Creating predictable aesthetic results

Dr Scott W Finlay explains the application of the functional aesthetic matrix

Table 1: Functional aesthetic analysis

![Image]

Dr Scott W Finlay DDS, FAGD, FAACD graduated with honours from University of Maryland, Baltimore College of Dental Surgery and a GPR program at a Washington DC Area Trauma Hospital. He was accredited by the American Board of Cosmetic Dentistry for accreditation and is a contributing editor for the Journal of Cosmetic Dentistry presenting the examiner’s perspective. He is also the author of the recent revision of Contemporary Concepts in Smile Design, which is the criteria guide that serves as a basis for Accreditation in the AACD. Dr Finlay is a senior faculty member for the Dawson Academy. He teaches contemporary functional concepts related to aesthetics and restoring anterior teeth in a hands-on format. He has contributed articles that have appeared in professional journals such as the Journal of Cosmetic Dentistry, Dentistry Today, Dentistry (UK) and Vistas. He began his practice in Annapolis, Maryland in 1987 (www.AnnapolisSmiles.com) with a special emphasis on aesthetic and restorative dentistry. Dr Finlay is a fellow in the Academy of General Dentistry and has been awarded four gold metals in the AACD annual Smile Gallery. He has appeared on Baltimore Fox 45 Morning News and two other health television programmes as an expert in dental aesthetics.

The baby boomers are coming of age. They are cumulatively beginning to experience the signs and symptoms of dental deterioration. They represent a significant demographic with very special dental needs. They enter our offices asking to improve their oral health and their smiles1. Many have done their online research and are requesting veneers, whitening and bruxism kits. The restorative dentist’s challenge becomes the reconstruction of these smiles with plastic and glass, with predictability and durability. Adding pressure to this demand, the media and economy have influenced the mindset of the consumer, resulting in more educated shoppers who put great value on having it done right the first time2.

Although the ability to provide tooth-coloured restorative materials and techniques has been available for the past century, in the earliest form as silicate cements, the predictability and aesthetic results were disappointing3. Great progress was made in dental materials over the ensuing decades, but the missing link was the relationship of these aesthetic goals and the proper management of the engineering of the system within which these teeth functioned. These wonderful advancements in materials have allowed us to be even more conservative and effective in providing dental treatment4. However, relying on technology alone can be a double edge sword as it can also have the effect of getting us into trouble faster. Dr Dawson tells us that 90% of failures are not attributed to the materials or techniques, but our failure to plan. As the materials or techniques, but our failure to plan. As the materials or techniques, but our failure to plan. As our understanding of the design of the stomatognathic system has evolved, we began to identify and address the two primary etiologies of dental deterioration: bacteria and force. By creating restorations that mimic natural tooth contours and with proper positioning, we can provide an environment that is cleansable and maintainable for our patients, and promote the best opportunity to obtain optimal biological health5.

With the application of the functional matrix presented Dr Dawson, we can begin to manage the risk factors related to force. The functional matrix is a sophisticated system that is composed of three primary elements: teeth, muscles and a joint. A compromise in any one of these components will inescapably influence the other two. This matrix, when appropriately functioning, allows the muscles to respond in a non-antagonistic way, providing comfort and efficiency.

The design of this system allows the temporomandibular joints, when they are in their hinge axis position, to facilitate balanced simultaneous contacts on all teeth, with an anterior guidance that is in harmony with the envelope of function and a peaceful neuromusculature. This helps to ensure an orthopedically stable position. The starting point of this functional matrix begins with a balance distribution of forces with muscles that are comfortable and coordinated due to the non-conflicting proprioceptive feedback from the sequentially loaded teeth (Figure 1). We begin with the assessment of the joint, because we are focused on predictability. Predictability that provides us with a reproducible, specific reference point we refer to as centric relation that is based upon our scientific understanding of the physiology in this orthopedically stable relationship6.
Our goal is to provide predictable solutions for our patients with the absolute best aesthetics possible. Our responsibility is to be our patient’s advocate in accomplishing this endeavour as conservatively as possible through the application of a timeless protocol. This protocol is a marriage of our understanding of how this system functions and our vision of universally accepted parameters of dental aesthetics, otherwise know as smile design. This protocol is comprehensive in nature and is evidence based.

The application of this advanced level of treatment planning is not about elitism, or dentistry for the rich and famous. Whether the solutions involve plastic or ceramic, implants or partials, the decision process remains the same. We must not be overly focused about selling products off the shelf like veneers, bonding or implants, but a treatment solution that endorses and promotes health, providing balance in a maintainable environment.

This consistency in treatment planning presents a unique value in challenging economic times, when treatment may involve transitional stages that allows for upgrades in the future when resources permit.

The process begins with a complete exam and an understanding of the patient’s desires. Our responsibility is to study this forensic data and make recommendations for treatment based upon the signs and symptoms of dental disease that exist. Educating the patient about their dental needs and relating them to their desires, provides a platform to make decisions that are well supported and in the patient's best interest. The protocol involves four stages:

- **2D treatment planning** – an assessment of the biological, structural, functional and aesthetic components of the smile creating a vision with the end in mind
- **3D treatment planning** – the in vitro creation of a dental blue print through the use of diagnostic mounted models with the anticipated surface changes to the teeth modelled in wax
- **Prototyperestorations** – the in vivo testing of the design of the contours and positions of the teeth in the patient’s smile
- **Definitiverestorations** – the delivery of the final restorations.

In 2D treatment planning we begin with the first of our checklists to help insure our result. In our 2D functional aesthetic checklist we assess the stability of the joints and complete a tooth-by-tooth evaluation (Table 1). We begin to create a vision of potential solutions for the aesthetic and functional needs of the patient. Smile design are those
parameters of dental aesthetics that have been recognised and vetted over the past several decades (Figure 2). Our analysis of smile design is divided into three sections to conceptually assist our evaluation (Figure 3). We begin with the broadest strokes of smile design and progressively narrow our focus to critique the individual characteristics in our attempt to emulate nature. The concepts of global aesthetics focuses on those criteria that are observed in un-retracted smiles and how the smile orients to the face and the lips that encircle them.

As we continue to narrow our study, our attention aims toward the elements of macro aesthetics. Macro aesthetics identifies the shapes and contours of teeth and their relationship to each other. Our final frame of reference converges on micro aesthetics, which are those criteria related to the subtle intricasies of shade, textures, translucencies and surfaces effects that make teeth look like teeth. These are the criteria that aid us in fooling the eye and allowing restorations to blend invisibly into the smile. Although aesthetics in the purest sense is a subjective experience that is open to artistic interpretation, it is first important to establish a universal set of objective, systematic criteria that will allow us to measure and guide our evaluation process. It is important to keep in mind however, that every smile is not the same. The true role of dentistry is to provide benchmarks that will assist in this predictability. The first is an incisal edge matrix. With a mounted approved provisional restoration, a putty matrix can capture the form of this incisal edge position in space with the final restorations. The second index that the technician will create is a custom incisal guide table. With the mounted approved provisional model in place, the incisal pin is raised off the incisal table of the articulator. A dollop of resin or composite is placed on the incisal table with a lubricated surface. The approved provisional model is then moved through all excursive movements defined by the guidance that has been carefully refined and captured on the lingual guiding surfaces of the provisionals. The movement of the incisal pin through the resin material on the incisal table will record these contours, enabling the technician to reproduce these surfaces in the definitive restorations.

When the restorative dentist receives the restorations from the lab in anticipation of delivery, he should also receive back the two key indices (described above) for verification. The restorations can then be presented to the patient with a level of confidence that requires very little modification. There should be no surprises at this point, and the final focus prior to delivery should simply be the refinements related to micro aesthetics.

Predictable, durable and aesthetic dental restoration can only come from the implementation of a reproducible protocol. This protocol must honour the functional and aesthetic parameters that are found in nature. In the end, each case is treated four times (Figure 7):

- Visually through the use of 2D Tx planning and smile design
- Visually through the use of mounted models and a Ds wax-up
- Through the use of prototype restorations as a trial test in the patient’s mouth
- Definitive restorations.

The commitment to a successful protocol will eliminate errors due to ineptness and insure a functionally, beautiful result (Figure 8).

“The orientation and alignment of the teeth to the face is a critical communication reference for the laboratory”

References


