The Age of Reason for COLOR

by Faber Birren

THE STORY BEHIND THE STORY

The use of COLOR is an essential part of our business, and we are always interested in broadening its application.

Some months ago we discussed the use of tinted book papers and color-related inks with our printer. The objectives were not only to broaden the use of color, but also to create a distinctive appearance for our publications, emphasizing visual appeal.

A series of booklets was printed, using colored inks on colored stocks. The colors were picked at random, without regard to color combinations which might be more readable or conducive to reading. The effects were rather startling; comments were all very favorable.

However, regardless of how desirable this approach may seem to a manufacturer of dyes and pigments, more practical reasons must be presented to our customers and the ultimate consumer. Upon investigation, we learned that E. A. Whiteford, President of the Whiteford Paper Company, Inc., New York, in collaboration with Faber Birren, an outstanding authority on COLOR, had developed a scientifically determined line of tinted papers with specially related color inks.

Presented here is an enlightening and provocative article prepared for us by Faber Birren. This brochure is printed on four different Whiteford Impact tinted papers and white with the special color-related inks on the tints. The back ten pages are devoted to a demonstration of four-color process printing on the four tints and white.

Our printer, Norman S. Githens, President of Githens-Sohl Corporation, New York, adds a few interesting comments.

It is our hope that this unusual presentation may stimulate the creative impulses of all who work with paper and ink.

Allied Chemical

NATIONAL ANILINE DIVISION

The Age of Reason for COLOR

by Faber Birren

A discerning and factual appraisal of color in paper, printing and the graphic arts by an outstanding authority.

Color is a subject packed with emotion and temperament. It is a human experience very difficult to judge factually and objectively. Because it is so personal in its appeal, judgments of it are likely to wander apart into esthetic and even spiritual realms. Ask a hundred people what color means to them, and probably not one of them will say the most obvious thing of all—that color is essentially functional in vision, that it gives greater sense and order to the world at large.

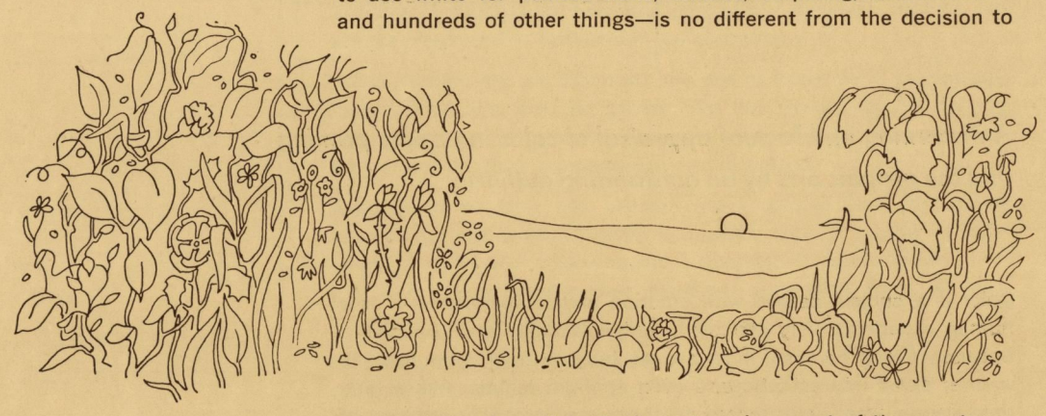
Research studies of color very often seem academic. Do you like color or don't you? Is it any good? Does it have any special value? Such questions more or less beg the issue. Color is an intimate part of human vision and life itself. Indeed, what is the answer to the most basic question of all: Why does man have color vision?

It would be fanciful, of course, to say that nature gave man color vision so that he could enjoy sunsets, flowers, oil paintings, colored papers and process reproductions. This interpretation would be purely cultural and artificial. Nature obviously included color in the sense of seeing in order to improve visual acuity and to enable man to perceive his world more clearly and to have a keener and more meaningful knowledge of it—to his own survival. Birds, insects, fish, which must distinguish different colors as a source of food, have a sense of it. Most mammals, however, which require no such discrimination, may be without color vision.

Further, in the broad sense, black and white are colors just as are red, yellow, green, blue. Yellow and white, for example, are far less "different" than are yellow and blue. In nature—snow and clouds

excepted—white is a rarity. Blue, green, shades of yellow are dominant. (One may be pretty sure that ancient man, when it snowed, got away from it and went into a cave or hut to look at things far more important to him.)

In the great majority of products bought by civilized man today, white is just another color and not a thing in itself. Even "white sales" today include sheets and pillowcases in colors. The decision to use white for painted walls, textiles, carpeting, automobiles—and hundreds of other things—is no different from the decision to

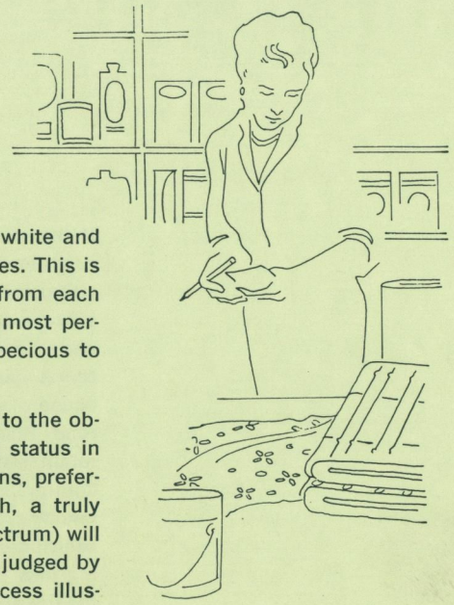


use any other hue, tint, shade or tone in or out of the spectrum. Perhaps it is that all things seen comprise a diverse range of visual sensations, and white is just as much a part of this overall "gestalt" as anything else. It is nothing that stands alone.

Yet in the graphic arts, in paper and printing processes, white has become such a conventional habit and tradition that many are prone to look upon it as some lone entity. If one faces the evident facts of human vision, it is no more plausible to conclude that a book, newspaper or magazine should be printed on white than to propose that they be printed on color!

The white tradition, of course, has a reason. This originally concerned the need for good legibility—and it included black type matter. The pair later became so inbred in the graphic arts that it resulted in a definite, if arbitrary, "law." Black on white admittedly has good legibility, but deep blue on pale yellow may be even superior. If clear visibility is a function of brightness-difference, this condition can be met by other combinations than white and black.

Printing is one of the very few arts or crafts in which achromatic white seems to be lined up by itself against the entire world of chromatic color. Such division is unnatural for the simple reason that all colors do not have like appeal. If a comparison is to be



drawn, it must not be restricted to a judgment between white and the whole spectrum, but between white and individual hues. This is where much research gets lost. Colors are as different from each other as they are from white. Blue and red are liked by most persons, while purple and orange are disliked. It is thus specious to ask if white is better than color. What color or colors?

As a matter of fact, recent studies by the author have led to the observation that even so-called white has no sure or fixed status in human estimation. In the judgments of hundreds of persons, preferences for white will vary significantly. Curiously enough, a truly "neutral" white (which reflects evenly throughout the spectrum) will not be liked as much as a cool white (where the paper is judged by itself) or a warm white (where the paper exhibits a process illustration). White may be just as temperamental as chromatic colors themselves.

Any number of studies of color preferences have been made by psychologists and commercial sources. In virtually no instance has white been much of a factor. In abstract choice, white is not liked nearly as much as blue, red, green. In the sale of consumer goods, white will usually be far down the line (paints, textiles, etc.). In advertising and packaging, white by no means has the profitable advantage of red, yellow, blue. This will come as no surprise to the reader, nor is there much room for dispute. Where white is measured against individual colors (not all of them in a bunch), it is only average. However, if it is not as good as some colors, it may still be head and shoulders above others.

As related to paper, however, it may still be insisted, (a) that white is better for reading matter, (b) black and white engravings look better on it, (c) PRINTED COLORS look better on it, (d) it may be more economical and convenient to use. If these merits are sound, they hardly justify the rejection of color in paper by and large. Yet such prejudice still widely exists, and much of it (as often happens with color) is based more on emotional bias than on reason.

As to visibility and legibility, it is futile to argue against white and black. The combination is excellent, but it is by no means the only right one. Indeed, it has several counts against it. Science has objected to shiny papers which create specular reflection and glare. In modern conditions of illumination levels, even mat whites may also produce glare, constrict the pupil opening of the eye, cause "blur" on the retina and otherwise prove anything but ideal. (Automobile road maps and air navigation charts have been successfully produced on tinted papers which have actually improved acuity under strong daylight.)

If there is adequate light, plus sizeable characters or details, any brightness ratio above 8 to 1 will be found satisfactory from the viewpoint of legibility—and probably more pleasant. Blackboards in schools have almost entirely disappeared. Ophthalmologists and seeing authorities have objected to large areas of black which cause trying visual adjustments and to small touches of white which, because of excessive contrast, are "hazy" to the eye and difficult to read. Black on white, which has a contrast ratio of about 16 to 1, might not be excessive if visibility were the only criterion. But if comfort, pleasure and ease of reading without undue strain are also involved, then lower ratios have great merit. The Impact Book papers seen here have been slightly lowered in brightness—and the printing inks slightly raised—to create a softer and modern "formula" for the all-important and highly civilized problem of reading.

In much printed matter involving "sustained visual tasks," lower contrast than black and white may make seeing not only easier but less fatiguing; the nerves on the retina may be less stimulated and therefore better able to function effectively over long periods of time. This article has been printed on four specially designed Impact Book papers (with specially designed inks) which illustrate the above point. Thus the reader may, for himself, determine if a lower contrast than black and white (a) is any better, (b) any worse, (c) or just about the same. The experiment will be all the more impressive (to the advantage of tinted paper) where the illumination is intense, such as full daylight. If possible, such judgment should be READABILITY alone.

Now, if the READABILITY is satisfactory, what about the esthetic or emotional appeal of the tints? Here reactions are likely to be more personal. To those who may say they just don't like printed matter on color, one may wonder if they would express the same attitude toward nature and prefer white everywhere. This is not a ludicrous statement. White has been the exception in nature over eons of years; why must it be the rule for the printed word? Surely white paper is a convention, born of arbitrary habit. It is not what man and his ancestors have normally been exposed to.

Debate aside, however, there are in color certain physiological factors not found with white. Highway signs (red for stop, yellow for caution, green or blue for destination) are used, not because of visibility alone, but because color holds more attraction to the eye (and brain) and is easier to find, remember and identify. (Highway signs in white are for information only.) In other words, color is more compelling than white. Nature apparently has made it more significant and motivating—probably because it holds greater importance to man in his worldly environment.

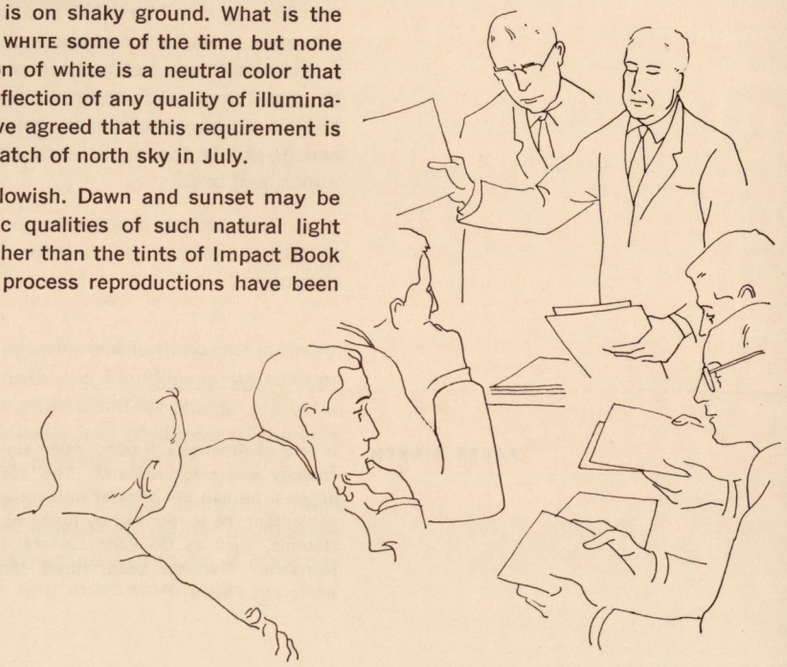
This matter of visual, physiological and emotional impact for color has been verified in scientific measurements of the reaction of the human organism. Where colors are equated for equal brightness, red will tend to arouse autonomic responses (blood pressure, respiration, brain waves), while blue will tend to retard them. White (and yellow) will occupy something of a neutral position. As to overall reactions, associations and "feelings," a Californian medical researcher gives this report: "The hypothesis that the neutral white . . . would induce feelings of boredom was supported by the data. The subjects reported feeling significantly more 'bore-disinterested' during the white condition than during the chromatic conditions. The monotonous white condition aroused the least amount of thoughts and associations."

Would the reader agree that these sheets of Impact Book are less "boring" than white? If he finds them so—and either likes or dislikes them—and if the readability is adequate, it probably may be concluded that color has "something" over white and that, unlike white, a person may find difficulty in being indifferent to it.

If color is by no means unnatural in nature, one wonders why it should be considered unnatural or inappropriate for printed matter. A final argument against white might rest with fidelity of color reproduction. Only white is thought to give process color a realistic appearance.

Here once again, the reasoning is on shaky ground. What is the color of natural light? It may be WHITE some of the time but none too often. The scientific definition of white is a neutral color that effects a total (or nearly total) reflection of any quality of illumination that strikes it. Scientists have agreed that this requirement is met by the light coming from a patch of north sky in July.

Yet sunlight at noon may be yellowish. Dawn and sunset may be decidedly pinkish. The chromatic qualities of such natural light may be more pronounced and richer than the tints of Impact Book included herewith and on which process reproductions have been



printed! In other words, natural light striking white paper during the course of a day may, in reality, be more colorful than the tints of the papers which are shown.

Thus these process reproductions, even though printed on tinted stock, have a natural and pleasing appearance. Because of a phenomenon known as color constancy, the colors all appear normal, but perhaps pervaded by faintly chromatic light. Nature, through color constancy, strives to keep things in balance. If this balance didn't exist in human vision, white paper itself would seem to change its shade every hour of the day, not alone in hue but in brightness as well. As it is, white remains white and colors hold their normalcy even though the illumination (or the overall background) is changed.

The tinted papers, in fact, may enhance the process color effects and make them even more beautiful. If so, this is because people prefer "warmth" in illumination, not sterile whiteness. Candlelight, firelight, dusk are generally more satisfying than cold north light. Impact papers have this quality.

Color doesn't need justification. What it does need, however, is discrimination. Color for the sake of color is never enough. If it can add to the appeal of paper and printing, it can also detract and be "ugly." If people by and large have certain favorites, if consumer goods sell best in certain hues and tones, if in advertising and packaging some colors outperform others, then the right solution lies in careful choice and intelligent research. Color should never be a vague or mysterious thing. It should be considered economically and not just temperamentally. It should be "put on the spot" and made to prove its case. This may require study of human vision, research on color preference—all that will make sense, gratify the public, and be practical and profitable to the maker and user.

FABER BIRREN is one of America's leading color authorities and a specialist in color psychology and color research. The author of sixteen books and numerous articles, he had his original training in the graphic arts. As an independent consultant, he is retained by many of the country's leading business organizations, such as Du Pont, General Electric, Masonite, Minnesota Mining, Monsanto, National Lead, Royal McBee, West Virginia Pulp and Paper, Whiteford Paper.

Hurdling the Barrier of Indifference

by Norman S. Githens

President,
Githens-Sohl Corporation

Since the days of Gutenberg, printing black ink on white paper has been standard procedure. So when somebody says print green on green or print maroon on coral . . . we open our eyes and take a suspicious look. But the more we look, the more we begin to wonder if this deep-rooted black-and-white complex has not fogged our vision somewhat.

Tinted papers will never replace white; color inks will never replace black. But there are vast quantities of printing that might be materially improved in attractiveness and effectiveness by going to color.

Color is playing a mighty important part in our lives today. Our homes, our apparel, our cars reflect the desire for color. During recent years, industry after industry has been conquered by color because . . . color possesses an intangible, and sometimes irresistible, appeal which quickens interest in, and acceptance of, new things and new ideas.

Scientists, chemists and engineers create and devise; then color is called upon to SELL. Recognition of the basic human reaction to color is one of the reasons for the rapid acceptance of change in the standard of American living.

Now, it seems, color is flexing its muscles within the paper industry. Its higher attention value, its warmth and friendliness, its ease on the eyes, its opportunities for new effects and for change are being more seriously considered by designers and producers of the kind of printing which seeks to impress, promote, sell.

Every printed piece, which attempts to promote something, must first hurdle the very formidable barrier of reader indifference before it can start to do the job it was planned to do. If color can help get it over this barrier, it is very much worthwhile.

This doesn't mean you should shift to color as a matter of general principle. Shift for a particular purpose. Color has proven its potency as a salesman when properly employed. Used with reason and with good taste, tinted papers and color inks offer limitless opportunities to make printed appeals more tempting and more easily digested than the same job done black on white.

Salt and pepper may provide adequate seasoning for the short-order cook. But the chef, who must tempt appetites to entice customers and keep them coming, never overlooks a new seasoning that might thrill jaded palates.

Here is an interesting exhibit—a four-color process engraving printed letterpress on white and four tinted papers.

The three primary colors (yellow, red and blue) were run without change of ink or make-ready. On white, the fourth color ran black; on the four tinted papers, each fourth color was changed to the Impact color-related ink.

Examine and compare these reproductions. Note how little the tint in the papers affects the color values. Which of these five reproductions, to your eye, is the most appealing?

FOUR-COLOR PROCESS ENGRAVINGS COURTESY OF HORAN ENGRAVING CO.

Three primary colors
are same inks
on all five papers

IMPACT BROWN
instead of black

FOUR-COLOR PROCESS ENGRAVINGS COURTESY OF HORAN ENGRAVING CO.

Three primary colors
are same inks
on all five papers

IMPACT MAROON
instead of black

IMPACT JONQUIL—Appleton Coated, Sub. 70, Dull Finish

FOUR-COLOR PROCESS ENGRAVINGS COURTESY OF HORAN ENGRAVING CO.

Three primary colors
are same inks
on all five papers

IMPACT GREEN
instead of black

IMPACT CORAL—Appleton Coated, Sub. 70, Dull Finish

IMPACT MINT GREEN—Appleton Coated, Sub. 70, Dull Finish

FOUR-COLOR PROCESS ENGRAVINGS COURTESY OF HORAN ENGRAVING CO.

Three primary colors
are same inks
on all five papers

IMPACT BROWN
instead of black

The Mark of Restful Reading

Whiteford Paper Company, Inc., has licensed several mills to manufacture and sell *IMPACT Papers. For further information address the company at 420 Lexington Avenue, New York 17, N. Y. *U.S. Pat. Pend.

IMPACT SUNTEX—Appleton Coated, Sub. 70, Dull Finish

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Standard
Four-Color Process
Inks

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