CULTURAL COLOUR CONSTRUCTION:

A CASE OF THE PHARMACEUTICAL INDUSTRY

By

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A thesis submitted to the Faculty of

Graduate Studies and Research in partial

fulfillment of the requirements for the

degree of

Master of Arts

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Carleton University, Ottawa, Ontario

September 20, 2006

Your file Votre référence
ISBN: 978-0-494-18281-9
Our file Notre référence
ISBN: 978-0-494-18281-9

Abstract

This is a study of colour variation in Japan and the United States of America. The specific interest is cultural colour construction as it applies to the pharmaceutical industry. Discussion centres on cross-cultural and intra-cultural aspects of colour construction; specifically, colour cognition, linguistic colour representation, consumer colour associations and possible pharmaceutical colour purpose. The goal is to discover what, if any, premises pharmaceutical companies use to colour their products. A proposition stating that pharmaceutical colour choice is based on a colour's temperature and activity level as standing in opposition to the temperature and activity level of a patient's ailment is tested against data retrieved from a pharmaceutical comparison within the two cultures. Results reveal that there are variations in the colouring of pharmaceuticals in Japan and the USA and that these variations can be attributed mostly to differences in each culture's approach to pharmaceutical usage as well as differences in market pressures.

Acknowledgements

I would like to take this opportunity to thank all those who supported me during the writing and defending of this thesis. I would like to begin by thanking Dr. Mark Lowes, who, by being such a great external, provided insight to, and zeroed in on, both the scholarly and practical applications of my thesis.

I would also like to thank my second reader, Dr. Brian Given, whose anthropological expertise broadened my cultural perspective by making me consider different avenues of research methodology. Your invaluable comments ensured the anthropological integrity of this thesis and contributed to the production of a much clearer, more coherent document, and for this you have my sincere gratitude.

Special thanks also goes to my defense chair, Dr. Jared Keil, whose hands on approach to chairing brought about many valuable comments and insights about my general area of study.

I would also like to express my gratitude to my supervisor, Dr. George Pollard, who worked with me patiently and with confidence. I was privileged to work with you, as your intellect and direction made me re-think and re-structure time and time again, making the realization of this thesis possible.

I would especially like to thank my family. My father, Alex Lynk, whose belief in my abilities and desire to see me succeed has given me the drive needed to thrive in both my education and my life. My mother, Josie Lynk, whose empathy has given me the strength and patience I needed to complete this paper, for this I cannot thank you enough. My sister, Alexis Lynk, who lightened my mood on the darkest of days and helped me keep things in perspective; you truly are one special lady.

I also need to acknowledge Manivillie Kanagasabapathy, who has been with me throughout this entire process and spent many late nights listening, advising and supporting my efforts. To my best friend Danny Cromwell, your acceptance of my neuroticism, combined with your self-sacrifice over the past few years speaks volumes about your character and your belief in me, I could never have asked for a better friend.

Thank you is also in order for Aaron Gould and Mejlina Modanu, who provided me with constant support and reassurance and made me realize that my accomplishments, though shared with many, are of my own doing.

In closing, I would like to thank Nathan Dempsey and Judi Symes, whose contributions to the overall presentation of this thesis have allowed me to successfully produce a document that reflects both my interests and abilities.

Table of Contents

List of Tables

List of Diagrams

List of Appendices

Preface

I undertook this project in order to test if there was a meaningful difference in the colour of pharmaceuticals in Japan and the USA. I figured because different cultures have different associations for colours (such as the traditional colour of mourning the dead being black in the West and white in many parts of the Far East) that pharmaceutical companies would use culturally specific colour associations to colour their products.

A pill comparison pre-test indicated that there was a difference in the colour of pharmaceuticals sold in both countries, so I went forward with the research to see if this was based on culturally specific colour associations. During this research I came across information indicating that pharmaceutical companies are aware that pill colour influences perception of intent and that these colours often coincide with innate responses and linguistic description, such as blue being a depressant and red being a stimulant. Hence I thought the rationale behind pharmaceutical pill colouring could either be based on culturally specific colour associations, colour associations that pharmaceutical companies believed crossed cultural boundaries, market based colour associations or randomized colouring.

The strongest evidence supported the notion that, because most people physiologically interpret colours the same and because pharmaceuticals are meant to treat physiological problems, than pharmaceutical colouring would be based on how patients respond physiologically to colour. Though this was shown to be true when patients were asked to pair a specific colour with a specific ailment, it did not hold true when tested against a comparison of pharmaceuticals that were sold in Japan and the USA under the same name for the same purpose. What was shown was that the Japanese have a higher

ratio of white to coloured pills than Americans, whose pharmaceuticals are mostly coloured. This demonstrated that the way each culture emphasizes the purpose and use of colour is what accounts for the differences in pharmaceutical aesthetics between the two cultures. I attempted to account for this variation by employing the other pharmaceutical colouring rationales discussed throughout the paper, such as market based colour associations and colour as a means to distinguish in a practical sense, and found that aspects of these rationales may possibly play a role in the colouring, or lack thereof, of pharmaceuticals in Japan and the USA.

One reason I chose this topic was the paucity of literature in this area; there was some but not enough information in this area which itself was not coherently brought together. I attempted to resolve the paucity in the literature and further contribute to the topic by bringing much of the information together into one place.

By way of this project I hoped to contribute to an awareness of the use and purpose of colour in a cultural setting by showing the differences and/or similarities in colour association between Japan and the USA.

I hoped to further clarify the division between the cross-cultural and culturally specific aspects of colour construction by teasing apart interrelated concepts such as physiological reaction to colour and linguistic colour representation in Japan and the USA.

Also, many researchers, such as Buckalew and Jacobs, have, on more than one occasion, stated that there needs to be more research done into the perceived therapeutic application of pharmaceuticals based on colour. Through this project I hoped to build on, and provide further avenues of study in this area.

The method employed in undertaking this study involved four steps; including the collection of both qualitative and quantitative data. The first step was establishing possible premises regarding the colour of pharmaceuticals. The second step was creating a proposition from the evidence presented in the strongest premise. The third step was conducting a comparison of pharmaceuticals between the two cultures, and the fourth was testing the proposition against results obtained from the pharmaceutical comparison.

I choose this method as I thought that by combining qualitative and quantitative data I would be covering all the possible aspects of pharmaceutical colouring. Another way to do this project would have been to choose different cultures in which to compare pharmaceutical colouring. As well, another way to determine why pharmaceutical companies colour their products the way they do would have been to pursue a more qualitative, interview based, form of field work. Also, another way to determine if patients make decisions about pharmaceutical purpose based on colour would have been to undertake a more quantitative test based approach, using respondents from each culture. I believe these methods still would have involved an examination of pharmaceutical availability in each culture do determine 1) if there is an aesthetic difference, and 2) to see if all companies concerned employ the same premise.

After completing the project it became evident that that are too many factors involved in the colouring of pharmaceuticals; a single study could not adequately account for all of them. In retrospect it would have been more effective to have focused on one area, such as physiological reaction, semiotics or variations in approaches to health care, providing the thesis with depth, rather than breadth.

The main findings of this project are that; there are many variables outside of ailment / colour categorization, such as neutrals colours and anxiety related disorders, which need to be accounted for if the true rationale behind pharmaceutical colouring is to be discovered. Also, there are a variety of differences between the way the Americans and Japanese emphasize the use on colour, both connotatively and as it applies to pharmaceuticals.

The third finding that arose from this study is that colour associations are bound by the context in which they're addressed, and that the context itself is open to interpretation. Such as blue being physiologically associated with passiveness, iconically associated with sky and water, associated with trustworthiness in marketing and with masculinity in relation to gender, though as was seen in this project, these contexts are dependant on the circumstances in which they are used.

There was some difficulty in clarifying the cross-cultural versus culturally specific aspects of colour construction, as concepts related to these fields are so intertwined that they exist in both the cross-cultural and culturally specific domains.

Although the implications of this paper have practical uses for industries where colour is a primary concern, it advances theoretical issues. It contributes to linguistic and symbolic anthropology by explaining the difference in colour emphasis as indicated by linguistic representation. Scholars such as Dreyfuss acknowledge the variations in colour terminology between the two cultures but never assert why, by examining the transition between iconic and symbolic associations, this paper aids in clarification.

By combining biological, neurological and psychological research, this project also contributes to anthropology by demonstrating the similarities in colour perception

and representation across cultures, specifically Japan and the USA, though this may apply to other cultures as well.

Because there is a lack on information pertaining to how colour is contextualized in relation to health this contributes to a foundation for further study in the area of medical anthropology as it identifies colour as a variable that may effect the perception of health issues such as identification, diagnosis, and treatments of ailments in different cultures. Much of the extant information in this area is based on Western premises of colour associations and as such this project also relays the importance studying the relationship between colour and health in other cultures; as may patients of Western medicine are from Eastern countries this information would further facilitate communication between patient and practitioner.

This study also advances notions relating to the importance of anthropology in globalization. Employing a comparative approach in the venue of physiology, linguistics, marketing and medicine allows us to not only examine how western culture effects other cultures but also how other cultures effect western perceptions of colour as well as health.

Finally, by providing a reasonably reliable data set of pharmaceuticals sold in both countries, this project provides a basis for further studies that attempt to unpack the purpose and use of pharmaceutical colour in different cultures.

Chapter One: Introduction

This thesis deals with variation in the cultural construction of colour as it applies to pharmaceutical use in Japan and the United States of America. It contributes to an awareness of the purpose and use of colour in a cultural system. The analysis is grounded by a review of the Anthropological literature in three areas: colour and association, marketing, and pharmaceutics. An overview of pharmaceutical use and availability in Japan and the USA is mounted to supplement this review. Case studies from Japan and the USA help to illustrate propositions derived from the review and discussion. Collectively, these works further an understanding of how colour may be culturally bound, explores the possible relationships between colour and health, and provide questions for further research in this general area.

The cultural construction of colour, that is, the way colour association is created, maintained and transmitted, provides insight regarding the exchange of cultural information. Although red[1] may signal danger, what else does this colour convey in Japan and the USA? Zopiclone, which helps a patient go to sleep, is typically blue or bluish in the USA, where the colour conveys tranquility. What colour is Zopiclone or its analogs in Japan, and why? Finally, if there is a difference, what does this reveal about Japan and the USA? A chapter entitled *The Anthropology of Colour* develops the position on the cognitive construction of colour, both as a culturally specific and cross-cultural phenomenon.

As distinct, developed nations, Japan and the USA make viable research models. Pharmaceutical consumptive practices are high in both cultures. Japan, with a population of 127,708,000, consumed over $50 billion worth of pharmaceuticals in 2003. The USA,

[1] Unless otherwise noted, the version of all colours introduced as examples, such as red, are taken from Table One:Visible Colour Spectrum

with a population of 295,734,134, spent over $150 billion on pharmaceuticals in 2003 (IMS Health, 2003:4). Pharmaceutical usage is at an all time high, with global expenditure reaching $430.3 billion dollars in 2003 (IMS Health, 2003:4).

Also, Japan and the USA are said to have distinct patterns of colour value emphasis. Dreyfuss (1972:231) states that, the Japanese identify colours in terms of associated meanings, whereas Americans identify colours "...on an intuitively horizontal plane." That is, the Japanese have more emotional connotations for colour terms than Americans, whose connotative meanings for colours often involve objects or situations. In Webster's Japanese Dictionary (1997:2101) for example, the colour yellow is associated with happiness and purity, whereas the Webster's English Dictionary (1997:389) associates yellow with an egg yolk, and jaundice. A chapter entitled *Cultural Colour Associations: Japan versus the USA* examines the validity of the latter statement by comparing and contrasting colour associations within the context of American and Japanese culture.

A review of the Anthropological literature pertaining to colour, association, marketing and pharmaceutics, form the foundation by which the main objective of this thesis may be realized, that is, to determine the existence or non-existence of cultural variations in the use of colours as it applies to health care, operatively defined as the variation in colour coded pharmaceuticals in Japan and the USA.

Understanding the purpose of colour and its use in two distinct cultures serves as a basis for examining cultural evolution. It encompasses the historic, religious, economic, educational and familial components of culture and serves as a prime indicator of the identifying practices of a culture. According to Jacobs, et al, (1991), the majority of respondents from many Eastern and Western cultures associate specific colours with spe-

cific emotions, institutions and packaging. The variation among the associations provides evidence that the cultures studied have evolved differentially. Comparatively, the similarities indicate the presence of a collective colour consciousness, as suggested by Eiseman (2000:15). A chapter entitled *Culture, Colour and Marketing* examines the role global marketing plays in constructing context specific colour associations.

This study begins with a literature review entitled, *The Anthropology of Colour*, which attempts to expose the scientific and cultural aspects of colour construction, and how each influences the process. Consideration of science and culture helps answer the question, what is colour. This scientific review considers (a) the science of visual recognition colour, and (b) how meaning is attached to colour. In other words, how an organic stimulus becomes a mental construct. Also considered in this review is how we react to colour, that is, what organic responses are evoked by colour stimulus, how these reactions find their origin in nature and how the societal use of colour is both based on, and reinforces these responses.

The culturally dependent aspects of colour relate to cultural evolution by way of linguistic representation. Two diametrically opposed schools of thought have developed to account for differences and similarities in the cultural construction of colour. The cross-cultural position states that individuals from all cultures recognize and categorize colours through biologically defined mechanisms and innate colour boundaries, and that, there are 11 colour categories: red, yellow, green, blue, orange, purple, pink, brown, grey, black and white (Berlin and Kay, 1969:4). Because not all cultures have linguistic distinctions for all eleven colours, the linguistic categorization of colours exists within an evolutionary realm. The more advanced linguistic systems contain all eleven colour cate-

gories, whereas the most simplistic contain two, black and white (Berlin and Kay, 1969:4).[2]

The culturally specific model indicates that, though visual colour recognition may be similar across cultures, the linguistic representation of colour boundaries determines which colours belong to which categories. Similar, yet visually distinct colours surround focal colours, which are the best mid-point representation of these categories (Berlin and Kay, 1969:5). These surrounding colours define colour categories by forming linguistic boundaries that separate them from other categories (Bousefield, 1978:72).

Within the culturally specific school of thought, colour categories are contained by boundaries that are not inter-cultural and instead, are considered a social construction. Those who argue in favour of the Sapir-Whorf Hypothesis (in Kay, et al, 1984:66), which will be explicated later in this paper, claim that, measuring colour categorization by way of imposed linguistic categories ignores the cultural variables inherent in the construction of these categories. That is to say, even if cross-cultural colour recognition does exist, categorization of this recognition cannot be measured on Western premises of social contructionism, which are manifestations of linguistic determinism. A section that combines both the cross-cultural and culturally specific models, introduced by Jameson (2001), serves to clarify the duality of these opposed positions.

The second literature review *Cultural Colour Associations: Japan versus the USA* by way of semiotics concentrates on the formation, transmission, and contextualization of

[2] "The more advanced linguistic systems contain all eleven colour categories, whereas the most simplistic contain two, black and white" (Berlin and Kay, 1969:4). Implied is an ostensible progression: as a system grows and expands, finer differentiations among colours, for example, are required. Likewise, a system that doesn't need four-wheeled vehicles has few words to denote or describe such vehicles; in a system dependent on such vehicles, a vast array of words to denote and describe emerge autopoietically. Advanced versus simplistic are the termi of an evolutionary continuum employed by Berlin and Kay (1969).

colour associations cross-culturally. Using blue, red and yellow, that is, the primary colours as seen on the colour wheel, this review attempts, by example, to uncover the meaning of these colours in Japan and the USA. Dictionaries, colour symbolism texts and case studies are used to refine colour meanings within these cultures.

For example, it seems that in the Japanese language colour is associated with emotions, whereas the English language associates colour with objects or situations. In Japanese, for example, red represents love, sensuality, happiness and adventure (Webster's Japanese Dictionary, 1997:1473). Conversely, the Webster's English Dictionary (1997:282), identifies red with blood, a ruby or a visible spectrum.

The media play an enormous role in the way we associate colours in our cultural environment. Colour preference, purchase category, competing products and brand identity all translate into a form of consumer colour association used by marketers to advertise their products. The importance of this medium has necessitated the inclusion of a chapter that examines the functional role played by the media in the shaping and reinforcement of colour associations.

The final literature review, *The Pharmaceutical Colour Connection*, examines colour's integrative role in the pharmaceutical world. This chapter also applies a method of colour analysis to examine how individuals from different cultures associate pharmaceutical colour with perceived effect, and develops an understanding of the premises on which these associations are based. For example, ask an American what the colour red represents and they may say love. If you ask this question in a product-specific context, they might say, the label on a bottle of Coca-Cola; in a medical context, they might say

blood. For an American, these are contextually specific associations attributed to the colour red. In Japan the association may be different.

In order to develop a perspective and identify the purpose of the four literature reviews contributing to this study, it is necessary to emphasize the basis for their inclusion. Chapters Two through Four are meant to establish the possible premises upon which pharmaceutical companies may colour their products. Options include: cross-cultural colour associations, culturally specific colour associations, consumer colour associations, and non-systematic colouring. Chapter Five aims to identify the purpose of pharmaceutical colouring by examining pharmaceutical colour branding, connections between colour and health, the effect that colour has on the perceived purpose and efficacy of pharmaceuticals, as well as the practical and beneficial applications of colour in a medical setting.

Findings acquired from the aforementioned chapters form testable propositions which, when combined with results from pharmaceutical comparison, reveal what role, if any, cultural colour construction plays in the colouring of pharmaceutics. Testing of the propositions derived from these reviews involves a comparison of pharmaceutical use and availability in Japan and the USA. The main sources of pertinent data are the *American Pill Book* (2002), and the *Japan Prescription Medicine Encyclopedia* (2002). A previously conducted pre-test indicates that the same pharmaceuticals prescribed for the same purpose in both countries differ in colour.

In order to further explore the findings from the pre-test, a pharmaceutical comparison attempts to determine if there are pharmaceuticals sold in both countries, for the same purpose, under the same name. Further, if these pharmaceuticals exist, are they

available in the same dosages in both countries? Is there a variance in their esthetic appearance? If so, why?

The findings from this comparison are used to test the following propositions: a colour's categorical temperature and activity level is based on physiological responses resulting from evolutionary exposure to nature's elements. Society uses these responses to convey social messages, in turn reinforcing physiological reactions, and creating the basis for cross-cultural, culturally specific and market dependant colour associations.

These physiological responses and socially constructed associations serve to reinforce the medicinal properties of colours. Ailments, represented by perceived temperature and activity level are treated with pharmaceuticals whose colour stands in opposition of that perceived temperature and activity level. For example, red is considered a warm or active colour because of its primal association activities or entities involving heat or blood, such as the sun, dangerous encounters and reproduction.

According to Birren (1984:14), when one is exposed to red they are physiologically stimulated in heart rate, blood pressure, perspiration, emotional and psychological activity, and so forth. Society uses the colour red to represent stimulating situations which has lead to colour associations connecting red with energy. When considering health, red's stimulating qualities negate its opposite, that is, lethargy, which is represented by blue's non-stimulating qualities. It follows that a person who becomes depressed (blue) should be given a stimulating (red) pharmaceutical. Hence, the categorical temperature and activity level of a colour represents the perceived therapeutic effect of a pharmaceutical, in turn establishing a rationale by which pharmaceutical companies colour their products.

This study relies partially, but not without wariness, on many case studies. These case studies are derived from work conducted by scientists and the pharmaceutical industry. By examining associations between colour and health, these studies test if the colour of a pharmaceutical corresponds with its purpose. These case studies consist primarily of tests where individuals were asked to colour categorize pharmaceuticals according to preselected ailments; in some instances, respondents were given different colour placebo pills to cure a variety of non-specific illness, such as pain, headaches and so forth.

Results of the research conducted for this paper provides insight into the cross-cultural and culturally specific aspects of colour, as well as the culturally determined constructions of colour, context, and health. The development of standardized colour system for pharmaceuticals within culturally specific, therapeutic application can be expected to derive benefits for society; anticipating an increase in the efficacy of medications, a decrease in fatalities due to administration error, and further anticipating an increase in prescription compliance. Since the latter has become a major obstacle for health care practitioners, a culturally relevant, standardized system for colouring pharmaceuticals, in ways that are functionally appropriate to the user's cognitive conceptions of colour, may help to alleviate this problem.

Chapter Two: The Anthropology of Colour

In the early 1940s, when this line of research began in earnest (Nayer, 2004:3), conceptualizations treated the cross-cultural and culturally specific approaches to the anthropology of colour as independent. This area of study, however, has recently re-examined the nature-nurture dichotomy, and highlights the interdependence of both perspectives.

The purpose of this research is to determine whether or not cultural variations exist in the use of colour as it applies to health care, specifically, in the colouring of pharmaceuticals. Though it is known that pharmaceutical companies colour their products, the context in which these companies are basing their choices is not well understood. It is on this premise that cross-cultural colour associations, culturally specific colour associations, consumer colour associations and random product colouring are offered as possible explanations.

Findings from a pharmaceutical comparison, discussed in Appendix One, identify the colours of pharmaceuticals sold in both the USA and Japan. It is within Appendix One that assumptions, derived from this chapter and in those that follow, are cross-referenced with the pharmaceutical comparison results to determine which approaches, if any, are being applied when colouring pharmaceuticals. It follows that, if there are differences in the colour of pharmaceuticals in Japan and the USA, they will become evident by way of comparison. Once the existence of cross-cultural variation is established, the contribution of cross-cultural or culturally specific factors of colour construction to pharmaceutical colour assignment can be assessed.

In order to test the cross-cultural and culturally specific aspect of colour, one must first look at the composition of colour and the process of colour vision, that is, colour sensation and perception. Following this overview is an examination of physiological reaction to colour, the presence of colour in the environment and society, as well as current theories surrounding the cross-cultural and culturally specific aspects of colour.

Information contained in this chapter provides the reader with a basic understating of what colour is, how colour is processed, and the physiological reactions that are elicited as a result of this process and their causes. This chapter will also provide information about societal messages, their basis, and how they reinforce these reactions. The chapter concludes with an overview of the three different approaches to colour identification and categorization, and combined with the previous information, will aid in establishing the cross-cultural versus the culturally specific aspects of colour construction.

Colour Theory

In order to explore the scientific aspect of colour vision, we must first look at the composition of colour, also known as hue. In order to do so, the following provides a descriptive background of general colour theory.[3] This overview lays the foundation for further understanding the process of colour vision. To begin with we will look at how light becomes colour.

Light is made up of a combination of wavelengths and intensities, photons, and electromagnetic radiation, and is measured in nano-metres (nm). The human eye has the ability to see this radiation when it is projected between approximately 380 to 740 nm.

[3] Unless otherwise noted, all information relating to colour theory has been taken from, Schwartz (1999) Visual Perception, 2nd Edition. Connecticut: Appleton and Lange as well as from Pease (1998) Color Vision. Chapter 9. In: Benjamine, W.J. ed., Borish's Clinical Refraction. Philadelphia: W.B. Saunders Company.

This projection is referred to as the visible spectrum or visible light. The visual system engages in a complex set of cascading processes of increasing complexity that structurally analyzes input from the visual field, in turn producing a holistic experience. That is, the visible spectrum records wavelength frequency, and when applied to an object, the light's full spectrum (acquired when the radiation connects with the object) determines the colour we attribute to the object.

This frequency is measured in TeraHertz (THz), with hertz as the unit of frequency measurement. Tera means trillion. Thus, colour frequency intervals are measured by the amount of light reflected by an object in TeraHertz.

White, the purest of all colours, is perceived when an object equally diffuses all wavelengths in the spectrum. Alternatively, objects that absorb all, and diffuse none of the wavelengths, are seen as black. Monochromatic or pure spectral colours are colours that are made up of a single wavelength. According to Isaac Newton, these colours include violet, indigo, blue, green, yellow, orange and red, (see Table One)

Table One: Visible Spectrum

Colour	Wavelength interval	Frequency interval
Red		
Orange		
Yellow	~ 565-590 nm	~ 530-510 THz
Green		
Cyan		
Blue	~ 440-485 nm	~ 680-620 THz
Violet	~ 380-440 nm	~ 790-680 THz

Hurvich, LM and Jameson, D (1957) "An opponent-process theory of colour vision", in *Psychology Review* 64:384-404.

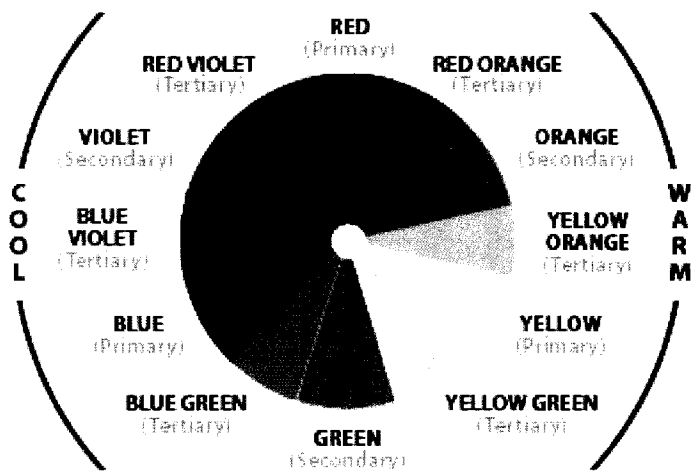
Colours that are perceived when the wavelengths and intensities used to create them are not pure are referred to as non-spectral colours, as combinations of different light intensities and wavelengths are used in their production. The human eye senses these colours as if they were from a pure spectral source, even though they are not made up of multiple wavelengths; this is caused by the dominant wavelength. Colours cannot be considered spectral when they are de-saturated, that is, lacking hue; achromatic, that is, white, black and grey, or if they contain any shade of purple. This is because pure frequencies of purple light, just like black and white, do not exist. To further explore colour theory, the following is an overview of the rules that govern colour division.

The Colour Wheel

The colour wheel is made up of blue, red and yellow (see Diagram One). These colours are called primary colours, and are considered foundation colours because they are the basis upon which all other colours are created. Secondary colours are created by mixing any combination of the three primaries and consist of orange, green, and violet. The third stage of colour combinations is that of tertiary colours, which are created when primary and secondary colours are mixed. These colours are red-orange, yellow-orange, yellow-green, blue-green, blue-violet and red-violet. Though there is a debate surrounding whether the classification of colours beyond the primaries is a cross-cultural phenomenon (this topic is addressed later in this chapter when the scholastic views relating to the cross-cultural, culturally specific and combined theories of colour construction are examined), it is thought that concepts pertaining to colour temperature and activity are remain consistent across cultures (Eiseman, 2000:15).

Though colours that comprise the colour wheel are divided according to their location on the colour wheel, they are also grouped according to their temperature and activity; that is, warm or active colours, and cool or passive colours (see Diagram One). Warm or active colours include red, orange, yellow, and their tertiary combinations, the cool or passive colours consist of blue, green, violet, and their tertiary combinations. Though all colours can be considered warm or active or cool or passive, this is only relative to their primary origin. For example, yellow-green is cooler and more passive than yellow-orange, though both are warm or active when compared to blue.

Diagram One: Colour Wheel



Melane, Newman (2006) Electronic Document

http://www.malanenewman.com/color_theory_color_wheel.html

The origin of colour temperature can be found in nature, with warm or active colours being reminiscent of entities such as the sun, fire or blood, and cool or passive colours being reminiscent of the sky, earth and water. Cheskin (1947) was among the first to separate colours into warm or active and cool or passive categories and stated that exposure to warm or active colours causes the release of neuro-chemicals that increase heart rate and speed up time perception, whereas exposure to cool or passive colours yields the opposite effect. Exposure to cool or passive colours, such as Baker Miller Pink (see page 85), often leads to an increased release of serotonin, the chemical that produces feelings of calmness and relaxation. Prolonged exposure to cool or passive colours is said to cause an overabundance of serotonin and can lead to depression (Bousfield, 1978:102). These responses have lead to warm colours being categorized as active and cool colours being categorized as passive, as these are the physiological reactions elicited during exposure.

Colours that belong to the warm or active category are more noticeable than those belonging to the cool or passive category and will overpower their cool or passive counterparts, even when used in equal amounts, on opposing walls for example; this is because cool or passive colours recede while warm or active colours advance. As will be seen in the following section, this phenomenon can be attributed to the manner in which the human eye senses and perceived colour.

Colour Vision

Colour vision, which is a physiological and psychological experience, is best understood by identifying the physical properties and psychological components that comprise it. For this reason we must discuss how the visual system processes and

transmits information about the physical properties of an object, and whether these processes are cross-cultural, culturally specific, or even subjective. Wavelengths of light and the object being viewed are not in themselves coloured. When we see colour, we are seeing the amount of unabsorbed light the object relflects. This visualized colour has three components, a source of light, an object to reflect this light and someone to physically sense the light's energy; from this the psychological construct of colour emerges.

Hermann von Helmholtz, confirmed, in part, one of the two most popuar colour theories, the trichromatic theory. This states that the retina of the eye is made up of photoreceptors, that is, rods, which are not colour sensative, and cones, that are colour sensative. Of the three types of cones the first one is called blue cones, short wavelength cones or S cones are the most unique of the three types of cones in that they are the most responsive to light and are responsible for the perception of violets.

The other two types of cones are very similar in their genetic, chemical and response make-up and are responsible for the perception of greens. The first of these two cones are called red, long-wavelength or L cones, and are most responsive to yellow-greens. The second of these cones are called green, middle-wavelength or M cones, and are most responsive to pure green. These three cones comprise visualized primary colours, which are different from socially categorized primary colours in that the former consists of black, white, blue, red, green, and yellow; and the latter, which is seen on a basic colour wheel, consists of blue, red and yellow.

The intensity reponse of each of the cone types is called the tristimulus, and occurs when light reflected from an object enters into the eye. According to this idea, it

is impossible to stimulate only one cone type as the overlaping; bell-shaped curves in the eye reduce this reflected light into the three values.

As noted above, tristimulus values explain colour vision as it applies to retinal cones, that is, physical sensation. How the eye actually senses and processes colour occurs on a higher level, by which the neuro-mechanisms of the eye take the data provided by the cones and create three channels of colour: the luminance channel, which consists of black and white, the blue-yellow channel and the red-green channel; this level of colour processing is outlined in the other colour theory, that is, opponent channels theory.

It is this idea, proposed by Hering in 1872, that aids in explaining why people may subjectively experience colour. If an individual cannot fully absorb light or has a missing or malformed cone, they may be considered colour blind. If not in the eye itself, colour blindness can also be a result of anomalies in the part of the brain where our visual mechanisms are located.

Unlike colour blindness, which is a genetic condition, the loss of colour sensing ability is often a result of head injury or stroke and allows the afflicted to see only in black and white. This is Achromatopsia. [4]

Though theories relating to colour blindness generally have remained the same since Hering, the issue of colour subjectivity has recently been challenged by scientists such as Cromie (1998); Keiji, et al, (2004); and Williams (in Sherwood, 2005); who

[4] A fuller discussion of optical mechanics is beyond the scope of this paper, for more detailed information see Daw (1995); Wandell (1995); Harding (1997); Gregory (1998); Oyster (1999).

belive that colour is not a subjective experience but rather that most humans are hard-wired in such a way as to see the same colours.

A recent discovery by Williams (in Sherwood, 2005:1) indicates that colour perception has a lot more to do with the workings of the brain than it does with the eye. Williams (in Sherwood, 2005) used the practice of adaptive optics to show that even though the number of colour responsive cones in the eye varies dramatically from person to person, most sense colour the same way.

Respondents in Williams (2005) were asked to choose the purest point of the colour yellow from a colour disk, with the majority choosing the same colour. When he studied the eyes of the respondents he discovered the cones that detected red, green and yellow, the long and medium wavelength cones were different for almost every subject. He attributes this variation to differences in genetic make-up and indicates that humans possess a type of auto-calibration mechanism that allows us to choose the purest point of any colour on an elaborate colour wheel (Williams, in Sherwood, 2005:1).

To further support his point, Williams conducted a study with Neitz and Yamauchi (2002), respondents were asked to wear coloured contact lenses for four hours a day. For the first few weeks respondents were able to see colours normally, that is, still choosing the purest shade yellow from the colour wheel. After this time, their colour vision became skewed, and they were no longer able to choose the purest shade of yellow. Regarding to the majority of subjects choosing the purest shade of yellow, and the shift in colour perception with the introduction of coloured contacts, Nietz, et, al, (2002:789) concludes,

> "This points to some kind of normalization or auto-calibration mechanism some kind of circuit in the brain that balances the colors for you no matter what the hardware is... This is direct evidence for an internal, automatic calibrator of color perception. These experiments show that color is defined by our experience in the world, and since we all share the same world, we arrive at the same definition of colors."

To further the idea that the brain is most responsible for colour perception is the recent discovery of the location in the brain where colour experience takes place. Cromie (1998) used functional magnetic resonance imaging (FMRI) to determine the activity levels of the brain, based on oxygen and blood flow levels, when exposed to rotating colour wheels. Results lead testers to conclude that after the eye actually responds to light, the message travels many different paths through the brain before it reaches areas that dictate texture, shape, motion, and colour. The colour centre of the brain lies below and behind one's temples, ironically enough, beside what is understood to be a monkey's colour centre, and what was considered to be our colour centre up until this recent discovery.

The eye has the ability to compensate for colours that are missing in a visual object, such as a painting. The eye will replace neutrals and greys with the missing colours that are on the colour wheel; for example, the mixing red and black will take on a purple hue. Also, after the eye has viewed the same colour for a long period of time and shifts its gaze, it will percieve the viewed colour as the oposite colour on the colour wheel (Nayer, 2004:3). This phenomenon, called the after image. It occurs across cutlures and as such appears to be biological in nature, further reinforcing the notion of auto-calibration proposed by Williams (in Sherwood, 2005:1).

Because the brain is mostly responsible for processing colour, and most human brains are similar in this regard, there is little reason to doubt the existence of cross-

cultural colour sensation, that is, the neurological processes by which reflected light energy ascribes colour to objects at the organic level (Chaplin, 1991:370). This, combined with the general knowledge that ideas pertaining to colour theory and foundation colours cross cultural boundaries, leads one to conclude that colour basics, that is, what colour is and how colour is processed, are similar across cultures. Further advancing this line of thought is the notion of perception, that is, the process by which meaning is attached to a sensory experience (Reid, 1941:548), in this case, colour.

Colour perception is the process by which a colour is seen, recognized, interpreted and reacted to. At the biological level, this process manifests itself as a physiological reaction and is inherent in nature. Due to similar biological make-up and evolutionary pressures, it is thought that most humans have the ability to recognize specific colours and react with pre-programmed responses. It is believed that these responses date back to our hunter-gatherer ancestors who relied on colour to distinguish between edible and inedible plants and animals, as well as to assess safe versus dangerous territories and situations (Eiseman, 2003:70)

In order to expand on the latter statements, the following is a comprehensive examination of the physiological responses evoked from exposure to the blue, red and yellow, their origins in nature and their function in conveying messages of social governance. If people initially underwent similar evolutionary pressures (Jameson, 2001:2) and most humans sense colour in the same way (Williams in Sherwood, 2005:1), then this phenomenon should still be seen today. Also, if Japan and the USA use these primal colour responses as a means to convey messages of social governance, than it supports the

idea that physiological reaction and the ensuing social presence of colours, are similar across cultures.

Physiological Reaction, Environmental Origin and Social Reinforcement

Though there is a paucity of literature regarding physiological reactions to colour, the research that does exist is primarily related to blue, red and yellow. Physiological response and response intensity resulting from exposure to these colours are a reflection of the wavelengths along which they are emitted, with colours emmited on longer wavelengths, that is, warm colours, corresponding with production of stimulating hormones and colours emitted on shorted wavelengths, that is, cool colours, corresponding with the production of calming hormones. For example, sensing red's longer wavelengths, 625-740nm, cause the production of hormones which increase blood pressure; alternatively, sensing blue's shorter wavelengths, 440-485nm, has the opposite effect (Holtzschue, 2002:38).

Because exposure to red increases physical tension and tends to over excite the autonomic nervous system, overexposure may cause stress, leading to anger, in turn causing a fight or flight reaction. This was seen by Faber Birren (1984:14) who noted that exposure to red made a person sweat more, literally mimicking the temperature of the colour. Red increases the pulse, causes a rise in blood pressure and also speeds up metabolism (Pahmer, 2003:1). It is often the primary colour choice for fast-food restaurants who want their patrons to eat a lot, as it is hunger inducing; and to eat fast, as it instills a desire to remove oneself from the colour (Johnson, 2006:1).

Red has traditionally been seen as representing those things which reflect life and death, such as menstruation, child birth, sexuality, dominance, and blood shed (Ammer,

1993:154). Due to its association with the most significant aspects of existence, society uses it to convey messages of importance

Examples of society reinforcing red as an attention commanding colour include, stop signs, red alerts, also known as code reds, red flags and the red carpet. In most industrialized nations, Japan and the USA, specifically, red as a tool for conveying norms of importance are almost identical, with Japan placing more emphasis on the colour than the written message. For example, an American stop sing is octagonal with the word "stop" in the centre, whereas a Japanese stop sign is an upside down triangle with the word "stop" at the top, making the colour much more prominent than the word. Knowing the colour red warms of danger when placed within the context of driving, the shape of the sign and the size of the lettering probably have little influence on the sign's purpose, as, in this context, the colour's meaning supersedes the form in which it is presented. Red alerts and red flags are also seen in Japan and the USA and are indicative of an imminent threat.

Another colour that finds its origins in nature, elicits physiological reactions, and is similarly used in both Japan and the USA is blue. Blue, categorized as a cool or passive colour (see Diagram One), is emitted on shorter wavelengths and as such, has a sedative effect, causing one to relax, become fatigued or even depressed (English and Stone, 1998:2). Because of this calming, slowing down effect, eating from a blue plate or eating blue food is said to make you more full (Blumenthal, 2005); it is thought that your brain takes up to half an hour to realize your stomach is full, so by slowing down your intake you become more full and in turn, eat less. Blue is also the colour of band aids used in restaurant kitchens, as the absence of blue food makes the band aid more notice-

able if it were to end up in a meal. It is also the colour used in the term "blue plate special", which originated with restaurant owner Fred Harvey who served meals to travelers on Wedgwood blue plates; the term has since come to mean a restaurant's daily special which can be ordered using the term (Quinion, 2006).

When studying the resting heart rate of subjects, Pahmer (2003) showed that blue had no significant effect on blood pressure, but that it did slow the heart rate of those who were anxious, making it an ideal colour for a bedroom. It is not, however, the ideal colour for a room that is constantly and consciously occupied, as overexposure could induce feelings of sadness.

Blue is one of the most prominent colours in nature, as it is the colour of water and the colour of the sky. Its consistency classifies it as a grounding colour (Lipscher, 2001:4), and as such, it has come to represent stability, strength and endurance (Ammer, 1991:46).

Due to the expense in reproducing blue in the past (see Chapter Three), the cool or passive colour used as a means to convey messages of social governance is green. In the Japanese language the term for blue and green are interchangeable, as is seen in the use of the term qing, which means both green and blue, depending on the situation; blue when referring to the sky and green when referring to the grass.

Blue is the most popular colour choice for cars and clothing, and according to ColorMatters.com, which reports on worldwide colour preference surveys, is globally ranked number one as favorite colour choice because of its versatility and positive associations.

The third primary colour to be examined is yellow, considered blue's most complimentary colour. As with red, yellow is considered a warm or active colour (Akashi, in Sasaki, 1991:1), and as such shares many similarities with respect to physiological reaction. The colour yellow is the most strenuous on the eyes, as it requires more physical effort to look at than any other colour. It is the most noticeable of all the colours and is said to increase concentration by stimulating brain cells, and is also shown to speed up metabolism (Lipscher, 2001:6). Kipperman and McKinstry (1998:1) found that exposure to yellow effects minor motor movement and causes trembling reactions in the aged. Pahmer (2003:1) indicates that yellow increases blood pressure, though not to the level of red and Birren (1984:15) states that, reactions to yellow are similar to that of red, but with less intensity. This relates back to the notion that a colour's wavelength corresponds to physiological reaction, and that because yellow is located below red on the colour spectrum and is emmited on shorter wavelengths (see Table One), it will produce a similar, but less intensified reaction than red.

The most prominent yellow entity in nature is the sun, which emanates light and warmth in the form of sunshine. With nearly all living things being dependant on the sun's rays, its representing colour, that is, yellow, has come to symbolize life and in turn, a celebration of all things living.

Other natural yellow phenomena that evoke primal associations are poisonous insects, amphibians and reptiles (Lipscher, 2001:6) which display the colour as a warning to potential predators. Examples of such animals are yellow jackets, female black widow spiders, and yellow-bellied sea snakes. There are also a variety of poisonous plants, berries and shrubs that are yellow in colour and include the yellow star thistle, yellow alla-

manda, yellow sage, yellow sarsaparilla, and the poroporo, just to name a few (Frohne and Pfander, 1984). Though yellow may be a sign of danger in nature, it is also an indication of sickness in humans, most notably with a condition known as jaundice whereby the skin and eyes become yellow as a result of liver malfunction (Tresidder, 1997:232).

With such a wide variety of negative associations, it is no wonder that yellow has become an indication of warning. Society uses it much in the same way as nature as can be seen in our use of amber traffic lights, where it represents caution. Amber is the middle ground between red (danger), and green (safe) on the visible colour spectrum. It is also used for yield signs, many emergency response vehicles, and serves worldwide as a warning on chemical products

Findings from the latter examination have shown that although blue, red and yellow have both positive and negative colour associations, such as red being representative of life and also death, when it comes to warm or active colours, it is the negative associations that have become an integral part of human physiology. This is perhaps due to the notion that it is the colour's negative associations that most effects survival. For example, though yellow may represent the sun's life force, it is the association of yellow with danger, specifically within the context of nature, that allowed our ancestors to avoid potentially dangerous situation such as eating poisonous plants.

The way in which we physiologically react to these colours is much the same way our ancestors did. Chemicals are elicited to warn us of danger, which in turn ensures our survival by allowing more time for reproduction, the main goal of all species. Cool or passive colours, by their lack of activity, indicate safety, and in turn, evoke a calming response. Colours that evoke these stimulating or calming responses are used by society as

a means to convey safety or severity of a situation or product. In this respect, the use of colour to deliver messages of social governance, are both based on, and reinforce, our physiological colour responses, with exposure seeming to mimic the temperature and activity level of the colour at hand.

Take, for example, the colour red, which is categorized as a warm or active colour. Exposure to red causes a chemical reaction releasing a hormone called epinephrine (Eiseman, 2000:19). This physically alters body chemistry and literally makes one exhibit symptoms related to overheating; such reactions include rapid breathing, heightened blood pressure and heart rate, as well as amplified perspiration; all of which are a result of increased blood flow.

Ideas related to colour temperature and activity level are cyclical in nature, in that; colours in nature affect survival techniques. Determining what is best for survival based on colour causes a chemical release which translates into automatic responses. Over time these responses become innate, even when the original context is no longer valid. As society evolved, humans relied on these colour based reactions to assess situations and used them accordingly, in turn reinforcing our primal automatic responses that originated in nature. Though the transmission of social messages may have culturally specific aspects, such as the difference in stop sign shape in Japan and the USA, the responses themselves seem to be similar across cultures, supporting the notion of similarities in cognitive development among humans.

Further reinforcing the cross-cultural similarities of physiological colour response is the work of Akashi (in Sasaki, 1991), one of the only scholarly studies of physiological response to colour outside of a Western framework. Akashi (in Sasaki, 1991) studied

colour reaction among 79,325 Japanese people; this is a larger base than almost all Western studies in the last twenty years combined, and discovered that the findings first presented by Cheskin (1947:35), that is, warm or active colours stimulate and cool or passive colours calm, are valid. These findings, along with many other studies that elicited the same results, leads one to conclude that, yes, there are measurable physiological reactions to colour, and no, these reactions do not vary cross-culturally.

Though colour sensation and perception may be similar across cultures, there is still a debate surrounding linguistic colour representation, that is, terminological colour categorization, and whether or not they are the same across cultures. By examining the current ideas regarding linguistic colour representation we will be able to establish if different cultures, specifically Japan and the USA, categorize colours in the same way. Determining the latter will further establish which aspects of colour construction are culturally specific and which ones cross cultural boundaries, in turn, providing a stronger foundation by which to assess the possible premise upon which pharmaceutical companies colour their products.

Heading up the linguistic colour representation debate is a group of researchers who believe that individuals from all cultures linguistically categorize colours in the same manner. In opposition to this is the position that purports that all cultures identify, and in turn, categorize, colours according to their linguistic specifications, not a pre-prescribed standard. The third and final position is a union of the two ideas and ascribes differences in colour categorization to variations in linguistic evolution and similarities in colour identification to parallel evolutionary pressures. To begin with the following will look at

the position dealing with cross-cultural colour naming, followed by the culturally specific position, and finally, the combination theory.

The idea that colour categories are a product of parallel linguistic evolution was once the most predominantly argued theory related to colour naming. From the sensation and perception of colour came a need for verbal articulation, resulting in the emergence of linguistic colour categories.

The Cross-Cultural Position

The study of linguistic colour terms was pioneered by Berlin and Kay (1969). They proposed that colour naming could no longer be viewed strictly in the realm of scientific data and that there was something to be said for the cross-cultural linguistic interpretation of visual stimuli, in this case, colour. Berlin and Kay (1969) caused tremendous controversy when they made the claim for the existence of colour categories that cross cultural boundaries.

These colour categories, blue, red, yellow, green, orange, purple, pink, brown, grey, black, and white, were termed basic colour categories. Berlin and Kay (1969:4) acknowledged that not all cultures have linguistic distinctions for all 11 colours, but rather, that the categorization of colours exists within an evolutionary realm, with the most advanced linguistic systems containing all eleven categories, and the most simplistic contain just two, black and white (Berlin and Kay, 1969:4).

The eleven basic colours Berlin and Kay (1969:4) refer to are those most representative of the actual colour within its colour space, termed, foci. The blue is that which measures 440-485nm or 680-620THz on the visible spectrum (see Table One), and is visually situated between the colour space of light blue and dark blue.

Results relating to colour categories which cross cultural boundaries have been established by Berlin and Kay (1969), who mapped the colour terms of twenty languages onto the Munsell Colour Chart. This colour chart was the most extensive, scientific colour referencing system available in 1969, when the study was undertaken. Berlin and Kay (1969) found that all cultures examined placed the basic colours in the same central location on the chart. From this, they proceeded to add seventy-eight other linguistic colour terms, finally determining that there were indeed eleven colour categories.

Many research studies within the fields of psychology, linguistics and cultural anthropology have been conducted to test the existence of these cross-cultural colour terms; many of which have been duplicated with great success by scholars such as Rosh-Heider (1972); Bornstein (1973); and Boyton and Olson (1990).

Since Berlin and Kay (1969), the anthropological study of colour has grown immensely. It has developed as an area of research that incorporates biology, psychology, sociology, linguistics, and cross-cultural studies into a singular, but interdisciplinary field. Works contributing to this area of specialization have not only incorporated the original progress of Berlin and Kay (1969), but also have elaborated on, stood in accordance with, and proclaimed opposition to, these findings. One such evidentiary body of work is that of Kay and MacDaniel (1978), which divides Berlin and Kay's (1969) basic colour categories into primary and derived colour categories.

Primary colour categories, as defined by Kay and MacDaniel (1978), are those that are expressed as a result of direct neural responses. These colours include black, white, blue, red, yellow, and green. Berlin and Kay's (1969) other basic colours, that is, orange, purple, pink, brown and grey, are labelled by Kay and MacDaniel (1978) as de-

rived colours categories, and thus named as they are a result of the mixing and overlapping of primary colour categories. To further explain, Kay and MacDaniel (1978:134) state that,

> "The least developed color vocabularies have only two composite categories. New color categories are added as composites split into their constituted primaries, until the color vocabulary contains only primaries. And finally the color categories are added as intersections of the primaries."

This division of primary and derived colours creates the notion of colour space, which according to Kay and MacDaniel (1978), is considered to be a cross-cultural phenomenon, both visually and linguistically. Though this line of thought had many supporters, researchers such as Sturges and Whitfield (1995), attempted to explicate it further and determined that though there are primary and derived colours, the latter are located in a categorical area known as hard to name colour spaces. As the name suggests, linguistically categorizing colours in these spaces is not as simple as being able to visually distinguish them.

Accordingly, Sturges and Whitfield (1995:733) stated that, "The existence of hard to name color space indicates a natural perceptual structure to colour space that is not directly embodied in the principles underlying the construction of any of the major colour order systems." Though this belief was first introduced by Boynton and Olson (1990), it was Sturges and Whitfield (1995) who confirmed that English terms for hard-to-name colour spaces could be divided into four main categories, that is, the colour spaces between red, green, blue and yellow.

In order to study this proposition, Guest and Van Laar (2000) selected ten, visually healthy, English speaking volunteers, aged 18-40. Three different colours were shown against three differently lighted backgrounds three times, equalling nine experi-

ments in total. The respondents were asked to name the colours as quickly as possible, and in such a way that another person would understand, that is, blue, bright blue, light blue, etcetera. In the end, it was concluded that out of 31,332 possible colour terms, 592 were named, making Boynton and Olson (1990) and Sturges and Whitfield (1995) correct in stating that there are four hard-to-name colour spaces, and that there is a natural colour system that is theoretically parallel to the constructed colour system proposed by Munsell and used by Berlin and Kay (1969).

In order to study this concept among cultures that are identified at different spots on the linguistic colour evolutionary scale proposed by Berlin and Kay (1969:4), Burges, et al, (1983) conducted a small scale reproduction using the indigenous Tarahumara peoples. They modeled colour categories such as pale blue and turquoise, and asked a group of individuals to name the colours and identify them on a colour sheet that contained socially categorized primary colours.

It was found that, the Tarahumara, just like the Japanese (Burges, et al, 1983:139) use the same term for green as they do for blue. Accordingly, it was determined that the Tarahumara were successful in identifying derived colour categories as variants of their primary colour categories, even if there was no linguistic terminology to separate the two.

These findings reinforced those of Berlin and Kay (1969) who stated that cross-cultural colour categories do exist, though there may not be terms of reference for them; those of Kay and MacDaniel (1978) who distinguished between the primary and derived colours that the Tarahumara were able to differentiate between; those of Sturges and Whitfield (1995) who first identified the hard-to-name colour spaces that the Tarahumara could identify but not name; as well as those of Boyton and Olson (1990) who first pro-

posed that colour space exists on a innately perceptual plane, as was seen when the Tarahumara identified derived colours in the same location and in the same manner as the other cultures studied, including the Japanese, who use the term qing to describe both blue and green as they are considered shades of qing.

The latter studies aid in establishing the exsitence of cross-cultural colour categories based on primary and derived colours, with the latter emerging within hard-to-name colour spaces. Though not all cultures have linguitic terms for every colour, colour naming seems to reflect the visual characteristics of the colour at hand. For example, most individuals will identify relative terms such as bright, light, and dark, when asked to identify colours in comparison to its best representation, that is, its focal colour. Moore, et al, (2000:5010) noted that, "...the semantic structure of color names is similar to the perceptual structures of colors." That is, the physical attributes of a colour are linguistically manifested in order to best communicate the colour's features to others. It is the cross-culture similarities of such information that validates the concept of the recognition and categorization of colours within a similar colour space as a seemingly cross-cultural phenomenon that can only be explained by a naturally, pre-existing categorical colour system. A system which, in itself, is pre-supposed by the previously suggested notion of cross-cultural colour sensation.

Not all scholars with an interest in this field of study readily accept the existence of colour categories that cross cultural boundaries. The opposing side to this debate is known as the culturally specific position which states that, the linguistic categorization of colour varies according to the language in which it is addressed, as language is what governs terminological colour identification.

The Culturally Specific Position

Perhaps the most effective way of examining the culturally specific position of colour categorization is through the examination of colour boundaries. As was stated, focal colours are located in the centre of similar, yet distinguishable colours which are often altered by brightness or saturation, such as dark blue, light blue, bright blue, etcetera. These surrounding colours comprise categories that are separated by colour boundaries (Bousefield 1978:72).

According to the culturally specific position, these categories and their separating boundaries cannot be similar across cultures because it is social construction, by way of linguistic identification, that determines their categorization. According to the Sapir-Whorf Hypothesis (in Kay, et al, 1984:66), the subjectivity of terminology is based on the language itself. The hypothesis states that,

> "We dissect nature along lines laid down by our native languages. ...the world is presented in a kaleidoscopic flux of impressions which has to be organized by our minds - and this means largely by the linguistic systems in our minds. We are parties to an agreement that holds throughout our speech community and is codified in the patterns of our language. The agreement is, of course, an implicit and unstated one, but its terms are absolutely obligatory; we cannot talk at all except by subscribing to the organization and classification of data which the agreement decrees."

According to Sapir and Whorf (in Kay, et al, 1984), cross-cultural colour identification and categorization is not only impossible, but also absurd. To ignore linguistic variables when assigning colour terms taints the results before the study even begins.

This theory does not imply that cross-cultural colour categories do not exist, though it does assert that such a system cannot be measured on Western premises of social contructionism since they are manifestations of linguistic determinism (in Kay, et al,

1984:75). To further elaborate: through the process of enculturation, a child learns what colours belong to what categories. Transmission of this information is through language and culturally relevant examples. Stated another way, different cultures will identify different colour boundaries and emphasize different colour categories due to prescribed terms in their native language.

Ideas such as the Sapir-Whorf Hypothesis (in Kay, et al, 1984:66) maintain that perceptual information is selectively transmitted, governed and interpreted. It follows that perception cannot be explained by purely biological responses (Ratner, 1989:361). The latter notion of the cultural relativism of colour boundaries relies heavily on linguistic determinism which will be explored in the following section.

The cross-cultural versus the culturally specific positions related to colour categorization are consistent in that they both recognize the existence of focal colours and colour categories. What they do not agree on is the way in which these categorical boundaries are identified and defined. The cross-cultural position attributes colour distinctions to a naturally, pre-defined colour system, and the culturally specific position attributes distinctions to differences in linguistic qualifications. For example, in English, colour features are often represented in name, such as dark blue. The focal colour blue is used as a point of reference when labelling the colour dark blue, which is a darker version of focal blue. Those who support the cross-cultural position would say that that the colour category which blue belongs to naturally contains dark blue in its perimeters. Cultural relativists would say that dark is a subjective term applied to any colour more saturated then its focal counterpart and that the word itself does not innately contain properties that divide it from other colours of varying shades.

It is important to note that, though there are scholars that support this position, there is little more than the concept set forth by Sapir and Whorf (in Kay, et al, 1984) to validate it. Few studies have provided convincing evidence, with many resulting in inconclusive results, or findings that support the cross-cultural perspective.

The Combination Position

In order to reconcile the two sides, Jameson (2001) devised a perspective combining both the cross-cultural and culturally specific explanations of colour perception. Jameson (2001) proposes that colour categorization and linguistic identification are a result of cognitive similarities and socio-linguistic evolution. Though not denying the existence of cross-cultural colour categories, she believes,

> "...color language and color categories (that) primarily reflect the culturally modal mapping of linguistic items and categories shaped by universal cognitive constructs.... a shared cultural representation of color based on widely shared cognitive dimensions may be what is truly universal about color naming and color categorization. Across cultures this form of representation may result from convergent responses to similar evolutionary pressures." (Jameson, 2001:2)

She argues that cognitive similarities are most likely the cause of cross-cultural linguistic colour categorization. Most people sense and perceive colour in the same manner, thus it is inevitable that these similarities would carry over to colour categorization, and in turn, linguistic identification.

Jameson (2001:38) states that colour is such an integral and accessible part of nature that it is possible for cross-cultural cognitive colour evolution to occur on a parallel plane. She writes that, "...this account of color naming and categorization rests on a clear separation between processes that produce a culture's color lexicons (sensation and perception), and processes by which individuals learn and maintain color lexical profi-

ciency (linguistic representation)." Buckalew and Coffield (1982) and Ratner (1989) also support this combination theory, and argue that colour perception, which is a result of shared neuro-physiological response, combined with social influence, creates colour categories that are similar across cultures.

This combination theory acknowledges that the cross-cultural position is most reasonable in that it establishes the concept of colour categories as cross-cultural entities resulting from similar evolutionary pressures. It does not, however, support the notion that there are concrete lines of distinction between colour categories, such as those introduced by Boyton and Olson (1990:1317) or that all cultures subscribe to the same system of division, as indicated by Burges, et al, (1983:139).

In support of the culturally specific position, Buckalew and Coffield (1982), Ratner (1989), and Jameson (2001) agree that, though colour categories may exists, it is linguistic evolution that establishes boundaries. They believe that, because there are such similarities in the evolutionary pressures that created the categories in the first place, it is no wonder that colour categorization across cultures is similar, but not identical. This further reinforces the notion that both the cross-cultural and culturally specific aspects of linguistic colour representation must co-exist in order to be fully explainable and functional.

Though there is still a debate around which of these three concepts is most accurate, the combination theory seems to be the most logical and practical as it negates the questionable aspects of both the universal and culturally specific positions while combining their most rational features and creating a workable version of the two, leaving few questions unanswered.

The purpose of examining these concepts has been to determine if the cross-cultural similarities observed in colour sensation and perception is evident in linguistic colour categorization. From the information presented it can be concluded that visualized primaries (blue, red, yellow, green, black and white) as well as generally defined colour space resulting for these categories are cross-cultural in that they are mentally categorized in a similar manner across cultures, whereas the culturally specific aspects of colour categorization are evident in the linguistic identification of colour boundaries that define categories.

In order to determine what premises the pharmaceutical industry is using to colour their products, the cross-cultural and culturally specific aspects of colour construction must be established. If the pharmaceutical companies colour their products according to aspects of colour construction that cross cultural boundaries, than the results of the pharmaceutical comparison in Appendix One will support the research laid out in the preceding chapter. If, however, the results of the comparison do not support this notion, then there must be another explanation; the products are not systematically coloured, they are coloured according to culturally specific colour associations or, their colouring is based on some form of consumer colour association.

Though it has been illustrated that society relies on our inherent colour response to convey messages of social governance, it has not been discerned that these colour associations are present in other aspects of our lives as well, and whether these social primaries (blue, red and yellow) hold culturally specific meanings. If these colours are regarded differently in Japan and the USA and the pharmaceutical companies are aware of these associations, then it is possible that they may colour their products according to the

culture in which they are sold, in which case, results from the pharmaceutical comparison will support the information presented in the following chapter, *Cultural Colour Associations: Japan vs. the USA.*

Chapter Three: Cultural Colour Associations: Japan versus the USA

In order to determine whether or not pharmaceutical companies use culturally specific colour associations when choosing the colours for their products, the colour associations themselves must be examined. By exploring the fundamentals of colour association we are able to examine a possible premise of pharmaceutical colouring, that is, the examination of colour associations in Japan and the USA, when cross-referenced with findings from the pharmaceutical comparison will reveal whether or not pharmaceutical companies are using culturally specific colour associations to determine the colour of their products.

In the following chapter, the origin of cultural colour association is traced, along with a comparison, analysis and categorization of the three socially categorized primary colours according to their usage in Japan and the USA.

In order to understand, and in turn, examine, culturally specific colour associations in Japan and the USA, one must first be aware of their presupposing concepts, that is, those related to semiotics.

Semiotics

According to Johansen and Larsen (2002:3), semiotics, in its most general form, is the creation and exchange of meaning based on signs that have been coded. These codes are defined as the rules that establish the selection and combination of material used in the formation and exchange of signs. In other words, codes create relevance between the elements that comprise a sign. The relationship between codes is called structure. Semiotics is therefore based on the notion that the sign is created from the relationship between codes, known as structure.

The ability to understand and use semiotics is known as semiotic competence and is what separates humans from all other animals (Johansen and Larsen, 2002:2). Semiotic competence consists of three elements: first is the ability to recognize every interaction as a sign, that is, to comprehend the link between the obvious, the implied, and the absent; second is the ability to create and convey signs, whether it is done consciously or subconsciously; third is the ability to retain transmitted information and act according to the rules prescribed by this information (Johansen and Larsen, 2002, 2-3).

A sign, according to Barthes (1967, pari pasu), is something that has no inherent meaning until it is determined to represent something other than itself, that is, when significance is applied to it. Such things include anything interpreted by the five senses, as well as objects, acts, and words.

A sign allows for inference. It permits us to see something that is not readily evident based on the indications provided by the sign. Signs serve as associations of something else, and as such do not have measurable, predetermined qualities; they are defined in terms of what they represent (Johansen and Larsen, 2002:25).

According to Barthes (1967:35) a sign is comprised of two parts: the signifier, what is being interpreted (47); and the signified, the concept the signifier represents (42). The relationship between these two elements is referred to as signification, and is what creates a sign (48).[5]

There are three types of signs: indexical sign, iconic signs, and symbolic signs. These signs are distinguished by their relationship to the object they represent. There are two types of indexical signs: reagents, by which the sign is interpreted due to a cause and

[5] Further information relating to Barthes conceptualization of signs can be found in his 1967 publication, Elements of Semiology. New York: Hill and Wang.

effect relationship that originates in the object; and designations, by which the sign is interpreted due to the designation itself. Reagents require that the relationship between the sign and object be interpreted in order for the sign to be regarded as such, whereas designations directly identify the object at hand (Johansen and Larsen, 2002:32).

Iconic signs consist of images, diagrams and metaphors, and are identified by their ability to identify an object based on conventional similarity, that is, there is pre-existing criteria in which the sign represents the object. Iconic signs remain similar to the object they represent even if they are not interpreted (Johansen and Larsen, 2002:36). For example, blood is similar to red in that they are of the same colour, blood is indicative of life, as it is what keeps one alive; hence, red represents life. Even if the interpretation of blood as representative of life had not occurred, the colour red would still be an iconic sign in that it is the same colour as blood.

The final type of sign is that of a symbol, and according to Pierce (1931:58), is "...a sign which refers to the object that it denotes by virtue of a law, usually an association of general ideas, which operates to cause the symbol to be interpreted as referring to that object." That is, we interpret symbols using previously established connections or rules that we have internalized through associated learning (see Chapter Four). The symbolic sign is not related to the object it represents by similarity or by cause and effect, and as such is only connected to its representing object by mental construct.

In order to examine symbolic colour association, an example using the colour pink as symbolizing feminine, furthers understanding. Female babies in our culture are often dressed in pink; the mental association of colour and gender is the sign. The word pink is the signifier through which the gender of the female baby is signified. The com-

monality of dressing female babies in pink has caused the colour pink to become representative or symbolic of femininity, in turn establishing pink as symbol for femininity (Ammer, 1993:47).

As language is considered the most prominent and complex examples of a sign system, the meaning of words is further categorized according to what each represents. A word's meaning is divided into two basic groups, denotative and connotative. They are not separate entities or signs, but rather two aspects of the same entity or sign. The difference between them exists in the relationship between the signifier and the object being signified as is manifested in their levels of meaning (Barthes, 1967:89-90)

Denotation refers to the literal definition of the word itself; whereas connotation refers to the cultural associations the word holds (Barthes, 1967:90). For example, the denotative meaning for the word blue is a colour that has a 680-620 Terahertz Frequency on the visible spectrum. The connotative meanings are many, though the most commonly used references are blue skies and blue water (Eiseman, 2000:39). These connotations are an example of iconic signs in that they are represented by the similarity to the colour blue.

The creation of symbolic colour associations is a multi-step process whereby signification is established between a signifier and signified, thus creating a sign. This sign, by way of situation specific interpretation and a connecting of general ideas, becomes representative of something unrelated. The repetitiveness and commonality of this association causes the sign to become a symbol; for example, pink symbolizing femininity.

The occurrence of this process is such an integral part of language that most do not even realize it exists. It is apparent in every aspect of linguistic representation, and is

most obvious in the way we attach physical and emotional meaning to colour, that is, colour as being symbolic of something else. These associations can be both cross-cultural and culturally specific in nature and are linguistically identified by way of connotative meanings, as it is these secondary definitions that provide indications as to the cultural evolution of a word from signifier to cultural symbol.

Again, the purpose of examining colour association by way of connotative meaning is to gather information that will be used to determine what premise, if any, the pharmaceutical industry is using to colour their products. If there are significant differences in the associations Japanese and Americans attach to colour and the findings from the pharmaceutical comparison corresponds with these differences, then it will show that pharmaceutical companies colour their products according to the cultural which it is sold in.

Cultural Colour Comparison

In order to examine colour terminology and symbolism in the above context, a comparison of the three primary colours in Japan and the USA has been employed. To get a general view of the cultural stance on any one given colour, three sources are used and provide the reader with a literal, traditional and market based perspective from which to examine colour association.

The first of the three sources is the dictionary; meant to provide a literal socially constructed view of these three colours. Though not considered a conventional scholarly source, a dictionary from both cultures is helpful in establishing a culture's relationship to colour. Dictionary definitions of colour allow the reader to get a dual sided view of colour meaning, in that it gives multiple definitions for colour terms. First is the literal

meaning of the word, that is, its denotative meaning, and second is the word's connotative meaning. Though they are both considered definitions, the differences in connotative meanings between the two cultures is what establishes the case that a society, by way of linguistic evolution, creates culturally based colour associations, and that these associations are so common place, as is indicative of symbols, that they permeate the most literal of texts, the dictionary. Dictionaries are reflective of linguistic usage of the culture to which they belong, hence the definitions found in these sources are considered to be as well.

The second source, Dreyfuss (1972), is meant to provide a traditional view of colours within a North American and Japanese context. The third source is Jacobs, et al, (1991) where in 159 Japanese residents and 114 American residents were shown 8 differently coloured swatches and were asked to equate them with 13 emotional words.

The colours being analyzed are within the context of their use as indicated by the sources in which they are found, and as such, an overview of the physiological reaction to these colours as well as their associative meanings resulting from innate responses as seen in the conveyance of governing societal messages is provided in Chapter Two. Information presented in the preceding chapter demonstrates that a colour's temperature and activity level provides indications as to the perceptual meaning of the colour, with warm or active colours indicating active situations and cool or passive colour indicating inactive situations. It was also shown that society's use of colour, in terms of relaying message of social governance are both based on, and provided reinforcement for, our physiological reactions, with colour temperature being used to indicate a situations importance or severity.

Colour sensation, perception, social usage and certain aspects of linguistic colour categorization are similar across cultures, hence it is necessary to see what aspects of these similarities influence or carry over to the cultural colour associations of both Japan and the USA. To begin with, the following addresses the definitions for each of the three colours found in each culture's dictionary.

Table Two: Colour Meaning - Japanese versus English Dictionary

Colour	Meaning in Japan	Meaning in the U.S.A
Blue	Sincere Trustworthy	Clear Sky Union Soldier
Red	Love Sensuality Happy Adventurous	Blood Ruby Visible Spectrum
Yellow	Happy Pure	Egg Yolk Jaundice
Webster's New World Basic Dictionary of American (1997) New York: Webster's New World Webster's New World Compact Japanese Dictionary (1997): Japanese/English-English/Japanese (1997) New York: Webster's New World.		

As can be seen in the Table Two, the definitions of the three colours found in the Webster's English Dictionary (1997) seem to take a much more literal form than those in the Webster's Japanese Dictionary (1997). The American definitions are in the form of iconic signs, where as the Japanese definitions are symbolic in nature.

The first term the Webster's English Dictionary (1997:36) uses when describing blue is that of a clear sky, with the Dictionary stating that blue is the, "color of a clear sky." The colour of the sky can vary depending on many environmental factors, though

the colour most often used when referring to it is blue; there is even a shade of blue specifically called sky blue, which is the pale blue a sky resembles on a clear day.

Though the word clear literally means transparent (Webster's English Dictionary, 1997:61), in this sense it is used to convey something that is not obstructed by something else. For example, the view of the sky is not obstructed by clouds, which, if it were, would be called an overcast sky. A clear sky has come to represent a nice day, as it stands in opposition to a day of bad weather, which is often referred to as a grey day. The terminological application is empirically based in that, anyone can look outside on a day when there are few clouds and see a clear blue sky.

The case of blue representing a Union Soldier, that is, a union army soldier during the American civil war, is addressed in the same manner as the clear sky, because it too is an iconic sign resulting from an empirical observation. The typical Union Soldier wore a uniform that consisted of blue pants, a blue overcoat and a blue hat; hence, the association (Pastoureau, 2001:86). Soldiers are typically regarded as those individuals who fight for the freedom of their country and its inhabitants, and are distinguished by the uniform they wear, in this case blue. Through repetitive association their cause and their being become intertwined and so the colour has also become symbolic of freedom in the USA. The stars on the American flag are blue; the colour of the conservative party which represents a democratic government is blue; and the American campaign for free speech is called the Blue Ribbon Campaign.

In the Webster's Japanese Dictionary (1997:194), the colour blue, qing, holds more figurative meanings than it does in the Webster's English Dictionary (1997), with the terms trustworthy and sincere being notable examples. In Japanese symbolism there

is a figure known as the blue dragon, which is often used to represent the role of a leader, which ideally requires the attributes of sincerity and trustworthiness. Blue is also the colour of water and sky, which, due to their consistency have become associated with dependability and in turn, trustworthiness (see Chapter Two).

In the Webster's English Dictionary (1997:282) the associations made with red are products of empirical observation as well, and are, in turn, iconic associations. Although it is not found in the Webster's Japanese Dictionary (1997), the association between the colour red and blood is one that permeates linguistic representation, as it finds its origins in primal colour associations. As with the distinguishable sky blue colour, there is also a colour called blood red.

This focal colour is also different from the colour of a red ruby, which is another popular colour, and is also seen as a definition for red in the Webster's English Dictionary, which states, "color of the ruby" (1997:282). Rubies are corundums that are red in colour, and though there has been much debate whether colour saturation defines the stone, it is generally agreed that all rubies are red, not pink. Rubies are the most commonly named gemstone in the Bible (Bromiley, 1995:268), making their association to wealth and royalty a common one.

The final definition for red found in the Webster's English Dictionary (1997:282) is that of visible spectrum. Red has the highest wavelength and frequency intervals on the visible spectrum (see Table One), which may account for why red is considered the definition for the visible spectrum, as other colours that belong to the spectrum are not defined as the spectrum itself.

Though being addressed within the context of the Webster's Japanese Dictionary (1997:1473), the colour red, aka in Japanese, is seen as meaning very similar things throughout the world, most of which are represented here. Because red symbolizes love, sensuality, happiness and adventurous in many different cultures, addressing these symbolic meanings will be general in nature and will draw upon culturally specific examples where necessary.

Sensuality, being directly related to sexuality is one of the main symbolic associations made with red, as it is the colour of blood, which is what contributes to sexual arousal. As blood is the life force of every human, it is considered magical in the sense that it (menstruation) is what allows women to have children (Tresidder, 1997:168). In many non-industrialized cultures red is still considered the colour of fertility and vitality reminiscent of prehistoric times when red ochre was used to draw fertility goddesses by those wishing to conceive to appease and invoke their powers (Buckley and Gottlieb, 1988:236). As previously stated, red is the predominant colour of mammal genitals and is directly related to mating success. Associations made between red and sexuality in Japan, and perhaps other parts of the world, include prostitution locations termed as red light districts, red lipstick and nail polish being seen as sexually inviting, and the inappropriateness of wearing red to sombre occasions.

Because romantic love is most often accompanied by sexual desire and encounter, one can see how red has also become representative of love, as well as sensuality and desire. It is considered the colour of love, and is most commonly seen on February 14, also known as Valentine's Day. In Japan this day is also called Red Day, whereby women express their love for their significant other through the giving of gifts. The Japanese cele-

brate a similar day when men are to give women gifts; this occurs on March 14, and is called White Day. Valentine's Day is represented not only by the colour red, but also by a symbol which is the cartooned rendition of a heart. Because the heart pumps blood, blood is red and red is associated with sexuality, which often accompanies love, one can see how the symbol of the heart became red and in turn, associated with love. Red, being the colour of love, can be seen in the romantic significance of red roses and the Japanese tradition of wearing red kimonos when married.

Red seems to represent happiness because the colour symbolizes things that people enjoy or celebrate. Joyful, celebratory acts are ones in which those involved are generally quite happy. Such Japanese celebrations that include the colour red are weddings, childbirths, and any celebration where something is renewed, for example, anniversaries, New Year's celebrations, and birthdays. In Japan, red, just like yellow in other cultures, symbolizes happiness due to its association with the sun. Though most cultures consider the sun to be yellow, the Japanese view it as red, as evidenced in their art and country symbols, such as their flag. The name Japan means land of the rising sun and their flag, which is a red circle centred against a white background, is their representing symbol (Finnemore, 1919:3).

Red, symbolizing adventure, seems to stem from the idea that red, being an active colour, has become the representative colour of physiological excitement, environmental fear, societal danger and celebration, and is so interconnected with stimulating things that it has naturally progressed into being associated with adventure. The logo for the fight network is red, as is the X of the extreme sports logo; the newest and most popular energy drink is called Red Bull; and findings recorded by Jacobs and Nordon (1979); Sallis

and Buckalew (1984); Buckalew and Ross (1983); Fodder (2003); and Wen (2001); all indicate that red, specifically when placed within the context of pharmaceutical application, indicates motivation, energy and rapid relief; all of which contain their own associations to stimulation.

Yellow, as defined in the Webster's English Dictionary (1997:389), means jaundice and egg yolk, with the dictionary specifically stating, "jaundice – to turn yellow" and "yolk of an egg". By direct observation it is obvious why yellow would be associated with the yolk of an egg because, regardless of how an egg is prepared, the yolk remains yellow. Yellow representing jaundice on the other hand, is a direct reference to the symptoms seen in those with a medical condition resulting from a liver malfunction, by which the skin and eyes become yellow in colour (Tresidder, 1997:232). Both of these definitions would be considered iconic signs in that they are similar to the object at hand, that is, the colour yellow.

In the Webster's Japanese Dictionary (1997:2101) the colour yellow, ki, is defined as meaning happy and pure. As has been previously explained, yellow, which is the colour of the sun, provides life. Life is to be celebrated and celebrations are happy occasions. Even though the Japanese reproduce the image of the sun with the colour red, as seen on their flag, society, especially the media, associates the sun with yellow and yellow with happiness. Examples of this include yellow happy faces, and sayings such as, let the sun shine in, which is using exposure to the sun as a sign for happiness.

The Japanese Dictionary seems to attach more emotional significance to colours than the American dictionary, which is clearly the case when analyzing these two sources. It seems as though the Japanese colour associations are symbolic in nature,

whereas the American colour associations are a product of semblance, that is, they are iconic signs because the colour is representative of things that are of that same colour. This semblance is the basis for separate associations that are not mentioned in the dictionary. For example, red as representative of danger due to its association with blood.

This leads one to believe that each culture's dictionary was compiled according to what was considered acceptable content, with the Webster's Japanese Dictionary (1997) using figurative, symbolic associations as definitions, and the Webster's English Dictionary (1997) using empirically based associations as definitions. Though some of the symbolic colour meanings in the Webster's Japanese Dictionary (1997) are also present in American society, such as yellow symbolizing happiness and red symbolizing love; these associations are obviously not considered definitive enough to include as connotative meanings in the text that represents American English.

The trend of Japanese colour associations being based more on emotional response than that of their American counterparts was first suggested by Dreyfuss (1972:231) who, after compiling his cultural colour symbolism research noticed that Americans often use objects as reference when associating colour, whereas the Japanese use words that described feelings or traditional associations that have been culturally transmitted. To further examine this notion, the following will look at the latter author's contribution to cultural colour symbolism analysis by examining his traditional view of the three colours.

Table Three: Traditional Colour Symbolism – Japan versus the USA

Colour	Meaning in Japan	Meaning in the U.S.A
Blue	In Theatre: Villains Ghosts Super-natural Creature	Sky Day Sea Cold
Red	Fighting Anger Danger Permissive	Life Warmth Passion Revolution
Yellow	Childish Happy	Light Intuition Cowardice
Dreyfuss, Henry (1972) Symbol Source Book: An Authoritative Guide to International Graphic Symbols. Montreal: McGraw-Hill Book Company.		

To begin with we will look at the American associations of blue. In this text, just as in the Webster's English Dictionary (1997), blue is symbolic of the sky. Though the dictionary refers to it as a clear sky, the above meaning does not indicate that clarity is needed for the sky to be blue. This meaning is not conditional and as such is a generalization. Similarly, blue, because of its similarity to the colour of the sky, specifically during sunlight, is associated with the daytime.

Associating blue with the day is also generalized in that, not all days contain blue skies. Its meaning relies on the day's opposition to night, which is black, and infers that the placement of the sun in relation to the earth is what distinguishes between the two time periods and their representative colours.

Another empirical observation, which has lead to a colour association is that of water, specifically, the sea. Though the sea may sometimes appear green, it is generally referred to as being blue. There is an assortment of colours, all of which are variances of

blue that have the water related names. Such colours include: Ocean blue, Nile blue, Aqua, Aquamarine and Navy.

Associating blue with cold can be taken as meaning, the cold itself, or being cold, both of which have their origination in temperature, whether environmental or physical. In an environmental context, cold is associated with blue because of its opposition to warm, which is represented by red. Bodies of water are blue and are often seen as being cold, as are highly elevated, snow-covered mountains which sometimes appear to be blue.

Physically, blue is considered cold because it is the colour the body turns when it begins to loose life, that is, warmth provided by blood circulation. Also, blue, because it is a passive colour, is said to have a calming effect on the body by eliciting calming chemicals (Kipperman and McKinstry, 1998:1) which slows down heart rate-the same reaction seen in hibernating animals during the winter months. Seasonal Anxiety Disorder, which is a form of depression resulting from a lack of sun exposure, occurs during the cold winter months, and is often referred to as the winter blues (Ammer, 1993:53). Blue represents the North, with the symbol for a cold front on a weather map being blue in colour; there is a colour named Blizzard blue, and a gum flavour called blue ice.

Dreyfuss (1972:235) provides a theatrical context when analyzing the symbolic significance of blue in Japan, and states that it represents villains, ghosts, and supernatural creatures. In this sense, blue is used to connote coldness, which indicates a lack of emotion (Webster's English Dictionary, 1997:64) the quality one would expect to see in a villain, a ghost or a creature from beyond. Blue characters represent lack of compassion and are used to oppose red characters whose colours represent heroic qualities such

as passion and warmth. A modern day example of this is the depiction of villains in Japanese anime, where bad guys are often depicted as having long blue hair and stark white skin, with good guys having yellow or red coloured hair and flesh tone skin.

In *The Symbol Source Book* (Dreyfuss, 1972:234), Americans are said to consider red to be representative of life, warmth, passion and revolution. With the first three associations having already been examined, we will look at the concept of red representing revolution. Ancient mythology associates red with the Roman God of War, Mars, as he was said to have caused massive blood shed, reinforcing the connection between red, blood, and danger, that is death (Eiseman, 2000:15). During the American Revolution, English soldiers wore red and white uniforms, reinforcing the notion of red as rebellion, that is, revolting. Red is also associated societal uprisings, and along with black is representative of anarchism (Tresidder, 1997:168). Red is the colour of the USA's army's Corps of Engineers, the Transportation Corps, the Ordnance Corps, the Medical Corps and the Artillery Corps.

According to Dreyfuss (1972:234), the Japanese associate the colour red with fighting, anger, danger and permissiveness. Red, representing anger, danger and fighting is not culturally specific, as these associations stem from the connection between the colour red and blood, and seem to be cross-cultural in the sense that similar evolutionary experiences have caused members of most cultures to acknowledge this relationship. Permissiveness as symbolized by the colour red is an association that is not found in any of the other cultures examined in Dreyfuss' text (1972) and may result from the notion that red is the colour of many liberal, democratic and social movements and parties around the world, including Japan.

Also, in opposition to its blue theatrical counterpart, red is the colour of heroes or good guys in Japanese theatre. Such characters would ideally have permissive qualities such as tolerance, open-mindedness and progressiveness. It is interesting to note that in American culture, villains are often portrayed as dark, shadowy figures that are opposed by white, angelic figures; what remains the same is the idea of temperature indicating character; characters that are described as cold, are often bad guys and characters that are described as warm, are good guys.

The final colour analyzed by Dreyfuss (1972:234) is yellow, which is said to represent light, intuition and cowardice among Americans. Light in this sense, is taken literally to mean the light provided on earth by the sun, hence the term, sunlight. Mimicking this natural occurrence is candlelight, which also looks yellow, especially at night. When the sun rises in the morning it appears yellow and is referred to as the wakening of the sun or the illumination of the earth. Intuition is based on an inner awareness that requires one to be awakened and illuminated as well. Because intuition is the most primal quality humans possess, it is very close to nature and nature's life force, the sun.

Most people who hear the term yellow-bellied immediately acknowledge it as an indication of cowardice. Other terms that use yellow in this sense are having a yellow streak and being yellow. This term became associated with weakness by way of jealousy and treason, as early as the times of Jesus, when Judas Iscariot is portrayed as wearing yellow. Also, during the black plague, 1348-1350, houses containing the sick were marked with yellow crosses, associating the colour with sickness and quarantine. The Germans considered the Jews weak and forced them to wear the yellow Star of David as a reminder of their inferiority. As was previously mentioned, yellow is the colour of

jaundice, and is included in the named sickness, yellow fever. As well, as plants in nature begin to die off, they too become yellow. Being jealous, held captive, sick or dying are signs of weakness, and as such, yellow has come to represent cowardice (Tresidder, 1997:232)

In Japan yellow represents nothing but good things; happiness and childishness. Tresidder (1997:232) indicates that yellow is the most inconsistent in its symbolic meanings, containing an equal number of both positive and negative associations. Culturally, the Japanese address this colour positively, as opposed to Americans, who address it negatively.

Yellow symbolizing happiness has been previously addressed and it is a small step to see why yellow represents childishness. Youth is said to be wasted on the young, because they do not appreciate the joy or happiness that comes with childhood. Quality of life is measured by things such as health, energy, and stamina. According to this, children have more life in them than any adult, and because life cannot survive without the sun, which is yellow, this colour comes to represent youthfulness.

One of the only sources that relied on independently collected research is that of, Jacobs, et al (1991) who used eight coloured swatches (invented by Luscher to test the relationship between colour preference and personality characteristics) and thirteen expressive words to determine what colours are associated with what words. The 522 respondents were asked to associate each word with a colour, after which the following findings were revealed. Though this was a multi-part test and there were also respondents from China and South Korea, the chart below only specifies findings from Japanese and American respondents in relation to emotional reaction, as these are the cultures and

premises being examined. Results from the entire test can be found in Chapter Four, *Culture, Colour and Marketing.*

Table Four: Emotional Colour Associations – Japan versus the USA

Colour	Meaning in Japan	Meaning in the U.S.A
Blue	Sincere Trustworthy High Quality Dependable	Sincere Trustworthy High Quality Dependable
Red	Love Good-tasting Happy Adventurous	Love Good-tasting Happy Adventurous
Yellow	Happy Pure Good-tasting	Happy Pure Good-tasting
Jacobs, Keown, and Worthley (1991) "Cross-cultural Color Comparisons: Global Marketers Beware", in *International Marketing Review* 8(3):21-30.		

What is interesting about the results of this test is that respondents from Japan gave the exact same answers as those from the USA, negating any culturally specific variables and implying that such associations may be similar to those from different cultures. Due to the close ended nature of this study, that is, only allowing respondents limited options, it was expected that the answers would be based on associations arising from modern, everyday observations or interactions.

Both the Japanese and the Americans described blue as representing sincerity, trustworthiness, high-quality and dependability. These are qualities that large corporations try to project as a part of their customer satisfaction mandate, making the business seem as if it is catering to the needs of average citizen.

Associations of sincerity, trustworthiness, dependability and high quality go hand in hand, as each is dependant on, or pre-supposes one of the others. As was mentioned in Chapter Two and was seen in the Webster's Japanese Dictionary (1997) definition of this colour, blue is considered to carry such qualities because it is the colour of the two most constant things on earth, that is, the sky and the water.

There are very few things in nature that come in any shade of blue, making it sought after and in turn, necessary to reproduce. Up until a few centuries ago reproducing a colour where the original material was not found in nature was not possible, and when it became possible, was very expensive. Blue, being one of these select colours, has always been seen as representing high quality, and because only the wealthy, such as royalty, could afford things such as blue textiles, it also came to be associated with authority. Examples of historical and modern day reproductions involving blue include dyes for clothing, natural make-up, and more recently, roses and metals.

It should also be mentioned that water, the sky and blue gems are the only natural non-living blue things. These things existed before humanity and as such are considered our most dependable resources; hence, the association of blue and dependability. Companies have taken this pre-existing association into account and many are now using the colour blue to indicate the dependability of their products. Such companies include IBM, Hewlit Packard, 3M and many of the world's major banks.

Blue is also the colour of conservatism, which implies dependability as it is the opposite of risk. Things that are risky are also not trustworthy, so blue is also, by disassociation, related to dependability and trustworthiness. Companies that have capitalized on this connection include the medical insurance companies Blue Shield and Blue Cross,

who not only use the word blue but also use symbols, that represent safety, and in turn, trust. By using blue as their representative colour companies are attempting to portray their business as one which clients can depend on to be trustworthy, sincere, high-quality and perhaps even elite.

On the opposite end of the spectrum is the colour red, which, depending on the context, can evoke positive as well as negative images and emotions. In this study, red was stated as symbolizing love, good tasting, happy and adventurous in both the USA and Japan. Red as representative of love and adventure has been thoroughly covered in the preceding pages and as such we will address the associations of red to good tasting and happiness.

Good tasting is an obvious choice to associate red with as this is one of the most predominant food colour in the world (Johnson, 2006:1). The colour red appears in most food categories and is one of the most reproduced food colour additives, being used for things such as juice, candy, and medicine; all of which come in the popular red flavours such as strawberry, watermelon and cherry. Also, because red is the second most noticeable colour next to yellow, it is often used by advertisers to market food based products such as those listed above.

Red as symbolizing happiness comes from the idea that blood, life's necessity, is red and that life and all that it contains should be cherished and celebrated. As such, red has become one of the most popular celebratory colours in the world. The celebratory dragon of many Eastern cultures is red, as are the streamers and noisemakers used in conjunction with its presence. Aside from red, yellow is the only other colour that has been seen as representing joy, celebration and happiness.

Next to green and red, yellow is the third most predominant colour for consumable products. Almost every red food has a yellow counterpart and they are synthetically duplicated to the same extent as well, with flavours that include lemon, banana and pineapple. Yellow, being the most noticeable colour in the world, lends itself nicely to marketers who want to have their product seen. Yellow is often used in grocery store chains, for corporate logos, product packaging, and promotional advertisements. Red and yellow make obvious choices for synthetic edible products and packaging because they are stimulating colours, which, unlike cool or passive colours, induce feelings of hunger.

Findings from the preceding comparisons have shown that, though there is a difference in way the Japanese and Americans assign connotative terms to colours, many of the associations are present in both cultures, with the USA socially employing connotative meanings for colours seen in Japanese literature, such as red's association with love.

Though many of the associations in both cultures are the same, either in text or in everyday use, the difference in the way these colours are addressed is in regards to their iconic versus symbolic associations, with the Japanese emphasizing the former and Americans emphasizing the latter; in both cultures however pre-existing meanings are context specific.

Pre-existing, context specific associations can also be seen in colours that represent physical symptoms of sickness and health. By examining colour idioms as they relate to health, we are able to see whether or not different cultures have the same terms of reference when it comes to appearance and wellness, in turn examining how cultural colour symbolism manifests itself into indications of sickness or well-being.

Colour Idioms

Colour idioms are a form of cultural symbolism, in that they are a linguistic representation of a pre-existing colour association. What is interesting is how, around the world, there are a variety of colour idioms that indicate one's well being. The sayings themselves differ according to culture, though it is common knowledge that skin tone is representative of how one should feel. For example, within the Caucasian population, one can look "white as a ghost" indicating fear or sickness. If someone is green, they are to be considered nauseated, as green represents bile. If they are pink or rosy, they are considered healthy. These associations would not necessarily hold true in ethnicities where the population had very dark skin, as visible symptoms are not as obvious, hence the lack of data pertaining to colour idioms related to health in dark skin cultures.

One saying which does hold true, seemingly across most cultures, is 'red in the face', indicating heightened blood pressure due to anger. Being red-faced is also an indication of embarrassment in both the USA and Japan. The Japanese say it is "better to be dead than red", that is, better to be dead than embarrassed. To be sober in Japan is referred to as having a "white face" or shirafu, whereas drunks have red faces in the West, literally, because alcohol increases blood flow to the face. In Japan, an anxious exasperation is called a blue breath or ao-iki. In the West, someone who feels blue is sad. (Watashi and Daigakusei, 2000). Colour idioms that relate to health are context specific in that they attach a specific colour to a physical or emotional attribute; this is one way of the many ways to observe context specific cultural colour construction. Another method of analyzing context specific cultural colour construction is to look at the way the media has created, contributed to, and maintained notions of colour association.

Chapter Four: Colour, Culture and Marketing

With the development of colour science, colour vision, physiological reaction, colour to convey social messages and much of our linguistic and symbolic colour associations as being similar across cultures, one may assume that pharmaceutical companies would use this information to colour their products. This may not be the case. Variables introduced by way of marketing indicate that consumer colour association, which is comprised of personal colour preference, product specific colour associations, purchase category, and product branding, affects how we associate colour. Hence, it is the purpose of this chapter to identify these alternative factors and explore ways in which they may contribute to the colouring of pharmaceuticals.

In order to understand the methods by which pharmaceutical companies may colour their products, the following chapter will look at the specifics of consumer colour association and the alternative ways it contextualizes colour. As with the two preceding literature reviews, this chapter will outline the concept being studied, in this case, consumer colour association, after which, the cross-cultural versus the culturally specific aspects of this concept will be identified. Due to global marketing, it is assumed that consumer colour association will contain aspects of both cross-cultural and culturally specific colour associations depending on the product being marketed. In order to contextualize this within the realm of pharmaceutics, a section focusing specifically on pharmaceutical marketing will also be examined.

In step with society, marketing companies use colour association as a way to convey specific messages, though the latter's objective is to increase sales through product recognition. In order to do this they must be familiar with all aspects of their target mar-

ket, including consumer colour preference, product specific colour associations, the economic factors that govern colour associations and the ways in which product branding can be used to ensure consumer loyalty.

In order to have a successful marketing campaign, and in turn, a profitable product, companies must identify their target market. In so doing they are able to direct their advertisements to a specific group of people who will relate with the product being sold. According to Luscher (1971), colour preference is a clear indication of personality characteristics. By identifying a target market's personality characteristics companies are better able to use colour as a means of conveying a specific message about their product. As pharmaceuticals are generally geared to specific target markets, pharmaceutical companies would benefit from knowing consumer colour preference, as they could use it as a basis for colouring their products to increase sales and use, which in turn increases efficacy and creates a satisfied, repeat customer. As such, the following will look at individual colour preference and the way in which it contributes to the formation of consumer colour association (be critical, don't just accept).

Colour Preference and Personality

Consumer colour preference finds its roots in the Luscher Test (in Bleicher, 2005). Max Luscher employed colour tests as a means for identifying psychological states. These psychological states, Luscher asserts, reveal personality characteristics through colour preference. The Luscher colour test consists of eight coloured cards: purple, black, green, grey, yellow, red, blue and brown. Purple, brown, black and grey are called auxiliary colours, as they are created by combining, blue, red, yellow and green; interestingly enough, the primary colours of visualization outlined in Chapter Two: *Col-*

our Vision. One must keep in mind that the test colours are not true representations of their named colours; they are focal colours. The purple is a violet or mauve colour; black is a night black; the green is blue-green; grey is a subtle grey; the yellow is a bright sunshine yellow; the red is an orange-red; the blue is dark blue and the brown is orange-brown (Luscher, in Bleicher, 2005:47).[6] In this test, respondents are asked to choose their favourite colours, in order of preference. As the colours are chosen, the cards are placed face down in order to not alter the remaining choices. The coloured cards are then divided into pairs and analyzed accordingly. That is, personality characteristics are based on the order in which one selects preferences.

According to Luscher (in Bleicher 2005) all persons personality characteristics based on colour preference are identified through the primal meaning of a colour. The extent to which we are drawn to a specific colour indicates our present emotional or psychological state, as it is our desire to take on the characteristics that the colour originally represented in nature that determines our choice. Colours that appear lower on an individual's preference scale indicate an emotional or psychological state that is being avoided, either by circumstance or by choice (47). For example, if our first choice is dark blue, which is associated with constancy, then we may be seeking calmness in our environment. However, if dark blue is our last choice, then either our being or our situation is suppressing the colour's attributes, that is, calmness.

To elaborate, the following will look at how Luscher (in Bleicher 2005:47-49) categorizes each colour and what a preference says about the individual. Blue, being the colour of the sky and water, is associated with depth of feeling and is emotionally repre-

[6] As Luscher sees psychological state as a manifestation of colour preference based on primal colour associations, he chose these colour variations as representative of reaction evoking colours seen in nature during the time of our nomadic ancestors.

sentative of calmness, tranquility, unification, contentment, tenderness and love. Those who choose blue as their favourite colour were primarily concerned will their own well-being. Those who choose green, the primary colour in the environment, are also considered selfish. This colour indicates an inelasticity of will and is linked to characteristics such as unwillingness to change, high self-esteem and persistence. Red, being the stimulating colour it is, represents a force of will, and is associated with desire, excitement, sexuality, aggression, and impulsivity. Those who choose red as their favourite colour are said to be altruistic and are more concerned with the well-being of others than their own. Yellow, as the colour of the sun, is a sign of spontaneity, which is linked to enthusiasm, originality, expectancy and exhilaration. As with red, those who choose yellow as their favourite colour show a great concern for others.

Luscher's categorization of visualized primary colours corresponds with the temperature and activity level of the colour wheel's primary colours laid out in Chapter Two. Within this context, warm or active colours like yellow and red are representative of excitement, stimulation and ensuing emotional representations, whereas cool or passive colours, which include blue green and violet, are representative of emotional states that are dependant on consistency.

It is interesting to note that those who choose warm or active colours as their favourite are altruistic, whereas those who choose cool or passive colours are considered selfish. The term warm in English can be used when referring to a kind, even altruistic person, whereas calling someone cold can be taken to mean a lack of emotion, perhaps even selfish. In this context, connotative meanings for warm and cold correspond to the

personality characteristics of Luscher test respondents who choose these colours as their favourite.

Aside from these visualized primaries are auxiliary colours, which consist of purple, brown, black and grey and black. These colours are a mixture of primaries in both their visual characteristics and their representing personality indicators, with Luscher (in Bleicher 2005:47-49) making the following assertions. Purple is the colour of unification. Those who choose purple seek to fuse the excitement of red and the passivity of blue.

Luscher indicates that purple is a magical colour that represents an understanding of the surreal. It is the favourite colour of gay men and pregnant women, and as such is said to indicate sensitivity and understanding, two generalizations attributed to the aforementioned groups. Brown, which is representative of the earth, is said to be chosen by those who have a need to belong, that is, those who suffer from insecurities. According to Luscher, it is the favourite colour of post WWII soldiers and those with an unbalanced psyche. It is among the least preferred among the general population and indicates a feeling of unsettledness. Moving forward, grey represents apathy, and is the favourite colour of those who conceal their emotions. It is indicative of people who would rather watch an event than participate and is a sign of someone who is psychologically regressed. The final colour examined is black which, as one might suspect, represents nothingness, rebellion, and a tendency to act out. It is literally manifested as the colour of death, in that; this is when one stops seeing light. Black is generally the least liked colour of those tested and is indicative of someone who is stubborn and inflexible.

The Luscher test (1971) suggests that colour preference, which is representative of innate colour associations, is manifested in the emotional and psychological state of

the individual. Although results with cross-cultural underpinnings might initially seem appealing for product colours selection, individual results, like those derived from the Luscher test change depending on the emotional of psychological state of the respondent. Since colour preferences change over time the Luscher results may provide an ideal starting point for a marketing concept, but will not satisfy all requirements of a marketing scheme. As results of the Luscher test may change, certain aspects, such as the cross-cultural colour associations upon which ensuing emotional attributes are based, may still be used when attempting to acquire product specific colour associations.

Unlike the cross-cultural colour associations established in the preceding chapters, consumer colour association are partially influenced by culturally specific product variability. A product that is sold in one culture may not have the same colour associations as a similar product sold in another culture. Similarities in product colour association, when not influenced by cross-cultural colour associations, can be attributed to global marketing forces that impose the colour associations of one culture upon another. Eiseman (2000:15) states that, "There is an increased awareness of typically American colours in foreign markets, out of which a new collective colour consciousness is emerging." To test this concept a study of product specific colour associations by Jacob, et al, (1991) is discussed.

Product Specific Colour Associations

A test conducted by Jacobs, et al, (1991) set out to establish the colour associations for four cultures across three categories; emotional, geographic and product specific. In this test, 584 respondents from China, South Korea, Japan and the USA were asked a series of questions related to variables that could influence colour associations.

In the first segment of this test, respondents were asked to associate thirteen emotionally stimulating words: powerful, expensive, high quality, trustworthy, dependable, inexpensive, love, happy, pure, good tasting, adventurous, progressive and sincere, with Luscher's eight colour swatches. Though only three of the eight colours are examined in Chapter Two (see Table Four), results from this segment demonstrate that Japanese respondents have the same emotional associations for blue, red and yellow, as their American counterparts. These similarities can possibly be attributed to notion that respondents only had a select number or words to associate with a select number of colours and associations for such colours are portrayed by media in both societies.

In the second segment of the test respondents were asked to associate one colour with either China, Korea, Japan, France, USA, Italy and in the third, were asked to associate each colour with institutional associations, that is, what colours reminded the respondents of government buildings, factories, museums, hospitals, schools, restaurants and theatre. In last segment, respondents were asked to associate the eight colours to product packages which included a vegetable can label, a box of candy, a hand soap wrapper, a box of laundry soap, a package of cigarettes, a can of soda, and a bottle of headache medication (Jacobs, et al, 1991).

In this analysis only results from Japan and the USA are examined, as these are this researcher's cultures of comparison. As well, only the last two segments of this test are analyzed in this chapter, as the colour associations made between the thirteen emotional words are outlined in Chapter Two.

In terms of colours associated with institutions, grey is most often associated with government buildings, factories, museums and schools; brown with restaurants; and

green with theatres. The consensus regarding the colour grey may be due to the notion that the institutions named are buildings, most of which are grey concrete; with brown being the colour of the bricks used to build restaurants and green being the colour of copper often seen on theatre rooftops (Jacobs, et al, 1991).

Respondents from Japan and the USA agreed on all associations with the exception of two; indicating that hand soap, laundry detergent and candy wrappers are yellow, soft drinks are red, and vegetable cans are green. Japanese respondents associated cigarettes with the colour grey, whereas Americans associated them with the colour black. Also, Americans associated headache medication with the colour red, most likely because Tylenol, which comes in a red package, is their number one headache remedy. Conversely, the Japanese associated it with grey, the complimentary colour on Japan's number one headache remedy package, Bufferin.

The similarities between the two culture's product specific colour associations indicate that the above mentioned products and accompanying packaging colours exist in both Japan and the USA. Because it is known that the most predominant colours for the agreed upon products are similar throughout the world, it is assumed that these similarities can be attributed to Eiseman's (2000:15) concept of a collective colour consciousness based on global marketing, whether dependant on American colour associations or not.

As with colour preference as an indicator of personality characteristics, product specific colour association is not an ideal premise by which to colour pharmaceuticals. Though it may be safe to assume that a collective colour consciousness (Eiseman, 2000:15) will ensure the success of a product, there are other variables, such as purchase category and pre-existing products in the market that must be taken into consideration.

As such, the following will examine the effect a product's price or purchase category has on colour association.

Purchase Category

A high involvement purchase can be defined as those purchases in which the overall decision is of relative importance; these purchases cost a substantial amount of money and usually reflect the customer's personality, in effect, making the purchase a reflection of himself, his taste, and his worth (Grossman and Wisenblit, 1999:85). Examples of high involvement purchases include cars, clothes, jewellery, and so on. Low involvement purchases, that is, frequently branded products, are of relatively little importance in the over all grand scheme of things and include things such as cleaning products, toiletries, beverages, and food (Grossman and Wisenblit, 1999:85). Branded products, that is, those products in which marketing gimmicks are employed and geared to one specific theme, are recognizable and consist of very little emotional involvement at the time of purchase; examples of such products include Sunlight, Tylenol, Dove, etcetera. For this reason it has been suggested that low involvement purchases are more influenced by product colour association via commercialization and advertisement (Grossman and Wisenblit, 1999:85). When it comes to high involvement purchases, Lee and Barnes (1990), and Grossman and Wisenblit (1999:85-86) believe,

> "...the individual may develop a contingency set of color preferences that are more representative of the appropriateness of difference objects... color preference may be less important than conforming to learned standards... for high involvement purchases."

Since most purchases fall into the low or high involvement category, it is imperative that marketers are aware of the rules governing price category so that they may market their products accordingly. As was previously stated, low involvement purchases, based on

learned standards, are more likely to be branded than high involvement purchases which are often reflective of personal preference.

Product Branding

Product branding, specifically colour branding, relies on associative learning. [7] Consumers who have been exposed to product colour associations may, for their entire lives, not realize how their purchases are effected (Grossman and Wisenbilt, 1999:86). This indicates that consumer colour associations may be a result of commercialized cultural conditioning. Grossman and Wisenbilt (1999) use Pavlov (1903) to suggest that successful colour branding is a result of associative learning which can cross cultural and geographic boundaries. An example of this is seen in Jacobs, et al, (1991:28), where more than 50 percent of American and Japanese respondents asked, associated soda with the colour red; the indirect evidence which supports colour associative learning since Coca Cola brand colour is not only red, but is also the number one selling domestic cola in the States and the number one foreign cola in Japan.

In order for colour branding to be effective, a combination of colour relevance and repetition must be employed by using a specific colour and including it in all ad campaigns for a specific product. This can be expected to result in an association between that product and that colour, that is, product recognition through branding. For example, Sunlight dish soap is yellow and also comes in a yellow bottle, which is associated with the sun. In its advertisements, Sunlight emphasizes the use of the sun and of the colour yellow; this suggests consumers who purchase this product do so because the dish soap

[7] "A learning process in which discrete ideas and precepts become linked to one another." Webster's English Dictionary (1997:21).

has been associated with the colour yellow, which signifies sunshine and as such, is recognizable (Grossman, and Wisenbilt, 1999:79).

Marketing companies are beginning to rely heavily on colour researchers in order to conduct their product branding in other countries. Historical marketing blunders related to colour have collapsed entire companies, Ricks (1983:32-33) states that,

> "The choice of package and product coloring is very tricky. Sometimes companies have failed to sell their products overseas and have never known why. Often the reason was a simple one, the product or its container was merely an inappropriate color."

For this reason modern day marketers turn to independent contractors within the country of interest. If a Canadian company wanted to sell a product in Latin America, they would most likely hire a Latin American marketing company. Instead of conducting independent research, companies often rely on the cultural similarities between the hired marketer and the target population.[8]

When branding a product for specific cultural demographic, companies take two things into consideration: the existence of similar products in the given culture's market and pre-existing colour of these products. According to Grossman and Wisenblit (1999:83), it is easier to market a product in a foreign country when similar products of like standards and quality are not in existence. As well, if a product is not doing well in a foreign country, it is more effective to create a seemingly new product than it is to change the colour associations for the pre-existing product ((Judd and Wyszecki, 1975:126). For example, if Tide were not doing well in China, and cultural colour association is consid-

[8] This has lead to the creation of companies that deal strictly with product branding. As a result of living in such a diverse society, many of these companies specialize in cultural consumer colour association, allowing them to be used in overseas marketing projects. Such companies include ColorCom, Color Matters and Color Genius.

ered to be the cause, it would be more effective to reinvent the entire product line, with a new name, packaging, slogan and colour , than it would to change the colours on the box.

Also, companies could do well by associating a product's name with its associative colour (Wen, 2001:3), such as with Sunlight, which comes in a yellow bottle. Product colour associations are ever present among merchandised products and can be seen in everything from cola, (Coke's color is red, whereas Pepsi's is blue) to soap, (Dove's colour is white, whereas, Irish Spring's is green). This shows that to understand cultural colour branding, the colours used by similar products and their colour associations must be understood, anticipating that culturally specific associations have less influence on branding.

As was demonstrated in the preceding chapter, consumer colour association is a multi-faceted concept in which personal colour preference, product specific colour associations, purchase category and colour branding all play a role. Though each idea on its own may not sufficiently form a basis for a marketing strategy, when combined, they may be enough to ensure a product's success.

The cross-cultural versus culturally specific aspects of consumer colour association are varied in that, colour preference as an indicator of personality are based on cross-cultural colour associations stemming from colour temperature and activity level. Product specific colour associations seem to arise from a collective colour consciousness (Eiseman, 2000:15), possibly based on American products, though there are market based exceptions. Purchase price category suggests a global understanding of what something should cost, indicating cross-cultural viability, and colour branding, though enhanced by

the use of known colour associations, is culturally specific in that it is dependant on the existence of similar products with similar colour association in a given cultural market.

Though it is unlikely that pharmaceutical companies use consumer colour association as the sole premise on which to base their product's colours, it is quite possible that they employ similar techniques when engaging in international product development. Take the following case of Tylenol for example.

Tylenol

According to Kate Foder (2003), Johnson and Johnson, and its new Japanese partner, Takeda Chemical Industries, introduced North America's number one selling headache remedy, Tylenol, to the Japanese market. Johnson and Johnson were concerned with the potential success or failure of Tylenol in Japan because other popular American pain remedies such as Advil and Ibuprofen had performed poorly compared with Bufferin, the first non-Japanese pain reliever sold in Japan. It was thought that Bufferin customer loyalty was strong because it was among the only foreign pain relievers sold in Japan shown to be safer and less irritating to the stomach than domestic products. Tylenol's solution for this concern was to introduce a culturally specific pill that would be gentle on the stomach.

The Johnson and Johnson consumer product division, along with Takeda Chemical Industries conducted market research involving 3,500 Japanese respondents in order to determine what characteristics the product and its packaging should or should not have. With 3500 respondent results, Johnson and Johnson decided on two things. The first was that the pills be from made 100% acetaminophen, eliminating stomach upset;

second was the on the colour of packaging. In regards to the package colour, Foder (2003:1) states,

> "Japanese consumers indicated that the American packaging for the product was confusing, Bell noted. In Japan, red packaging generally signals an upper respiratory product; as a result, adult Tylenol products will get new blue bottles and cartons for the Japanese market, while the children's packaging will be pink."

Johnson and Johnson benefited greatly from their research and are perhaps the only company that has culturally specific colour association information within the context of over the counter pharmaceuticals. An attempt to acquire the actual market research data from Johnson and Johnson was made, with the Tylenol representative indicating that, sensitive information relating to product development and marketing strategy were unavailable for review and that everything customers needed to know could be found on their website, www.tylenol.com. It wasn't even possible to acquire the reasoning behind the change of the packaging colour, except for the fact that red pill bottles are often associated with upper respiratory pharmaceuticals and blue ones are not. This information must have been solely a result of the independent market research because there is no secondary evidence to support this claim.

In the USA, red is considered a stimulating colour not only because of its physiological effect, but also because it stands in opposition to blue, which instills feelings of calmness and in its extreme form can be associated with depression. Tylenol's packaging has always been red in the USA; though they recently changed the colour of their American pills to red as well, indicating its increased effectiveness as a rapid release and rapid relief medication.

In Japan however, red is the predominant packaging colour for respiratory medications, as respondents indicated that the red packaging used by Tylenol in the USA reminded them of respiratory medications sold in Japan. There were no pre-existing association with a specific medical condition and blue packaging, as this is the colour Tylenol decided on. This indicates that Japanese consumers already have pre-existing notions of an over-the-counter medication's perceived therapeutic effect based on package colour. For this reason, it is not surprising that Tylenol chose to package their Japanese children's medication using pink, as pink is associated with femininity, and in turn gentleness.

Tylenol provides a prime example of the inner workings of consumer colour association for a variety of reasons. First, Tylenol, whose packaging has always been red in the USA, changed the colour of the product itself to red, in turn further reinforcing the cross-cultural association of red as stimulating as well as adding to the pre-existing colour association of red with headache medication in the USA (Jacobs, et al, 1991:28). By conducting culturally specific market research in Japan, they realized that, though the Japanese associate red with stimulation, this association is overshadowed by consumer colour associations in Japan, where the product specific colour association of headache medication is grey (Jacobs, et al, 1991:28). Tylenol identifies the price category of its product as having a low level of involvement upon purchase. As such, its product will be more effectively selected over other products by applying colour branding techniques which, as was mentioned, are based on the existence of similar products, with similar colour association in a given cultural market. In order to ensure the success of their product in Japan, Tylenol identified pre-existing competing products, such as Bufferin,

and chose not to use similar colours for their products. They also identified the pre-existing product colour association of red and upper respiratory medication in Japan and as such packaged their product in blue, in turn establishing an exclusive colour association for their product in a foreign market.

Tylenol's use of consumer colour associations allowed them to develop a brand identity in a foreign market. Though they did not consider colour preference a necessary variable, they did rely on the other aspects of consumer colour association to aid in their effort. Such an example demonstrates how a pharmaceutical company could provide an exclusive brand identity for their product, that is, if it was being openly advertised.

As has been illustrated, the most effective way to colour brand a product is to use pre-established colour associations: use colours that have representative characteristics of the product. Tylenol, choosing the most stimulating of all colours (red) instills feelings of energy and eminence. Cross-cultural colour associations are the most known and in turn, the most used colours to develop a product's brand identity, with advertisers often using the temperature and activity level of a colour to signify the characteristics of their product.

Since the physical symptoms of ailments appear to reflect temperatures and activity levels that can be described with colours, and these colours have cross-cultural associations that evoke physiologically represented perceptual experiences that reflect the physical symptoms exhibited by people with medical conditions, then using colour to convey meaning can improve a user's interaction with pharmaceuticals. If the product is to be marketed, it would be in the best interest of pharmaceutical manufacturers to combine the cross-culturally associated pharmaceutical colour with techniques used to estab-

lish consumer colour association, in turn creating a brand identity that can be altered to succeed anywhere in the world.

As has been demonstrated in the preceding chapter, product branding, specifically, colour branding, greatly affects the frequency of product use. The more recognized a product is in the market place, the greater likely-hood that it will be purchased. This is also the case with prescription pharmaceuticals, which, until recently, were not advertised at all.

In 2003, global pharmaceutical expenditure reached an all time high of more than $400 billion. Among the top profit makers in the world, the pharmaceutical industry relies heavily on advertising to promote their products. Like most other companies, pharmaceuticals corporations attempt to promote brand identity though advertising mediums such as print, television and the Internet. In 2003, the American pharmaceutical industry spent 2.38 billion dollars marketing just over one hundred pharmaceutical products (IMS Health, 2003:4).

Though it may seem unusual for pharmaceutical companies to advertise prescription products directly to consumers, recent reports have shown that brand conscious patients now ask for prescriptions by name; regardless if it is the cheapest or even most effective medication for them (Wen, 2001:1). William Holgeson, a physician at Newton-Wesley Hospital, opposes extensive advertising to patients and suggests that it makes patient-physician interactions difficult and wastes time. Explaining why a given advertised medication is not the ideal medication for the patient is complicated. Other times the cost of the pharmaceutical is outside of the user's price range, a cost driven in part by advertisements (Wen, 2001:1).

Knowing that colour can ensure the success or failure of a product, it becomes important to examine the relationship between pharmaceuticals and colour as understood from the perspective of the industry itself. The following chapter provides an insider's view of pharmaceutical colouring techniques and purpose. Furthermore, sections of the chapter will look at the effect of colour on perceived purpose and efficacy of a pharmaceutical, as well as the benefits of pharmaceutical colouring, and the purpose of pharmaceutical trade marking.

Chapter Five: The Pharmaceutical Colour Connection

With the purpose of Chapters Two through Four being to establish the possible premises upon which pharmaceutical companies may colour their products, this chapter serves to provide an explanation as to the function and importance of pharmaceutical colouring from both an industry and patient point of view. The first section, Pharmaceutical Colour Purpose, will explain the rationale and method of pharmaceutical colouring and the effect these have on pharmaceutical colour choice. The second section, Perceived Therapeutic Effect and Colour, examines the connection between the perceived therapeutic effect of a pharmaceutical based on colour and the possible premises on which pharmaceutical companies may base product colour choice; it also serves as an indication of how pharmaceuticals should be coloured based on perceived therapeutic effect. The two final sections, Colour Coding and Trade Marking will establish the importance and usefulness of systematic pharmaceutical colouring. To begin with, we will look at the purpose of pharmaceutical colouring.

Pharmaceutical Colour Purpose

Until the 1940s, the majority of pharmaceuticals were white tablets. Epstein (2004) says that the only reason medicinal tablets became coloured was to distinguish them from illegal drugs, which, up until that time, were white as well. It wasn't until the introduction of soft-gel capsules in 1975 that pharmaceutical companies were able to colour the plastic coating to any colour they desired. Today, there are over 80,000 colour combinations to choose from (Wen, 2001:1), making product colour choice vast and complex.

Many studies suggest that pharmaceutical colour affects preference perception of patients, physicians and pharmacists alike, influencing brand preference, which, in turn, influences prescribing and usage (Morton, 2005:1). According to Morton (1998), pharmaceutical colour is critical in product design. Colouring pharmaceuticals can serve many purposes, and though it is used to distinguish between dosages of the same prescriptions, it is also used as a recognition tool, mostly for those who administer medication such as nurses, and patients who take multiple medications.

It has been shown that those who take multiple medications on a daily basis prefer coloured pharmaceuticals to the generic white tablet; and with the typical Medicare patient taking 18-24 prescriptions each year, the ability to distinguish among them becomes even more important (Morton, 2005:1). By ensuring profitability by way of necessity, pharmaceutical companies began marketing their products directly to consumers, even though the medications themselves require prescriptions.

Morton (2005:1) explains that pharmaceutical companies should concern themselves with product colour long before it requires marketing because many prescriptions turn into over-the-counter medication, especially after patents run out. This leaves the way open for many companies to sell a similar product, except, with the added benefit of packaging.[9] According to research conducted by the Henley Centre, 73% of all sales decisions are made in store, and because prescriptions often become over-the-counter, brand loyalty, via product recognition, that is branding, is important right from the beginning, while it is still a prescription (Morton, 2005:1).

[9] Many companies use package colour as a marketing tool for over-the-counter medications, though because prescription pharmaceuticals are not sold directly to consumers, marketers of products such as Viagra and Levitra use the colour of the pill itself as a central theme throughout their marketing campaigns.

Competing brands of the similar prescription pharmaceuticals provide great insight into the various contextual colour associations used by pharmaceutical companies; take Viagra and Levitra for example.

Viagra, a prescription for erectile dysfunction, is blue, historically a masculine colour in the Western world (Eiseman, 2000:47). Pfizer choose the colour blue to represent strength and virility. It goes by the nickname, "the little blue pill", a term coined by its most famous endorser, Bob Dole. Its catch phrase is, "keep the spark alive", and its web site oozes masculinity; made up entirely of blues and greys with happy men and women adorning the pages. Pfizer thought that the colour was representative of what it means to be masculine, though Levitra, by way of their market trials, discovered that their assertions were incorrect.

When Viagra competitor, Levitra, came to market it was bright orange, which, due its warm temperature and high activity level, represents vibrancy and energy. During marketing trials, GlaxoSmithKline discovered that the light blue colour of Viagra was cold and reminded subjects of a medication used to treat illness, not to enhance sexual function (Wen, 2001:1). As a result, GlaxoSmithKline chose orange for their pill, orange and purple (high contrast colours), for their logo and web-site, and the catch phrase, 'strong and lasting' as their slogan. Interestingly enough, respondents of Levitra's market trials associated the colour blue with its linguistic connotation, that is, lacking emotion; hence its perceived divergence from the intimate act of sexual intercourse. When asked about the choice of colour Levitra's makers described it as "attractive, yet dignified".

By way of these two examples, one can see that the way in which patients contextualize colour in reference to a pharmaceutical's purpose can change the outcome of the product's intended meaning. Pfizer, the maker of Viagra, states that it has relied on research conducted in Switzerland in 1997 by the Basel Institute of Physiology for some of the colours used for their medications. This research found that pink slowed the heart rate, green was preferred all around and red had a stimulating effect on the body (Wen, 2001:1).

In the USA, colour variety is a hallmark of pharmaceuticals. Xanex, a mood stabilizer, is pink: a colour research report indicates a short term calming effect on hyper-anxious respondents in clinical trials (Morton, 2005:1). Pink was the original colour of Vallium, a tranquilizer initially used by cabin-fevered housewives in the 1950s and '60s to calm their restless spirits; pink, being the symbolic colour of femininity, came to signify qualities that are stereotypically feminine, such as passivity and calmness. Science has considered pink a calming colour since the 1970s, when a shade of pale pink, called "baker miller pink", was used to paint jail cells in the USA, inadvertently causing prisoners to be calm and subdued (Walker, 1991:51).

The use of green as the most generally preferred colour for pharmaceuticals, specifically in Switzerland, may stem from the notion that green is considered a safe colour. It is the most predominant colour in nature and the colour most used to signify safe situations. Within a medicinal context green, representing safety would imply that, regardless of what the pharmaceutical was meant to treat, the product itself is safe.

The concept of the colour red having a stimulating effect on the body relates directly back to the notion that it is categorized as a warm or active colour, and as such

physiologically causes one to become stimulated. Associations with the colour red causes responses that, regardless of the context, will always have a stimulating effect on the body.

These colour associations would seem to have implications for pharmaceutical companies. Red is perhaps the best colour for any pharmaceutical intended to cure ailments related to depression, pink for disorders related to anxiety and green for any pharmaceutical intending to convey safety. The fact that Pfizer made this information public is interesting in that, most pharmaceutical companies, such as Tylenol, refuse to divulge information related to product colour choice. To this effect Wen (2001:2) states that,

> "Drug makers are generally loath to say exactly why they chose the colors for specific brand-name products, citing trade secrets and hating to appear manipulative concerning their health products. They acknowledge however, that certain color schemes tend to go with certain ailments. Bold colors, such as red, suggest power and quick action, and tend to go with headache medicine and pain drugs. Antidepressants, for another example, tend to come in soothing pastels."

The information contained in the above quote, as well as the above section, is explicitly relevant to the purpose of this paper in that, it demonstrates that the pharmaceutical industry not only acknowledges that certain colours are representative of certain ailments, but also that patient perception of pharmaceutical purpose based on colour is a governing factor in the colouring of pharmaceutical products.

It seems that the possible premises upon which pharmaceutical companies may colour their products is a direct reflection of what premises patients use when determining the purpose of a pharmaceutical based on colour, whether it be cross-cultural colour associations, culturally relative colour association, or consumer based colour associations. Because it has been determined that pharmaceutical companies do employ some

form of systematic colouring, the final possible premise proposed, that is, non-systematized colouring can be discounted.

In order to establish the decision making strategies used by patients when determining the therapeutic effect of a pharmaceutical and whether or not these premises correspond to those established in Chapters Two through Four, the following will look at a variety of case studies in which patients were asked determine the purpose and efficacy pharmaceuticals based on colour.

Perceived Therapeutic Effect and Colour

Patient ailments seem to decrease when the colour of the pharmaceuticals they are taking corresponds with projected results (Sallis and Buckalew, 1984). For example, red indicating rapid relief or a calming turquoise to promote sleep. One can see the effect of this if we look at it from the opposite angle as well, a black pharmaceutical, representing death, for a bacterial infection or a red pharmaceutical, representing stimulation, as a sedative; neither of which seem logical within the proposed system of colour and ailment classification (see Appendix One).

Along with colour indicating projected results is the notion that if a pharmaceutical is perceived as being more effective, compliance goes up (Epstein, 2004). The effect of colour on perceived pharmaceutical strength and efficacy has been confirmed to be true in a variety of studies, with Buckalew and Coffield (1982), indicating not only that warm or active colours stimulate and cool or passive colours calm, but also that, when colours correspond to desired result, perceived potency and in turn, efficacy, increases.

The results of another study conducted by Sallis and Buckalew (1984) showed that capsules were identified as being more potent than pills, and that red was considered

more effective than white; with respondents indicating they would be more inclined to continually take a red capsules than the white. This provides reasoning for Tylenol recently changed their pill colour from red to white in the USA. Based on cross-cultural colour associations this reasoning makes sense, since the colour temperature and activity of red is indicative of increased energy and quick recovery.

Further connecting perceived therapeutic effect of a pharmaceutical and cross-cultural colour association is a study conducted by Buckalew and Ross (1983), whereby 102 respondents placed 29 different coloured capsules into ailment classifications. It was shown that capsules were preferred over pills and that orange and red pharmaceuticals, that is, those in the warm or active family, were classified as stimulants; blue capsules, belonging to the cool or passive family, were considered sedatives; purple ones were seen as being hallucinogenic; turquoise, light green and dark green, that is, safe colours, were considered anti-anxiety related; and white pharmaceuticals, the most common pharmaceutical colour of all, were classified as general.

Advancing this line of thought are the results from a study (Jacobs and Nordan, 1979), by which 100 respondents were asked to place six coloured pharmaceuticals into three therapeutic categories. Results indicated that colours most often associated with stimulants were the warm or active colours, red and yellow; while colours most associated with depressants were those of the cool or passive colour, blue.

Contextualizing colour and perceived efficacy in Japan is a study conducted by Nagao, et at (1968) by which 300 Japanese respondents were asked to rate a pharmaceuticals efficacy based on colour. Respondents indicated that that white was the most effective, red the second most and blue, the least. Adding credibility to this study is that it is

one of the only studies where a placebo was administered and results gathered based on patient response of their level of relief. As will be seen in the following chapter the lack of coloured pharmaceuticals in Japan aids in explaining the perceived heightened efficacy of white.

The main purpose of this section was to establish a connection between the perceived therapeutic affect of a pharmaceutical as indicated by its colour, with the possible premises in which pharmaceutical companies may base product colour choice. Because pharmaceutical companies colour their products in order to increase product recognition, and in turn, usage, than it can be asserted that they are relying on patient response of pharmaceutical colour to purpose when colouring their products. That is, the same premise being used by patients to discern purpose according to colour is manifested in the colouring of pharmaceuticals by their representing companies.

For example, in Holland, many pharmaceuticals are colour coded by application, based on associations made between colour and purpose. De Crean, et al, (1996) tested whether anti-depressant pharmaceuticals sold in Holland, differ in colour from sedative and hypnotic drugs. The stimulant action versus the depressant action of a drug was measured according to the colour of the pharmaceuticals and it was determined that warm or active colours, such as red and yellow are often used for stimulants whereas cool or passive colours, such as blue and green are most often used for sedatives.

Coding pharmaceuticals according to ailment and colour would serve to simplify and ensure the proper administration and usage of pharmaceuticals on many levels. If a pharmaceutical's colour provided indications as to its purpose, there would be no confusion as to which medication treated each ailment for which pharmaceuticals are available.

As well, if a pharmaceutical colour corresponded to perceived effectiveness, than patients would continue to take their medication. Epstein (2004) has emphasised that failure to complete a full cycle of prescriptions is as wide spread as illicit drug usage.

Colour Coding

In terms of pharmaceuticals, colour is often used to distinguish between dosages of the same medication. The *American Psychological Association Statement on the Use of Color Coding* (2005) indicated that though colour coding of pharmaceuticals is beneficial, and may be possible in the future, its usefulness would have to be confirmed prior to its implementation.

With a growing need for research on the effectiveness of colour coding; the American Psychological Association (APA), has suggested several directions of inquiry that might assess the consequences of implementing a standardized system. Such things included studies related to colour and user knowledge, the possible number of errors this system would correct as well as extensive controlled studies that establish its effectiveness (American Psychological Association, 2005).

Colour coding practices are already in place in the field of ophthalmology, where the American Academy of Ophthalmology (AAO) promotes the colour coding for the caps and labels of topical medication. This initiative has been mounted in response to serious health concerns that have occurred in the past, where patients used the wrong medication, failing to distinguish between products. The American Academy of Ophthalmology stated that these concerns were well received by the Federal Drug Administration (FDA) and the pharmaceutical industry, and that the pharmaceutical industry has since been given the responsibility of selecting colours and assigning them to ailments. Re-

sponsible colour selection necessitates an understanding of a colour's ability to signify ailments to the user.

The American Dental Association is also using colour coding for injectable local anaesthetics which are colour coded according to their dose level and their place in the epinephrine and non-epinephrine family. This initiative was formed for the same reasons as the American Academy of Ophthalmology's project, intending to limit the number of errors made due to the aesthetic similarity of anaesthetics; in turn, increasing patient safety (Berthold, 2003). Since it is pharmacists, drug administers such as nurses and patients who are packaging, distributing or injecting these pharmaceuticals, color coding labels, bottles or caps would not be as effective as colour coding the pharmaceutical itself.

Pharmaceutical Trade Marking

In recent years many companies have attempted to trademark colours and colour combinations that represent their product. With the Federal Drug Administration approving almost 1000 prescription drugs a year, it is understandable that companies are trying to distinguish their products from others. The trade marking of a solid coloured pharmaceutical was struck down by the courts, which cited 'colour depletion' as the primary reason. It was said that, though colours play an integral role in distinguishing and promoting products, colour itself cannot be trademarked, as there would eventually be no colours left to choose from. This ruling was challenged up to the Supreme Court which in 1995 indicated that though a solid colour, on its own, cannot be trademarked as representing a specific product, a solid colour that has secondary meaning directly relating to that prod-

uct can be. Take the three red bands on the handles of certain tennis and squash racquets, for example (Ladas and Perry, 1996)

In Canada, in 2001, Astrazeneca attempted to trademark Plendil, a circular yellow tablet used to treat hypertension. A competing pharmaceutical company, Novopharm, opposed this on the grounds that the colour of the pharmaceutical was not enough to distinguish it from similar pharmaceuticals. The judge presiding over the case said the following, "...the colour, shape and size of a product may together be capable in law of constituting a trade-mark, the resulting mark is, as a general rule, likely to be inherently weak." This does not exclude pharmaceutical companies from trying this again in the future, when the distinguishing characteristics of the product are stronger, though up until now, this has not been accomplished (Steele, 2002).

The desire to trademark a pharmaceutical provides insight into importance of the aesthetics of the product, not just for companies, but also for patients. Trade marking is the ultimate branding, as it excludes others from creating products of similar look, in turn raising the awareness, and ultimately the loyalty, to their product. In this respect there is a great benefit to both the consumer and the manufacturer. If the product's appearance indicates its application, the user is more inclined to take the full cycle of medicine, in turn, treating the affliction. By remedying the illness the medication becomes associated with good health, creating life-long customers and word-of-mouth advertisement.

As has been seen, pharmaceutical appearance, specifically colour, has a huge effect on the perceived strength of a medication, its intended application, and its overall effectiveness. Because eighty percent of visual stimuli come from colour, it is no wonder colour has such an effect on health related perceptions. To elaborate further, the follow-

ing chapter will summarize this papers finding up to this point, establish the proposition derived from the information presented in the preceding chapters as well as test this proposition against data acquired by way of a pharmaceutical comparison.

Chapter Six: Summation

The purpose of this chapter is to summarize the research and subsequent findings of issues addressed up to this point. The aforementioned findings serve as the basis for the creation of a testable proposition and its details, outlined in the second section of this chapter. A comparison of pharmaceutical availability and appearance in Japan and the USA is undertaken in Section Three, with retrieved data being presented in the final section of this chapter. This data is used as a basis for testing the above noted proposition, with findings being relayed in Chapter Seven: conclusions and discussion.

Chapter Two: *The Anthropology of Colour* sets out to define the scientific and social aspects of colour construction within a cross-cultural versus culturally specific context. These topics are addressed in ways that aim to determine which aspects of colour construction cross cultural boundaries and which do not, as these are two of the four possible premises upon which pharmaceutical companies may colour their products.

The scientific understanding of colour construction relates to the sensation and perceptual organization of colour, the way in which perception translates into a physiological reaction, and the manner in which this physiological reaction is reflective of the exposed colour's temperature and activity level. Findings about the biological process of colour construction indicate that most humans, with the exceptions of those with colour deficits, similarly respond to light energy to establish visualized primary colours which consist of blue, green, yellow and red, Cromie (1998); Keiji, et, al (2004); and Williams (in Sherwood, 2005).

Along with sensation, perception of these primaries is also said to be similar among humans, as most humans are believed to have undergone similar evolutionary

pressures (Jameson 2001:2), which has lead to physiological reactions to specific colours originally found in nature. These reaction evoking colours were divided by Cheskin (1947:35) according to temperature and activity level, with the warm or active family consisting of reds, oranges and yellows, and the cool or passive family consisting of blues, greens and violets.

Physiological reactions to these colour categories, also called primal colour reactions, are reflective of the representative characteristics of the colours themselves, with warm or active colours illiciting stimulating responses and with cool or passive colour illicing calming responses, Birren (1984); Akashi in Sasaki (1991); Ammer (1993); English and Stone (1998); Kipperman and McKinstry (1998); Lipscher (2001); Pahmer (2003); and Blumenthal (2005).

These reactions to colour have stayed with humans throughout the development of society and have manifested themselves in the social construction of message conveyance. That is, society uses colours that evoke physiological response in order to indicate the severity or importance of a situation, such as the use of green, yellow and red in traffic lights.

According to the reviewed research, the basics of colour theory, colour sensation, colour perception and the societal manifestation of this perception cross cultural boundaries. That is, the colours that make up visual primaries evoke the same physiological reaction in most humans based on colour temperature and activity level.

The cultural aspects of colour construction, that is, those related to linguistic categorization, are divided among two schools of thought, the cross-cultural and the culturally relative positions. Both concepts acknowledge focal colours and colour categories,

but do not agree on the identification and classification of the boundaries that distinguish these categories from one another.

The cross-cultural position asserts that colour boundaries are a result of a naturally, predefined colour system by which all colours are comprised and categorized, Berlin and Kay (1969); Kay and MacDaniel (1978); Boynton and Olson, (1990); Sturges and Whitfield (1995); Guest and Van Laar (2000); and Moore, et al, (2000).

The culturally relative position asserts that such a system cannot possibly exist because colour categories and their representative boundaries are a result of linguistic interpretation, which does not adhere to prescribed colour categories outlined by cross-cultural position, Sapir-Whorf Hypothesis, in Kay, et al (1984) and Ratner, (1989:361).

In order to reconcile this debate between the above noted positions a third idea, which combines both the cross-cultural and the culturally specific aspects of colour categorization is employed. This idea states that cross-cultural cognitive similarities, which develop out of similar environmental evolutionary pressures, explain the presence of basic visual colour categories, but that it is linguistic evolution that determines the boundaries within which colours fall, Buckalew and Coffield, (1982); Ratner (1989); and Jameson (2001). This combination position seems to be the most sound of the three in that, it covers all aspects of colour construction, and leaves few unanswered questions. As indicated, cultural colour construction comprises cross-cultural as well as culturally specific aspects.

Chapter Two set out to define the scientific and social aspect of colour construction within a cross-cultural versus cultural dependant framework. Determining which aspects of each concept are cross-cultural and which ones are culturally specific aids in

establishing two of the four possible premises upon which pharmaceutical companies may colour their products. Contributing to the establishment of these premises are the creation and use of colour associations seen in Japan and the USA, which again, are addressed in reference to their cross-cultural or culturally specific

Chapter Three examines statements made by the pioneer of cultural colour symbolism, Dreyfuss (1972). He states that Americans attached little emotional meaning to colour, adding that, the Japanese assign emotionally representative words to most colours (1972:231). By way of semiotic theory, both cultures dictionaries, a contemporary colour association manual, and a cross-cultural marketing research study, the above scholars statements are addressed by examining the colour associations of blue, red and yellow in both cultures. Also examined in this chapter is the cross-cultural versus culturally relative application of colour idioms as indicators of health.

Findings from the cultural colour comparison reveal that, though Dreyfuss (1972) is correct in his assertions, it is the iconic versus symbolical linguistic representation of colours that differentiates the majority of associations used in each culture. That is, though Americans use the process of iconic signage to associate the colour red with blood, red's symbolic association with love, as the Japanese identify it, is a matter of symbolic creation by way of linguistic evolution. Both associations originate from the temperature and activity level of the colour red, with the American association being one of similarity and the Japanese association being one of symbolism.

It should be noted as well that many of the symbolic associations held by the Japanese are also held by the Americans, and though they are not present in many scholarly resources, they are seen in social use, such as red being representative of love with

respect to flowers, Valentine's Day, the colour of hearts, etcetera. The lack of documented evidence regarding this notion does not negate its existence, as there are countless empirical examples in which the Japanese and Americans associate colours in the same manner, using the same context. There are exceptions.

Differences in colour associations appear when the meanings attached to colours are based solely on cultural experience, such as blue representing a Union Soldier based on American history and the Japanese associating it with villains from Japanese theatre. Other than such specific incidences, colour associations in both cultures stem, in one way or another, from colour associations based on similar evolutionary pressures.

An area of colour association in which both cultures have the exact same responses was a study based on marketing research. In this study it was determined that the colour associations held by both cultures were a result of both colour associations and global marketing that cross cultural boundaries.

The purpose of Chapter Three was to identify the cross-cultural versus culturally specific aspects of colour associations. From the information presented in the chapter it can be asserted that the majority of colour associations, whether iconic or symbolic, held for blue, red and yellow, are based on cross-cultural colour associations as represented by temperature and activity level. Other similar colour associations based on colour temperature and activity level, between Japan and the USA, are idioms related to colour and health, such as skin pigment being representative of physical and emotional well-being.

Chapters Two and Three served to identify colour science, sensation, perception, societal use, much of linguistic colour representation and symbolism as cross-cultural entities. With two of the four possible premises of pharmaceutical colouring established,

Chapter Four: *Culture, Colour and Marketing* aids in establishing the third, that is, consumer colour association. Though the cross-cultural versus culturally specific aspects of consumer colour associations are distinguishable, this chapter's main purpose is to identify variables that may play a role in the colouring of pharmaceuticals.

Consumer colour association is comprised of personal colour preference, product specific colour associations, purchase category, and product branding. Personal colour preference as an indication of personality was first proposed by Luscher who indicated that the choice of one colour over another provided indications of a person's personality. The assessment determining what colours represent specific emotions is based on cross-cultural colour associations resulting from colour temperature and activity level, that is, those who choose red as their favorite colour are seeking stimulation.

Product specific associations were shown to be similar in both the USA and Japan, with these findings being attributed to a collective colour consciousness (Eiseman, 2000:15). That is, associations result from marketers using similar associations for similar products around the world, that is, the colour green as being representative of a vegetable can. Collective colour consciousness (Eiseman, 2000:15) also finds its origins in cross-cultural colour association in that; cross-cultural colour associations are the most widely known and widely used associations when marketing products. It is much easier, and in turn, more prevalent, to use pre-established colour association when introducing a product than it is to create a new colour association. When product specific colour associations differ, it is due to the existence of a pre-established association between a certain colour and a specific product; because this is market dependant, this too may vary by culture.

The purchase category of a product (high or low involvement purchases) is also cross-cultural in that, consumers around the world are aware of what a product should cost. Though it has been shown that consumers are not influenced by colour when purchasing expensive goods, they do rely on product recognition when buying low involvement items. This results in the use of colour branding to ensure customer familiarity with low involvement purchases.

The final aspect of consumer colour association is that of colour branding, that is, making a product recognizable through the use of colours whose characteristic most often represent the product being sold. Though colour branding often involves the use of cross-cultural colour association based by way of temperature and activity level, it is culturally specific in that the use of such associations are dependant on the existence of similar products with similar association in a given cultural market.

Though consumer colour associations are based primarily on cross-cultural factors, other variables, such as pre-existing product colour associations, the presence of competing products in the market and pre-established colour associations with these products, are specific to the culture in which the product is being marketed and in this sense, is culturally specific.

Though Chapter Four served to establish consumer colour association as a possible premise in which pharmaceutical companies may colour their products, its main goal was to identify variables that may affect the colouring of pharmaceuticals. Findings from this chapter demonstrated that, though the use of cross-cultural colour associations may work for branding the identity of a product, cultural market variables must be taken into consideration before proceeding with such a decision.

The final chapter of this research to be summarized is Chapter Five: *The Pharmaceutical Colour Connection.* The objective of this chapter is to provide the reader with an insider's view of the purpose and necessity of pharmaceutical colouring, both from a patient's perspective and that of the industry. In extension it is important to determine if user based pharmaceutical identification by colour corresponds to any of the premises established in Chapter Two through Four.

A pharmaceutical's colour serves to indicate an observer about its purpose, dose, effectiveness, and also whether or not it is illicit. In this way colour has an effect on the prescription and application of a product due to influence on preference perception (Morton, 2005:1). As well, how patients contextualize colour in reference to health indicates which colours will be representative of the ailments or treatments they are assigned to, as we have observed with Viagra and Levitra. Many companies conduct product trials to ensure that a pharmaceutical's colour is representative of its intended usage and in this respect, the pharmaceutical companies are aware of the effect colour has on a pharmaceutical's perceived strength, purpose and overall efficacy.

This acknowledgement not only negates the fourth possible premise of pharmaceutical colouring, that is, randomized colouring, but also indicates that patient perception of purpose is a governing factor in a product's colour choice. As such, the possible premises upon which pharmaceutical companies may colour their products are a direct reflection of the premises patients use when determining the purpose of a pharmaceutical.

According to the research examined in the second section of this chapter, *Perceived Therapeutic Effect and Colour*, patients identify the intended purpose of a pharmaceutical based on its identifiable characteristics, that is, its colour as governed by its

temperature and activity level. These representative characteristics are regarded as standing in opposition to the patient's ailments, that is, the stimulating action of a red pharmaceutical eliminates ailments of depression and lethargy, representing characteristics of the colour blue. The recognition of this concept by the medical industry has lead to the colour coding of certain pharmaceuticals in countries such as Holland, where medications are coloured according to their intended purpose. This process of colour coding is also witnessed in the dental and ophthalmology fields, whereby coloured packaging is used to identify the medical function of the product. Though the colour coding of pharmaceuticals would have many practical applications, notions relating to ownership have greatly hindered this process, and issues related to trade marking have overshadowed the importance of such a system.

Establishing whether such a system is in place, whether or not these systems differ according to the culture being examined, the nature of their differences and the adherence by all involved is addressed in Appendix One: *Proposition and Pharmaceutical Comparison*, by way of the proposition, the pharmaceutical comparison chart, findings and assertions derived from the chart and its sources, as well as a testing of the proposition against the data presented in the findings and assertions.

Chapter Seven: Conclusion and Discussion

This thesis, *Cultural Colour Construction: A Case of the Pharmaceutical Industry* took a three step approach by which to measure what effect, if any, cultural colour construction has on the colouring of pharmaceuticals in Japan and the USA. The first step in this examination was the establishment of possible premises upon which pharmaceutical companies may colour their products, from which the strongest possible premise was used to derive a testable proposition The second step was to determine if there are variations in the pharmaceuticals sold in the two countries by way of a pharmaceutical comparison, and if there are, why. The third step was to test the proposition against the results from the pharmaceutical comparison in order to determine what role, if any, cultural colour construction plays in the colouring of pharmaceuticals.

Considerations

Considering the proposition (pharmaceutical colour is based on the temperature and activity level of a product's colour as standing in opposition to the representative colour temperature and activity level of an ailment) in terms of the available data, it can be concluded that, though valid, this proposition is too narrow to account for the variations in pharmaceutical colour seen in Japan and the USA.

The proposition, in part, was derived from many case studies requiring patients to determine the purpose, strength and efficacy of pharmaceuticals based on colour or color and shape, depending on the study. Such studies rely on patient association of a given number of colours to a given number of ailments. This raises concerns regarding the reliability and validity of these studies.

By limiting the number of colours and ailments, researchers limit the number of possible responses. Subjects have no way out, no way not to decide about what's offered; they must link each colour to one or another pharmaceutical. To the extent of what was offered to subjects, that is, what colours and what pharmaceuticals, these studies are reliable and valid, but the scope is severely limited.

The proposition established by way of the presented research categorizes both colours and ailments according to their temperature and activity levels. Though pharmaceutical companies are aware of these categorizations, they are not seen as being employed in the data presented in the pharmaceutical comparison. What may account for this is the limited number of pharmaceuticals sold in both the USA and Japan that were available for examination. The proposition may have been validated had there been additional pharmaceuticals in which to test it against, or perhaps if it were tested against pharmaceuticals sold solely in the USA.

The absence of correlation between the proposition and the data retrieved from the pharmaceutical comparison indicates that there are other factors that influence pharmaceutical colouring, or the lack thereof, in both Japan and the USA. These factors may account not only for the differences seen between the pharmaceuticals in the two cultures, but also for the colour choice of pharmaceuticals in general. As such, the following offers suggestions as to what variables may influence pharmaceutical variation as well as pharmaceutical colouring.

The high number of white to coloured pharmaceuticals in Japan as well as the high number of coloured to white pharmaceuticals in the USA indicates differences in the pharmaceutical markets and approaches to health care in both cultures. Market differ-

ences that were addressed in the preceding chapter introduce a culture based variable by which the Japanese are assumed to have a much more basic approach to health care and pharmaceutical usage than Americans. In this sense colour variation may be a matter of colour as a means to convey distinction and meaning in the USA versus the lack of colour as a way to convey function in Japan.

From the data presented in the pharmaceutical comparison, combined with the Japanese view of white pharmaceuticals as being the most effective, it seems as though the customary approach to pill colouring in Japan is no colour at all. The number of American coloured pharmaceuticals in the pill comparison, combined with numerous examples of colour branded pharmaceuticals, indicates that the approach to pharmaceutical aesthetics in the USA is simply the use of colour. Due to the fact that companies are so reluctant to divulge pharmaceutical colouring rational to be public, and interviews were not employed as a method of gathering of data, it is not possible to say why pharmaceuticals are coloured the way they are, though, by way of variables, suggestions are offered.

Possible variables that may influence pharmaceutical colouring that do not ascribe to the classifications of colour and ailments based on temperature and activity level as seen in the proposition are: consumer colour associations examined in Chapter Four, pharmaceutical export, differences in pharmaceutical company rational in product colouring outlined in Chapter Five, ailments with both active and passive characteristics, and colours such as neutrals and pastels that, though employed, seem non-reactionary.

Consumer colour associations, specifically those related to competing products, pre-established colour to product associations and product recognition are all possible variables that may influence pharmaceutical colour choice. The extent to which these

variables affect pharmaceutical colour choice is dependant on the cultural market being examined. These variables may account for why Pasefocin, the 50mg Minocycline and the 100mg Diflucan pills are available in both cultures, but differ in colour.

Also related to market variability is the importation of pharmaceuticals from foreign countries, such as CellCept. The presence of pharmaceuticals that do ascribe to any colour/ailment classification may be due, in part, to the fact that they are internationally distributed with no alteration in colour and that their colour may be based on associations held by patients in their country of origin.

Variations in the research used by different pharmaceutical companies to colour their products is another variable that may account for the lack of correlation between the proposition and the pharmaceutical comparison. As was seen with Viagra and Levitra, respondents contextualize colour in reference to health in many different ways. It is this difference in contextualization that determines what results will be obtained by pharmaceutical market research which, in turn, contributes to the colour choice of a given product. If respondents are using contextual associations such as blue representing masculinity, than a company such as Pfizer, has achieved its desired outcome, that is, to make its product recognizable to, and representative of, those who use it. If however respondents are using other types of associations, such as those that are influenced by consumer colour association variables, a company such as Pfizer has not attained its goal; this can be seen in Levitra's market research whereby respondents indicated that the blue used for Viagra reminded them of a pharmaceutical used to treat illness. This consumer based colour associations influenced Levitra's makers to such an extent that they used the cross-

cultural colour association of orange as representing stimulation to colour their product, presumably what a patient with erectile dysfunction would want.

In the aforementioned instance, the contextualization of colour in relation to health was used to determine the therapeutic effect of a pharmaceutical based on colour, but what about mood and anxiety related disorders for which their ailments cannot strictly be represented by activity or passivity? Patients with such conditions can be both depressed and stimulated at the same time, in which case, identifying a colour that would stand in opposition to both ailments would be difficult. To account for this duality pharmaceutical companies may use seemingly unassociated colours such as neutrals and pastels, as seen with Mellaril in the USA.

In the context of the proposition colours such as neutrals and pastels seem to defy classification, though as is demonstrated in the presence of pastel coloured pharmaceuticals such as the yeast treating Diflucan, which is pale pink in the USA and pale yellow in Japan, they may provide indications of soothing. Another possibility to account for this variable relates back to contextual associations, birth control pills are almost always pastel colours, perhaps the softness of pastels are considered feminine, and as such are used for mostly female specific pharmaceuticals such as contraceptives and yeast infections.

The variables that may account for pharmaceuticals that do not appear to ascribe to the presented colour or ailment classification system that are: consumer colour associations, imported products, pharmaceutical market research variation, as well as ailments and colours that lay outside the warm or active, cool or passive categorizations. Though there may be more variables, these are the ones that seem most applicable to the study at hand.

As was stated throughout this paper, the purpose of this research was to determine whether or not cultural variations exist in the use of colour as it applies to health care, specifically, in the colouring of pharmaceuticals. The testing of the proposition against data acquired by way of the pharmaceutical comparison suggests that there are meaningful variations in the colouring of pharmaceuticals in Japan and the USA, and that these variations can be attributed mostly to a difference in each culture's approach pharmaceutical usage as well as market pressures.

Though a case has been made for the establishment of a pharmaceutical colour coding system according to perceived therapeutic effect, such as system may not be necessary in Japan, where the majority of pharmaceuticals are white. Also, employing such as system in the USA would be difficult in that perceived therapeutic effect as determined by colour may be contextualized differently by different individuals when enough variables are considered. Difficulties in implementation aside, the creation of a standardized system by which pharmaceuticals are coloured according to perceived purpose, and strength, would provide a variety of practical benefits for both patients and administers alike. Such benefits are already being realized by the American Ophthalmology Association and the American Dental Association who, since implementing a representative colour coding system for their products, have noticed the decrease in patient and administer error, and as a result, an increase in efficacy.

Now that the findings subsequent assertions resulting from the testing of the proposition have been elaborated and concluded on, the following sections will serve to identify difficulties encountered in the undertaking of this study, areas that warrant further research, as well as the practical and scholarly contributions of this study.

Difficulties Encountered

Though the writing of this thesis was rewarding, there were many challenges that had to be overcome in order to produce a clear, comprehensive document.

The first issue was the language barrier faced by the author, which in turn lead to difficulty in locating comparable Japanese data. When preparations for the thesis first began, material from both countries seemed readily available in English, though as research commenced, this proved not to be the case. The information that was available took a very long time to reach Canada from Japan and once it arrived, was difficult to have translated.

Another issue regarding language was the difficulty in searching the Internet for information. As the Internet is one of the only sources that can be accessed from, and allows access to, information anywhere in the world, it was to be relied on when searching for research material. Since acquiring a Japanese keyboard was not possible, an on-line translation program was used to establish appropriate Japanese search terms. Once seemingly suitable documents were found, they were then translated into English using this same program and printed. Though this technique was helpful, it was very time consuming and did not yield enough results to be deemed successful. The only way conducting Internet searches in another language could be effective would be by either having the aid of a human translator, though this would be quite expensive, or by choosing a culture of study where the language is made up of an alphabet comparable to English, as this would allow for more thorough and accurate search results and would eliminate the reverse translation issues associated with converting symbols to letters.

Information relating to context specific colour associations in Japan was difficult to locate, and though there is a plethora of information related to the everyday use of colour symbolism in the USA, very little of it was recorded in scholarly texts, making many of the assertions related to this topic based on empirical observation.

Also, though there are market research studies that included Japanese respondents, there are few Japanese specific studies. All colour related marketing information was based on Western studies that involved the participation of different cultural groups, leaving open the possibility of cultural bias on behalf of the researchers. There were also only two research studies relating to pharmaceutical colour and perceived therapeutic effect conducted in Japan, and both were very difficult to translate.

Though a Japanese student was employed to aid in the translation of documents, the material itself was too technical for the individual to translate, as it was medically based. Searching for information with the aid of this individual was also difficult in that, there were few English concepts that had direct translatable search terms in Japanese. Examples of this include, perceived therapeutic effect based on colour, context specific colour association, consumer colour associations and colour branding. Needless to say, there was very little help available for translation, and what help was available ended up incurring a lot of time and money, with little result.

The lack of accessible pharmaceutical marketing trials such as those conducted by Tylenol also proved to be a challenge as such information would have provided great insight into the process by which pharmaceutical companies acquire their research data. Results from such trials would have greatly increased the author's breadth of knowledge relating to what context patient use when assessing the therapeutic effect of pharmaceu-

tics based on colour. Gaining access to such information was impossible as pharmaceutical companies were shown to be extremely secretive about any research that grants them an edge over their competition.

Another challenge faced throughout the course of this project was connecting information from such a wide variety of disciplines. In order to establish the case for this study, it was necessary to cover all aspects of colour construction as it applied to both cultures; this required four literature reviews in the areas of colour cognition, colour association, colour based marketing and pharmaceuticals; each of which could have been its own thesis project.

Perhaps the most challenging of all was having to address and reconcile competing concepts, as well as to tease apart overlapping information. Examples of the former include linguistic colour representation, culturally specific colour associations, and context specific colour associations, whereas examples of the latter pertain mostly to the cyclical nature of colour associations that are similar across cultures. The separation, reconciliation and merging of all this information was necessary in order to establish premises that were used in the creation of the proposition; it is for this reason that so much time is spent establishing the premises that presupposed the proposition.

Having addressed all the difficulties encountered during the writing of this thesis, the following section will look at topics in the research that warrant further investigation.

Topics of Further Investigation

This research assignment was successful in that it established a basis for future study in the area of cultural colour construction and the pharmaceutical industry. Though many issues were reconciled in this paper, there are topics that warrant further investigation. The following is an overview of inquiries that arose from the previously presented research and areas of possible future studies.

The first, and most elusive, is the manner in which colour exposure elicits physiological reaction, as it is still not known what brain receptors are engaged and what messages sent as a result of colour exposure. Though it has been shown that exposure to certain colours causes physiological reactions, what occurs between perceiving a colour and the release of emotionally and physically reactive chemicals is a mystery that would perhaps best solved by neuro-psychologists. The major obstacle facing such research is the fact that studies would have to be conducted on live, conscious humans. Though conducting such study on primates would be helpful, this would only provide insight into the physical reactions of colour exposure, as primates are unable to articulate emotional response.

Another area of future research that arose from this project would be to explain why the Japanese have more connotative meanings attached to colour than Americans, treat colours so informally. Researchers such as Dreyfuss (1972) have acknowledged that this is the case, but fail to provide reasoning as to why this may be. Though this seems like an area suited for linguists it would also rely heavily on the expertise of symbolic anthropologists, preferably those who specialize in the Japanese culture.

The role of media plays constructing consumer based colour associations is also another topic for future study, as it too has yet to be thoroughly reported on in a cross-cultural context. Though there are many studies relating to the effect media has on society, there is little research pertaining to the process by which marketing instills a permanent colour to product association in the minds of consumers, specifically in relation to cultural specificity.

As far as pharmaceutics are concerned, there is a variety of unaddressed issues that are in need of further investigation. Aside from the notion that pharmaceutical colour branding increases patient request for specific medications, as well a prescription writing on behalf of doctors, the lasting effects that this type of marketing has on patients and society is unknown, as direct to consumer advertising is a phenomena that has only emerged within the last decade.

Because it would be difficult to determine exactly what premises pharmaceutical companies use when colouring their products, it would at least be beneficial to identify all of the variables that relate to pharmaceutical colouring, both within, and between cultures. Though many of these variables were addressed in the first part of this chapter, there are probably additional factors which should be identified if the premises upon which pharmaceutical companies colour their products are to be fully established.

The final topic that warrants further investigation is the colour context patients use when determining the perceived therapeutic effect, strength and efficacy of a pharmaceutical based on colour, and perhaps shape. Pharmaceutical companies rely on patient feedback when choosing the colour for their products, so determining the context of colour association used will also aid in further establishing the latter mentioned variables.

Contributions

This thesis was initially undertaken with the potential theoretical contributions to anthropology in mind, though as time went on, it became more apparent that there was a very practical side to this study as well. Along with providing insight regarding the cross-cultural and culturally specific aspects of colour, linguistic representation, and context specific colour associations, information contained in this thesis also contributes to an awareness of the use and benefit of colour in the health care industry, specifically in the colouring of pharmaceuticals.

It is possible that, if pharmaceuticals were coloured according to their perceived therapeutic application there would be many practical benefits. Patients would be more inclined to take their medication, which would in turn alleviate the medical systems burden, in turn, freeing up countless numbers of medical professionals.

Patients who take multiple medications along with those who administer medications would be able to distinguish between dosages more easily, and would even be able to tell which pill was for what ailment based on colour; this has already been demonstrated in other medical arenas where medications are coloured coded according to effect. The practical benefits of applying this technique to pharmaceuticals would far outweigh any negative ones, though it is implementation that would pose the biggest problem.

By way of this thesis it is hoped that individuals who wish to delve further into the study of cultural colour construction as it applies to pharmaceuticals will be able to take from, and build on, the topics addressed, explore areas of further study, and provide contributions that will both practically and theoretically further this area of research.

Appendix One: Proposition and Pharmaceutical Comparison

Assertions drawn from the relevant research have established a basis in which to create a testable proposition that will aid in identifying and in turn, explaining, the premise upon which pharmaceutical companies based their products colours. Testing this proposition by way of a pharmaceutical comparison will establish if there is a difference in the colouring of pharmaceuticals in Japan and the USA, and if so, why.

Proposition

Findings relating to the above mentioned assertions have lead to the following proposition: a colour's categorical temperature and activity level, that is, warm or active as well as cool or passive, is based on physiological responses resulting from evolutionary pressures. Society uses these responses to convey social messages by way of evoking colours, in turn reinforcing physiological reactions and creating the basis for cross-cultural, culturally relative and market dependant colour associations. These physiological and socially constructed colour associations serve as reinforcement for the medicinal property of colours in that, sickness, which is also reflected by way of temperature and activity level, is cured by pharmaceuticals whose colour stands in opposition to the temperature and activity level of a sicknesses ailments. For example, red is considered a warm or active colour due to its primal association with activities or entities involving heat or blood. When one is exposed to red they are physiologically stimulated: heart rate, blood pressure, perspiration, emotional and psychological activity, and so forth. The use of the colour red to indicate dangerous or stimulating situations has lead to socially constructed colour associations linking red to energy. In regards to health, energy as indicated by red's stimulating qualities negates its opposite, that is, lethargy, as indicated by

blue's non-stimulating qualities; hence, a person who is depressed (blue) should be given a stimulating (red) pharmaceutical. As such, it is the categorical temperature and activity level of a colour that indicates the perceived therapeutic effect of a pharmaceutical, in turn establishing the premise which pharmaceutical companies use to colour their products, that is, cross-cultural colour associations.

Pharmaceutical Comparison

In order to test the above noted proposition, the task of comparing pharmaceuticals sold in Japan to those sold in the United States is undertaken. This assessment used the *American Pill Book* (2002) and the *Japan Prescription Medicine Encyclopedia* (2002) to compare pharmaceuticals that are sold both in Japan and in the USA. Using the two above-mentioned sources, as well as many Internet pharmaceutical directories, the following chart was compiled.

In order to assemble this list, the 50 pharmaceuticals or packages that had English names in the *Japan Prescription Medicine Encyclopedia* (2002) were identified and cross-referenced with the pharmaceuticals found in the *Pill Book* (2002); 26 of which were located. The name and details for each of the 26 that were available in both countries were added to the following pharmaceutical comparison chart.

Table Five: Pharmaceutical Comparison – Japan versus the USA

Purpose	Name	Dosage	US A Colour	Shape	Other[10]	Japan Colour	Shape	Other
Anticonvulsant	Tegratol	100mg	White	Circle		White	Circle	
Anticonvulsant	Tegratol	200mg	Pink	Capsule		White	Circle	
Antipsychotic	Mellaril	25mg	Beige	Circle		White	Circle	10 and 50mg
Alzheimer's	Aricept	5mg	White	Circle	10mg	White	Circle	3mg
Antigout	Colchicine	.5mg	Yellow	Circle	0.6mg	Yellow	Circle	
Tranquilizer	Diazepam	2mg	White	Circle		White	Circle	
Tranquilizer	Diazepam	5mg	Yellow	Circle	10mg	Yellow	Circle	
Sleeping	Estazolam	1mg	White	Circle		White	Circle	
Sleeping	Estazolam	2mg	Red			White	Circle	
Immuno-suppressant	CellCept	250mg	Orange / Blue	Capsule		Orange/Blue	Capsule	
Antiinflamatory	Ridaura	3mg	Pale Yellow			White	Circle	
Asthma	Singulaire	10mg	Pale Yellow			Pale Yellow	Circle	
Bacterial	Pasefocin	250mg	Pink / Navy Blue		500mg	White / Blue	Capsule	125mg
Bacterial	Unasyn		Clear Liquid			White	Capsule	375mg
Macrolide Antibiotic	Erythromycin	100mg			500mg	White	Circle	
Macrolide Antibiotic	Erythromycin	200mg			500mg	White	Circle	
Macrolide Antibiotic	Zithromax / Zithromac	250mg	Pink	Capsule		White	Capsule	100mg
Infection	Vibramycin	50mg	White / Blue	Capsule		White	Circle	
Infection	Vibramycin	100mg	Blue	Capsule		White	Circle	
Infection	Minocycline	50mg	Yellow / Green	Capsule		Pale Yellow	Circle	
Infection	Minocycline	100mg	Grey / Green	Capsule		White	Capsule	
Antiviral	Zovirax	200mg	Turquoise	Capsule		White	Circle	
Antiviral	Zovirax	400mg	White	Shield	800mg	White	Circle	
Antiviral	Valtrex	500mg	Dark Blue	Capsule		White	Capsule	
Antifungul	Diflucan	50mg	Pale Pink	Capsule		White	Capsule	
Antifungul	Diflucan	100mg	Pink	Capsule		Yellow	Capsule	

[10] "Other" refers to other pharmaceutical dosages that are available in the specified country.

Findings and Assertions

This section will serve to relay the data presented in the pharmaceutical comparison as well as to examine differences and/or similarities between pharmaceuticals sold in Japan and the USA as seen in the contributing texts. The purpose of this section is to determine the existence or non-existence of a colour system with respect to pharmaceuticals in Japan and the USA, to note whether or not there are cultural differences and/or similarities in the available pharmaceuticals within this system, as well as to provide possible explanations for these differences and/or similarities if they should present themselves. Inferences made in regards to the presented data will be asserted following the statement of the data, with findings related to colour serving as the basis upon which to test the above noted proposition. The testing of the proposition will be conducted in the last section of this chapter, after which conclusions will be drawn.

The presented data indicates that there are 18 of the same pharmaceuticals sold in both countries under the same name, with eight additional dosages in both countries accounting for a total of 26 comparable pharmaceuticals. These 18 named pharmaceuticals are Tegratol, Mellaril, Aricept, Colchecine, Diazepam, Estazolam, CellCept, Ridaura, Singulaire, Pasefocin, Unasyn, Erythromycin, Zithromax, Vibramycin, Mincycline, Zovirax, Valtrex and Diflucan.

Of these 18 pharmaceuticals Tegratol, Diazepam, Estazolam, Erythromycin, Vibramycin, Minocycline, Zovirax and Diflucan had two of the same alternate dosages in both countries. Aricept, Pasefocin and Zithromax are available in lower dosages in Japan, whereas Mellaril is available in a higher dosage. As well, the USA had no available lower dosages for any of the pharmaceuticals, though Aricept, Colchicine, Diazepam,

Pasefocin, Erythromycine, and Zovirax came in higher dosages than those available in Japan.

The difference in dosage levels between Japan and the USA demonstrates that the USA has an increased number of pharmaceuticals with higher dosages, whereas the Japanese have an increased number of pharmaceuticals with lower dosages. The most probable explanation for this dosage variation is the difference in the physical size of patients in both cultures, with a secondary possibility being increased tolerance levels among Americans.

In 2002, the average height and weight of women aged 20 to 74 in the USA was five foot, four inches and 164.3 pounds, with men in the same age range averaging five foot nine inches, and 191 pounds (Ogden, 2002). According to the *Japan Statistical Year Book* (2002) the average size of women within the 18 to 75 year old range was five foot one inch tall and 112 pounds, with men in the same age range averaging five foot six inches and weighing 142 pounds. This data shows that American men are three inches taller and 49 pounds heavier than their Japanese counterparts, with American women also standing three inches taller and being 52 pounds heavier than Japanese women. These differences in height and weight may account for the need for higher dosage pharmaceuticals in the USA and lower dose pharmaceuticals in Japan.

Another possible explanation for the variation in pharmaceutical dosage between Japan and the USA is the over abundance of pharmaceutical usage in the USA. This over usage, over time, contributes to increased pharmaceutical tolerance which necessitates a need for stronger pharmaceuticals (Epstein, 2004). Though this possibility may serve as an additional explanation, the lack of verifiable evidence combined with the context con-

straints of this paper does not allow for a full exploration of the topic; rather, a suggestion is offered.

As was previously stated, 50 pharmaceuticals found in the *Japan Prescription Medicine Encyclopedia* (2002) had English designations, though only 26 of them were found to be available in the USA. Though it was thought that pharmaceuticals sold in Japan with English names must all come from Western countries, further research indicated that some Japanese pharmaceutical manufacturers assign English names to their product, specifically those that are named after their active ingredient or usage. Examples of the former include: Azanin, Polymyxin, Acetylspiramycin, Leucomycin, Josamycin as well as Amlexanox whose chemical compound is derived from solfa and as such, the Japanese call the medication Solfa, whereas in the USA it goes by many names, such as Guservin and Dantonin, depending on the manufacturer. Examples of the latter relate mainly to diabetic medications such as Diaben and Diabetos.

In the USA, manufacturers choose the name of their pharmaceuticals very carefully, especially if the product it to be involved in an advertising campaign. Pharmaceutical naming in the USA, like pharmaceutical colour choice, seem to follow trends, with the trend in 2000 being the use of the letter Z. Examples of pharmaceuticals released in that year with Z letter names include Zoloft, Zantac, Zyban and Zocor (Wen, 2001:3).

Aside from the differences in pharmaceutical dosage and naming between the USA and Japan is the difference in pharmaceutical shape. Of the 26 pharmaceuticals in the USA, 12 come in capsule form (tubular with rounded edges), 12 come in circular tablet form, one resembles a shield, and the other is an injectable liquid. Comparatively, Japan has eight capsules and 18 tablets. Also, of the capsules available in both countries,

seven of the capsules were for the same product, with the remaining 11 in the USA being tablets in Japan and the remaining one in Japan being an injectable liquid in the USA. The higher number of capsules in the USA may be attributed to the notion that American patients prefer capsules to pills (Buckalew and Ross, 1983), and that capsules are considered more effective than pills (Sallis and Buckalew, 1984).

Of the eight capsule shaped pharmaceuticals sold in Japan, only three, CellCept, Pasefocin, and Diflucan, came in colours other than white, whereas all 12 capsules seen in the USA were colours other than white. As well, of the 13 tablets seen in the USA, 9 were colours other than white; whereas in Japan, only four of the 18 were colours other than white. Out of a possible 26 pharmaceuticals, Japan had seven that are coloured, where as the USA had 22 out of a possible 25.

Based on this cultural colour comparison, one can see that the Japanese have far fewer coloured pharmaceuticals, both in tablet and capsule form, than their American counterparts. There are a variety of possible explanations to account for this occurrence, such as: market size, the necessity for pharmaceutical differentiation based on market size, competing products within the market, as well as the different approaches each culture has toward pharmaceutical usage.

Though pharmaceutical consumption is similar for Japan and the USA, there are considerably more people, and in turn, more pharmaceuticals in the USA, that is, the American market is much larger than the Japanese market. This larger American market accounts for a higher number of pharmaceutical manufacturers, which inevitably leads to the creation of more products. The creation of more products necessitates a need to distinguish between products and also causes an increase in market based competition. Be-

cause there are only so many distinguishing features that can be used in the manufacturing of a pharmaceutical, of which shape and size is limited, colour becomes a function of differentiation and a tool for product recognition (Morton, 2005:1).

As well, the American approach to pharmaceutical usage appears to be much more aesthetically based, in that patients have demonstrated a preference for coloured pharmaceuticals, compared to the white tablets (Epstein, 2004) that are so prevalent in Japan. The lack of coloured pills in Japan may correspond to a smaller market with less need for pharmaceutical distinction as well as less product competition. The higher number of white pharmaceuticals in Japan is not only based on, but also reinforces the Japanese view that white pharmaceuticals are more effective (Nagao, et at, 1968); that is, their prevalence increases perceived efficacy which accounts for their heightened presence. With a society that is accustomed to the generic colour and shape of a pharmaceutical there seems to be no need to introduce a non cost effective alternative.

The difference in the number of coloured to white pharmaceuticals in Japan and the USA is also seen in a comparison of the overall number of pharmaceuticals in both supporting texts. Out of the +1000 pharmaceutical photos in the *Japan Prescription Medicine Encyclopedia* (2002), over 80% were white. Comparatively, out of the 450 pharmaceuticals photos in the *American Pill Book* (2002), fewer than 20% were white. Suggestions as to why this may be are addressed in Chapter Seven.

Of the 26 pharmaceuticals available for comparison, six of them: CellCept, 1mg Estazolam, Colchicine, Aricept, Singulaire and 100mg Tegratol were identical in aesthetic appearance; with CellCept being an orange and blue capsule, 1mg Estazolam, Ari-

cept and 100mg Tegratol being white circular tablets, Colchicine being a yellow circular tablet and Singulaire being a pale yellow square tablet.

With the1mg Estazolam, Aricept and the 100mg Tegratol being white, it is difficult to provide reasoning for their identical aesthetic appearance and presence in both countries. One possible explanation may be that white tablets, historically the generic colour and shape of pharmaceuticals, are the default choice of pharmaceutical manufacturers when there appears to be no reason for distinction.

The identical look and presence of CellCept in both markets can possibly be attributed to its manufacturer, Roche, whose Swedish based company exports this pharmaceutical in this standard aesthetic form around the world. Within the context of the proposition, the only readily available explanation for its colouring is that of distinction. Its colours may be used to allow administers to distinguish it from other pharmaceuticals, as it is an immunosuppressant prescribed to those who have received donor.

Singular, which is used to control asthma and allergies, is manufactured by Merck, which also internationally exports its product in this same aesthetic form. It is a pale yellow square shaped tablet that may be coloured in such as way as to instill happiness, that is, the feeling that one would get from ridding themselves of the persistent physical symptoms associated with asthma and allergies; though due to the limited evidence linking yellow to happiness, this can only be offered as a suggestion.

The final pharmaceutical that is identical in aesthetic appearance and is available in both countries is Colchicine, a gout and cancer treatment. Colchicine comes in a vari-

ety of different shapes and colours depending on the country in which it's sold.[11] The fact that this pharmaceutical is yellow in both Japan and America may have something to do with the virulence of the medicine itself. Because Colchicine is a poisonous, plant-based, alkaloid, it may be coloured yellow to serve as an indication of its potential toxicity. Again, this is offered only as a suggestion, as the likelihood of a pharmaceutical company colouring their pharmaceuticals to provide warning may be counterproductive in that it relies on a fear based association, rather than the positive association of yellow as life giving.

Though possible suggestions have been offered to account for the colouring of identical pharmaceuticals available in both the USA and Japan, the main purpose of this pharmaceutical comparison was to provide verifiable data that could be tested against the pre-established proposition. Retrieving this data required a cross-referencing of pharmaceuticals sold in the Japan and the USA to determine whether a pharmaceutical colouring system exists; if one does exist, to note what similarities or differences are seen between the USA and Japan; and to provide possible explanations or suggestions for these differences or similarities.

The data presented by way of the pharmaceutical comparison indicates that though there are coloured pharmaceuticals in both cultures, Japan has a significantly lower ratio of coloured to white pharmaceuticals than the USA. As well, the rational by which pills are coloured in the USA versus the non-colouring of pharmaceuticals in Japan does not appear to indicate the systematization of pharmaceutical colouring in either culture. Inferences made in regards to the differences and similarities of available pharma-

[11] Though Colchicine is available in blue as well as pink tablets in China and comes in a dual sided orange and yellow capsule in many European countries, an analysis of these colour associations in these countries is beyond the scope of this paper.

ceuticals in both cultures demonstrate that though there are substantial differences between the two cultures that can explain dosage levels, naming, shape, and the ratio of white to coloured pharmaceuticals, these differences do not point to any type of system, either cultural or otherwise, by which all, or even most, pharmaceuticals are colour coded.

Testing of the Proposition

The established proposition, that is, that pharmaceuticals are coloured according to their perceived therapeutic effect based on their colour's temperature and activity level as standing in opposition to the temperature and activity level of a patient's ailments, does not seem to correspond to the overall picture of pharmaceutical colouring and non-colouring in Japan and the USA. That is, the lack of an identifiable colour system does not permit a thorough testing of the proposition but rather, leads one to conclude that either the proposition or the pharmaceutical comparison, or perhaps both, are lacking; these possibilities are further addressed in Chapter Seven.

Though there are a select number of American coloured pharmaceuticals that correspond with the proposition, there are also ones that stand in complete opposition to it. The following examples, combined with the unexplained colouring of the remaining pharmaceuticals in the USA and the lack thereof in Japan, indicate the presence of unidentified variables that contribute to pharmaceutical colouring, and possibly, colour coding. Such variables are mentioned in the final section of this chapter and are further examined in the following chapter.

Examples of American pharmaceuticals that reinforce the proposition are the 100mg Vibramycin, the 200mg Zovirax and Valtrex; that is, three of the seven antiviral

and anti-infection pharmaceuticals. Examples of pharmaceuticals that oppose the proposition are the 5mg Diazepam, a tranquilizer; and the 2mg Estazolam, a sleeping pill. Those that neither support of refute the proposition are the remaining 20 pharmaceuticals and the one injectable liquid.

The notion that viruses, infections and their ensuing ailments disrupt the balance of human physiology by way of an attack on the bodily system, allows them to be classified as active afflictions, that is, those that correspond to the family of warm or active colours. According to the proposition, treatments for such afflictions should, in colour and activity level, oppose these ailments. The colours of the 100mg Vibramycin, the 200mg Zovirax and the Valtrex pharmaceutical all belong to the cool or passive family of colours, with the 100mg Vibramycin being a medium blue capsule, the 200mg Zovirax being a turquoise coloured capsule, and the Valtrex being a navy blue coloured capsule. In correlation with the proposition, the cool or passive colours of these pharmaceuticals should not only serve as an indication as to their purpose, that is, to cure warm or active ailments, but also to increase effectiveness based on this indication.

Though the preceding three examples correspond with the proposition, there are not enough examples to conclude that the pharmaceutical manufacturers anticipated this correlation and coloured their products accordingly. Contributing to this line of thought are pharmaceuticals whose colours stand in opposition to the presented proposition. These products are: the 5mg yellow tranquilizer, Diazepam, and the 2mg red sleeping pill, Estazolam.

Both of these pharmaceuticals are categorized according to their warm or active colours, though they are both intended to treat ailments that can also be classified as

warm or active. Diazepam, which, in this instance, is a warm or active yellow, is used to treat anxiety, seizures and insomnia; whereas Estazolam, a sleep aid, is also used to treat insomnia, and is red. Testing these pharmaceutical colours against the proposition reveals that, in this case, pharmaceutical colours do not correspond to ailment opposition but rather with the ailment themselves. Again, due to the lack of examples, this ailment/colour correlation cannot be taken as the intended approach of the pharmaceutical industry, and although it does not verify the proposition, it does allow for the question: should pharmaceuticals be representative of the ailments they treat?

The remaining 13 coloured pharmaceuticals in the USA, as well as the remaining five coloured pharmaceuticals in Japan that have not been addressed, neither support nor refute the testable proposition. These pharmaceuticals are a variety of colours that have no identifiable meaning within the context of the proposition. The most basic explanation, that is, the default explanation, is that the colour of these pharmaceuticals is intended as a method to distinguish them from other pharmaceuticals.

However, in order to provide other possible explanations as to why most of the pharmaceuticals presented in the pharmaceutical comparison do not correspond to the established proposition, alternative factors, that is, variables other than colour and ailment classification are addressed in Chapter Seven: *Conclusions and Discussion.*

References Cited

Adams, F.M., and Osgood, CE
1973 A Cross-cultural Study of the Affective Meanings of Color. Journal of Cross Cultural Psychology 4:135-56.

Allan, G.
1892 The Colour Sense: Its Origin and Development. London: Kegan, Paul Trench and Trubner.

American Academy of Ophthalmology
2000 Policy Statement: Color Codes for Topical Ocular Medications. Electronic Document. www.aao.org/aao/member/policy/color.cfm?RenderForPrint=1.

American Psychological Association
2005 Statemend of the Use of Color Coding. PDF, Electronic Document. http://www.fda.gov/ohrms/dockets/dockets/05n0036/05N-0036_emc-000008 01.pdf#search='APA%20Statement%20on%20the%20Use%20of%20Color%20Coding'.

Ammer, Christine
1993 Seeing Red or Tickled Pink. Toronto, Canada: Penguin Books Ltd.

Anime, Mike
2001 Symbolism: Colors. Electronic Document. www.three-musketeers.net/mike/colors.html, accessed October 23, 2003.

Barthes, Roland
1967 Elements of Semiology. New York: Hill and Wang.

Beare, A.C.
1963 Color-Name as a Function of Wave-Length. American Journal of Psychology 76:248-256.

Berlin, B., and Kay, P.
1969 Basic Color Terms: Their Universality and Evolution. Berkley: University of California Press.

Berthold, Mark
2003 Anaesthesia Color Codes: New System Helps Recognition, Increases Safety. Electronic Document. www.ada.org/prof/resources/pubs/adanews/adanewsarticle.asp?articleid=30.

Bilmeyer, F.W., and Saltzmann, M.
1981 Principles of color technology, In: Color and Color Difference Measurement, 2nd ed. (pp. 67–109), New York, NY: Wiley.

Birren, F.
1973 Color Preference as a Clue to Personality. Art Psychotherapy 1:13-16.

Birren, Faber
1978 Color in Your World. New York, NY: Macmillan.

Birren, Faber
1984 Color and Human Response. New York: John Wiley and Sons Inc.

Bleicher, Steven
2005 Contemporary Color: Theory and Use. New York: Thomas Delmar Learning.

Blumenthal, Gary
2005 Color and Food Matters. International Food Strategies. Electronic Document. www.colormatters.com/appmatters.html.

Bornstein, M.
1972 The Psychophysiological Component of Cultural Difference in Color Naming and Illusion Susceptibility. Behavior Science Notes 8:41-101.

Bornstein, M.
1973 Color Vision and Color Naming: A Psychophysiological Hypothesis of Cultural Difference. Psychological Bulletin 80:257-285.

Bornstein, M.
1975 The Influence of Visual Perception on Culture. American Anthropologist 77 (4):774-798.

Bousfield, J.
1978 The World Seen as a Color Chart. In R. Ellen and D. Reason. eds., Classifications in their social context. New York: Academic Press.

Boyton, R.M., and Olson
1990 Salience of Chromatic Basic Color Terms Confirmed by Three Measures. Vision Research 30:1311-17.

Bromiley, Geoffrey
1995 International Standard Bible Encyclopedia: Q-Z. Michigan: WM.B.Eerdmans Publishing.

Buckalew, L.W., and Coffield, K.E.
1982 Drug Expectations Associated with Perceptual Characteristics: Ethnic Factors. Perceptual and Motor Skills 55:915-18.

Buckalew, L.W., and Ross
1983 The Placebo as an Agent in Bahvioral Manipulation: A Review of Problems, Issues, and Affected Measures. Clinical Psychology Review 3 (4):457-71.

Buckley, T., and Gottlieb, Alma.
1988 Red Magic: The Anthropology of Menstruation. California: University of California Press.

Burges, D., Kempton, W., and MacLaury, R.
1983 Tarahumara Color Modifiers: Category Structure Presaging Evolutionary Change. American Ethnologist 10:133-149.

Cammilleri, Angelo
2005 Chromotherapy. Electronic Document. www.ifct.net/chromo.html

Canadian Pharmacists Association, eds.
2004 Compendium of Pharmaceuticals and Specialties. Toronto: Webcom Limited.

Chaplin, James
1999 Psychology Dictionary. New York: Laurel Publishing Inc.

Chan, L.W., Chan, W.Y., and Heng, P.W.S.
2000 An Improved Method for the Measurement of Colour Uniformity in Pellet Coating. International Journal of Pharmaceutics 213 (2001): 63-74.

Cheskin, Louis
1947 Colors: What They Can Do For You. New York: Liveright Publishing Corporation.

Cheryl, Currid
1995 Make Your Point! Rocklin: Prima.

Color Dream Net
1998 Color Preferences in Japan. Electronic Document. www.colordream.net/research/eresult.htm, accessed October 30, 2003.

Costigan, K.
1984 How Color Goes to Your Head. Science Digest 12:24.

Cromie, William
1998 Brain's Color Processor Located. The Harvard University Gazette.

Crozier WR.
1996 The Psychology of Colour Preference. Rev. Prog. Coloration 26:63–72.

Daw, Nigel
1995 Visual Development: Perspectives in Visual Research. Illinois: Springer.

Danesi, Marcel
1998 Sign, Thought and Culture: A Basic Course in Semiotics. Toronto, ON: Canadian Scholar's Press.

Danger, E.P.
1968 Using Color to Sell. London: Gower Press.

Davidoff, J.
1991 Cognition Through Color. Cambridge, MA: The MIT Press.

De Craen, Roos, De Varies, and Kleijnen.
1996 Effect of Color of Dugs: Systematic Review of Perceived Effect of Drugs and Their Effectiveness. British Medical Journal 313:1624-1626.

Dreyfuss, Henry
1972 Symbol Source Book: An Authoritative Guide to International Graphic Symbols. Montreal: McGraw-Hill Book Company.

Eiseman, Leatrice
2000 Patone Guide to Communicating with Colour. Florida: Graffix Press Ltd.

Eiseman, Leatrice
2003 The Color Answer Book: From the World's Leading Colour Expert. Virginia: Capital Books.

English, Anthony and Stone, Nancy
1998 Workspace Color on Mood, Satisfaction and Performance. Creighton University, Department of Psychology Publication, 18:2.

Epstein, Richard
2004 Does America Have a Prescription Drug Problem?: The Perils of Ignoring the Economics of Pharmaceuticals. New York: Institute for Public Innovation.

Finnemore, John
1919 Peeps at Many Lands: Japan. Montana: Kessinger Publishing.

Foder, Kate
2004 Tylenol to go on sale in Japan. Personal Medical Doctor. Electronic Document. www.personalmd.com/news/n0720054231.html.

Frohne, Dietrich, and Pfander, Hans
1984 A Colour Atlas of Poisonous Plants: a handbook for pharmacists, doctors, toxicologists, and biologists. London: Wolfe Publishing.

Garro, L.
1986 Language, Memory and Focality - A Re-examination. American Anthropologist 88:128-138.

Guest, S., and Van Laar, D.
2000 The Structure of Color Naming Space. Vision Research 40:723-734.

Gregory, Richard
1998 Eye and Brain: The Psychology of Seeing. New York: Oxford University Press.

Grossman, and Wisenbilt
1999 What We Know About Consumers' Color Choices. Applied Marketing Science 5(3):78-88.

Hall, E. T.
1959 The Silent Language. New York: Doublesday and Company, Inc.

Harding, J.J.
1997 Biochemistry of the Eye. London: Chapman and Hall Medical.

Heath, R.P.
1997 The Wonderful World of Color. Marketing Tool. Electronic Document. www.demographics.com/publications/mt/97_mt/9710_mt?mt971022.htm.

Hernon, Greg
2005 Color Therapy Resources and Equipment. Electronic Document. www.ozelink.com/natures_energies/color1.htm.

Herriot, Peter
1976 Introduction to the Psychology of Language. London: Routledge.

Holtzschue, Linda
2002 Understanding Color. New York: John Wiley & Sons, Inc.

Hsiao S. A.
1995 A Systematic Method for Color Planning in Product Design. Color Resolution Application 20:191–205.

Hurvich, L.M., and Jameson
1957 An opponent-process theory of colour vision. Psychology Review 64:384-404.

IMS Health
2003 IMS Word Review. Electronic Document www.imshealth.com/ims/portal/front/articleC/0,2777,6599_3665_41336931,00.html

Jacobs, K. A., and Nordan, F. M.
1979 Classification of Placebo Drugs: Effect of Color. Perceptual and Motor Skills 49:367-72.

Jacobs, Keown, and Worthley.
1991 Cross-cultural Color Comparisons: Global Marketers Beware. International Marketing Review 8(3):21-30.

Jameson, K.A.
2001 Culture and Cognition: What is universal About the Representation of Color Experience? Manuscript submitted for publication.

Japanese Pharmaceutical Association, eds.
2004 Japanese Pharmacopoeia. Tokyo: Japanese Pharmaceutical Association.

Johansen, Jorgen., and Laresen, Eric
2002 Sings in Use: An Introduction to Semiotics. New York: Routledge.

Johnson, David
2006 Psychology of Color: Do Different Colors Effect Your Mood. Electronic Source. http://www.infoplease.com/spot/colors1.html

Judd, D.B., and Wyszecki, G.
1975 Color in Business, Science and Industry. In: Tools and Technics, 3rd edn. (pp 105-170), New York: NY, Wiley.

Kay, Paul, Willet, and Kempton
1984 What is the Sapir-Whorf Hypothesis? American Anthropologist 86(1):65-79.

Kay, Paul and MacDaniel, Charles
1978 The Linguistic Meaning of Basic Color Terms. Language 54:610-648.

Keiji, U., Kenji, Y., and Yamauchi, Y.
2004 Categorical Color Constancy is More Tolerant than Apparent Color Constancy. Vision Sciences Society Abstract 57.

Kipperman, D. and McKinstry, M.
1998 Color Design Rules. Electronic Document. www.writedesignonline.com/resources/design/rules/color.html#psych.

Koop, J. and Land, H.
1968 Hue Discrimination Related to Linguistic Habits. Pshychonomic Science 11:61-62.

Ladas and Perry
1996 Trademarks: Sounds, Colors and Scents. Electronic Document. www.ladas.com/Trademarks/MakingSenseTM.html.

Lee, S., and Barnes, J.H.
1990 Using Color Preferences in Magazine Advertising. Journal of Advertising Research 1(4):25-30.

Linton, Harold
1994 Color Forecasting: A Survey of International Color Marketing. New York: Van Nostrand Reinhold.

Lipscher, Juraj
2001 Pigments Through the Ages, eds., Micheal Douma. Electronic Source. 1-11. http://webexhibits.org/pigments/

Luscher, Max
1971 The Remarkable Test that Reveals Your Personality Through Color, eds., Ian Scott. New York: Simon and Schuster Adult Publishing Group.

Miki, Y., Shinno, T., Kuwano K., Hoshino, H., Nakamura, T., Sato, T., Kajiwara, K.
1999 Color Emotional Assessments with Three Independent Media. AIC Midterm Meeting 291–298.

Moore, C., Romney, A.K., and Hsia, T-L.
2000 Shared Cognitive Representations of Perceptual and Semantic Structures of Basic Colors in Chinese and English. Proceedings of the National Academy of Sciences 97: 5007-5010.

Morton, J.L.
1998 Taking the Color of Medications Seriously. ColorMatters.com Electronic Document. www.colormatters.com.

Morton, J.L.
2005 Why Color Matters. Colorcom.com Electronic Document. www.colorcom.com/why_color.html.

Nagao, Y., Komiya, J., Kuroyanagi, K., Minaba, Y., and Susa, A.
1968 Effect of the Color of Analgesics on Their Therapeutic Results. Shikwa Gakuho 68:139-42.

Nayer, Jean
2004 Color: A Powerful Mood Altering Tool. Steelcase 1-3.

Neitz J., Carroll J., Yamauchi Y., Neitz M., Williams D.R.
2002 Color Perception is Mediated by a Plastic Neural Mechanism that Remains Adjustable in Adults. Neuron 35:738-792.

Nobbs, Ho, Parker-Jervis, Sato, Kajiwara, Hoshino, and Nakamura T.
1997 A Study of Colour Description Terms. Proceedings of NPL-CIE-UK Conference (Visual Scale) 27–30.

Ogden, Cynthia
2002 1999-2002 National Health and Nutritional Examination Survey. New York: The National Center for Health Statistics.

Ou, Li-Chen, Luo, Ronnier, Woodcock, Andre´, Wright, Angela
2002 A Study of Colour Emotion and Colour Preference. Part I: Colour Emotions for Single Colours. Color Research and Application 29 (3): 232-240.

Oyster, Clyde
1999 The Human Eye: Structure and Function. Sunderland, MA: Sinauer Associates.

Pahmer, Audrey
2003 How Does Color Effect Blood Pressure. Experimental Submission. California State.

Pastoureau, Micheal
2001 Blue: The History of a Colour. New Jersey: Princeton University Press.

Pease, PL.
1998 Colour Vision. Chapter 9. In: Benjamine, W.J. ed., Borish's Clinical Refraction. Philadelphia: W.B. Saunders Company.

Peterson, L.K., and Cullen, C.
2000 Global Graphics: Color, A Guide to Design with Color for an International Market. Massachusetts: Rock Port Publishers.

Pierce, Charles
1931 Collected Writings. Hartshorned, Weiss, Burks, eds., Cambridge, MA: Harvard University Press.

Quinion, Michael
2006 World Wide Words. Blue Plate Special. Electronic Document. http://www.worldwidewords.org/qa/qa-blu3.htm

Ratner, Carl
1989 A Socio-historical Critique of Naturalistic Theories of Color Perception. Journal of Mind and Behavior 10:361-372.

Redd, William and Manne, Sharon
1991 Sloan-Kettering Cancer Center News Release. New York

Reid, Thomas
1941 Essays on the Intellectual Powers of Man. Woozley (ed.), London: Macmillan.

Ricks, David
1983 Big Business Blunders: Mistakes in Multinational Marketing. Illinois: Dow Jones-Irwin.

Rivers, W.H.R.
1901 Primitive Colour Vision. Popular Science Monthly 59:44-58.

Robertson, P.W.
1967 Colour Words and Colour Vision. Biology and Human Affairs 33:28-33.

Rosch-Heider K.G.
1972 Universals in Color Naming and Memory. Journal of Experimental Psychology 93(1):10-20.

Russo and Boor
1993 How Fluent is Your Interface: designing for international users. In: Ashlund, Stacey, Mullet, Kevin, Henderson, Austin, Hollnagel, Erik, White, Ted, eds., Proceedings of the ACM CHI 93 Human Factors in Computing Systems Conference in Amsterdam, The Netherlands. New York: ACM Press.

Sallis R.E., and Buckalew L.W.
1984 Relation of Capsule Color and Perceived Potency. Perceptual Motor Skills 58:897-8.

Sasaki, Hiroshi
1991 Color Psychology. Electronic Document. www.shibuya.com/garden/colorpsycho.html

Sato, T., Kajiwara, K., Hoshino, H., and Nakamura, T.
2000 Quantitative Evaluation and Categorizing of Human Emotion Induced by Colour. Advanced Colour Science Technology 3:53–59.

Schwartz, S.H.
1999 Visual Perception, 2nd Edition. Connecticut: Appleton and Lange.

Segall, M.H., Campbell, D.T., and Herskovits, M.J
1966 The Influence of Culture on Visual Perception. Indianapolis: Bobbs-Merrill. Silverman, Harold Ed.

Sharpe, L. T., Stockman, A., Jaegle, H. and Nathans, J.
1999 Opsin Genes, Cone Photopigments, Color Vision, and Color Blindness. In: Sharpe, L. T. eds., Color Vision: From Genes to Perception, New York: Gegenfurtner.

Sherwood, Jonathan
2005 Color Perception Is Not in the Eye of the Beholder: It's in the Brain. University of Rochester News. Electronic Document. www.rochester.edu/news/show.php?id=2299.

Steele, Alexandra
2002 Color, Shape of Pharmaceutical Tablet Deemed Not Distinctive Enough. W.I.R.P 16(1):6-7.

Sturges, J., and Whitfield, T.W.A.
1995 Locating Basic Colors in the Munsell Space. Color Research and Application 20:364-376.

Tresidder, Jack
1997 Dictionary of Symbols: An Illustrated Guide to Traditional Images, Icons and Emblems. Vancouver, Canada: Duncan Baird Publishers.

Van Wijik, H.A.C.W.
1959 A Cross-cultural Theory of Colour Brightness Nomenclature. Bijdragen tot de Taal, Land, en Volkenkude 15:113-137.

Walker, Morton
1991 The Power of Color. New York, NY: Avery Publishing.

Wandell, Brian
1995 Foundations of Vision. Sunderland, MA: Sinauer Associates.

Watashi, Nihongo and Daigakusei.
2000 The Wonderful World of Color in Japanese. Electronic Document. www.wvup.edu/Academics/humanities/Oldaker/wonderful_world_of_color_in_japanese.htm

Wen, Patricia
2001 Pills that Pop. The Boston Globe. April 4, 2001.

Wirth, M.
1991 Instrumental Color Measurement: A Method for Judging the Appearance of Tablets. Journal of Pharmaceutical Science 80(12):1177–1179.

Witkowski, Stanley and Brown, Cecil
1977 An Explanation of Color Nomenclature Universals. American Anthropologist 79(1):50-57.

Wright B, and Rainwater L.
1962 The Meanings of Color. Journal of General Psychology 67:89 –99.

Xin, JH., and Cheng, K.
2000 Quantitative Evaluation of Colour Emotion. JSPS Fund Meeting 71– 86.

1997 Webster's New World Basic Dictionary of American English. New York: Webster's New World.

1997 Webster's New World Compact Japanese Dictionary: Japanese/English-English/Japanese. New York: Webster's New World.

2001 Designer Pills Aimed At The Consumer's Subconscious. The Boston Globe. Electronic Document. www.intelihealth.com/IH/ihtIH/WSIHW000/8124/21291/322037.html

2002 Japan prescription medicine encyclopaedia consulted with a photograph.

2002 The Pill Book. Toronto: Bantam Books.

2002 Japan Statistical Year Book. Health and Sanitation. Japan: Ministry of Internal Affairs and Communication. Electronic Document. www.stat.go.jp/english/index.htm

2005 Red. Microsoft Encarta Reference Library Premium 2005 DVD.

2005 Blue. Microsoft Encarta Reference Library Premium 2005 DVD.

2005 Yellow. Microsoft Encarta Reference Library Premium 2005 DVD.