

Putting the Plaster on the Table

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Most will agree that the plaster model has been the hallmark of orthodontics. Our professional goodness and the relative quality of our orthodontic efforts have all been directly or indirectly judged by plaster models.

Aside from the separate, but also important, questions about faces and facial skeletal patterns, is the plaster on the table the best measure of our excellence? Because the model has long been the only 3-D record of the patient and we believe the model is accurate, we have to agree that the model itself is indeed the best measure available so far. The problem is not in the model, but in our assessment of the model.

In school we learn how to make a proper model, but we spend as much time on the art bases as we do in a critical assessment of the patient information the model contains. The assessment process is widely seen as an expert viewing the model from various angles and making a subjective opinion based on some imprecisely described personal (and ever-evolving) concept of perfection, usually related to Edward Angle's Old Glory skull.

What's wrong with this picture? In today's evidence-based professional goals, it is lacking in any reproducible measure. Expert opinion is not consistent from time to time within the same expert, and clearly opinions vary between experts.

What do we need? Patients vary, and we need a clearly defined reproducible goal for each individual patient. The gold standard will vary for each patient based on their own individuality, but each individual patient's gold standard will be the same gold standard for anyone to use to measure against. We do this now, but each judge is allowed to have a personal gold standard for each patient, and variation is unavoidable.

An individual patient gold standard is not Utopian. Remember how we did set ups in school with wax that would not stick to the plaster and swore that when we got out we would never do one again? That was before the digital age, and now most digital models can be set up cleanly and rapidly so the student (or the ABO candidate) can establish clearly defined treatment goals before starting. Here is the time and place to discuss individual treatment modifications—not after the patient's treatment is nearly completed—and what

an opportunity for evaluation of the candidates understanding of treatment!

Given that a mutually agreeable digital gold standard treatment goal is established, there still remains the problem of assessing the goodness of the actual treatment vis-à-vis the gold standard. The ABO has recognized the problem of model assessment and done the logical next step. The candidate established a standard for measuring a series of given parameters and even supplied a measuring tool. This was a progressive step, but fraught with the same inherent problem that has always existed with cephalometrics—the inability to select precise points in general areas and on surfaces where points are not easily defined. The result is that different examiners will select slightly different points, with an envelope of error surrounding the “point” selected. Bottom line: a nonreproducible system that is inadequate for objective and systematic results.

However, technology keeps moving ahead. There are now in development systems that can superimpose individual teeth of the finished model on themselves in the gold standard setup and record automatically the exact movement it took for each tooth to become aligned. This will be possible with no skilled help and an untrained person can operate the system. No points are picked and every examiner gets exactly the same score. A treatment model assessment that is now reproducible and reliable.

This development is obviously useful for assessing treatment, but it also will automatically give the movement that was needed to make the pretreatment model become the gold standard setup: an automated difficulty index!

All the questions are not answered, however. The detail possible will supply the change for each tooth in terms of rotations, tips, and torque as well as translation vertically, horizontally, or transversely. In other words, the digital world will give six degrees of freedom, which may be more detailed information than the orthodontist can usefully assimilate.

Because everyone will always get the same information for each patient, the information will be potentially cumulative and, like a systematic analysis of the literature, become available cumulatively for meta-

analysis as the data bank grows. Indeed, small evaluation programs can be weighted to reflect treatment and amounts of tooth directional movement that are more difficult and therefore scored differently from

each other. With complete disclosure of the exact tooth movement amount and direction, almost anything will become feasible and time will determine the best and most useful approach.