BRACKET DRIVEN ORTHODONTICS: A CONCEPT UNDER REVISION
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The last twenty plus years in the history of orthodontics has certainly been the era of the pre-adjusted bracket. The desire of the orthodontist to reduce the time required for archwire fabrication along with the orthodontic companies’ enthusiasm to have a new and different idea to market, contributed in some degree, to the success of the concept of the pre-adjusted bracket.

It is not the intent of the author to diminish, in any way, anyone’s contribution to the development of the concept of the pre-adjusted bracket. The intent is to take a look at how this concept is understood and utilized in the world of orthodontics today, and to offer a new concept of bracket design that makes the work of orthodontic treatment easier, simpler and will greatly reduces chair time needed for each patient.

The Concept of the Pre-adjusted Bracket
“Straight Wire: The Concept and Appliance” by Dr. Lawrence Andrews was utilized as the reference book in establishing the original ideas and design of the pre-adjusted bracket. The field of orthodontics will forever be indebted to him for his contribution toward quality orthodontic treatment.

Dr. Andrews’ goal was to develop a set of orthodontic brackets whereby the edgewise slot is inserted into each bracket by the manufacturing process in such a fashion that predetermined torque
and angulation angles are formed between the long axis of each tooth and the occlusal plane when a full sized archwire is utilized. With this manufacturing process, the proper in/out relationship between the teeth would also be established. This negates the need to insert first, second, and third order alignment bends into every archwire. Despite these advantages, however, the pre-adjusted bracket offers no advantage over the non-pre-adjusted bracket with orthodontic procedures involving:

1. Incisor intrusion for bite opening
2. Correcting rotations
3. Treating Wits sagittal discrepancies
4. Space closure in extraction cases
5. Anchorage requirements

These five categories represent at least 75 percent of orthodontic treatment.

To acquire the necessary data to establish the ideal torque, angulation, and in/out for each individual tooth, the records of 120 individuals were selected and examined. The criteria for the selection of the individual cases that made up the research sample are explained on page 7 in the following statement (1): The cast are continually reexamined, and the less exemplary are screened out. The cast reported on here are the 120 best of the total sample, as of 1988. These dentitions (1) have never been subjected to orthodontic treatment, (2) are well aligned and are pleasing in appearance, (3) appear to have excellent occlusion, and (4) would not benefit from orthodontic treatment....
Utilizing the data obtained from the 120 cases, Andrews’ “Fully Programmed Bracket System” along with his “Six Keys to Optimal Occlusion” was developed. *It is stated that these six keys were consistently present in the research sample which was composed of 120 cast of naturally optimal occlusion.* The sagittal jaw relationship of the 120 cases was not defined; however, because it is stated that all 120 cases had *naturally optimal occlusions* one must assume that they all were Wits sagittal Class I cases, and no sagittal jaw discrepancies cases.

Figures 12.19 through 12.21 on page 236 demonstrate Wits Class I, II and III type sagittal jaw relationships. Since there is no occlusal plane drawn, one has to assume that the two vertical lines drawn, one passing through point A and the other passing through point B, are drawn perpendicular to the occlusal plane. In explanation of Figures 12.19 through 21 on page 236 and 237, Dr. Andrews makes the following statement (2): *In Class (II and III) jaws, the cortical bone boundaries in each jaw prevent concurrently attaining optimal incisor interarch inclination. Correction of jaw disharmony, therefore, is essential for correct incisal inclination and interarch relationship, and optimal arch lines.* Dr Andrews continues on page 237 with the following statement (3): *Jaw surgery should be recommended when anteroposterior or buccolingual jaw position prevents treating the dentition to optimal arch lines, and to occlusal and anterior-limit goals. In this situation, where jaw disharmony is not correctible orthopaedically and when the patient refuses surgery, a less-than-optimal result is inevitable.*
Chapter 9: Beginning on page 179 is the following statement (4): As reported in the measurement study (Chapter 4), the inclination range for the incisors was greater than the other teeth. This presumably does not reflect differing tooth morphology, but differing skeletal patterns that exist even with patients with exemplary occlusion. There must be at least three standard brackets, each with a different base inclination to accommodate one of the three acceptable but different post treatment interjaw relationships.

It is further stated that there would be no need for three types of cuspid and bicuspid brackets. The Wits Class I sagittal jaw relationship bracket would also work with Wits Class II and III sagittal jaw relationships. The question is obvious: If you change the torque angle in the incisors brackets, which plays a major role in the anterior posterior position of the incisors, why should you not need to change the angulation angle in the cuspid and bicuspid brackets, which also plays a major role in the anterior posterior position of the cuspids and bicuspids? The answer seems very obvious: You must, if a Class I relationship is to be established between the maxillary and mandibular posterior teeth.

As previously stated, the edgewise slot of the pre-adjusted brackets are designed to create certain torque and angulation angles between the plane of a full sized edgewise archwire and the long axis of the teeth. Once the arches are leveled, the occlusal plane and the plane of the edgewise archwire become parallel. Therefore, the angle formed by the long axis of any tooth to the plane of the edgewise archwire would form the same angle to the occlusal plane. The Wits Analysis is an ideal cephalometric measurement to determine jaw
relationships, because it uses the occlusal plane to establish the Wits measurement.

It has been established by Jacobson that a Wits measurement of +1mm in females and a -1mm in males is considered an ideal sagittal Class I jaw relationship. Likewise, the predetermined torques and angulations of the pre-adjusted bracket system is ideally suited for treatment of the Wits Class I case only. A Wits measurement of +3mm or greater is usually considered as Class II. A Wits measurement of less than -2mm is usually considered as an apical base Class III. The range between the Class II and Class III is usually considered Class I.

**Discussion:**
As a result of statements (1, 2, 3 and 4) it is apparent that the torque and angulation angles of the pre-adjusted bracket system were developed from a sample of 120 Wits sagittal Class I cases, and therefore, if reason is to prevail, modification of these angles is necessary to obtain optimal occlusion when treating Wits sagittal Class II (+3mm or more) or III (less than -2mm) cases. The marketplace has chosen to ignore statements (3 and 4) and thereby have generated the idea that a prescription containing a single set of torques and angulation angles, and in/out for each tooth, are ideal to treat all type cases, either extraction, non extraction, and or Wits sagittal Class I, II or III.

In Wits sagittal Class II and III cases the pre-adjusted bracket actually works against the establishment of the treatment goals needed for optimal occlusion. Only the ingenuity and hard work of orthodontists
who have developed complicated and time consuming procedures to modify the predetermined torque and angulation angles of the pre-adjusted bracket have made it possible to achieve successful treatment in sagittal Class II and III cases.

The beauty of the Cannon Ultra II Bracket System, with its unique Wing slot, is that it will greatly reduce and simplify the work previously needed to treat Wits sagittal Class II and III cases. *The design of an orthodontic bracket should not dictate the final torques and angulations of the teeth, but rather facilitate their establishment.* Orthodontic treatment need not be hard work or complicated.

The concept that the only way to obtain optimal post treatment occlusion in Wits Class II and III sagittal cases is to first correct all jaw disharmonies seems unrealistic. In today’s world, surgical correction of the Class II or III sagittal jaw relationship is simply not always possible. Presently, most insurance companies do not cover orthognathic surgery. In many areas of the United States, the cost of orthognathic surgery can be as much as $35,000, an amount beyond the budget of most families. There are also individuals who simply will not consider surgery due to their real fear of the procedure. There are also numerous Wits sagittal Class III cases with a harmonious profile. Surgery to correct these type Wits sagittal Class III cases would result in an unacceptable convex face.
What is the answer? The answer is found in the new bracket design concept of the Cannon Ultra II Bracket System. It is a bracket system that adds a Wing slot to the existing pre-adjusted edgewise bracket. The Wing slot allows for easy individualization of the torque and angulation angles needed for successful treatment of mild to moderate Wits Class II and III cases. The archwires are secured into the Wing slot utilizing the same ligating elements that are used to secure an archwire in the edgewise slot. Another very useful feature of the bracket is that there is a hook on every bracket which proves very helpful in surgery cases and elastic placement.

The idea of trying to design differing pre-adjusted bracket prescriptions for treatment of Wits sagittal Class I, II and III cases is doubtful. Even if it could be done, the inventory of differing bracket designs would be completely unmanageable. The Wits sagittal Class I cases and the Wits sagittal Class I cases that have a Wits sagittal Class II or III tendencies would require three different prescriptions, with three brackets for the maxillary and mandibular incisors.

The next step would be the mild Wits sagittal Class II and III cases, and in these cases not only would the maxillary and mandibular incisors need an additional bracket for mild Wits sagittal Class II as well as mild Class III, the maxillary and mandibular cuspids, bicuspid would also need an additional bracket for Wits sagittal mild Class II as well as mild Class III. Then of course everything would repeat itself in the moderate Wits sagittal Class II and III cases. Furthermore, to compound the problem is the fact that all Wits sagittal Class I, II and III cases at the start of treatment do not always remain Wits sagittal Class I, II and III cases throughout treatment.
The latest new idea in pre-adjusted bracket design is a custom prescription for each individual case. Questions: How do we decide on which Wits Class II sagittal jaw cases remains Wits sagittal jaw Class II during treatment and which ends up with a Wits sagittal Class I? Likewise, which Wits sagittal Class I case remain a Wits sagittal Class I and which one develops into a Wits sagittal Class III?

Growth prediction is a hit-and-miss proposition at best, and crystal balls are very rare. There is no need for growth predictions with the unique Wing slot of the Cannon Ultra II Bracket System. No matter what the Wits sagittal jaw relationship is at the time of finishing the case, the needed torques and angulations can be developed utilizing the Wing slot to establish optimal occlusion.

The major discussion in regard to the Cannon Ultra II Bracket System in this article has been the utilization of the unique Wing slot when treating Wits Class II and III sagittal jaw cases.

For further information on the advantages of the Cannon Ultra II Bracket System download and view “Full Power Point Presentation” in Cannon’s Corner.