timothy Barrett, defines classical paper as a material "made from cellulose fiber that has been beaten, dispersed in water, strained out again in an even layer, and dried." Timothy Barrett, email message to the author, January 21, 2018.
3. Vija Bergs Lusebrink, Kristīne Mārtinsonē & Ilze Dzilna-Šilova, "The Expressive Therapies Continuum (ETC): Interdisciplinary bases of the ETC," *International Journal of Art Therapy*, vol. 18, no. 2 (2013): 75–85. <http://www.tandfonline.com/doi/abs/10.1080/17454832.2012.713370> (accessed December 6, 2017).
4. S. Geoffrey Schladow, Minhee Lee, Bernhard E. Hürzeler, and Peter B. Kelly, "Oxygen Transfer Across the Air–Water Interface by Natural Convection in Lakes," *Limnology and Oceanography*, published by the American Society of Limnology and Oceanography, vol. 47, no. 5 (2002): 1394–1404. <http://onlinelibrary.wiley.com/doi/10.4319/lo.2002.47.5.1394/abstract> (accessed January 11, 2018). Also see Department of Fisheries and Aquatic Sciences; Institute of Food and Agricultural Sciences, Florida LAKEWATCH. A Beginner's Guide to Water Management: Oxygen and Temperature, Circular 109. University of Florida, Gainesville, June 2004. [http://lakewatch.ifas.ufl.edu/pubs/circulars/Circ109\\_OxygenTemp.pdf](http://lakewatch.ifas.ufl.edu/pubs/circulars/Circ109_OxygenTemp.pdf) (accessed January 16, 2018). For more on dissolved oxygen, see Fondriest Environmental, Inc., *Fundamentals of Environmental Measurements*, <http://www.fondriest.com/environmental-measurements/parameters/water-quality/dissolved-oxygen/#> (accessed January 28, 2018).

5. T. Tolmunen, J. A. Laukkanen, J. Hintikka, S. Kurl, H. Viinamäki, R. Salonen, J. Kauhanen, G. A. Kaplan, and J. T. Salonen, "Psychiatric Epidemiology: Low Maximal Oxygen Uptake Is Associated with Elevated Depressive Symptoms in Middle-aged Men," *European Journal of Epidemiology*, no. 21 (2006): 701–706. <https://www.ncbi.nlm.nih.gov/pubmed/17048086> (accessed January 6, 2018). Also see Elaine Taylor, "Paradoxical: The Link Between Mental Health and Oxygen," *Utah Public Radio*. Posted December 12, 2014. <http://upr.org/post/paradoxical-link-between-mental-health-and-oxygen> (accessed December 15, 2017).
6. Stacey A. Reading and Maggie Yeomans, "Oxygen Absorption by Skin Exposed to Oxygen Supersaturated Water," *Canadian Journal of Physiology and Pharmacology*, vol. 90, no. 5 (May 2012): 515–524. Published on the web April 11, 2012. <http://www.nrcresearchpress.com/doi/abs/10.1139/y2012-020#WnsnWZM-cWo> (accessed January 3, 2018).
7. Kellie Marksberry, "Take A Deep Breath," published on Daily Life website, August 10, 2012, <https://www.stress.org/take-a-deep-breath/> (accessed January 8, 2018).
8. Biometrics is a technical term for body measurements and calculations.
9. An oximeter is an easy, noninvasive method for monitoring a person's oxygen saturation ( $SO_2$ ). Its reading of peripheral oxygen saturation ( $SpO_2$ ) is not always identical to the more desirable reading of arterial oxygen saturation ( $SaO_2$ ), however the two are correlated enough for the easier, less expensive method for clinical use. Blood pressure measurements would have also been useful but required more time and patience from my volunteers so I decided against it.
10.  $SO_2$  values were averaged due to the tendency of these readings to fluctuate rapidly.
11. This will need to be confirmed with an air/gas sensor designed for such purposes but I was able to confirm later that the instrument I was using was sensitive enough to give me readings for oxygen saturation in the air.