



It Gets Better with Age

Denise Nicole Green, Cornell University

Keywords: Natural dye, yoga, athletic wear, contact dye

Contextual Review and Concept: What if our active wear clothing improved with wear and with age? What if our bodies did the same? The impact of time, gravity, ultraviolet light, washing, and other forces are typically perceived as detrimental to our clothing and bodies, but this yoga ensemble forces us to re-imagine the opportunities that frequent use, laundering, soiling, and consistent hot yoga practice may provide. With wear and washing the colors have become deeper and more robust. Rather than remaining static, this design actually gets better with age.

It Gets Better With Age is an experiment in contact-dyeing plant matter onto a synthetic active wear fabric (80% nylon, 20% Lycra spandex) for the design of hot yoga clothing for women over the age of 50. *Hatha yoga* is the physical practice of yoga *asana* (bodily postures). Originating on the Indian subcontinent thousands of years ago, yoga is a mind-body discipline that includes seven other limbs in addition to *hatha yoga asana*; however, *hatha* is the branch of yoga most widely adopted in the Western world (Saper, et al. 2004). In 2015 an estimated 24.5 million people in the United States practiced *hatha yoga*—from Bikram Hot Yoga to Vinyasa, Ashtanga, Iyengar, Kirpalu, and many other forms—a number up from 15 million in 2008 and is projected to grow to 55 million by 2020 (Statista 2018). Hot yoga is a type of *hatha yoga*, sometimes referred to Bikram Yoga, and was brought to the United State in the 1970s by Bikram Choudhury (Bikram and Reynolds 1978). Bikram Yoga is a set series of 26 postures and two breathing exercises performed over a 90-minute period in a room heated to 105F/40C and 40% relative humidity. Even hot yoga has been lauded as a safe and productive exercise regime for older adults, who now account for an increasing portion of the yoga practicing populace (Couturier 2013). According to an ISPOS Public Affairs survey conducted in collaboration with the Yoga Journal and the Yoga Alliance in 2016, approximately 38% of all yoga practitioners were over the age of 50. A study by Sunyang Park found that this demographic was disappointed by the availability of “appropriate” yoga clothing and frustrated by the “commercialized yoga wear market that opposes the philosophy of yoga” (Park 2016: 46-7). A smaller study of yoga practitioners in Finland found increasing desire for sustainable yoga clothing across all ages (Jason 2014). A 2014 study of hot yoga practitioners revealed that over time practitioners increasingly preferred more revealing yoga outfits for two equally important reasons: (1) thermoregulation, and (2) improved body image and acceptance (Green 2014). Most recently, a 2017 study of the apparel needs of hot yoga practitioners also found that minimal fabric and tight-fitting clothing was preferred (Doty, Li, Guria, Park, and Green 2017). These previous research findings posed an interesting challenge: to design a more sustainable garment that would appear less commercialized and still meet the functional needs of ageing yoga practitioners and their understanding of modesty. Ultimately, the resulting design integrates functional, social, and aesthetic needs: first, through textile design; second, through garment design; and lastly, through use, wear, and laundering of the garment.

The resulting design is presented here in two temporal phases: (1) the sleeveless top, which is a very basic form designed to bring focus to the aesthetics of the eco-printed textile. It was worn to 150 hot yoga classes and laundered that many times. The color and pattern, which was created from bundling yellow onion skins and Hopi dye sunflower seeds into pre-mordanted fabric, has gradually darkened in value over time; (2) the shorts, which have not yet been worn to yoga, were designed with small patches of yellow fabric to show what the top would look like had it not been worn, laundered, and sweated in for the past 6 months; the complementary fabric is made from bundling only the Hopi dye sunflower seeds to create a complementary purple color for aesthetic contrast with the predominant yellow from the onion skins. The overall design addresses the sustainability desires of yoga practitioners by using natural dyes and minimal amounts of fabric, and even incorporates scraps as patchwork to reduce fabric waste. A contact dyeing (also sometimes called eco-printing) technique was used to enhance the sustainability of the textile because this technique uses steam rather than immersion; therefore, less water is used in the dyeing process, yet color extraction is maximized (Kadolph & Casselman 2004; Haar 2015).

Process, Technique, Execution, Aesthetic Properties and Visual Impact: Textile design was an important starting point for this ensemble, and continued to be the focus throughout the ongoing lifespan of the garment. In a hot yoga class practitioners sweat so profusely they are required to put a towel on top of their mat. Because of the extreme quantities of sweat, natural fibers like linen and cotton are impractical because they retain water. On the other hand, nylon is ideal because it has a very low water absorption rate and is relatively simple to wash. Nylon is great for athletic wear because it is abrasion resistant and lightweight; furthermore, it is lustrous, similar enough in its chemistry to silk that it is the only synthetic fiber than can easily take natural dyes with a mordant of aluminum sulfate (Miah et al. 2016). However, 100% nylon could not be used because it did not have the stretch and elasticity that was needed. Instead, a jersey knit of 80% Nylon and 20% Lycra Spandex with 25% 4-way stretch was selected. The fabric was pre-mordanted in an aqueous bath of water and aluminum sulfate (at 12% weight of fiber), then cut into two pieces. One piece was bundled tightly with yellow onion skins and Hopi sunflower seeds and then steamed, while the second piece only used Hopi sunflower seeds. The onion skins were food waste diverted from the designer's compost pile, while the Hopi sunflower seeds were grown in the designer's natural dye garden at the university.

Previous research has shown that dimensions of the body (e.g., center front, center back, etc.) change dramatically during yoga postures (Doty et al. 2017); therefore, a one-piece design is impractical and may result in undesired exposure in a backward bend when the centerfront elongates. Older practitioners also did not want to reveal the midriff, so a simple tank with a very long center back and center front was designed to be tucked into the shorts. The simplicity of the design ensured an undisrupted display of the gorgeous texture, pattern, and ghost-like forms that emerged from contact dyeing. The tank top was completed in August 2017 and given to the model, a 62-year-old yoga practitioner who attends hot yoga classes nearly every day. She wore the top 150 times and laundered it daily using a warm cycle with 7th Generation brand detergent and dried the top on medium heat in a dryer. Over time, the contrast between the eco-printed forms increased, the colors saddened and became darker in value, and the top shifted from a bright yellow to a deep, rich, rust-like burnt orange. The top, like the yoga practitioner herself, was inspiration for the title of this piece: "It gets better with age."

The shorts were designed in a patchwork style to utilize scraps and minimize fabric waste. The side seam was shifted toward the backside to create shaping over the buttocks and a gusset was designed into the crotch to ensure coverage during postures where legs are separated. Unlike the top, the bottoms have not been worn or laundered and include both fabrics. In combination, the two fabrics intensify one another through complementary colors, and the patchwork creates visual interest and balance across the colors and textures. The form of the overall design minimizes fabric use while ensuring coverage of necessary parts of the body in various yoga poses and the garments have been photographed as they would be worn in three different yoga postures to show front, side, and back view (permission to photograph in *asanas* rather than "at attention" was approved prior to submission by design track chair). All seams were sewn using a Juki 4-thread serger MO 6814S, and seam allowances were flattened against the fabric by using top-stitching on a Juki MF-7823 Coverstitch machine. Contrasting topstitching was both functional and added aesthetic interest to the piece.

Cohesion, Design Contribution, & Innovation: Interest in natural dyes has increased over recent years, but design scholarship has typically focused on applications for natural fibers rather than synthetics (Křížová 2015). Yoga practitioners require athletic wear, but their embrace of spiritual and philosophical aspects of yoga means that they have different priorities and requirements for their apparel (Park 2016). This design is a necessary innovation that addresses the social, aesthetic, and functional desires of the hot yoga community, particularly the growing population of people over the age of 50 who practice yoga for improved mental and physical health. This design also creates opportunity for future research on the mordanting effect of human sweat on natural dyes over time, the impact of repeated laundering and wear, and development of large-scale industrial processes for contact dyeing with plant matter. With future research, this design would ideally shift from the category of limited production (LP) to mass market (MM) and would be targeted to the growing number of yoga practitioners over the age of 50.

References:

- Choudhury, B. and Reynolds, B. J. (1978) *Bikram's Beginning Yoga Class*. Los Angeles: J. P. Tracher, Inc.
- Couturier, K. (2013). Yoga After 50. *The New York Times*. Retrieved from: <https://well.blogs.nytimes.com/2013/05/01/yoga-after-50/?src=rechp>
- Doty, K., Li, M., Guria, S., Park, H., and Green, D. (2017) Preliminary Investigation of Bikram Yoga Apparel for Improved Mobility and Comfort. *International Textile and Apparel Association (ITAA) Annual Conference Proceedings*, 177. Retrieved from: https://lib.dr.iastate.edu/itaa_proceedings/2017/posters/177
- Green, D. N. (2014). Mind-Body Transformations: Appearance and Yoga in the Hot Room. *International Textile and Apparel Association (ITAA) Annual Conference Proceedings*, 77. Retrieved from: https://lib.dr.iastate.edu/itaa_proceedings/2014/presentations/77
- Haar, S. (2015). Summer Harvest. *International Textile and Apparel Association (ITAA) Annual Conference Proceedings*, 82. Retrieved from: http://lib.dr.iastate.edu/itaa_proceedings/2015/design/82
- Jason, H. (2014). Sustainable Yoga Apparel (Thesis). Retrieved from: <http://www.theseus.fi/handle/10024/71437>
- Kadolph, S. J. and Casselman, K. D. (2004). In the bag: Contact natural dyes. *Clothing and Textiles Research Journal*, 22(1/2), 15-21.
- Křížová, H. (2015). Natural dyes: their past, present, and future sustainability. In D. Křemenáková, J. Militký, R. Mishra (Eds.), *Recent Developments in Fibrous Material Science*. Prague: Kosmas Publishing.
- Miah, M. R., Hossain, M. A., Dipto, A. I., Telegin, F. Y., Quan, H. (2016). Eco-dyeing of Nylon Fabric Using Natural Dyes Extracted from Onion Outer Shells: Assessment of the Effect of Different Mordant on Color and Fastness Properties. *International Journal of Scientific & Engineering Research* 7 (9), 1030 – 1042.
- Park, S. (2016). Exploring Yoga Wear Needs for the Baby Boomer Generation (Master's Thesis). Retrieved from: http://digital.library.ryerson.ca/islandora/object/RULA%3A5529/datastream/OBJ/download/Exploring_yoga_wear_needs_for_the_baby_boomer_generation.pdf
- Saper, R. B., Eisenberg, D. M., Davis, R. B., Culpepper, L., Phillips, R. S. (2004). Prevalence and Patterns of Adult Yoga Use in the United States: Results of a National Survey. *Alternative Therapies in Health and Medicine* 10(2): 33-9.
- Statista (2018). Revenue of the yoga industry in the United States from 2012 to 2020 (in billion U.S. dollars). *Statista: The Statistics Portal*. Retrieved from: <https://www.statista.com/statistics/605335/us-yoga-industry-revenue/>



Front View: *Trikanasana* (Triangle)



Back View: *Ardha Chandrasana* (Half Moon)



Side View: Standing Backward Bending



Detail