Spatial Development, a Frequent Problem in Treatment*

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Most of the ideas in this paper are probably already familiar to you, either evolved out of your own experience, or perhaps noted in a previous contribution from me to the Western Component Group of this Society.

I shall purposely be brief, firstly, because Dr. Strang has already experimented along the lines I here present, and having discarded the principle, is at this Meeting presenting his solution of the problem I attack; and secondly, so that I may spare the member who may read this paper to you. The great distance separating us, and my regretful inability to attend personally, precludes the possibility of presenting this material in the more desirable form of a table clinic. The principle under discussion is *spatial* development, a necessity in practically all cases of malocclusion presenting for treatment.

In the employment of Dr. Angle's last appliance, the writer has developed the use of spiral spring auxiliaries, using the archwire as the axis along which the forces available are applied and distributed. An essential feature of the technique is the use of square archwire .022″ in diameter, which I understand, has been tried by many of you and discarded because it was not strong enough. Yet the use of .022″ round wire has been continued.

Although the use of square archwire requires care, both by patient and operator, the writer has been using it with success for more than three years. He offers it for your consideration as meeting the demands for the continually sought-after delicacy of force application and, more important, for its wide range of usefulness.

"I have combined the principles of Dr. Angle's latest appliances and am now using in most cases the tiny reinforced ribbon arch brackets and the tie brackets, in combination, as in the models shown in the Dental Journal of Australia, Vol. 1., No. 4. A consideration . . . will show you,

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that our available forces are here combined at their maximum advantage to secure movement in an antero-posterior direction,—a most urgent need in the technique of treatment. Using tie-brackets buccally—for mediodistal movements, and tiny reinforced bands (for the ribbon arch mechanism) on the incisors—for labiolingual anchorage, one gains a cumulative and complimentary force for antero-posterior movements. A square arch, .022″ in diameter and used in conjunction with these brackets, offers the maximum advantage,—in that it renders possible, positive force application in each type of bracket. The round .022″ arch, while capable of being used with both types of brackets, offers positive antero-posterior movement in only the buccal regions."[1]

With the use of these two types of brackets in the one unit, to which can be applied either a square or a round archwire as the demands of anchorage or tooth movement require and which may be changed without disturbance, one may well realize the great range and adaptability of such a technique, the possibilities of which there is no need to outline to your analytical minds.

We will therefore pass on immediately to a consideration of the question of the development of space,—a desideratum in most cases of malocclusion, and an admitted limitation in the tie bracket mechanism. You have all approached this problem in various ways and I feel sure that Dr. Strang, out of his greater experience, has presented to this meeting a definite contribution to this problem. Nevertheless, in response to my promise to various members, I here briefly present a technique that has proven to be satisfactory to me, and which is now being used to some extent by most of the orthodontists in Australia.

The essential mechanism for the development of space is a spiral spring auxiliary which can be adapted for use with the square or round arches. The springs may be made of S. S. W. orthodontic wire or stainless steel. At present the writer is experimenting with stainless steel, which seems more applicable to the requirements of this technique on account of its greater strength and rigidity. I have not yet determined whether it is more elastic. The gold alloy springs, .013″ in diameter, are wound at about ten times per cm. onto the axis of .022″ or .026″, respectively, depending on whether they are to be used with the round or the square archwire.

The springs are placed in position under compression, expanded periodically (every two or three weeks), and renewed when necessary. The gold

alloy wire loses some of its temper in the mouth; the steel seems more resistant.

"A consideration of the amount of force available in these springs will convince you how delicate they are—in relation to other forms of pressure application, and how much greater proportion of the applied force is utilized for positive movement. As the spiral spring is coiled around the metal arch, the force—applied through the long pressure, i. e., at either end of the spring and, consequently, the force available, is used up in movement. If care is taken to stabilize the anchorage—when this spring force is being used—there is an absence of "back-lash" or intermittent force application, as in the less stable types (finger springs, loops, etc.). At the same time, the force available is more delicate, constant and acts through a greater range than with the use of more rigid forms, as the threaded arch with nut, and the stop spur applications, used hitherto."[2]

"Recent published measurements by instruments—such as the Irishometer—give the amount of force used by various operators as being between two and ten ounces. Although differing in the manner of their application, all are agreed that our forces should be as delicate as possible. Measurements taken by Major Booth of the Physics Department of Sydney University give, for the gold alloy spiral springs, a force of one and one-fifth ounces per millimetre compression per centimetre length of spring. As the spring, used for measurement, had twice the pitch of those I use clinically, we may quite conservatively assume a pressure of less than one ounce."[3] In brief, delicacy, constancy and positiveness are the properties that may be ascribed to this spring application.

There is no need to detail minor movements such as the opening of space for one tooth, or the movement of teeth into contact, etc., by the use of this force;—the variety and range of its usefulness will be apparent to you on careful analysis. Dr. Strang readily admits effectiveness for such movements, but considers it unable to produce, satisfactorily, mass movements from a localized point. With some misgivings, therefore, I shall outline the treatment of a case where this movement was required.

The patient, aged fifteen years, presented with a deep incisal overbite, both maxillary cuspids completely impacted lingually and the first premolars being almost in contact with the lateral incisors. Treatment necessitated distal movement of the upper arch buccal segments, general arch expansion—upper and lower—and opening of the 'bite'.

Appliances used:—Maxillary arch—Incisors—tiny reinforced bracket bands.
Premolars—tie bracket bands.
1st. molar—tie bracket bands.
2nd. molar—clamp bands and rectangular sheaths.
.022″ round archwire in incisor area.
.022″ square archwire in buccal segments.

Mandibular arch—All tie bracket bands, including 1st. molar teeth; 2nd molar—clamp bands and rectangular sheaths.
Class II intermaxillary anchorage was also used.

Stationary anchorage was employed in the lower arch by use of the square archwire. The round archwire was used in the upper arch in the early stages to facilitate the employment of spiral springs,—as they work more easily on the round archwire. The upper buccal brackets were aligned—picket-fence principle—very slightly and the upper archwire was curved pronouncedly. Spiral springs (four in number) were placed between the lateral and first premolar brackets, and from a stop spur in the first molar region to the second molar sheath on either side, respectively. Thus there were four springs acting independently, yet in conjunction. As the second molars moved distally the spring force was taken from them to the first molars, during which time the cuspid spaces were continually being enlarged, until full room for the impacted cuspids were created. By the time this movement was completed and the necessary expansion gained, the overbite was reduced to normal. The upper incisor segment was not moved anteriorly to any extent, during treatment, being supported by the intermaxillary elastics.

In experimenting, the writer has found it possible to accomplish many and varied types of movement by adequate intramaxillary support. It is often found necessary, however, in distal movements, to move the posterior teeth in series—the second molars, then the first and finally the premolars. This, of course, is not mass movement, but yet is a definite posterior movement and so eminently satisfactory in treatment.

The aim in this technique is to have all the spring forces working together, complementarily, and the writer has found the spiral spring a most

helpful adjunct to the distal moving properties of the tie bracket bands, when used for that purpose. They have never been found to be bulky, and I have been singularly free from complaints from patients, although hundreds of these springs are in use in active practice. They are a little difficult to clean, but as a rule the food they trap is not near any tooth surface.

In conclusion, the writer trusts that, by virtue of his isolation, and being more or less out of touch with the more recent technical developments overseas, this paper, is at least, not an anachronism.

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1, 2, 3, are quotations from a paper by Dr. Taylor, presented before the Sixth Australian Dental Congress at Brisbane, in 1930.