

THE ART OF COLOUR COMMUNICATION

By: Henri Rotsaert, R.D.T.

Like the elusive qualities of beauty, the perception of colour lies in the eye of the beholder. Subjective, emotionally charged and culturally conditioned, the interpretation of colour resists objective definition. Although the visual stimulation of reflective light is first received by the eye, the true sensation of colour is determined in the brain. Each one of us perceives colour from a unique perspective, influenced by the subtle interplay of physiology, psychology, culture and language. Is it any wonder that we have such difficulty communicating the intricacies of tooth colour reproduction to our dental clients and patients?

Selecting the right tooth shade to compliment a well-designed restoration can make all the difference between a mediocre result and an esthetically superior one. Unfortunately, however, shade analysis has traditionally been an imprecise science, heavily dependent on human interpretation and incorporating a high degree of trial and error. In dentistry, shade taking is a very subjective art. For years, both dentists and ceramists have struggled to explain the difficulties of shade matching to their patients. Even with the introduction of computerized shade readers, including the sophisticated ShadeScan System by Cortex Machina, this has been one of the most persistent challenges of our profession.

Balancing art and science

No longer content with simply regaining function, patients increasingly expect a harmonious, natural appearance from their dental restorations. Most of the time, that is precisely what they get, thanks to a judicious combination of technological advancements, new porcelains and the artistic skill of the modern ceramist. Yet, these same patients often have little or no awareness of the challenges involved in duplicating the highly reflective and translucent qualities of natural teeth. Even though patient satisfaction may be high, the real value of restorative dentistry is rarely understood or appreciated.

The truth is that creating a perfect ceramic restoration is as much an art form,

as it is a science. To successfully reproduce the appearance of natural teeth, ceramists have learned to manipulate the subtle properties of colour. We painstakingly translate the dimensions of *hue* (the basic colour), *chroma* (colour intensity) and *value* (colour brightness) into our restorations, always seeking the most vibrant and lifelike effects. Recognizing that colour interacts with its surroundings, we design our restorations to incorporate the modifying colour influence of dentin, soft tissues, the dark background of the mouth and the light sources that illuminate the face. During every step of the fabrication process, we

'In order to use colour effectively, it is necessary to recognize that colour deceives continually'

—Joseph Albers

strive to achieve a colour match that will blend most naturally with the surrounding teeth. When we accomplish this goal – and a good ceramist can achieve it with the help of the patient and dentist – it is usually because we have set our sights beyond the basic levels of technical capability and aimed for the elevated platform of true art.

Subjective colour response

Despite our best efforts, there are times when the exchange of shading information between the dentist and technician is inadequate. These communication deficiencies are inevitable and frequently result from variability in materials, methods and skill levels. Even when patients are actively involved in the shade selection, acceptance of the final product depends on a multitude of subjective factors. As a result, even the most carefully fabricated restoration colour may be perceived as

inaccurate by the patient. This gap between expectation and final product can be very frustrating for everyone concerned and, if not handled correctly, can potentially result in a loss of credibility for both the dentist and the ceramist.

Ultimately, it is the responsibility of the ceramist to compensate for shading deficiencies by verifying the restoration colour in the mouth and making minute changes in colour and form. Satisfying the individual preference of the patient is often a delicate balancing act that requires considerable skill, diplomacy and patience. In some cases, successful restorations require patients to invest a fair amount of time, working closely with the ceramist to achieve the ideal shade selection and colour match. How much easier our job would be if our patients had a clearer understanding of the inherent difficulties in shade measurement and fabrication! Perhaps, then, they would co-operate more willingly and have a higher level of appreciation for the artistry and skill involved in preparing a restoration that has all the characteristics and colour nuances of a natural tooth.

Visual and spatial ambiguities

It occurred to me that, if we could only put these challenges into a context that patients could grasp quickly and easily, we could effectively increase their confidence levels and add real value to the restoration process. Motivated by the potential benefits that improved patient communication would bring, I decided to take this challenge personally. I went searching for a method that would clearly demonstrate the psychological and physiological mysteries underlying the process of colour perception and replication.

Hunting for a solution for this problem, I turned to the world of art, where the principles of colour harmony are well defined. I was drawn to the work of Joseph Albers, one of the great colour theorists of the 20th century. Albers was fascinated by the ambiguities of visual and spatial perception. His penetrating studies of colour, space and movement shaped an entire generation of young artists and his

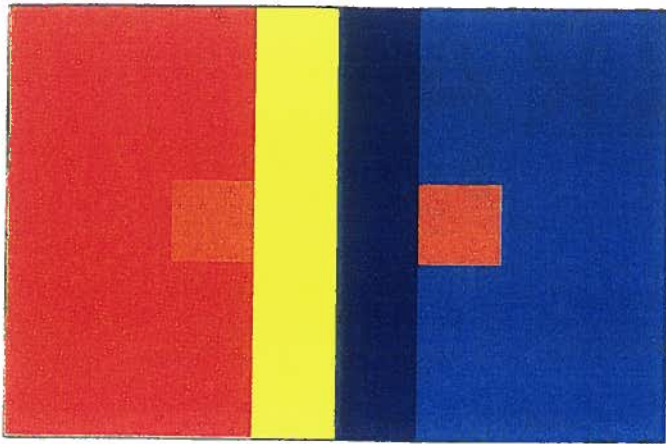


Fig. 1 The horizontal strip is the same shade of ochre.

expressive publication, *Interaction of Colour*(1), is still considered to be one of the definitive works on colour theory. In his famous series of paintings, *Homage to the Square*, Albers utilizes colour to produce deceptive and unpredictable effects, altering the perception of hue by surrounding it with differing colours.

Inspired by his work, I made a colour chart based on one of Albers' most compelling images. I have since used this chart extensively in my laboratory, with positive results. This colour chart can be made quite simply, using coloured paper, as illustrated in Figure 1.

The colour allocations are as follows:

- 1) Black background
- 2) Light blue stripe
- 3) Dark blue stripe
- 4) Yellow stripe
- 5) Light orange stripe
- 6) Ochre stripe for the middle – this must always remain removable

Assembling the various stripes as illustrated in Fig. 1 will create a small slot or opening behind the yellow and dark blue stripes. The ochre stripe should always remain unattached, so that it can be easily removed from the slot to demonstrate the dramatic, colour changing effects of the contrasting background.

Simple as it seems, this chart has proven to be a very useful tool for

demonstrating the challenges of colour communication. When viewing the chart, both my dental clients and patients are deceived by the juxtaposed colours and remain convinced that the central colour stripe is composed of two different shades of ochre. Imagine their astonishment when they discover that the stripe is actually one continuous colour! This ingenious illusion has tricked their eyes and brains into modifying the optical composition of the juxtaposed colours. What they see is not the reality of colour but the perception of colour, as interpreted by the intellect.

Conclusion

Once a client or patient has participated in this quick and easy experiment, I find that they have a much clearer understanding of colour interactions in the shading process, have a greater respect for the artistry of the restorative profession and are far more accepting of the inherent quality of their dental restorations. We have persuaded so many patients with this simple little device, that Josef Albers has virtually become a hero

in our lab. I highly recommend that dentists and ceramists consider adding this colour chart to their repertoire of communication tools. It is, by far, the easiest and most effective way that I know to demonstrate the difficulties inherent in the fine art of colour communication. ■

References

1. Josef Albers, *Interaction of Colour*, Yale University Press, New Haven, 1971.

About the author

Henri Rotsaert is the founder of Rotsaert Dental Laboratory Services Inc., a company based out of Hamilton, Ontario, Canada since 1964. Mr. Rotsaert has been well-recognized for his contributions to the international dental community and has received numerous awards for professional excellence at the regional, provincial and national levels. He currently offers consulting services in dental technology and management.



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