A VISUAL GUIDE TO BASIC COLORMANSHIP

By H.D. Justi Co. and Bruno Pozzi

For sometime now I have wanted to reprint the H.D. Justi Co. Visual Guide to Basic Colormanship which was first published in 1965. I have eliminated the first paragraph because it was outdated and edited the original guide with graphic designer Phillip Zubiate to fit in the Tooth Express newsletter format. I hope you enjoy this presentation.

Bruno Pozzi

The one very important phase of restorative dentistry that has NOT kept pace with the other advances is the shading of restorations with the subtle gradations of color necessary to match the vitality of natural dentition. The technician is expected to create natural, vital appearing shades under conditions that present an infinite variety of thicknesses and contours. There are two basic reasons why less success has been achieved in this phase of restorative dentistry:

Continued on page 2

The Age Shade System

Why It’s Important in Dentures, Overdentures and Partials

By Bruno Pozzi

The Imperial Age Shade System represents the shades most often found in beautiful natural dentition. The selection of these shades is based on the Justi Eterna System which is a patented system to facilitate reading shades. The shade number is related to the ideal shade for the age of the patient. It also allows patients to select a younger shade look if they so desire. The Shade Guide comes with the Kroma Shield and one sample of the patented Kroma Tab.

Many dental researchers have written about color in dentistry, esthetics and the science of shading. Several manufacturing companies have even attempted to fabricate machines, which are supposed to read colors. I remember vividly when Stern Gold introduced the Chromoscans and American Tooth purchased one of these machines. Two years later the machine was found in the trash bin behind our tooth factory. We could not use it and the system was taken off the market later on.

The study of tooth colors and tooth shade matching is very complex as it deals with:

Physics: Radiation-Illumination
Chemistry: Pigmentation
Physiology: Human Eye
Psychology: Study of the Mind

Continued on page 4

Emilio Pozzi Profile

It is with great enthusiasm that I have taken over the responsibilities of Sales and Marketing at American Tooth Industries, at a time where the entire dental industry is shifting its focus to providing beautiful smiles. The new trend is to give patients great looking teeth or what ATI calls Hollywood teeth. While I was working in the sports business on the East Coast in the early 90’s, I also had the opportunity to service ATI dealers, visit dental schools and government facilities, at the same time I was in charge of running very large events with the direct responsibility of important budgets and personnel. In the last four years I was working in Italy and this allowed me to stay in close contact

Continued on page 5
The study of tooth color/hue also deals with the variance of material, as we want to match Human Dentition of different make-up and age:

- Ceramic Materials
- Composite Materials
- Vinyl Materials
- Plastic or Hard Plastic Materials

In addition it deals with:

- Thickness
- Translucency
- Transparency Opacity

The mathematical combinations are almost infinitesimal and impossible to calculate.

So where do we start?
Where do we go from here?
We start with a simple formula: The Age Shades System.

Instead of identifying shades with an incomprehensible number or letter, we assign arbitrary numbers representing the age of a patient like 35-45-50-60-70 etc.

Then we use these age shades in conjunction with fabrication of Dentures, Over Dentures, Partial Dentures, Laminates, and Complete Arch Caps.

We may use the Age Shades also for Crown and Bridge. The Dentists may use the Age Shades to their advantage, as they may be able to convince the patient to go for a complete makeover. Based on a younger (higher) shade range.

Lack of a common language and tools to communicate between the Dentists and the Technician requires the adoption of a new system. Also the accurate description of shades between the dentists and the laboratory has been frustrating and impossible to control until now.

I have proposed three simple remedies that will clarify this confusion:

1. Age Shade System
2. Kroma Tab
3. Blue Mat Background
The Age Shade System once accepted universally to select the shade of a patient will be the common descriptive language used by the Dentist and Technician.

With the Age Shade System the patient is in charge of his tooth color. Finally, he or she can communicate with his/her dentist without the problems of the past.

During annual check-ups dentists and their assistants shall record the Age Shade of a patient to see if it has been maintained by brushing and cleaning.

The Kroma Tab and the Justi Color Neutralizer shall be used as the only uniform background which will help the dentists and specialists to read a shade more uniformly.

In the future we shall write more articles on Age Shades and publish testimonials in our upcoming issues of Tooth Express News letter to inform you of the success of the Age Shades System.

Be sure to read the article on page six, “How to Improve Shade Matching in the Dental Operatory Office” and the photo step by step use of Justi Kroma Tab on page 11.

Shown above are the three steps to help patients, dentists, and lab technicians communicate a true description of what shade a patient would like to have... esthetically pleasing, and therefore providing patient satisfaction.
A VISUAL GUIDE TO BASIC COLORMANSHIP

By H.D. Justi Co. and Bruno Pozzi

1. The lack of a common language or tool to enable both dentist and technician to communicate with each other regarding the true description of shades.

2. Lack of technical knowledge of color and color mixing... COLORMANSHIP.

The purpose of this article is to simplify this communication problem and to assist in the understanding of color and color mixing so that better shade matches may be obtained.

COLOR TERMINOLOGY

The nature of color is not as simple as it appears on the surface. It has a three-dimensional existence. As a room is long, high, and wide, so is color. To establish a common denominator in communicating about color, we must consider three different dimensions or characteristics. They are hue, chroma and value.

Hue

Hue is that dimension which describes color as "red," "orange," "yellow"... etc.

Chroma

Chroma is that dimension which describes the intensity of a given hue as "dark yellow" (high chroma) ...or "light yellow" (low chroma). Chroma is also referred to as "strength" or "saturation."

Value

Value is that dimension that describes the proportion of white or gray in a hue. If the hue is red, the addition of white produces pink (bright); the addition of gray produces maroon (dull). The more white in a hue, the higher the value (bright); the more gray, the lower the value (dull). Value may be referred to as "brilliance." In dentistry, a tooth with a low value lacks vitality, while one with a high value appears very vital. Poor control of value is one of the primary causes of shading problems. A dental restoration may match the hue and chroma of adjoining natural dentition, but if the value differs greatly from that of the natural dentition, it will not be an acceptable shade match.

We may know what we mean by describing a color as "light yellow," but we can communicate this idea much more precisely and understandably by referring to it in terms of the dimensions of color: bright (value) yellow (hue) of medium saturation (chroma).

THE COLOR WHEEL

All colors are present in the spectrum; three of them are primary colors red, yellow and blue. They are referred to as primary because any equal combination of two of them will create secondary color. There are three secondary colors: Orange - made by mixing red and yellow, Green - made by mixing yellow and blue, Violet - made by mixing blue and red. The color wheel is comprised of these six colors, with the secondary colors positioned between the two primary colors from which they were created.
A VISUAL GUIDE TO BASIC COLORMANSHIP  By H.D. Justi Co. and Bruno Pozzi

CHROMA AND VALUE CHARTS
CHROMA... the strength or saturation of a hue is depicted here from high to low.

VALUE ... the brilliance or dullness of a hue is depicted here by adding percentages of gray over a 100% chroma.

By blending the grays on the hues underneath, you see a progressively decreasing level of value and chroma.

A Visual Guide To Basic Colormanship will continued in the next issue of the Tooth Express News #35

Emilio Pozzi Profile

with Major and Leone companies, which are key partners of ours.

At American Tooth Industries we have developed a strong line of teeth and dental products to promote the idea that a cosmetic makeover is a positive step for a denture patient. In the upcoming months I will be working with my father to enhance our business, and aggressively market our tooth lines. Our strategy will include special promotions and focus on our high quality American made products. Our in house manufacturing plant allows the possibility to deliver in a timely fashion, order quantity and if necessary to customize a special order.

I am available to speak to you personally at anytime to answer questions about our product line. Please feel free to contact me and keep your self smiling buying our products of high quality at fair prices.

Emilio Pozzi
Executive Vice President
By ADA Council on Dental Materials, Instruments, and Equipment

This article, reprinted by American Tooth Industries with the permission of the American Dental Association, originally appeared in the February 1981 issue of The Journal of the American Dental Association. ATI believes this article to still have strong validity even today. In the future ATI will continue to publish articles regarding shade reading and shade matching subjects.

Today's dental patient is becoming increasingly aware and much more critical of modern restorative services. Considerable emphasis is now placed on the esthetic appearance as well as the function of restorations.

As a result, shade matching is a challenge in both the dental operator and dental laboratory. This report gives some basic guidelines for matching dental prostheses with tooth color.

Color is the effect of a source of light as it is reflected by an object to the eye of the observer.1 Observer color perception is conditioned by a light source, object, and observer.2 Color blindness, either congenital or temporarily induced by medication, can affect color or shade perception.3

Color is described in three qualities: the hue (color); the value (lightness or darkness); and the chroma (saturation or intensity of color). This method of color designation, known as the Munsell system, has been applied to matching tooth color. The dentist should also be aware of problems such as metamerism in which two materials appear to have an identical color under one light source, but are an obvious mismatch under another.

Shade matching is, therefore, a complex problem. This article focuses on how shade matching can be improved by understanding the variables presented by the light source, the teeth and surrounding environment, and the observer.

THE OBSERVER
The ability to distinguish colors is not uniform among observers, although it is usually possible to improve color discrimination by conscious effort. In addition, the observer can be trained in color discrimination by the repeated use of standard color tests. Some of the tests, currently available emphasize slight changes in hue; others use a limited number of hues and introduce small steps in chroma to test for color discrimination.4 Some knowledge of light and color notation5-8 is desirable to transmit data from the dental operatory to the laboratory - dental shade guides provide the most common standard.9

During color matching, eye fatigue can be avoided by looking at neutral (gray) surfaces occasionally, or gazing at colors complementary to those prevalent in tooth shades, such as blue, for short periods. The qualified observer should have no gross deficiencies in color discrimination, such as any form of color blindness, either congenital or temporarily induced by medication. All types of color blindness can be detected by relatively simple vision tests.10,11

OBJECT
Objects modify light by transmission, absorption, reflection, and scattering. The human tooth is both translucent and transparent and, as such, presents a complex material for color matching. Manufacturers have developed shade guides to help in selection of the proper shade, but the dentist should realize that these guides can only approximate natural tooth color and must be used properly even to approach an accurate color match.

LIGHTING
Lighting in the dental operatory is a most important factor in proper shade matching. The ideal light source would have its energy evenly distributed across the entire visible spectrum. This is unattainable in practice; however, color-corrected light sources approach this condition.12 It is recommended that a dental light with a color temperature (a measure of the energy distribution of the light) of 5,500 K be used, and that the color rendering index (a measure of the degree the light source corresponds to natural daylight) of the light be above 90.13 If possible, the shade should also be checked under a different light source, as the patient will not always be seen under color-corrected lighting. A light source that approaches an incandescent light, such as a warm white fluorescent light, is a good choice.

The intensity of light is also an important factor. Improper lighting intensity can result in severe adaptation fatigue; in particular, the differential color sensitivity of the eye decreases as the intensity of intraoral illumination deviates from an optimum level. The ideal ratio of intraoral to extraoral illumination is considered to be 3:1; however, ratios as high as 10:1 are acceptable. It is recommended that the extraoral light intensity be in the range of 200 to 300 foot-candles at a distance of 30 inch (76 cm) above floor level. This can be attained by the use of 12 4-ft fluorescent tubes in a 10 ft. x 10 ft. room with an 8 ft. ceiling.13,14 An all-luminous ceiling is also desirable for good visibility with fewer shadows. Acrylic diffusers that have at least 90% light transmission and do not alter the spectral characteristics of the light source are recommended because they tend to scatter the light evenly throughout the operatory and reduce glare.

The color environment of the dental operatory is another critical factor in shade matching. To reduce the specific absorption and reflection of incident light, which will modify the per-
HOW TO IMPROVE SHADE MATCHING IN THE DENTAL OPERATORY

By ADA Council on Dental Materials, Instruments, and Equipment

exception of color, a neutral, lightgray background color (Munsell Value, ~ 8) should be present in the room. The counter tops should have a nonglare surface with a Munsell Value of 7 or higher, and the floor should be neutral, if possible, with a Munsell Value of 6 or higher.

SELECTING SHADES

The following rules should be observed in shade matching.

• The manufacturer’s shade guide for the product should be used. This is true for both porcelain and plastic denture teeth, as well as for porcelain-metal or plastic-metal restorations. Errors by the dentist and laboratory may result when shade guides other than those designed for the material specified are used.

• Shade matching should be done under lights of similar spectral distribution and intensity, both in the dentist’s operatory and in the dental technician’s laboratory. Ideally, shades in the patient’s dentition should be an equally good match under daylight, fluorescent light, and incandescent light. At the least, restorative materials and natural teeth should match closely under lighting conditions similar to daylight.

• Effects of translucency and position should be considered; higher translucency and more distal position in the natural dentition causes a darker gray appearance. The color of the lips, tongue, palate, and gingiva also affects the color of the teeth. The position of the tooth in contrast to the palatal vault will affect translucency: higher translucency against a dark background would be equivalent to a lower Munsell Value in the shade of a semi-opaque restoration.

• The manufacturer’s recommendations for preparing the surface of the tooth before shade-matching should be followed. Leaving a glossy layer of saliva or removing moisture affects the proportion of specular (mirror-like) reflection to diffuse reflection. Only diffuse reflection is indicative of the true shade. Specular reflection can be misleading, especially if high intensity illumination is used.

• When shade matching, the individual shade tab should be removed from the guide and held close to the tooth alone. This will prevent the so-called “effect of placement” in a series of tabs in which saturation varies.

• The surface texture of the restoration should be matched as closely as possible with that of the remaining dentition. This will tend to reproduce the characteristics of light reflection inherent in the remaining natural dentition.

References


Special Dispatch


Since its inception in 1976 American Tooth Industries has adhered to GMP, FDA, ANSI and ADA for the maintenance of quality systems and the delivery of certified dental specialties. In addition we have been ISO Certified since 1998 and on July 5th 2006 our certification body Med/Cert has re-certified American Tooth Industries recognizing that we meet the requirements for DIN EN ISO/13485:2003 and 93/42/EEC Annex II. Our hardened plastic teeth are also accepted by the ADA under the specification protocol ANSI/ADA #15 published in 1999. Please go to our website to review the test results. Our Missions Statement is: Our family of brands: Justi, Pozzi, Major, Leone and Regal carries an old motto of our company “Simple inventions last forever.” Using tools of their forebears, the human eye and hand, our craftsmen carry on the American Tooth Industries’ tradition of excellence. We are delivering quality products at a fair market value and we shall continue to do so.

For your information Med/Cert is a specialist from Hamburg Germany for testing and certification of Quality systems as well as medical devices.
Dear Mr. Pozzi

I am writing to let you know that the project was shipped to Afghanistan last Thursday by sea, 80,000 pounds of dental supplies and equipment. It arrive in Karachi, Pakistan and be trucked to Kabul, where it should arrive shortly after August 1. In addition to your generous donation of 35,000 complete sets of denture teeth, other manufacturers and individuals also donated laboratory and general equipment and supplies, as well as construction materials and cash donations.

Since your donation was made, we have acquired a wonderful piece of land in the middle of some hospitals, where there is water and electricity available. We will be starting out in our shippable clinic for a year, while a 10,000 square-foot permanent building will be built on land that will be deeded to our organization. The building will have student teaching classrooms and laboratories, as well as care facilities for volunteers, including a kitchen and dinning room. Covering the remaining half of the property will be a perma-culture garden with composting, fruit trees and a vegetable area.

We cannot express our gratitude sufficiently to truly show how important your gift is to this project and to the needs of the Afghan people. Your generosity will actually save lives in many ways: by giving the people who cannot eat the ability to do so, by providing the young orphans who had no future the capability of making lives for themselves, and by helping the laboratory technicians who are volunteering to make a difference in Afghanistan with the materials to do so. Next time you are in Kabul, stop by the clinic in the Darulaman Medical Center and say hi!

In appreciation,
James G. Rolfe, DDS Chairman and Founder
Justi is now manufacturing a special line of posterior teeth. These teeth are made of hard copolymer enamel which will allow the perfect mastication by the cutting shape of the maxillary cusps of the second bicuspid, the first and second molars, left and right.

This design ensures functional performance, and aesthetic value without undue wear on the opposing plastic teeth.

- Dimensional Stability - more than 120 hours (After washing, rinsing and removing excess water by shaking, impression must be placed in a plastic bag.)
- Pleasant scent - patients like the vanilla scent which has a neutral taste.
- Chromatic Phases:
  - Violet (Mixing - approx. 35 sec.)
  - Rose (Packing/Working - approx. 40 sec.)
  - Light Blue (Setting - approx. 45 sec.)
(The impression is complete in just about 2 minutes.)
- Final impression is light blue for easier reading.
- Lead and Cadmium free
- Very low dust
- Bio-compatible
- Meets ISO 1563 and ADA #18
- Easy removal - High Tear Strength

Models are an effective way to gain patient acceptance for treatment options being offered to them. These three-dimensional models will allow your patient to be at ease with implant treatment. These models are manufactured using genuine Justi denture teeth which provide true shade hues and natural aesthetics for positive reinforcement of the implant treatment. Models are cost effective demonstration devices allowing the patient to visualize and assess the different treatment options. These removable prosthetic models are designed to illustrate "o" ring overdenture, bar overdenture, and hybrid style dentures.

- Hybrid Denture: Implant support hybrid denture with base model. This model is available to illustrate a retained screw or cemented option.
- 4 Implant Ball & O-Ring: Clear lower implant base with 4 Ball Implants, includes overdenture with O-Rings. The clear base provides excellent visibility of implants.
- Upper Hader Bar: Clear base has two 2-implant supported hader bar overdenture with EDS clips. The clear base resin provides excellent visibility of implants.
The Schreinemakers Edentulous Impression Trays have gained reputation as the No. 1 impression tray in the prosthodontic field by dentists from countries all over the world. Now sold in the U.S.A. endorsed by Pozzi®.

The black colored autoclavable Border-Lock® trays are reusable acrylic impression trays. The name Border-Lock® refers to the patented retention system. Special horizontal slits along the border of the tray provide an excellent locking mechanism for the impression material. The tray is made from Ryton, Polyphenylene Sulphide (PPS). This is a thermoplastic material with high dimensional stability at elevated temperatures. The rigidity of the Border-lock® tray has been scientifically tested and proven suitable for making precision impressions. A characteristic of the autoclavable border-lock trays is that they have a “metal sound”.

The border-lock edentulous impression trays have been designed specifically for both the monophase and sandwich impression techniques. In the monophase impression technique, the tray is filled with one impression material. The sandwich impression technique, the tray is filled with two impression materials of different viscosities, which are used simultaneously when making an impression. Impression materials that can be used in the trays are materials like alginate, silicones and polyether.

Tray selection of the edentulous for the lower arch: measure intraorally the distance between the retromolar pads, using a caliper. The caliper is then placed on the template to identify the proper size of tray to use. The upper arch: measure the greatest distance between the buccal faces of the alveolar ridge with the caliper.

Place the caliper on the measuring template to identify the proper size of tray to use.

If activation and the removal of the impression tray using the pressure technique occur correctly, it is not necessary to use an adhesive with elastomers or polyether, in combination with the impression trays. For certain particular hard impression case, the specialist may select the adhesive suggested by the impression material manufacturer.

Disinfect in accordance with the instructions provided by the maker of the impression material used. The black color “metal sound” can withstand a maximum heat of up to 600 degrees Fahrenheit, and are suitable for sterilization in an autoclave.

The Pozzi Schreinemakers Edentulous Trays with calipers and tray selection template.

Group/Item# 003-2-0012

- Reusable Trays
- Ask About Our Introductory price for kit

The Pozzi Schreinemakers Edentulous Trays have gained a reputation as the #1 impression tray due to the outstanding features and benefits.

**Features**
- Autoclavable
- Border lock
- Made from Ryton, Polyphenylene Sulphide

**Benefits**
- Easy to remove Impression Material
- Holds impression on tray without Adhesive
- Use alginate or silicone impression material
- Light Weight

**Benefits**
- Easy to remove Impression Material
- Holds impression on tray without Adhesive
- Made from Ryton, Polyphenylene Sulphide

- Use a brush and cleaner before autoclaving the trays
- Small slits in trays so material goes in trough for hold
- Comfortable to Patients
- Comes in 5 sizes Maxillary & Mandibular
Dear Dental Professional:

American Tooth Industries is including this article for clarification as to the uniqueness of the Justi Blend® Tooth Line.

The structure of Justi Blend® anterior hardened plastic teeth creates the vitality of natural teeth. The centrals, laterals and cuspids are manufactured with the same HUE, but each has a different VALUE. It is this combination of tones blended together in one set that give that natural look.

The semi-translucent body creates the look of depth within the tooth and reflects color from within, as dentine does in a natural tooth.

Justi Blend® Posterials visually match as closely as possible the cuspids, left and right. It does not match the centrals or the lateral teeth. It is manufactured with the same HUE but has different VALUES or TONES. Following the studies of U.S. Universities, it was concluded that natural posteriors are darker than the centrals and laterals. American Tooth Industries is following this characteristic.

The posterior teeth are available in 18 articulating upper and lower molds in 0º, 10º, 20º and 33º. They are available in anatomical medium and long shapes.

Justi teeth are not only of the highest quality, they represent a real value to you and your business because of this unique feature. For additional information please email to info@american-tooth.com and we will respond promptly. Please include your phone number so a representative can contact you. We appreciate your continued loyalty.
TOOTH EXPRESS Service

- Tooth Express Service is available for all of our product lines.
- No order is too small for us.
- 50% off the price of Dentsply teeth, for all tooth products which are of the same molds and colors.
- Our teeth are manufactured in the U.S.A.
- ADA data on teeth is supplied - most other manufacturers do not.
- Orders received by 12:00 noon PST (3:00 EST) will be shipped the same day.
- New accounts will have FREE freight charges for their stocking order.
- Full sets and broken sets are accepted for credit/exchange - see tooth policy.
- FREE BODY for TOOTH EXPRESS Service in California and Nationwide.
- (800) 628-1437.
- FREE Technical Consultation.
- FREE Full Service can be arranged. We will come to service your cabinets.
- Monthly sales promotions.
- Invoice is included in the package.
- FREE or at-cost accessories - please request an order form.
- House Brand marketing package available to lab’s.
- Immediate Delivery.

TOOTH EXPRESS SERVICE Call TOLL FREE to Order
(800) 628-1437 • FAX (805) 483-8482

VISIT OUR WEB SITE!
www.americantooth.com

Catalogs & Price Lists:
- ATI 2006 General Dental Product Catalog
- New Mold Charts
- Literature Tooth Express / Ortho News
- Leone General Products Catalog
- Expansor Atlas
- #2 LEO - 2006 Leone Price List

Newsletters:
- Tooth Express #27, #28, #29, #30, #31, #32, #33
- Ortho News #25, #26, #27, #28

Services:
- Tooth Express Service
- Free Prewelding

New Products:
ADA-HOW TO IMPROVE SHADE MATCHING
POZZI SCHREINEMAKER EDENTULOUS TRAYS
JUSTI BLEND TEETH - A UNIQUE BLEND