Psychology in Relation to Orthodontia*

J. Howard Furby, D.D.S.
Pasadena, California

Herbert Spencer truly says, "The conception of a part is impossible without the conception of the whole." As this is a sound principle, it becomes necessary before studying Psychology, a part, to know something about life as a whole.

Spencer defines life as "The continuous adjustment of internal relations to external relations." If we turn this definition around and say that all things have life as the result of the change produced by external stimulation, we find that it will not stand. We know many inanimate objects which show internal changes when external stimulation is applied. A good example of this change is shown in the application of heat to ice or steel; the internal structure expands, yet this does not constitute life. However, as living objects are dependent upon external stimulation to maintain life, the definition taken in that sense will suffice.

Now, if human life is adjusted in this way, how does the stimulation get to the internal structures and what is the force that propels it? The stimulation is applied to the senses, such as hearing, seeing, feeling, smelling, tasting and a number of others, among which is the hunger sense and which is very important, as I shall show later. All the acts of life are the result of messages which enter the nervous system through these senses. If we take away all the senses, there is no life, as there is no longer a feeder system from the outside and the internal structures have nothing upon which to act. Personally, I believe that if one sense, that of feeling, were removed, life would cease to exist. To me it is the most important of all the senses and has more to do with the habits of children than any other. Hearing and seeing have very marked effects on the character of the child but the sense of feeling seems to be even more important. Some of these senses and the part they play in habits will be referred to during the consideration of that topic.

*Read at the First Annual Meeting of the Edward H. Angle Society of Orthodontia.

Psychology

What is Psychology? Ladd's definition is the one most generally accepted by Psychologists. He defines it, "as the description and explanation of states of consciousness as such."

James describes, "States of Consciousness" as "sensations, desires, emotions, cognitions, reasonings, decisions, volitions and the like." Psychoanalysis deals with what it terms consciousness of unconsciousness, believing that these two states are entirely separated from each other but are passing messages back and forth to each other at will. It teaches that the unconscious mind is the store house for impulses which have come in through the senses and which may be given back to the conscious mind when it is necessary for the individual to remember something. Yet at times they may come forth when the conscious mind does not will it. Scientific psychology does not recognize the unconscious, or sub-conscious, as some authors prefer to call it, claiming that when a thing ceases to be conscious it is nothing. These authors admit, however, that when stimulation is applied to any part of the nervous system, it leaves an impression in the structure of the neuron whereby it is susceptible to a later stimulation and the result of such stimulation will be the reproduction of the original impression.

Explanations of States of Consciousness

Let us now consider James' explanation of "States of Consciousness" and see how they are related to orthodontia. We find they do have a certain relation as they affect the various movements of the muscles, although some of them somewhat remotely.

Children, as well as adults, are very susceptible to sensations, desires, and emotions. Cognitions, reasonings, decisions, and volitions, however, are not developed in early childhood, though they could and should have much influence on the function of the body. It seems to me that this inability to develop all of the "States of Consciousness" constitutes one of the most deplorable failures in our system of education. Sensations, desires, emotions and cognitions are instinctive traits of every animal and a part of its life. Some give rise to sensory stimulation, others to motor, and are cause and result, respectively, or, going back to our formula of life, constitute the "Continuous adjustment of internal relations to external relations."

Any one of these things may be the cause of any one of the others as, for example, a sensation may cause a perception, a perception a desire and a desire an emotion. Furthermore, each may be a cause whereby a motor

response may be excited which may either expand itself in some muscular movement or excite, in its turn, some other stimulating cell which latter action would constitute what is termed association.

It is the education of these faculties that makes man a superior animal, yet, with all our superior knowledge, we neglect, in the child, three things that also make man superior, i.e., reasonings, decisions and volitions. These traits are not instinctive or hereditary and, therefore, must be developed by education and as they are extremely important to the well being of man, it would seem to be better to pay more attention to these things that must be taught than to allow the hereditary instincts to overbalance them. These three states, i.e., reasonings, decisions and volitions, will be further considered under the discussion of the treatment of habits.

Some Anatomical Factors

As before stated, scientific psychology does not recognize the unconscious or sub-conscious, but believes that every stimulation of nervous tissue coming from the outside world, leaves its impression in the substance of the brain and this can be irritated into action again at any time. In other words, man has the function of memory.

Just what this stimulation is or how it acts is unknown. Psychoanalysis believes it is psychic and even Swift says, "The mind enters the body at some stage of the development," but, he adds, "No evolutionist will believe it." My own impression is that the mind does enter the body at some stage of development, but that stage is the first sign of specialization of nerve tissue from the epiblast. We know that in this specialization different senses have their origin in different lobes of the brain and yet can act together or form an association. All messages coming in through the eye go to the occipital lobe; those of smell pass through the olfactory tracts to the lower part of the temperal lobes; the sensations of hearing traverse the auditory nerve fibers to the cerebellum and, according to some anatomists, go from there to the temporal lobes. If we both see and hear something, the occipital and the temperal lobes are each stimulated.

Discussions are rampant as to whether the stimulation is received and acted upon in the lobe of the brain alone or whether the nerve centers, their trunks or endings, are affected. In cases of fatigue, Shire Tashire has proved that there is a chemical change in the neuron of a trunk when a nerve is stimulated. In the resting state, a nerve gives off CO_2 and when excited produces CO_2; and as irritation is decreased in a resting nerve, CO_2 production is also reduced.

Instincts and Habits

Doctor Jackson defines instinct as "An inherited disposition to notice, to feel, and to want to act in certain ways in certain situations."

In a way instincts cannot be distinguished from habits as they are nothing but habits which have been prolonged through countless years and have become a part of the phenomena of life, subject, of course, to adaptation according to the environment. Such instincts or innate habits are feeding; the instinct to run away from danger (the endoskeleton); the instinct to fight (self preservation); the instinct to herd together (protection); and last but not least, the instinct of reproduction. While these instincts are normal and necessary to life and are such as a result of habit, they may, by prolongation or excessive stimulation, again become habits of a more pernicious nature and by so doing be detrimental to animal life. A large number of the pernicious habits are due to this changing of a natural instinct into an abnormal habit, as will be shown later.

What is habit? As James says, "The moment one tries to define what habit is, one is lead to the fundamental properties of matter." "The laws of nature are nothing but the immutable habits which the different elementary sorts of matter follow in their actions and reactions upon each other." Swift says, "Habit is a psychological matter—the tendency of nerve impulses to follow old, well-worn paths." Later he states, "Habits are physical conditions" and cites an example, the well known tendency of the book to open to the place to which we frequently turn, remarking, "That it is quite as difficult for man to break an established habit in himself as it is to change the habit of the book."

As we learned in the beginning, all the acts of life are the result of external stimulation and as habits, both good and bad, are a part of life, it is obvious, therefore, that habits are the result of external relations, transmitted to the hemispheres of the brain through the senses.

The principle of association has a very great bearing on the habits of all forms of life and we see it taking shape even in the infants. While the instinct to feed is usually stimulated by the sense of hunger, we can, by association, also stimulate the hunger sense. When an infant sees its mother or is shown a bottle, its sense of sight immediately stimulates the hunger sense. It is an association between the cells which control sight and the cells which control hunger. This association or grouping of neurons leaves its impression in the substance of the brain just as an individual impulse and when the same stimulation is applied at a future time, the group will respond exactly the same as in the original response. If this group is stimu-

lated often enough, the repetition soon has a path worn in the structure of the brain of such depth that it becomes very easy for impulses to travel along it and, as a result, a habit is formed. (The terms "Path" and "Worn" should not be taken literally. They are used as a means of expressing something which is unknown and which may be a chain of chemical actions, leaving no sign of definite path or groove.)

Abnormal Habits

The effects of pernicious habits on the development of the denture were early recognized by Angle and, while it is true he gave them a secondary place among the causes of malocclusion, still the seed was planted from which the tree of understanding should have grown far beyond its present size. It remained for Angle, himself, to come back, after fifteen years of observation of conditions, and again call our attention to the importance of habits and to place them first in the list of causes of malocclusion.

"Our nervous system," as Doctor Carpenter says, "grows to the modes in which it has been exercised." We can readily believe this as we can see it happening in every form of life. Our bones and muscles will grow to the mode in which they have been exercised. James gives, as the result of it, "that habit simplifies the movements required to achieve a given result, makes them more accurate and diminishes fatigue." Now, if habit is the result of an action which simplifies effort and, as we know, the normal or perfect effort should be the simplest, according to all the laws of mechanics, then why should not the derangement in the mechanics of the denture, nose or throat, cause an abnormal habit just as well as normal mechanics causing normal habits. As malocclusion is a mechanical process and the function of the brain is also a mechanical process, it follows that perverted mechanics of the denture can upset the mechanics of the brain and, conversely, improper functioning of the nervous system can and does upset the mechanics of the denture. Hence, we may divide habits that are factors in the development of the denture into two divisions,—those which are caused by the denture and those which are caused by the nervous system. It is not implied that all mechanical derangements cause a habit but rather that it is possible for poor mechanics to change the structure of the muscles of the face and tongue to such an extent that they feel uncomfortable, and that the constant trying to adjust them to a more comfortable position, will, if carried to the point of automatism, become a habit. Now we see why the sense of feeling, as mentioned before, plays such an important part in the development and maintainance of malocclusion. If the mechanics of the

denture can change the structure and, therefore, the function of the muscles, causing a habit, it is just as reasonable to say that a habit formed by the muscles can change the mechanics of the denture. Action and reaction are equal and opposite in all mechanics and, as these habits are all mechanical ones, it follows that their actions are also equal and opposite.

There is one more point to be clarified before going into the enumeration of the different habits and the part they play in the development of the denture, and that is, that habits which begin as a result of mechanical derangement within a denture, if carried on until they make a definite impression in the nervous system, will cease to be a strictly mechanical proposition and become a habit of the nervous system.

While all habits are mechanical, as well as all other actions, there is a difference between the mechanics of the denture and the mechanics of the nervous system, in that one is a direct force, while the other is a referred force. The referred force starts with an irritation of a cell; this irritation causes action; this action causes force and this force is mechanical. We see this change of mechanics in mouth breathers. Clear up the nasal passages, correct the malocclusion, and still the child continues to breathe through the mouth. The habit caused in the first place by the nasal obstruction, a mechanical cause, has by repetition changed into a habit of the nervous system and will continue as such until voluntarily overcome, on account of the feeling tone and the lack of fatigue. Another illustration of the same change from mechanical into psychological habits is seen in malocclusion caused by abnormal tonsils with mechanical results opposed to that of mouth breathing. The sore tonsils, by their irritation, cause the mandible and tongue to move forward as a means of relief, a mechanical cause, but, when kept up, the repetition changes it into a habit of the nervous system and it will be registered in the brain as such. Now, opposed to that process, we sometimes find the mandible moving forward in cases where the tonsils are not involved. In such cases the movement probably is caused by the habit of imitation, a psychological process. This is an example of the sense of sight transmitting the message which eventually changes the mechanics of the denture.

Angle, in his Seventh Edition, gives eleven causes of malocclusion, as follows: Premature loss of deciduous teeth; loss of permanent teeth; imperfect crowns and fillings; prolonged retention of deciduous teeth; tardy eruption of permanent teeth; supernumary teeth; transposed teeth; disuse; abnormal frenum labium; habits and nasal obstructions.

It is not the purpose of this paper to consider all of the mechanical

causes of malocclusion except those which have a relation to psychology to the extent they may be forerunners of habits. Nasal obstructions have already been considered. Can any one of the other causes have an effect on the denture in such a way as to cause a habit? I think they can and while such an effect may not always be noticeable still it must bear some relation to the abnormality or, at least, become a force to contend with in retention.

Let us take the first cause in the list for illustration— premature loss of deciduous teeth. Suppose a child loses any one of the deciduous teeth early. We all know what the effect on the denture will be. The child masticates on the unaffected side of the mouth and, as a result of this, the force of mastication as a developing factor is lost on the mutilated side of the denture. In addition to this the wedging force of the erupting teeth is lost and certain other evil effects are noted. Hence the arches fail to develop on one side and, as a result of this, the muscles covering the abnormal side are retarded in growth to a corresponding degree. As the other structures of the face are probably developed to their normal size, this leaves the muscles associated with the mutilated side of the mouth off balance and, as a result, they do not feel quite right. The child, in his endeavor to find a comfortable, "equalizing" position constantly keeps these muscles in play which, of course, establishes a habit and this, by reacting on the denture, will augment the malocclusion. Therefore, it is necessary for the orthodontist to try to determine where the perversion of forces started and whether it was mechanical or psychological. If we go through the whole list of causes, we will find them all capable of producing a habit in this way. It might be termed the habit of comfort.

Physiological Habits

The habits which are the result of nervous force have become habits either through perverted instincts or by acquisition. Examples of these are sucking habits, biting habits and habits of the facial muscles of expression.

Sucking habits include sucking the thumb, tongue, finger or foreign bodies, such as pacifiers and bed clothing. As we find these habits prevalent among small children it seems to me, after studying the clinical nature of the act, that all of them are relics from the days of infancy when the child was entirely dependent on sucking for nourishment. When an infant fails to get enough food, or when the nourishment is not the right quantity to satisfy the hunger sense, he is very apt to keep up the sucking motion involuntarily, either to call attention to the fact that more food is wanted or as a sort of relief from the hunger feeling. As James points out, habits are

usually along the lines of least effort so we see how easily a small child could derive comfort, as well as amusement, from this simple device. As the child grows older one naturally would think that with the eruption of the teeth and weaning from the sucking method there would be secession of this act, but this does not follow. Probably this would be the case with a strictly mechanical habit, but when the structure of the brain cell is so persistently trained to respond in this way to any hunger stimulation the sensation of hunger naturally follows along this path and, in a purely psychological sense, irritates the hunger cells in the brain, which, in turn, send the motor messages to the tongue and other muscles involved in the sucking act.

Biting Habits

Biting habits include biting the tongue, lip, cheek, finger nails and foreign bodies, such as pencils and pen holders. Of these habits the one which is probably most prevalent is that of biting the lower lip, and this, according to Sir Charles Bell, is caused by the "emotion of restrained anger —restrained expression." It seems to me that all the biting habits are caused by "restrained expression" but not necessarily by restrained anger and I do not believe that biting the lip is entirely related to anger, as I have seen many children who have been frightened, suppress the natural expression and bite the lip. As to the anger emotion, we see it manifested mostly, I think, when a child is forced to do something that he does not wish to do, such as studying or practicing; or desires to do something and is not permitted to carry out his desire, which would, of course, be the antithesis of the foregoing. While both might be related to anger and probably have their origin in the natural instinct to fight, still a feeling of disappointment or worry without any anger could just as easily cause the emotion.

Fright is another emotion, which, if suppressed, might have its outlet in abnormal biting. A child who is on the platform at school or church, or one who is constantly being exhibited to visitors by fond parents, often takes refuge in the emotion of clenching the hands or biting the lip or finger, to hide the fright surging through his system. Or perhaps it might be due to worrying for fear the recitation will be forgotten. In all of these causes the desire to run is a strong factor and as that is one thing a child seldom does, for they probably wish to make just as good an impression as their elders expect them to, it must be suppressed and so in this restraint, the nervous energy exploding, as it were, escapes through all the outlets possible. This shows another association, in that the emotion of fright

caused the desire to run and both emotion and desire are divisions of "States of Consciousness".

Why do children suppress these emotions? Why do they not give them their natural outlets? I think the reason for this is that the natural expressions, or the ones long used, have been recognized and fought by parents and teachers, until the child, by the process of adaptation, has become "foxy" and developed a new expression, one which is not recognized as showing what is in the mind. This would apply mostly to the anger emotion and less to fright and worry. Although, in some cases, it might be due to fright when, for instance, the child is threatened with a policeman, as some parents do to make a child behave, and he does not wish them to see he is afraid. It is not implied that children are conscious of this change of expression. It is, to my mind, unknown to them and is a product of adaptation to the environment, as people generally have put the tabs on pouting, crying and other known ways of showing anger. Very often we see children biting the tongue, lip, finger nail or pencil, while studying and we naturally think it is because of the concentration on the work in hand and such is probably true, in some cases. There is an overflow of nervous energy that must be used up. We notice this mostly in dull students and it probably has a relation to the vulgar man scratching his head while thinking, as described by Darwin. In some cases, however, I believe it is repressed anger at having to study or practice instead of being allowed to play, as is the daily habit of very small children, and so has almost become an innate habit with all children.

The subject of biting habits, therefore, resolves itself into "restrained expression" and as these natural expressions are restrained, the nerve impulses find a new way out which is, as in sucking habits, a method of relief and therefore a comfort habit.

Habits of the Facial Muscles of Expression

Of all the pernicious habits those of the muscles of expression are the most obscure. One has to be ever on the alert to catch these muscles in action and it is only by careful watching that a continuity of their actions may be discovered, and, with the aid of the effect of their forces on the denture, a sound diagnosis made. The question at once arises as to whether these habits are the result of reaction to faulty mechanics. As before stated, it seems to me that some of these habits are caused by one or more of the perversions within the arches, through alteration of structure in the attempt

to find the greatest ease and comfort in functioning. If this is true it somewhat simplifies treatment but adds to the difficulty of diagnosis. In diagnosis it is imperative that we distinguish between the alterations in the structure of the muscle tissue from force and the changes due to excess stimulation of the natural function of expression.

One of the chief characteristics of the human being is his expression. We look for the light of joy and understanding in the eye, followed by the contraction of the zygomatici in laughter; the attention and surprise, as well as pain, as expressed by the forehead and around the eyes; that of anger by the dilatation of the nostril; the expression of sorrow as manifested by the trembling of the upper lip; the drawing of the corners of the mouth downward in showing irony; and the raising of the lower lip and its protrusion in the expression of doubt. These are all innate tendencies and have been a part of man from time immemorial. Another interesting question presents itself. Were the natural expressions of the people long ago developed and shown as they are in the individuals of today, or has the continual change in the environment of the human race made it necessary to also change these expressions? In examining the instincts to which all animals have been subject for countless ages, we find the instinct to feed still the predominating one and as the character of the food has changed, the tissues of the body have changed to meet it. The next instinct, that of fleeing from danger, is not so well developed today because we are all well protected and there is no need of being constantly on the watch for danger from which to flee. The instinct to fight is also naturally diminishing, as we are not threatened today by enemies and, furthermore, fighting is prohibited by laws made by ourselves. The instinct to herd together, the result of the instinct of protection, we find very highly developed as it is the very high degree of efficiency of this instinct that allows us to decrease the instincts of flight from danger and fighting. The instinct of reproduction is still a powerful one and will be until the end of the world and it ranks second to feeding as a means of perpetuation of the animal kingdom. Now, have these changes of environment had any effect on the character of the children of the present generation and, if so, are they manifested in any way in the emotions. Do these emotions take their natural outlet in the muscles of expression or do they, upon being repressed, find a new way out? The natural expression of joy, pain, attention and sorrow, stimulates either pleasure or sympathy in the parent or teacher and as these reactions are confined to the upper part of the face, with the exception of the insertion of the zygomatici, the excess stimulation of the muscles which control them would have very little if any bearing

on the forces that govern occlusion. But those of doubt and irony, as manifested by the contraction of the triangulares and mentales, undoubtedly would have a vital influence on the denture as they are confined to the lower part of the face, their origins and insertions being on the mandible. Bell says that the contraction of the triangulares and mentales shows the emotion of testiness and peevishness. If we accept this statement as the truth, and it seems reasonable to do so, at least in some cases, especially since some light has been thrown on the subject by photographs of these muscles in action, then we are confronted with the fact that peevishness and testiness in the child are shown by the same muscles as doubt and irony in the adult. However, while these emotions are expressed through the agency of the same muscles, there is a difference because doubt is shown by the contraction of the mentales alone and irony by the contraction of the triangulares alone, while testiness and peevishness are shown by the combined action of both, as Atkinson's pictures clearly illustrate.

From this standpoint it would seem that most of these habits are caused by the emotions of testiness or peevishness. But there are other emotions which I think can cause that just as easily. In the biting habits, the emotion of worry over conditions at home, where too much nagging is the rule, might be a cause. A sense of disappointment at being left out of things or the emotion of doubt, expressed at the enforced wisdom of parents, which, while probably right yet unless impressed on the growing mind with tact, love and patience, might readily cause the child to respond in emotions that escape through other channels than those naturally associated with the ones mentioned above. The diagnosis of these cases is difficult and possibly the only way to find their true cause would be to visit the family in their home and, by so doing, detect something in the environment.

Another habit is one that is just opposite to the force mentioned, i.e., that of too much laughter causing excessive pulling of the zygomatici with their well known effects on the development of the denture. This would indicate a lack of seriousness in the growing mind; too much animation for play and the ridiculous. It should be counteracted by more reading, reasoning and discipline in drill.

The next habit to be discussed is one of the most important, involving the contraction of the orbicularis, either alone or with the buccinator. None of the anatomists seem to recognize this habit so there is no precedent on which to base a diagnosis. As the fibers of the orbicularis are so complicated,

owing to their intermingling with the other facial muscles, it is very difficult to separate their actions. It seems to me that as the main part of the orbicularis is made up of decussating fibers from the buccinator, the contraction of one would, necessarily, involve the other and I believe this is true in a majority of cases. What is the emotion which causes these contractions and why does the nervous system refer the impulse to this muscle? It is a question that must be answered some day if we have any hope of combating its influence on the denture. When do we find it most active? My observation has been that it has been prevalent in all stages of life, from the youngest child to the oldest man or woman. It is especially noticeable in thinkers or in people who have a strong determination. Shall we call it the habit of thinking? As thinking requires determination and as it is quite uncommon to be determined without thinking, I believe that the better name for it would be the "Habit of Determination".

Treatment of Habits

If the many authorities on psychology, physiology, chemistry and physics do not know what the force is behind a habit or how an impulse goes to the brain and out again, how can we, as orthodontists, expect to find the correct treatment for these habits? It is impossible to describe a sound treatment unless we know the cause. The outlook from this standpoint is discouraging and, until the exact nature of these forces is found and proven, we can do no more, I think, than to adjust the structures by restoring normal function through education. If most normal habits of man are brought about by education, why is it not reasonable to suppose that abnormal habits can be corrected by the same means? Let us apply this principle of education to the treatment of habits and see if we can obtain any light. If, as stated before, habits of the muscles could be caused by altered mechanical force within the denture, nose or throat, then the main treatment in those cases would be to remove the cause and in a short time the muscles would become adjusted to their new positions, change their structure to normal size and, consequently become comfortable and the habit would be gone. But, if the habit had made an impression in the substance of the nervous system, removing the cause would not be sufficient and the habit would have to be treated exactly like a psychological one, the only difference being that it would probably respond to treatment more quickly and the result be more permanent. This is illustrated by the habit of mouth breathing.

Psychological habits are an entirely different matter and demand a higher degree of skill in both diagnosis and treatment. While it is true as

before stated, that both are mechanical, still we must remember that they are different in that one is a direct mechanical force while the other is a referred force, beginning with a cell irritation that causes action, and this action creating force which is mechanical. It is hard or practically impossible for man to break an established habit in himself as the path is so well worn that it would take all of his time and thought for an indefinite period to get the impulse to travel in a new path. Man will not give up this time for thought; therefore his habit remains unbroken. But in a child, where the structure of the brain is not changed to such a great extent and because the child has more time to give to the task of starting a new groove, it would seem that the normal habit could be made to respond quickly and in a short while the abnormal groove could be obliterated in these growing brains. It is my firm belief that when these habits are not corrected by education, it is because the orthodontist or parents, who in this case are the teachers, have failed in their work. This is well verified in the words of Swift, when he says, "Objects and animals alike offer resistance to modification—to change; and, when the change has taken place, the new arrangement requires a permanency of its own; it has taken on new habits and again resists alteration."

Habit simplifies effort, so it is but natural that a child should resist the effort necessary to break up the old and start the new, as such effort is fatiguing to both child and teacher. Here, I think, is the secret of the failures in correcting habits. The teacher, be he parent or orthodontist, fails to take into consideration the fact that changing from an abnormal habit into a normal one, requires as much energy and, in consequence, as much change of structure, with a corresponding amount of fatigue, as changing, a "clerk to a brick layer", as Swift says. The comparison is exaggerated, of course, but it is given to show the relative amount of change which the structures must undergo in order to transfer from one habit to another.

The clerk, by persistence, will in time learn to work all day at the brick layer's trade and the brick layer can also learn to walk the floor of the store all day without fatigue and the desire to return to the old trade. Also, by the perseverance of the child, stimulated by the parent and orthodontist, the abnormal habit may be displaced by the normal and all sense of fatigue and desire to quit will cease. The alteration has now become a new habit and the abnormal one no longer exisits.

This cannot be brought about in a day, a week or a month, as the tissues do not change that quickly. In the case of the book we would not expect to change the place to which it had the habit of opening without first

finding the new place to which we wished it to open and then making a business to open it at that place until it would do this every time on being allowed to open by itself. So with a muscular habit, we must first find the muscles that are performing abnormally, follow this by educating opposing muscles to work, and then, by constant practice, gradually estabish normal function, which when once "set" will resist effort to change, just as the perverted action resisted in the beginning. For example, when we find a case in which the triangulares and mentales are functioning abnormally, expressing peevishness, testiness or worry, the treatment should be based on educating the mind to consider things from the standpoint of pleasure, making even work or lessons fun, and, by so doing, increase the action of the zygomatici, the muscles in opposition to those of peevishness. Critics will say that their patients do not know when they are using these muscles abnormally, they are unconscious of the act. How can we expect a child to break a habit of which he is unaware? I know this to be true, as it happens nearly every day in my own practice, not only with patients I have seen for the first time, but extending over weeks and maybe months after treatment is begun. When such is the case the first thing to do is to educate the "state of awareness"—perception. I would try to form in the mind of the child the necessity for setting a trap for the habit, trying to catch himself in the act. This can only be done by practice and thought. When the child becomes aware of the fact that he is actually doing what we tell him he is doing then is the time to begin to educate the mind in an effort to overcome the abnormal habit. All this takes time and perseverance on the part of all concerned and should anyone "fall by wayside" we have some reason for the failure. In this fight the child has the advantage as he has or should have constant stimulation from both orthodontist and parents to keep up the effort. The parents, in turn, look to the orthodontist for help while the orthodontist has no one but himself to rely on. Therefore, he must be careful never to neglect his own "state of consciousness" either through hurry, carelessness, or lazyness, as, in all events, he is the one on whom responsibility rests.

So we see that the first stage in the treatment of psychological habits is to educate one of the great faculties of the human being, i.e., that of awareness, which is one of the chief divisions of the "states of consciousness". After the child has become aware of the habit, the other principles of "states of consciousness" must be trained. These you will recall are reasonings, decisions and volitions and are the three that are neglected by instructors in favor of rote learning. If we can, firstly, induce the patient and parent to

see the principle involved, as outlined above; secondly, show them the effects of the habit and, thirdly, attempt to draw from them a definite decision to cooperate and conquer the problem this should be automatically accompanied, in most cases, by the will to make the effort. Under some circumstances, such as when patient and parents are below normal mentality, with not much prospect of cultivating the reasoning faculty, it might be well to resort to the rote method of having them repeat a specified lesson a number of times a day. The advantage of this method is that it comes too easy and is not taken seriously while if the thing is once reasoned out in the mind, the brain cells tend to work themselves out to a decision.

Some teachers have advanced the idea of the systematic exercise of those muscles whose actions are opposed to the ones acting abnormally. They do this by instruction along specified lines and at stated periods, believing the force of the one will counteract that of the other. It is probably true that exercising the muscles in opposition to the abnormally acting ones will affect the force of the other, but these men fail to take into consideration the fact that excess action of a new set of muscles, may, by repetition, become a new habit with results as pernicious as the ones which were perverted originally. The only way, to my mind, to stimulate opposing muscles to work is by transferring the emotional outlet from one set to another, and this must be done by changing the mental state of the patient.

There is another form of exercise which has been advocated. This is by means of a mechanical exerciser. Good results might be obtained from this device in certain cases. It has the advantage of the foregoing in that it would not tend to establish a new abnormal habit, as the force would be strictly mechanical and, when discontinued, would leave no impression in the nervous system whereby it could cause a habit. The feeling of the mechanical appliance would be gone and any association that might have been formed would be broken by the discontinuance of the exerciser. The alteration would not be registered in the brain and, therefore, could not stimulate in group form, hence would not constitute a habit.

In conclusion, while the outlook upon this habit equation is discouraging, we may, by becoming thoroughly familiar with the various correlated sciences, by giving more attention to diagnosis and by striving to develop the reason and will of the patient and parents, so broaden our vision and capability as to become equally as proficient in dealing with this and various other causes as with any of the strictly mechanical problems with which we come in contact every day.

Summary

First—That psychology and the study of the nervous system has a vital relation to orthodontia in that the problem of malocclusion is not confined to the dental tissues alone but can be traced to the senses which govern all animal life.

Second—That abnormal habits are caused by both the denture and the nervous system.

Third—That the sense of feeling is the most important factor to be considered, as all habits are based on comfort or relief.

Fourth—That correct diagnosis is imperative to achieve a permanent result.

Fifth—That habits of the nervous system must be corrected by educating and changing the mental state of the patient.

Jackson Street

Bibliography

Angle, Edward H.—Malocclusion of the Teeth, Seventh Edition.
Swift, Edgar James—Psychology and the Day's Work.
Bell, Sir Charles—Bell's Anatomy of Expression.
Spencer, Herbert—Data of Ethics.
Darwin, Charles—Expressions of the Emotion in Man and Animals.
Gray, Henry—F. R. S. Anatomy of the Human Body.
Dunlap, Knight—Mysticism, Freudianism and Scientific Psychology.
Prince, Morton—Psycho-Theraputics.
James, William—Psychology.
Jackson, Dr. Josephine and Helen Salisbury—Outwitting Our Nerves.