IMPERMANENCE OF COLOR

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Color – what may appear to be permanent, even inherent to certain objects, textiles, and nature is actually a very ephemeral phenomenon. As Joseph Albers says, "On the blackboard and in our notebooks we write: Color is the most relative medium in art" and to this should be added that color is also the most relative medium in nature [Albers, 8]. Through the exploration of interactions between air, light, and time with colors in artwork, as well as in plants and animals, it can be seen that color is not only one of the most difficult mediums to control, but is also one of the mediums that controls much of the physiology and livelihoods for species in the real-world. Through the lens of the natural world, as well as the teachings of Joseph Albers, one can begin to explore the effects of layering, tinting, shading, opacities/ transparencies, color mass, texture, and the effects of handicraft in the age of the computer.

In the book, *Interaction of Color* [1963], by Joseph Albers a multitude of facets for creating color combinations is explored while walking a fine line between art and science. Albers himself is a fervent artist, staking such claims as "Abstraction is real, probably more real than nature." His work in this text explores ways to use massing, overlap, and color intensity to create different effects in artistic compositions. He is very concerned with the fact that the true, the exact physical color is never actually perceived. Color is a medium that continually 'changes' depending especially on lighting conditions, but is also changed due to the age of a specific artwork and the environments that work has been exposed to.

The ephemerality of colors can be especially seen with the aging of pieces of art, textiles, and works of architecture. "Colors oxidize [change after exposure to light and air] over time… various colors in a composition altar at different rates. In a single textile or painted object, some colors change enormously over time and others hardly at all, so the balance of the original color palette is lost" [Holtzschue, 223]. Linda Holtzschue also explores the natural and synthetic life-cycles of colors in her book, *Understanding Color*. She explains that there are not only natural stages of decay in the world of color, but also cultural, economic, and marketable influences that change the favorability of certain colors opposed to others, and thus may in fact change what we 'see' based upon what we desire to see. In the fashion world, there is something called "color forecasting" that happens during every season and every few years in the realm of home furnishing design [Holtzschue, 215]. Color forcasting and color cycling determine what is trendy and therefore available on the market during a certain period of time and in specific places. Today, the typical cycling of color palettes happens at a rate of every 8 months in fashion and every 3 – 5 years in home décor [Holtzschue, 221].

In the natural world, layering and massing and the interactions of color happens as it does in the teachings of Albers. Also, time-scales and seasonality work upon colors in the natural world in comparison to the culturally-driven and artwork aging time-scales discussed by Holtzschue. In nature, "colors signal harvest time, breeding conditions, and change of seasons, from the greens of spring to the brilliant reds and browns of fall" [*Causes of Color*, 1]. Like the art world, color in nature is dominated by its interaction with light. Biologically, melanin determines the coloration of animals' skin, fur, and hair. Plants on the other hand have many more complex structural elements that allow them to create colors such as greens and blues that are not commonly found in the animal color spectrum. In addition to melanin, insects such as fireflies create luciferins, "light-emitting biological substances" that allow them to create bioluminescence [*Causes of Color*, 2].

The structural effects of colors and layering in animal tissues create interesting interactions of the colors we see on various species. A bluebird, for instance would look black, but due to small air sacs in the feathers light is scattered to create a blue color [*Causes of Color*, 4]. Peacocks are colored through the combination of colors that generates "iridescence and diffraction." The structural effects of color on animals such as bluebirds and peacocks are "the result of selective reflection or iridescence usually because of multilayer structures" [*Causes of Color*, 4]. Likewise, greens are very difficult colors to produce given the melanin structures in animals, but fish and reptiles use forms of structural color – the interaction of layers of blue and yellow to create the color green.

The layering and ephemerality of colors in chameleons, octopi, and cuddlefish is extremely pertinent with respects to the teachings of Joseph Albers. Chameleons change color due to the interactions of three cellular layers:

> "the inner layer consists of melanin, the next layer diffracts and scatters the light, and the top layer contains pigments [such as red and yellow]"

The expansion and contraction of the color is controlled by the chameleon's brain reacting to environmental factors such as fear or desire to mate, and "the inner layer can move closer-to, or farther-from the skin surface, allowing it to blend in with or intensify color in relation to other cells" [*Causes of Color*, 8]. In an octopus, color comes from "pigment-filled sacs" called chromatophores in the outer layer of skin. These sacs hold red, yellow, or brown pigments and some octopi can have up to five different colors, the color-change happens when the muscles constrict or relax due to the animal responding to its environment, "when muscles relax, the chromatophores close back up" [*Causes of Color*, 8]. Cuddlefish have similar ink sacs, made up of concentrated melanin or poison, by which they squirt into their environment to stun prey or confuse attackers. The emittance of ink thus changes the color of the animal almost immediately.

Arctic animals exhibit another unique form of color-change mainly in relation to seasonal changes and exposure to daylight. The many white animals in northern climates change color for camouflage, as well as survival in the harsh climates, where white actually serves to keep many species warm. It may seem like a paradox, but the white color is “the absence of pigment” in the natural world, which allow hairs and feathers with the absence of color to fill with tiny sacs of air [*Dressing for Winter*, 1]. The trapping of air in these tiny sacs keep the arctic species warm in the wintertime. Molting occurs when the daylight period becomes longer. During this time many, but not all species change color from white to shades of brown. One interesting phenomenon is that northern weasels change coat color due to seasonal changes and sunlight exposure, but when researchers take a northern weasel south, and out of the seasonal-changing context, it will still turn white in the wintertime [*Dressing for Winter*, 1]. Furthermore, the polar bear’s coat is a good example of the use of white in arctic animals. The polar bear’s “coat” is made up of two layers of white fur that never change color due to seasonality. The outer layer is thinner furs, with the under-layer, called “coarse guard” create pockets for air to become trapped to both warm the animal and allow it to have more buoyancy in the water [*Dressing for Winter*, 2]. Beneath these two layers of air-trapping white furs, the polar bear’s skin is black, made to absorb all of the heat captured from sunlight in the upper layers of fur. Thus, the apparent “whiteness” of the polar bear can be disputed, seeing as the under-layer in this animal is black. Here, layering of color creates complex interactions for the survival of animals as they interact with diverse environmental phenomena, as well as complex phenomena to describe in terms of color-categorization and color as it is discussed theoretically.

Color is a constantly-morphing phenomenon. In both the natural world, and the artificial creations of man, such as paintings and textiles, color fades, changes, and is altered due to a multitude of complex factors. The works of Joseph Albers and Linda Holtzschue highlight the immutable fact that controlling color and finding the correct, physical color is nearly impossible. From the conditions at the time of a print job [humidity, temperature, and speed of the printer], to the age of the artwork one is looking at, colors and color palettes will be seen as radically different, it is the instantaneous effect of viewing colors that happens in this way. Likewise, in the natural world, colors are the result of complex phenomena due to layering, pocketing, and interaction with light conditions. Animals change color due to what they eat, the time of year it is, and the various climates they are exposed to. From air pockets to ink sacs, and fluorescent colors to tints of white, the natural world is just as much a play of intensity, massing, and balance as what is achieved through the work in Color Theory. The world of color is complex mosaic of patterning, layering, and juxtaposition much like a kaleidoscope, the life of particular color in a given context will always change due to external factors. This is why color is much more than something permanent or given, but rather it is an ephemeral quality seen in instances by whoever may be looking.

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