

Elements and Principles of Smile Designing

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ABSTRACT

Background: Why do certain smiles amongst us look beautiful while certain only average? All beautiful things in this world are having some specific design features that make them beautiful. The literature is full of articles that have elaborated in an excellent way the clinical steps of smile designing. This article reviews the building blocks of designing, the elements and principles in designing smile, a thorough knowledge of which will change the outlook of treatment planning in the field of esthetics.

Keywords: Dentistry, smile design, Prosthodontics.

INTRODUCTION

Smile is one of the facial expression that is essential in expressing friendliness, agreement and appreciation. Smile is the most important social bonding gesture, and the most important professional announcement - it tells others who you are. The importance given to a beautiful smile is not new. The search for beauty can be traced to the earliest civilizations. Throughout the history of humanity, healthy teeth have represented a symbol of youth, health, beauty and strength. Paleodontological research has proven that some form of cosmetic dentistry existed in ancient times.¹

The ancient Greeks introduced and understood the important parameters of beauty called the "golden proportion". These principles have been long used by renowned and famous artists, builders and designers for thousands of years². Today, we blend these design principles into beautiful smiles by carefully managing size, shape, alignment and proportion to create a result that is natural and pleasing to the eye. Irwin Smigel "father of aesthetic dentistry" (Fig.1) has been involved with

many major developments in dentistry over the past three decades.

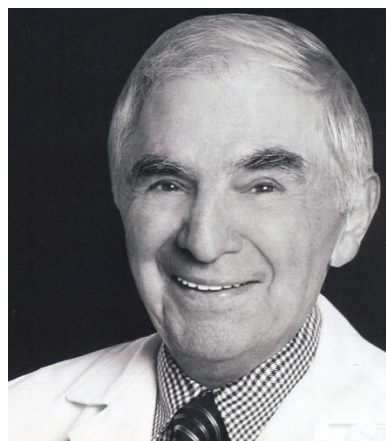


Fig 1: Irwin Smigel "father of aesthetic dentistry"

Fortunately with the work of this great man we now understand the principles of nature and exactly what makes a nice looking smile look beautiful. We call these principles the "Principles of Smile Design". There is both an art and a science involved in restoring and creating strong attractive smiles. When good cosmetic artistry is combined with modern dental materials and expert training,

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we can be assured of a durable radiant and healthy new smile that speaks volumes. The ultimate goal of an esthetic makeover is to develop a peaceful and stable masticatory system, where the teeth, tissues, muscles, skeletal structures and joints all function in harmony (Peter Dawson)³.

The elements and principles of design are the building blocks used to create a work of art. The elements of design can be thought of as the things that make up a painting, drawing, design etc. Good or bad - all piece of art will contain most of it. The Principles of design can be thought of as what we do to the elements of design. How we apply the Principles of design determines how successful we are in creating a work of art.

ELEMENTS OF DESIGNING

Line- direction and shape

It is an enormously useful and versatile designing device . A line is a form with width and length, but no depth.

Lines in a particular **direction** contain their own power of expression and emotional significance, which can be classified as follows:⁴

- Vertical straight lines represent strength, power, and masculinity.
- Horizontal straight lines represent the surface on which we are born, live, and die and express equilibrium, passivity, and tranquility.
- Inclined straight lines express dynamism, movement, and joy.
- Curved lines represent the gradual transition between two planes (vertical and horizontal) and express gentleness, delicacy, femininity, and sensuality.

Artists use lines to create edges, in turn the **shape** of objects. A smile artist can completely change the shape of a tooth by changing the line angles, a skinny tooth look wide and a crooked tooth look straight by manipulation of the line angles. Being able to understand the line angles and having the skill to manipulate the line angles to create different tooth shapes is one of the most important skills a cosmetic dentist should possess. Having this ability gives the dentist the

power to change the looks of patient during temporization. It enables a dentist to change the look of final restoration by contouring them into different shapes. Being able to see the line angles of teeth allows the dentist to see what is wrong with each tooth in the smile and the knowledge of what it would take to correct it.

More mature and masculine smiles have line angles that are straighter creating more rectangular shaped teeth. More feminine teeth have more rounded and fuller line angles. The curvyness of the line angles can create beauty in the smile. (fig.2)



Fig 2: Variation in line angles can give various shapes to teeth, depicting the personality of a person.(image has been taken from a digital library in a smile designing soft ware)

Size

Size is simply the relationship of the area occupied by one shape to that of another that is, how big or small something is. In design, size can *function*, size can *attract* or size can *organize*. Variation in the size of the teeth either with its own length and width or with respect to other teeth will make the smile look more natural instead of a “chicklet” teeth appearance⁵.(fig.3)



Fig 3: Non -variable smile giving chicklet teeth appearance

Designing should be such that the largest piece of art gains the attention of a viewer than the smaller ones. The arrangement of lateral incisor 1 to 2 mm above the level of incisal plane and placement of canine so that only its mesial borders are visible makes the central incisors most dominant teeth of dental composition.⁶ Organization in size can be obtained by arranging the composition in such a way that larger object appear close and smaller objects far.

Texture

Texture is the surface quality of a shape - rough, smooth, soft hard glossy etc. Surface texture directly influences the value, color saturation and zones of light reflection and absorption. The natural tooth's surface is composed of horizontal and vertical concavities and convexities that vary in complexity and intensity from tooth to tooth. Achieving the desired level of esthetics in restorations is rarely possible when these structures are not faithfully replicated. Surface texture plays an important role for the aesthetic result of our restoration, and the expertise and ability to reproduce it, help imitate such processes as the tooth's natural ageing. As nature is actually the only model for our work, the careful observation of natural teeth, together with the development of the necessary skills are the key to an esthetic restoration.⁷

Colour

The Basics of Color

The color of an object is determined by a light source and visible light that it reflects or emits. In other words, the color of an object is determined by the light that enters the human eye from that object. So there are essentially three elements of color⁸:

1. A light source.
2. The object that absorbs, transmits, reflects, or scatters the light from this source.
3. The interpretation of the result by the human visual system.

This aspect also includes the interaction between the observer and the light source. Light is a

form of visible energy that is part of the electromagnetic spectrum. Specific wavelengths of radiant energy may be used to identify the type of energy. The visible spectrum ranges from about 380 to 780 nanometers (nm). When daylight passes through a prism, it is refracted (bent), and each wavelength changes direction by a different amount. This separates the various wavelengths, and the individual colors of the visible spectrum are seen (Figure 4). Because passing these individual colors through other prisms doesn't produce further change, we can demonstrate that daylight is composed of all the colors of the visible spectrum and that "white" light is produced when all of these colors are combined.



Fig 4: The individual colors of the visible spectrum.

Hue⁹ Hue is that quality by which we distinguish one color family from another, as red from yellow, or green from blue or purple. It is the family name we apply to a group of colors. There are ten hue families in the Munsell Color Order System, and they are designated by the following upper-case letters: **R** for red, **YR** for yellow-red, **Y** for yellow, **GY** for green-yellow, **G** for green, **BG** for blue-green, **B** for blue, **PB** for purple-blue, **P** for purple, and **RP** for red-purple (Figure 5). Each of these ten hues is further subdivided into ten numbered segments. For example, the middle red would be 5R.

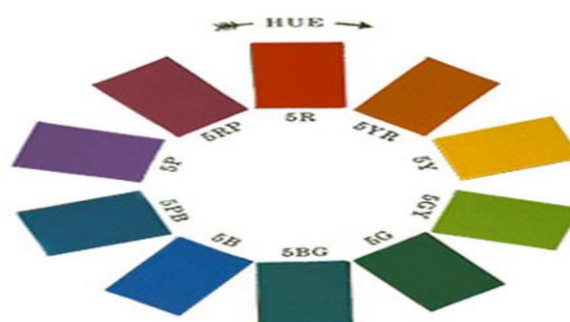


Fig 5: The ten hue families in the Munsell Color Order System.

Value Value is that quality by which we distinguish a light color from a dark one. In other words, this is a colorless distinction. The possible

range of values used in describing the lightness or darkness of a surface in the Munsell Color System extends from zero to ten¹⁰. Black is zero and white is ten with a range of grays between (Figure 6). The value of a color is determined by which one of the grays it matches on the scale. Colors with low value numbers are termed dark colors, and one with high value numbers are called light colors. To compare the color match between a restoration and tooth, value is generally considered the most challenging of the three dimensions of color. One reason is that value differences are readily detected, even by an untrained eye, and restorations with improper value are frequently described by patients as being too dark or too white. In addition, value differences are more easily detected both close-up and at a distance, whereas differences in hue and chroma become less noticeable as the viewing distance increases.



Fig 6: The range of values in the Munsell Color Order System.

Chroma

Chroma is that quality of color by which we distinguish a strong color from a weak one; the degree of departure of a color sensation from that of white or gray; the intensity of a distinctive hue; color intensity. The chroma scale starts from zero, or achromatic, with increasing numeric values indicating stronger colors. In terms of chroma, color is defined by Munsell as weak, moderate, and strong. A strong chroma would be in the range of seven to ten¹¹. There are standards for very strong chromas above ten. Different chromas of a particular color are arranged from those of least purity or intensity on the left to those of greatest purity on the right. (Figure 7) shows six reds arranged in ascending order from a weak one (grayish) on the left to a strong one on the right.



Fig 7: Different chromas of a particular color are arranged from those of least purity on the left to those of greatest purity on the right.

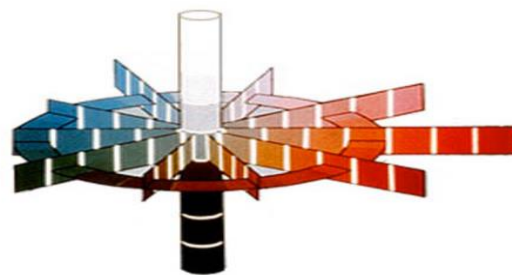


Fig.8 - A wheel with the hues designated around the periphery of the wheel, the center value axle, and the spokes representing increased chroma going from the center of the wheel toward the rim.

PRINCIPLES OF SMILE DESIGNING

Balance

Balance is the distribution of the visual weight of objects, colors, texture, and space. If the design was a scale, these elements should be balanced to make a design feel stable. In symmetrical balance, the elements used on one side of the design are similar to those on the other side; in asymmetrical balance, the sides are different but still look balanced.¹²

A balanced composition feels right. It feels stable and aesthetically pleasing. While some of its elements might be focal points and attract our eye, no one area of the composition draws our eye so much that one can't see the other areas. Balancing a composition involves **arranging both positive elements and negative space** in such a way that no one area of the design overpowers other areas¹³(fig.9 ,a&b). Everything works together and fits together in a seamless whole.



Fig.9: Arrangement of positive and negative spaces in two figures. a. An unbalanced composition b. balanced composition

An unbalanced composition can lead to tension¹⁴. When a design is unbalanced, the individual elements dominate the whole and the composition becomes less than the sum of its parts. In some projects, unbalanced might be right for the

message a smile artist is trying to communicate (fig.10).



Fig 10: Asymmetric composition fabricated to give the original dentition look to the patient

Proportion

Proportion is the relationship of two or more elements in a design and how they compare with one another ¹⁵. Proportion is said to be harmonious when a correct or desirable relationship exists between the elements with respect to size, color, quantity, degree, or setting. Good proportion adds harmony, symmetry, or balance among the parts of a design.

Proportion is another important concept of smile designing. It is often defined in context of symmetry and evenness (fig-11). Historically, harmonious effects are attributed to certain proportions. The widely known golden mean of Pythagoreans is one example. It exist when the ratio of shorter length (0.618) to a longer one (1) is the same as the ratio of longer to the whole. Such a proportion i.e, the one approaching the ratio of 5:8, is said to have an especially esthetic effect ¹⁶. The golden mean can also be expressed geometrically in the pentagram, the sides of which are these proportions.

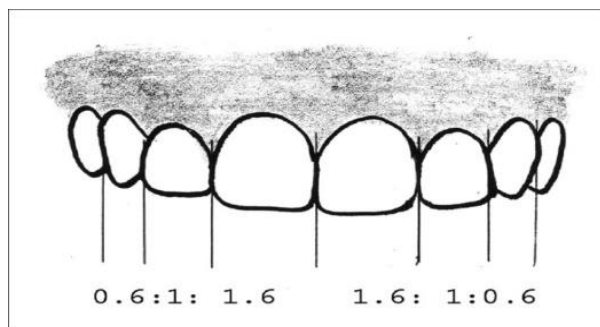


Fig 11: The golden mean shown by these teeth in frontal view.

Dominance

In many dynamic designs and artworks, one dominant aspect is the first to claim viewers attention. Known as a focal point, it provides a way to access the page or the canvas. Once "in," one can look around, making instinctual connections between pieces to get a sense of the unified whole. The artist puts greater emphasis on one part of the overall design to communicate a specific intent or a primary reason for creating the work. Typically, the center of the design is the first place one looks. As elements move away from the center, they become less and less dominant. An element can have more dominance than another by giving it more visual weight. The greater its visual weight, the more an element will attract the eye and exhibit dominance. Identical items can't dominate each other. To exert dominance, an element has to look different from the elements it's meant to dominate ¹⁷.

CONCLUSION

Irrespective of the treatment approach, sticking to principles of art and visual perception, and understanding symmetry, asymmetry, and "perfect imperfection", and contrasting the different approaches when applied to treating individual patients will create a beautiful and natural smile. The craft, skills and techniques in designing smile is not a one man show, rather a multidisciplinary approach and the role of prosthodontist is significant. Whether, a young aged teen or a person belonging to middle age or an edentulous patient with number of geriatric changes in his face, a prosthodontist can be a best smile maker in this wide range of dental patients.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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