

# Tranquilizing Effect of Color Reduces Aggressive Behavior and Potential Violence

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I would like to report on a significant use of color to reduce potential or actual aggression. It has been discovered that the use of a specific shade of pink can have a moderating effect on subjects experiencing feelings of anger or agitation. The calming effect of pink if appropriately applied, relaxes hostile or agitated behavior in approximately ten to fifteen minutes.

In 1978, Glen Wylie of Santa Ana, California, showed John N. Ott, noted photo-biologist, a Kinesoid experiment utilizing the colors pink and blue. If a two foot by three foot piece of bright pink construction paper is placed in front of a subject's eyes, the response is a significant loss of muscular strength. In the experiment, the subject stretches his arm straight out in front of his body, thereby creating a 90° angle. The experimenter's goal is to bring the subject's arm down to the hips. The subject attempts to resist this effort by exercising maximum resistance at the agreed upon command. It

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is essential that the experimenter and subject be of comparable strength.

To establish the subject's baseline strength, press down on the subject's arm, at the agreed upon command, for three seconds. The subject should be able to resist the experimenter's efforts, if they are of comparable strength. (Wrist watches which keep time by utilizing an oscillating system or emit any radiation, even from the digital read-out, reduce subject's strength and must be removed before testing. Similarly, too much clothing made of synthetic blends has a weakening effect.) Next, place the pink construction paper about 15 inches in front of the subject's eyes. Repeat the resistance test. The subject experiences a significant loss of muscular strength. Finally, place a blue construction paper at a similar distance from the subject's eyes. Strength returns and the subject shows no evidence of the earlier loss of muscular strength.

This experiment has been tried with 153 subjects. Using the Kinesoid method, only two subjects failed to demonstrate a loss of strength to the pink color (.01 percent).

Experiments with 38 subjects using an adjustable dynamometer show similar results

All 38 subjects exhibited losses of strength, when exposed to the pink color, ranging from six to 23 percent.

As early as 1932, research has shown that visible wavelengths of light reach the pineal and pituitary glands through neurochemical channels independent of the optic system (Krieg, 1932). This suggests that colors can have a direct effect on the entire endocrine system. Recent research supports this premise. (Wurtman and Axelrod, 1956; Shipley, 1964; Hague, 1964; Kerenyi, 1977; Wurtman, 1975; Valenzano and Pooler, 1979). The importance of these independent neurochemical channels as it relates to health and behavior has been given considerable attention by John N. Ott. (Mayron, Ott, Nations, and Mayron, 1974; Ott, 1974; Treichel, 1974). Human response to color and light has been studied by Faber Birren (1979) and Max Luscher (1969). In animal experiments, some behavioral and morphological changes were recently reported by Salterelli and Coppola (1979) when mice were exposed to pink light (45.7 cm fluorescent lamps (F15T8, 15W, General Electric); 550-700 nm, 620 peak). Pink light, they reported, increased the weight of the adrenals compared to all other light conditions ( $p < 0.05$ ) when the mice were exposed for 12 hours each day for a total of 30 days. However, the relationship between pink color and human aggressive behavior has not previously been reported.

In 1978, I demonstrated the Kinesoid experiment, involving pink color, to a series of classes on innovative treatment techniques in corrections (Schauss, 1978). As a result of this provocative demonstration, I had suggested that a pink holding cell might be useful as a "time-out" room for acting out confinees. Two commanding officers at the U.S. Naval Correctional Center in Seattle, Washington, decided to try the pink holding cell in early 1979.

On March 1, 1979, Chief Warrant Officer Gene Baker and facility commander Captain Ron Miller, ordered that a holding cell used for initial confinement of new inmates be painted completely pink, except for the floor. The cell selected housed new inmates for less than 15 minutes. Newly confined

inmates at intake are generally more prone toward violence than any other inmate. Before painting the experimental holding cell pink, duty intake officers remarked to the prison administrator CWO Baker that hostile behavior by new inmates was daily a "whale of a problem".

After 223 days of continuous use as a temporary holding facility for new confinees, the results have been impressive. A memorandum to the Bureau of Naval Personnel, Law Enforcement and Corrections Division, Washington, D.C, written 156 days after use of the pink holding cell stated: Since initiation of this procedure on March 1, 1979, there have been no incidents of erratic or hostile behavior during the initial phase of confinement. The memorandum went on to state that the new confinees only required a maximum of 15 minutes of exposure to ensure that the potential for violent or aggressive behavior had been reduced. The effect continues for fully thirty minutes after release from the cell! This is enough time to process the new inmate to a permanent cell.

According to Dr. Paul Boccumini, Director of Clinical Services for the San Bernardino County Probation Department, similar results have been reported at their Kuiper Youth Center, a co-educational residential facility for delinquents. Dr. Boccumini states that "the staff report excellent results, with the youngsters' aggressive behavior diminishing quite rapidly. In fact, it has worked so well that staff must limit their [delinquents'] exposure because the youngsters become too weak."

Similar results have now also been reported by the Santa Clara County Jail in San Jose, California. The County painted their large holding cell pink, at the recommendation of the jail commander, Captain Miller. However results have not been as consistent because large holding cells, or "fish tanks," hold many confinees at one time. This situation reduces the pink color's effect because other colors are worn by the inmates. In fact, so aware are the inmates in San Jose of the pink color's powerful effect that they have been scratching at the pink

color to remove it from the cell's walls. In discussions I have had with inmates at both the Seattle and San Jose facilities, all confirm the pink color's significant effect on their behavior.

The use of pink color in reducing aggression and causing muscular relaxation is humane and involves no medication or physical force. The phenomenon affects the endocrine system causing a tranquilizing effect on the muscle system. The effect can not be controlled by conscious or unconscious effort. This has been proven by experimenting with accomplished athletes in the martial arts and yogas. It is similarly effective with the color-blind. In repeated experiments with adolescents and adults, the non-drug anesthetic effect occurs, on the average in 2.7 seconds. I would suggest the use of pink color in any situation where sudden or uncontrollable aggression is likely.

Recent experiments with several middle aged males with a history of violence suggest that imagery can be a valuable adjunct to treating such subjects. The subject is trained to concentrate his eyes on the pink construction paper while imagining a violence provoking situation. Eventually a transference occurs so that the subject can visualize the color when provoked, thereby reducing this hostility. Further work in this area is proceeding.

The use of color in tranquilizing aggression and potential violence has many implications and is opening up a new frontier of behavioral technology heretofore not seriously considered.

## REFERENCES

- BIRREN, F.: Human Response to Color and Light. Hospitals, pp. 93-96, July 16, 1979.
- HAGUE, E.B. ed.I: Photo-Neuro-Endocrine Effects In Circadian Systems, with Particular Reference to the Eye. Annals New York Acad. Sciences 117 (11,1-645, Sept. 1964.
- KERENYI, N.A.: The Pineal Gland - What is its True Importance? Modern Medicine, pp. 81-84. Nov. 30, 1977.
- KRIEG, J. S.: The Hypothalamus of the Albino Rat. J. Comparative Neurology 55 (11, May 1932.
- USCHER, M.: The Luscher Color Test. Random House, New York, 1969.
- MAYRON, L.W., OTT, J. N., NATIONS, R., and MAYRON, L: Light, Radiation, and Academic Behavior. Academic Therapy 10 (1), 33-47, Fall, 1974.
- OTT, J. N.: The Eyes' Dual Function - Part I: Eye, Ear, Nose and Throat 53 (71.276-288, July, 1974.

OTT, J. N.: The Eyes' Dual Function - Part II: Eye, Ear, Nose and Throat 53 (81,309-316, August 1974.

OTT, J. N.: The Eyes' Dual Function - Part III: Eye, Ear, Nose and Throat 53 (11), 465-469, August 1974.

SALTERELU, C. G. and COPPOLA, C. P.: Influence of Visible Light on Organ Weights of Mice. Laboratory Animal Science 29, 3, 319-322, June, 1979.

SCHAUSS, A.G.: Body Chemistry and Offender Behavior. Correctional Training Personnel, August, 1978.

SHIPLEY, T.: Rod-Cone Duplexity and the Automatic Action of Light Vision Research 4,155-177, May, 1964.

TREICHEL, J.: School Lights and Problem Pupils. Science News 105, April 30, 1974.

VALENZENO, P. and POOLER, J. P.: Phototoxicity. The Neglected Factor. Journal American Medical Association (JAMA) 242 (5), 453-454, August 3, 1979.

WURTMAN, R. J. and AXELROO, J.: The Pineal Gland. Scientific American, pp. 50-58, July, 1956.

WURTMAN, R. J.: The Effects of Light on the Human Body. Scientific America 233 (1): 68-77, July 1975.

editor's Note: Please note that the cover of this issue is close to the shade of pink used in the experiments described by Alexander Schauss.

## EXCERPTS FROM A TELEPHONE CONVERSATION WITH DR. HUMPHRY OSMOND

I met Alexander Schauss at the HIBR symposium in Houston in June and became very interested in the work he and Dr. John Ott are doing with the color pink. When I got back I got a number of pink papers and tried them out on a variety of people — psychologists and others. I found that it worked but no one had an explanation. Then I used it on a number of patients, particularly those who were having difficulty with tension, and I found there that it worked. There were one or two on whom it worked very well indeed. The effect is much quicker than even an injection. Then I bought some pink cloth and cut it into squares and gave it to patients urging them to look at it for two or three minutes out of every hour. They don't always do it, but those who do undoubtedly benefit. It means you can carry your own tranquilizer in your

## TRANQUILIZING EFFECT OF COLOR

pocket — and it doesn't matter if you get addicted to it. In addition to this we have one man who is a very good visual imager, and he doesn't need paper or cloth now; he simply images the color, envelops himself in it and finds it very relaxing. We have recently painted the doors of some of our seclusion rooms pink and are waiting to see how that works.

I consider it a very promising development. It is a very simple thing to do, comparatively inexpensive and far safer than other methods of producing the same sort of tranquility. . . . Those who don't believe it can demonstrate it for themselves; it doesn't make any difference to the effect whether a person is skeptical or not. . . . It shows once again that there is a great deal that we don't know. But the fact that there is no satisfactory explanation should not be used against it, as much of medicine is not supported by explanation. What may be used against it is that it is safe, inexpensive, and available. That's a heavy burden for it to bear!

Certainly I have confirmed that it is useful to some people; now I want to know how useful to how many people, and this will require a great deal of inquiry. In the meantime we must see that it is put to use.

# Color Psychology (the “Colour Affects” system)

*Color psychology is a matter of debate, to say the least. There are very few (if any) undisputed scientific research presented, yet an increasing number of physicists, psychologists, biologists and neuroscientists are taking the subject increasingly more seriously.*

## **How does it work?**

Many people think that color is just a matter of how things look and it is often dismissed as being purely cosmetic. However, the truth is that color is light – the source of life itself; there is nowhere that color does not exist and our instinctive, unconscious response to it is a vital element in our survival.

Color is Nature's own powerful signaling system. Scientifically, it is the first thing we register when we are assessing anything: a very simple and obvious example of that is our reaction to a fly in our home: if it is black, we will probably find it a minor irritation, but if it has yellow stripes our reaction will be different. The same instinct tells us when food is unsafe to eat and throughout the animal kingdom color is widely used to signal sexual availability.

In today's sophisticated world it is easy to underestimate the power of primitive instincts, as they are largely unconscious. Today we might be contemplating a packet of corn flakes or a new cold cure, rather than a primitive meal or a curative herb, but exactly the same instincts come powerfully into play. The colors of the interior environment wherein we live or work affects us in just the same way as those in the natural world always did. The colors that people wear still send out clear signals that we can all read accurately.

Science has always recognized the link between color and mood/behavior and there is a large body of scientific research into it. However, no one has written a monograph on the subject for over thirty years and one reason for this might be that results are so often inconclusive. It is not normally part of a psychologist's remit to study the finer points of color harmony so colors are defined as, for example, "blue and orange" or "red and green" without much consideration of the subtleties of shade and tone.

However, most of us agree that response to color is subjective and assumes that it must therefore be unpredictable.

According to the research of psychologist Angela Wright (and others), this is not true.

Response is subjective but, when the study of color harmony is combined with the science of psychology, reactions can be predicted with startling accuracy. There is no such thing as a universally attractive color. Red, for example, might be your favorite color but another person might hate it. You see it as exciting, friendly and stimulating, he sees it as aggressive and demanding. Blue might be perceived as calm and soothing – or as cold and unfriendly. It is the combination of colors that triggers the response.

The key factor that Angela Wright recognized in studying color psychology was that, equally, there are no wrong colors; we do not respond to just one color, but to colors in combination. In many ways, color and music work the same way. Or, as jazz pianist Thelonius Monk observed: "There are no wrong notes".

It is important to understand that there is a great difference between color psychology and color symbolism. Historically, what is often described as color psychology is actually color symbolism – the conscious associations that we are conditioned to make. For example, cultural responses to color derive from a variety of causes: green is the sacred color throughout Islam, being the color of the Prophet's robe; in Ireland it is considered lucky, perhaps because when the world about us contains plenty of green this indicates the presence of water and therefore little danger of famine. There are many examples of color symbolism: purple is associated with royalty for the simple reason that, until relatively recently, it was an extremely expensive dye and only royalty could afford it; red is the color of blood and has associations with war.

These associations often coincide with color psychology (red actually can trigger aggression) but they are by no means the same thing.

The key to successfully applied color psychology is the recognition of tonal families of color and how they relate to personality types. All the millions of shades, tones and tints can be classified into just four tonal families and great minds throughout history have also repeatedly classified humanity into four types; from Galen in early Rome (predominant bodily fluids defining a person as *Choleric*, *Melancholic*, *Sanguine* or *Phlegmatic*) to Jung in the twentieth century (determining function being predominantly *Thought*, *Feeling*, *Intuition* or *Sensation*).

### **Psychological properties of color**

Color is light, traveling to us in waves from the sun. When light strikes any colored object, the object will absorb only the wavelengths that exactly match its own atomic structure and reflect the rest – which is what we see. Turn this around and it is easy to understand how the color of anything is a clear indication of its atomic structure or, in simple terms, what it is made of. When light strikes the human eye, the wavelengths do so in different ways, influencing our perceptions. In the retina, they are converted into electrical impulses that pass to the hypothalamus, the part of the brain governing our hormones and our endocrine system. Although we are unaware of it, our eyes and our bodies are constantly adapting to these wavelengths of light.

Color is energy and the fact that it has a physical effect on us has been proved time and again in experiments – most notably when blind people were asked to identify colors with their fingertips and were all able to do so easily.

There are only eleven basic color words in the English language, and yet there are literally millions of colors. After the basic eleven, we borrow words, such as avocado (is that the flesh, or the skin?) and grape (is that deep purple or green?) to describe the myriad of shades, tones and tints. This inevitably creates confusion in color communication. People often ask, "Do we all see colors the same?" Who knows? The point is that in color

psychology it does not seem to matter what we think we are looking at; the effect of colors on us is caused by their energy entering our bodies. Color-blind people are also sensitive to color psychology.

The eleven basic colors have fundamental psychological properties that are universal, regardless of which particular shade, tone or tint of it you are using. Each of them has potentially positive or negative psychological effects and which of these effects is created depends on the relationships within color combinations.

There are four psychological primary colors – *red, blue, yellow and green*. They relate respectively to the *body*, the *mind*, the *emotions* and the *essential balance between these three*. The psychological properties of the eleven basic colors are as follows:

RED.                    *Physical*

Positive:                Physical courage, strength, warmth, energy, basic survival, 'fight or flight', stimulation, masculinity, excitement.

Negative:              Defiance, aggression, visual impact, strain.

*Being the longest wavelength, red is a powerful color. Although not technically the most visible, it has the property of appearing to be nearer than it is and therefore it grabs our attention first. Hence its effectiveness in traffic lights the world over. Its effect is physical; it stimulates us and raises the pulse rate, giving the impression that time is passing faster than it is. It relates to the masculine principle and can activate the "fight or flight" instinct. Red is strong, and very basic. Pure red is the simplest color, with no subtlety. It is stimulating and lively, very friendly. At the same time, it can be perceived as demanding and aggressive.*

BLUE.                    *Intellectual*

Positive:                Intelligence, communication, trust, efficiency, serenity, duty, logic, coolness, reflection, calm.

Negative:              Coldness, aloofness, lack of emotion, unfriendliness.

*Blue is the color of the mind and is essentially soothing; it affects us mentally, rather than the physical reaction we have to red. Strong blues will stimulate clear thought and lighter, soft blues will calm the mind and aid concentration. Consequently it is serene and mentally calming. It is the color of clear communication. Blue objects do not appear to be as close to us as red ones. Time and again in research, blue is the world's favorite color. However, it can be perceived as cold, unemotional and unfriendly.*

YELLOW.                *Emotional*

Positive:                Optimism, confidence, self-esteem, extraversion, emotional strength, friendliness, creativity.

Negative:              Irrationality, fear, emotional fragility, depression, anxiety, suicide.

*The yellow wavelength is relatively long and essentially stimulating. In this case the stimulus is emotional, therefore yellow is the strongest color, psychologically. The right yellow will lift our spirits and our self-esteem; it is the color of confidence and optimism. Too much of it, or the wrong tone in*

*relation to the other tones in a color scheme, can cause self-esteem to plummet, giving rise to fear and anxiety. Our "yellow streak" can surface.*

### GREEN.

Balance

Positive: Harmony, balance, refreshment, universal love, rest, restoration, reassurance, environmental awareness, equilibrium, peace.

Negative: Boredom, stagnation, blandness, enervation.

*Green strikes the eye in such a way as to require no adjustment whatever and is, therefore, restful. Being in the centre of the spectrum, it is the color of balance – a more important concept than many people realize. When the world around us contains plenty of green, this indicates the presence of water, and little danger of famine, so we are reassured by green, on a primitive level. Negatively, it can indicate stagnation and, incorrectly used, will be perceived as being too bland.*

### VIOLET.

Positive: Spiritual awareness, containment, vision, luxury, authenticity, truth, quality.

Negative: Introversion, decadence, suppression, inferiority.

*The shortest wavelength is violet, often described as purple. It takes awareness to a higher level of thought, even into the realms of spiritual values. It is highly introverted and encourages deep contemplation, or meditation. It has associations with royalty and usually communicates the finest possible quality. Being the last visible wavelength before the ultra-violet ray, it has associations with time and space and the cosmos. Excessive use of purple can bring about too much introspection and the wrong tone of it communicates something cheap and nasty, faster than any other color.*

### ORANGE.

Positive: Physical comfort, food, warmth, security, sensuality, passion, abundance, fun.

Negative: Deprivation, frustration, frivolity, immaturity.

*Since it is a combination of red and yellow, orange is stimulating and reaction to it is a combination of the physical and the emotional. It focuses our minds on issues of physical comfort - food, warmth, shelter etc. - and sensuality. It is a 'fun' color. Negatively, it might focus on the exact opposite - deprivation. This is particularly likely when warm orange is used with black. Equally, too much orange suggests frivolity and a lack of serious intellectual values.*

### PINK.

Positive: Physical tranquility, nurture, warmth, femininity, love, sexuality, survival of the species.

Negative: Inhibition, emotional claustrophobia, emasculation, physical weakness.

*Being a tint of red, pink also affects us physically, but it soothes, rather than stimulates. (Interestingly, red is the only color that has an entirely separate name for its tints. Tints of blue, green, yellow, etc. are simply called light blue, light green...etc.) Pink is a powerful color, psychologically. It represents the feminine principle, and survival of the species; it is nurturing*



*and physically soothing. Too much pink is physically draining and can be somewhat emasculating.*

### GREY.

Positive: Psychological neutrality.

Negative: Lack of confidence, dampness, depression, hibernation, lack of energy.  
*Pure grey is the only color that has no direct psychological properties. It is, however, quite suppressive. A virtual absence of color is depressing and when the world turns grey we are instinctively conditioned to draw in and prepare for hibernation. Unless the precise tone is right, grey has a dampening effect on other colors used with it. Heavy use of grey usually indicates a lack of confidence and fear of exposure.*

### BLACK.

Positive: Sophistication, glamour, security, emotional safety, efficiency, substance.

Negative: Oppression, coldness, menace, heaviness.

*Black is all colors, totally absorbed. The psychological implications of that are considerable. It creates protective barriers, as it absorbs all the energy coming towards you, and it enshrouds the personality. Positively, it communicates absolute clarity, with no fine nuances. It works particularly well with white. It communicates sophistication and uncompromising excellence. It creates a perception of weight and seriousness (it is a myth that black clothes are slimming). Black is essentially an absence of light, since no wavelengths are reflected and it can, therefore be menacing; many people are afraid of the dark.*

### WHITE.

Positive: Hygiene, sterility, clarity, purity, cleanness, simplicity, sophistication, efficiency.

Negative: Sterility, coldness, barriers, unfriendliness, elitism.

*Just as black is total absorption, so white is total reflection. In effect, it reflects the full force of the spectrum into our eyes. Thus it also creates barriers, but differently from black, and it is often a strain to look at. It communicates, "Touch me not!" White is purity and, like black, uncompromising; it is clean, hygienic, and sterile. The concept of sterility can also be negative. Visually, white gives a heightened perception of space. The negative effect of white on warm colors is to make them look and feel garish.*

### BROWN.

Positive: Seriousness, warmth, Nature, earthiness, reliability, support.

Negative: Lack of humor, heaviness, lack of sophistication.

*Brown usually consists of red and yellow, with a large percentage of black. Consequently, it has much of the same seriousness as black, but is warmer and softer. It has elements of the red and yellow properties. Brown has associations with the earth and the natural world. It is a solid, reliable color and most people find it quietly supportive - more positively than the ever-popular black, which is suppressive, rather than supportive.*

## **Color as means of marketing communications**

"Color Affects" is a logical and methodic approach to the psychology of color: a clear, scientifically developed system, practiced since the early 1980s. It's primarily created by psychologist Angela Wright and is frequently used in commercial design; it applies to interiors, product design, web design, uniforms, packaging, corporate identity and branding.

The system has almost twenty years of successful application behind it and major corporations (Shell, Motorola, Procter & Gamble, BT and The Body Shop to name a few) attest to its effectiveness, most notably in sales of their products and reduction of expensive design time.

Color can in many cases be used as an effective means of enforcing an underlying message. The reason being that color as communicator is far more objective than we think.

It is a common misconception that color psychology is purely subjective, with no objective criteria for predicting response, possibly because everyone responds instinctively and each of us has our own favorite color. In commercial design, no matter how much time, money and effort are invested in the finest expertise and technology, when it comes to color the decisions are largely made on the basis of rank. Although some people are generally deemed to have a "good eye", if the Chief Executive does not like green it would take a brave subordinate to take issue on such an apparently subjective matter, and insist upon using it. Without any objective rationale, it is difficult to challenge this.

Another misconception is that, because color is physically processed through the eyes, it is a purely visual phenomenon. However, color is light and light is the source of life. Or, as Faber Birren, the eminent American colorist, observed in 1950: "Its role in all forms of life is too evident to be either denied or ignored."

Color *is* light, and spectral hues are its components. Scientifically, color is the principal cue to composition – i.e. the first thing we register when assessing anything. Hence, a powerful communication tool. Therefore it is arguably the most critical element of design.

Throughout millions of years of evolution, innately understanding the language of color has helped humanity to survive – to recognize poisonous foods, threatening predators and danger signals of all kinds. In modern times this primitive instinct is often quite unconscious, but this does not diminish its power. When light strikes the eye, the different wavelengths do so in different ways; the eye constantly adjusts and long wave colors require the most adjustment. In the retina, they are converted to electrical impulses that pass to the hypothalamus, the part of the brain that governs our hormones and endocrine system. Thus color sets up complex physiological reactions, which in turn evoke a psychological response. Every living creature on earth responds to the messages implicit in the play of light and color. In Europe, when the world about us turns grey we recognize the onset of winter and instinctively draw in; large amounts of green in any landscape indicate plenty of water and therefore little danger of famine, so we are reassured; we recognize that a creature colored black and yellow is unlikely to be friendly.

It is important to recognize that color symbolism, deriving as it does from our *conscious* associations, is a conditioned response – an entirely different process from color psychology, which is what happens on an *unconscious* level. It is essential to take account of cultural conditioning, and often the two coincide – but if they do not, the unconscious response will prevail.

Although the science of psychology is relatively young (little more than one hundred years old), the study of color is as old as time. In the twentieth century, great strides were made in our understanding of human behavior, and latterly the links with patterns of color have become a bit clearer. Before that, the importance of specific tones was not recognized. It is not usually part of a psychologist's remit to study the finer points of color, and since there are only eleven basic color terms in the English language, but millions of variations, one vital element was overlooked. It is not enough to refer to 'blue' or 'red'; these terms are relatively meaningless in the context of close study. The precise variation of each color and the harmonic relationships are of paramount importance. Why, for example, do two versions of the same spectral hue, say, royal blue and powder blue, have such different effects? Why do people respond differently to the same color? Crucially for the design industry, are there colors that have universal appeal? (The answer to the last question is *no* – but there are universally attractive color combinations).

Contrary to previous research, the “Color Affects” system works on two levels; the psychological properties of each of the basic hues – red, blue, etc. – and the difference that tonal variations, and combinations of specific shades, tones and tints will make in achieving visual harmony and the desired psychological effect.

Science recognizes four psychological primary colors, based on the way that color is processed in the eye and the brain – red, blue, yellow and green. These four colors relate respectively to the physical, the mental, the emotional and the essential balance between these three. Beyond that, each of the seven spectral hues has distinct psychological properties of their own. Although the *principles* have long been accepted, more recent work demonstrates that color perception and color preference are *not* a matter of response to *one* color in isolation, but to all the colors presented.

The essence of successful use of color derives, not from the choice of any particular hue, but from tonal relationships, and that is universal. No matter how attractive a particular color may be (the world's favorite color, time and again in research, is blue), if the tone of it relates inaccurately either to the other tones present or to the basic message one is trying to convey, its negative perceptions will emerge, so it must be adjusted. There is no such thing as a good color or a bad color – red, for example, can be perceived as stimulating and exciting, or as stressful and demanding – there are only appropriate and inappropriate color schemes.

One of the most important needs for humanity is balance. One example of the natural restoration of balance occurs in the phenomenon of after images, when the eye is focused for thirty seconds or so on a particular color, and then closed or redirected, the image will continue in the eye for a few moments in the *complementary* color. The practical value of this is demonstrated in the traditional use of green in operating theatres – when the surgical team looks up from the inevitable focus on blood red, their eyes will immediately be rested

by the green. The most effective color schemes are those that contain a balance of wavelengths.

Aristotle, in linking colors to the four elements (earth, air, fire and water) also observed the primary importance of blue and yellow. These two colors represent polarity, the sky and the sun, night and day, introvert and extrovert, cool and warm, contraction and expansion. Newton's discovery of the spectrum appeared to replace Aristotle's theory, which had formed the basis of all color work for two thousand years, but in fact it was an extension of it.

When we realize that all people can also be classified broadly into four categories, application of color psychology becomes more manageable and more accurate. The Swiss psychologist Jung's defined us, together with other twentieth century neurologists and psychologists, as being fundamentally *extrovert* or *introvert*, being *externally* or *internally* motivated.

A totally new approach in color psychology came when the links were recognized between all the sixteen million shades, tones and tints available to us in a color computer – classified into four categories – and the four personality types defined by Jung. Extroverts appeared to respond more strongly to color in general and longer wavelengths in particular, whilst introverts prefer cooler, blander tones.

There are four tonal families of color; cool based and warm based, deriving from blue and yellow respectively, within which further classification comes from intensity. Each group contains variations of all spectral hues, so it is not necessary to draw from more than one group for any color scheme. In fact, doing so will negate it.

When all the colors used in any design project belong to the same group, they combine to create a relationship, which protects the positive perceptions of each individual hue. Therefore it is essential to establish which color group, or psychological color family, best conveys the desired underlying message. Thus a framework is created within which designers can work freely, secure in the knowledge that the color scheme will fulfill its function.

Look around, and you'll see that there's rarely a design brief that does not wish to combine the virtues of modern efficiency and caring friendliness. Virtually every color "mistake" arises from failure to understand how to encompass both, without mixing the tonal families. We see cold grey mixed with warm red, warm yellow with black, 'pharmaceutical' blue (Pantone Blue 072) with light, friendly red (Pantone Red 032) in the mistaken belief that this will capture the best of both worlds. Instead, what happens is that the reds suddenly appear cheap or defiant, the blues convert from reliable and efficient to cold and hard and the grey depresses everyone. It is worth repeating that every color – without exception – has potentially positive or negative properties inherent in it. Which of those are communicated depends entirely on how it is used.

The four color groups, and the predominant characteristics of each, could loosely be described as follows:

## GROUP 1

Clear, delicate warm colors containing no black.

*Descriptors such as scarlet, coral, peach, daffodil yellow, emerald green, sky blue, cobalt and lilac apply.*

*Personal characteristics associated with this tonal family are light, warm, friendly, new, young, lively, fresh, clean, and optimistic.*

*Negatively, they may be perceived as insubstantial, frivolous and immature.*

*Famous people whose personalities appear to belong to this type are: The late Princess Diana, Bill Clinton and Tony Blair.*

*Examples of this color group are the corporate colors of British Petroleum, Virgin and Norwich Union's new colors.*

## GROUP 2

Cool, contain more grey and, whilst also delicate, are not necessarily light.

*They are soft and subtle and examples are maroon, rose pink, grapefruit, sage, viridian, dove grey, Air Force blue, delphinium, lavender.*

*The characteristics are understated elegance, cool, calm poise, graceful, upmarket, timeless, expensive, soothing, aspirational.*

*Negatively they may be interpreted as draining, unfriendly, aloof, elitist, and 'wishy-washy'.*

*Famous personalities are, or were: H.M. The Queen, Nelson Mandela and Grace Kelly.*

*Since these tones are inherently understated and recessive, there are no striking examples of Group 2 corporate colors in the market place. They are more effectively used in small boutiques, museums or government buildings.*

## GROUP 3

Warm, but much more intense and fiery.

*They contain black in their mixing (e.g. olive green is yellow mixed with black) but black itself does not belong in this group. Examples of the colors are described as tomato red, burnt orange, rust, butter yellow, leaf green, olive, teal blue, peacock, and aubergine.*

*The characteristics are warm and friendly, traditional, solid, substantial, reliable, earthy, environmentally aware. They can also express iconoclasm and a certain flamboyance.*

*Misused, these tones can convey heavy, old-fashioned, boring predictability and bossiness.*

*Famous personalities include: Germaine Greer, Sophia Loren and Sir David Frost.*

*Shell International Petroleum, The Body Shop and Mothercare corporate colors are mainly Group 3.*

#### GROUP 4

Very clear and strong, with no subtleties.

*The group includes black, white, crimson, magenta, lemon, jade green, ice blue, indigo, violet.*

*They communicate characteristics of uncompromising excellence, material aspiration, efficiency, drama, sophistication, modernity, and 'high-tech'.*

*The other side of this group is cold, uncaring, unfriendly, materialist, and expensive.*

*Famous personalities include: Margaret Thatcher, Sean Connery and Gordon Brown.*

*Examples of Group 4 corporate identity are British Airways (apart from the unfortunate 'tail fin' re-design) National Westminster Bank and Texaco.*

This whitepaper is largely based on work by Angela Wright (psychologist of Queen Mary's Hospital, Roehampton, England, and at Carmel, California, USA) who studies both unconscious thought processes and the dynamics of color harmony in her exploration of color psychology.

Between August 2003 and March 2004, the color printer manufacturer, OKI Printing Solutions, sponsored stringent research to test Angela Wright's theories (from which the Colour Affects system was developed). The project was carried out by the Colour & Imaging Institute (Derby, UK) across six cultures, in five countries throughout Europe (Britain, France, Germany, Spain and Sweden); Chinese observers resident in Britain were also tested. The results were remarkable, achieving 77% overall agreement with the theories, and over 90% agreement in places. Another striking discovery from this project was the remarkable level of agreement among all observers – demonstrating that response to color is not as dependent on age, gender or culture as was previously thought.