



# STUTTERING AND RELAXATION: APPLICATIONS FOR SOMATIC EDUCATION IN STUTTERING TREATMENT

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Relaxation techniques have been an integral part of many stuttering treatment approaches since the early part of the 19<sup>th</sup> century. The therapeutic use of relaxation has fallen out of favor in recent years, however, due to concerns that the sensation of being relaxed is difficult to generalize and so has limited efficacy outside the treatment environment. This paper reviews the history of relaxation techniques in stuttering therapy and proposes a means for viewing relaxation not as a passive process (e.g., a feeling of calmness), but rather as an active, dynamic process involving coordinated movement of the entire neuromusculoskeletal system. This balance is central to the theories of somatic education, such as those developed by Alexander, Rolf, and Feldenkrais. Accordingly, this paper argues that the use of somatic education in stuttering treatment may promote the perception of relaxation and facilitate the habituation of new behavior patterns, thereby leading to improved generalization of relaxation outside the treatment setting. © 2000 Elsevier Science Inc.

**Key Words:** Stuttering; Relaxation; Somatic education

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## INTRODUCTION

Relaxation techniques have been used to prevent or minimize the struggling behaviors of people who stutter since at least the early part of the 19<sup>th</sup> century (Otto, 1832; Van Riper, 1973). Unfortunately, the mechanism by which relaxation promotes fluency is not well understood (Bloodstein, 1995), and the beneficial effects of relaxation seen in treatment do not readily transfer outside of the treatment setting (Bloodstein, 1969; Shames, 1986; Van Riper, 1973; Webster, 1980; Williams, 1979). Bloodstein (1995) and Van Riper (1973) argued that a speaker cannot employ relaxation techniques and main-

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tain spoken social interaction at the same time. In other words, they believed that relaxation could not be sufficiently habituated in treatment for it to be of significant use as a tool to reduce stuttering. Because of this lack of a significant carry over effect, relaxation has fallen out of favor as a tool for the treatment of stuttering (Bloodstein, 1969).

Although the long-term effects of relaxation in stuttering treatment have not been clearly demonstrated, relaxation has proven to be a useful means of helping speakers achieve a greater degree of fluency in specific situations (Bloodstein, 1995). Rather than completely dismissing relaxation as a viable therapy technique, therefore, it may be useful to examine the nature of commonly used approaches for achieving relaxation in stuttering treatment in order to better understand—and ultimately overcome—the roadblocks that limit the generalization of relaxation effects outside the treatment setting. One framework that seems particularly useful for such consideration is the notion of somatic education, or mobilization of the sensorimotor system, through touch, deep tissue massage or verbally directed movement to improve function. Implicit in the concept of somatic education is the idea that the “mind-body-brain” functions in an interdependent dynamic relationship (Damasio, 1994), rather than as three separate entities. When stuttering is viewed as a discoordination of the entire mind-body-brain, rather than as a discoordination of the body or a physical manifestation of mind, a new understanding of relaxation develops that may hold promise for improving the clinical usefulness of relaxation therapies in stuttering treatment. More specifically, recent advances in the understanding of somatic education suggest that the relationship between relaxation and stuttering should not be reviewed in terms of linear cause and effect (i.e., relaxation leads to improved fluency). Rather, this relationship should be seen as part of a dynamic system in which relaxation is an active process that is intertwined with improved fluency. The purpose of this paper is to review the definitions and use of relaxation exercises in stuttering treatment during the past two centuries and to propose a new definition of relaxation as a dynamic process based on the principles of somatic education. Inherent in this approach is the notion that the use of somatic education in treatment can promote the perception of relaxation through increased coordination, thus facilitating the habituation of new behavior patterns. These new behavior patterns then would lead to improved generalization of the beneficial effects of this altered perception outside the treatment setting.

## **RELAXATION AND STUTTERING TREATMENT**

A review of the history of stuttering theory and treatment over time reveals that the nature of preferred treatment for stuttering has changed as the prevailing theories about stuttering have changed (Bloodstein, 1995). For example, when early theories of stuttering focused primarily on the physical causes and

manifestations, treatment, too, focused on physical remedies. By the middle of the 19th century, however, when psychological theories of stuttering began to take precedence, preferred treatments were based more on psychotherapy. This is not surprising, given that ideas about treatment flow directly from ideas about etiology (and vice versa). Interestingly, however, the use of relaxation techniques in stuttering treatment has remained relatively consistent over time regardless of the prevailing views about the nature of the disorder. According to Boome and Richardson, (1947, p. 101), “the basis of all treatment for stammering—whether individually or in a group—should be relaxation.” Indeed, relaxation was viewed as an essential part of treatment when the proposed etiology of stuttering involved motor coordination, psychic trauma and/or nervous disorders resulting from shock, fear or juvenile illnesses such as rheumatic fever (Eldridge, 1968; Fogerty, 1930; Klenke, 1862; Otto, 1832).

One possible explanation for the pervasive presence of relaxation in stuttering treatment may be the fact that many approaches to stuttering treatment used relaxation exercises in preparation for other types of treatment (Boome & Richardson, 1947; Hunt, 1967; Jacobson, 1938; Otto, 1832; Van Riper 1973). Another likely explanation may be the fact that one of the most noticeable physical manifestations of stuttering is physical tension. Clinical experience revealed to practitioners from a variety of theoretical perspectives—as well as individuals who stutter—that physical tension could be reduced by certain forms of relaxation therapy. For example, Fraser (1993, p. 23) explained that “the more calm, passive, and relaxed you are, the less stuttering you will do.”

## HISTORY OF RELAXATION IN STUTTERING THERAPY

Otto (1832) was one of the first of the new emerging group of “speech specialists” to mention the need for relaxation: “Practice and lessons begin by getting the stutterer to relax . . .” (p. 123).<sup>1</sup> The goal of the relaxation exercise was to bring the speaker into a restful state through the use of easy breathing, intended not only to relax the speaker, but also to reduce this level of anxiety. Speaking was introduced gradually with practice on vowels while maintaining the easy breath (Otto, 1832). Like Otto, Klenke (1862) believed that breathing and the use of measured speech was key to the reduction or elimination of stuttering. Although Klenke did not use breathing exercises to reduce tension directly, he believed that his clients should “take the time for a calm and adequate breath” (Klenke, 1862, p. 44). Similarly, Fogerty (1930) encouraged her young clients to breathe in and out gently to help the body release tension.

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<sup>1</sup>Unless otherwise indicated all quotations from original German texts were translated by the primary author.

In the middle of the 19th century, proposed etiologies for stuttering began to focus on the relationship between mental anxiety (mind) and physical tension (body) (Klenke, 1862). During this time the goal of relaxation in treatment was to reduce tension resulting from anxiety and fear or struggling behaviors. Sandow (1896) noted that “smooth flowing speech depended upon a feeling a physical ease and well-being, that is, *the freedom from anxiety*” (Sandow 1896 cited in Van Riper, 1973, p. 41; emphasis added by Van Riper). Many of the early advocates of psychological trauma as the etiology of stuttering, (Gutzmann, 1879; Haase, 1846; Klenke, 1862) continued to use breathing exercises as a way to promote relaxation and freedom from anxiety.

Scripture was an advocate of a theory of stuttering which defined stuttering as “a neuropathic disposition or a condition of nervous exhaustion” (Scripture, 1912, p. 8). Rather than focusing on breathing, Scripture began to explore the use of posture to aid in the relaxation process by asking his clients to “lie on the couch, close [his] eyes, purposely try to relax every limb” while “speaking softly, melodiously, and pleasantly” (Scripture, 1912, p. 61).

In the early part of the 20th century, the theories of Sigmund Freud began to have a major impact on the way stuttering therapy was approached, particularly among those who viewed stuttering from a psychological perspective. Freud believed that the motor activity, the so-called “tics” or “spasms” of speech, had their root in psychic trauma (Freud, 1955a, 1955b). Accordingly, the focus of treatment shifted from an emphasis on the somatic, physiological symptoms to the presumed underlying psychological causes. Freud and his followers believed that methods of distraction, suggestion, and relaxation were superficial attempts to deal with symptoms alone, rather than what they believed to be the underlying cause. As a result the use of relaxation by some practitioners as a primary means of treating stuttering began to fade.

Bridging the gap between the purely psychoanalytic and the somatic treatment of stuttering, Jacobson (1938) asserted that “neuromuscular hypertension” was responsible for both the somatic and the nervous ailments. He believed that the imbalance of muscular tension throughout the body exacerbated, if not caused, a wide variety of ailments, including digestive system disorders, respiratory disorders, and nervous disorders. Using electromyographic studies, Jacobson showed that when muscle tension was reduced to near zero, anxiety and its related symptoms seemed to disappear. Jacobson developed his concept of “differential relaxation” in which one set of muscles could remain passive while another group of muscles was engaged in order to transfer the relaxation effect into movement and activities of daily living. Jacobson’s protocol was very specific and time consuming. He insisted that certain criteria be met before the patient was allowed to progress further. According to Jacobson, three stutterers made “marked improvement” using this method (1938, p. 417). Although progressive relaxation was widely used for many years, most therapists did not adhere to the required protocol and

shortened the process (Van Riper, 1973). Subsequent therapists did not achieve the same level of improvement perhaps, as suggested by Van Riper (1973), because they did not fully understand the process or did not have the proper equipment to adequately monitor tension levels.

Wolpe (1958) used a modified form of Jacobson's work in his "systematic desensitization," developed as a method of treating anxiety disorders. He believed that organisms "conform to causal laws" (Wolpe, 1958, p. 3) and that "every content of consciousness depends upon specific, though no doubt complex, neural activity" (Wolpe, 1958, p. 16). Based on research in neurology Wolpe hypothesized that certain behaviors of the "mind" (as differentiated from brain), such as images, could be induced when parts of the frontal lobe were stimulated. Aware that all human activity had neural roots, he speculated that it might be possible, through the use of guided imagery, to change or at least diminish the physical fear and anxiety responses experienced by some people in certain situations. Relaxation was used as an inhibiting response to anxiety. He was

guided by the presumption that responses that largely implicate the parasympathetic division of the autonomic nervous system would be especially likely to be incompatible with the predominantly sympathetic responses of anxiety . . . in many circumstances they are by and large opposed and one or the other clearly dominate. (Wolpe, 1958, p. 72)

Wolpe believed that the features of stuttering represent disruptions of speech conditioned by fear responses to neural stimuli. Case reports by Wolpe (1958) and Brutten and Shoemaker (1967) indicated mixed results with regard to diminution or elimination of stuttering; however, reduced anxiety was reported in several cases. Bloodstein (1995) cites four studies (Adams, 1972; Boudreau & Jeffrey, 1973; Burgraff, 1974; Gray & England, 1972) in which 50% to 75% of the subjects reportedly experienced some improvement in stuttering following treatment by systematic desensitization and relaxation.

Ingham (1984) expressed a contradictory opinion suggesting that the conclusions of the studies mentioned were not as positive as they appear. They fail to provide sufficient systematic evaluation with regard to speech behavior data as it related directly to the effects of relaxation or systematic desensitization. In addition, he suggested that alternative procedures to promote relaxation such as biofeedback, hypnosis, and autogenic training might also aid in anxiety reduction in stuttering. These contradictory opinions reflect the confusion that has developed over the years regarding the role of relaxation in stuttering therapy and highlights the need for a more unified approach to explaining the apparent effects of relaxation on the speech of people who stutter.

Johnson's "diagnosogenic theory" (Johnson, 1944) postulated that stuttering had little organic or physical basis. Nevertheless, Johnson used what he referred to as "extensionalization" as the corner stone of his treatment. In exten-

sionalization, Johnson helped the stutterer to develop a level of self-awareness of the feeling when he was fluent and how he interfered with this behavior when he stuttered. Johnson talked about “semantic relaxation,” or release from tensions “due to worry, resentment, anxiety—self-destructive tensions; and the relaxation we are considering is characterized by freedom from tensions of this kind” (Johnson, 1946, p. 230). Johnson believed that semantic relaxation “comes about simply as a result of adequate personal adjustment in a general sense” (Johnson, 1946, p. 230). He did not feel that there was any specific technique that could directly promote this type of relaxation. He did however, briefly describe a new experimental technique developed by Korzybski in which gentle self touch and self stroking of the face and hands, as well as other body parts, was believed to promote “optimal tonicity.” Johnson (1946) stated that the technique made a person

more aware than usual of any tension that may exist, and so it increases one’s natural tendency to reduce excessive tension . . . By using this technique for brief periods a few times a day, one tends to cultivate a more or less consistent state of optimal tonicity. (p. 235)

Van Riper (1973) noted that Johnson promoted self stroking as a means of defining the internal image of the self. Johnson believed that “personal adjustment fosters relaxation, but relaxation also fosters personal adjustment” (Johnson, 1946, p. 231). In this way, he believed, a sense of well-being would grow out of the ability to accept stuttering and the knowledge that there was nothing to prevent fluency. In other words, Johnson used relaxation, through heightening self awareness, as a tool to creating a positive sense of self, which would then promote fluency.

In sum, relaxation techniques have been used by clinicians representing a wide variety of perspectives for most of the modern history of stuttering treatment. Although the progressive relaxation approach described by Jacobson, or the adaptation described by Wolpe, appear to be the most commonly used methods of relaxation in recent years, it is apparent that different practitioners have utilized relaxation techniques in widely different ways and for widely differing purposes. When assessing the overall results of relaxation techniques in stuttering treatment, therefore, it is necessary to consider exactly what is meant by the term relaxation, as well as how the feeling of relaxation may have been used to accomplish the goals of treatment.

## **The Nature of Relaxation**

**Passive versus active relaxation.** As noted above, traditional relaxation exercises were often intended to relax a speaker in preparation for other treatment activities, or to reduce tension or anxiety in the treatment setting, away from the anxiety-provoking stimulus. These types of relaxation strategies

have taken the form of breathing exercises (Fogerty, 1930; Gutzmann, 1879; Haase, 1846; Otto, 1832), positioning (Scripture, 1912), or progressive relaxation (Jacobson, 1938). The resulting feeling of relaxation is often equated with a sense of heaviness, or sleepiness or calmness. A common characteristic of many of the relaxation techniques described above is that they were designed to produce a static relaxed state, (e.g., a sense of calmness or lack of muscle tonus), which was to be followed at some later time by action (e.g., speaking in a given situation). In other words, the intent of these exercises was to release tension prior to beginning the act of speaking. It was assumed that new speech patterns could be learned once the speaker was free of tension, and it was hoped that these patterns would easily transfer outside the therapeutic setting. Unfortunately, as noted above, this was not always the case. For example, Webster (1980) reported a treatment approach that

taught muscle relaxation and presented the hierarchies during the periods of relaxation. Our relaxation technique was effective; we were frequently able to induce sleep in the participants. However, little progress in transfer was accomplished . . . several mild stutterers had an increased ease of transfer, but overall results of this approach were disappointing. (p. 308)

For Webster, the goal of relaxation, evidently, was to achieve a static state.

These passive or static forms of relaxation can be contrasted with a more dynamic form in which the individual learns to respond to tension-provoking stimuli in their environment with relaxation in an active and direct manner. An example of this can be seen in Johnson's (1946) use of Korzybski's state of 'optimal tonicity,' or a state in which the individual exhibits a heightened awareness of physical tension and an ability to function with greater ease even in the face of tension-producing stimuli. Another example can be found in the work of Wolpe (1958), who taught speakers to diminish the physical response to fear and anxiety through guided imagery. Johnson and others came to understand that to be passively relaxed was different than maintaining a sense of relaxation in action. The concepts of differential relaxation and optimal tonicity grew out of the awareness that muscles need to contract (i.e., be tense) in order for movement to occur. It is the spontaneous coordinated activity between and among muscle groups that results in a sense of increased ease of movement and that is perceived as being relaxed, while excess activity in any one group of muscles results in a perception of tension. Thus, although it is often assumed that relaxation is a lack of tension, it is instead true that the feeling of relaxation occurs when muscles exhibit increased coordination of movement. A new definition of relaxation begins to emerge, referring to muscle groups working in harmony with one another rather than to lack of tonus. This definition of relaxation as 'coordinated movement' rather than the lack of tension has important implications for stuttering and stuttering treatment. This will be explored in more detail in the following section.

**Relaxation and discoordination.** Research on the (dis)coordination of the speech musculature in stuttering began as early as 1828 with the work of Rullier, and continued almost a century later with the work of Travis in 1927 (Bloodstein, 1995; Eldridge, 1968). Early theories of incoordination were primarily focused on the presumed discoordination between the mind and the organs of speech or between the articulators and the respiratory system (Eldridge, 1968). More recently, the focus has been on discoordination of the phonatory, articulatory and respiratory subsystems (e.g., Perkins et al., 1976); discoordination of the purely laryngeal level (Conture, McCall, & Brewer, 1977; Freeman & Ushijima, 1978); or discoordination at the level of motor planning (Van Lieshout, Hulstijn, & Peters, 1996). Recently, Denny and Smith (1997) focused on the possibility of discoordination between the speech controller in the cerebral cortex, the emotional-vocal controller in the mid-brain periaqueductal gray, and the metabolic respiratory controller. Their research, which shows a “widespread, powerful influence of the metabolic respiratory controller on all speech subsystems” (p. 131), supports the thesis that speech is part of a large dynamic non-linear system, in which minor discoordination at one point can have major effects in a seemingly unrelated area. Smith and Kelly (1997) also suggest that stuttering is not a linear process, but rather a dynamic, non-linear process for which traditional linear treatment modalities have limited efficacy. Recent findings in research into the neuromuscular patterns of the brain (Maturana & Varela, 1980; Thelen & Smith, 1991) and the application of non-linear dynamic theories (Smith & Kelly, 1997) suggest that relaxation is the result of an active process of neuromuscular coordination in which sustained movement or action can take place. Together, current views about the role of coordination in stuttering support the notion that optimal functioning of the speech production system is likely to arise when muscles, or other subsystems are working together in a state of active coordination, rather than a state of passivity or calmness associated with earlier views of relaxation.

### **Relaxation and Somatic Education**

In light of current theories of neuromuscular coordination, a new definition of relaxation can be proposed. Gross and fine motor movement in space involves a constant shift between stability and instability (Thelen & Smith, 1991; Feldenkrais, 1985). The complex dynamic, non-linear interaction of constantly changing somatic patterns as we breathe, walk, sit, talk, for example, requires instantaneous and subtle shifts of coordination throughout the entire body. When rigidity or stiffness is present in one part of the system, tension may be perceived elsewhere (Rolf, 1962). For example, if the pelvis is held too far forward, the upper body needs to counterbalance the pelvis in order to maintain stability in space and tension is thus perceived in the upper back and

shoulders. Once the alignment of the pelvis is adjusted in relation to the shoulders there is no longer need for the strong counterbalance of the upper back. The sensation of tension is diminished and the perception of relaxation, or greater freedom of movement, results. Thus, according to theories of somatic education, relaxation is a state of being or a feeling, resulting from increased stability of the neuromuscular systems and the concomitant coordination of muscles through the entire body. Ease of movement, whether phonatory or gross motor, is the result of the smooth transition from states of instability to stability (Feldenkrais, 1972).

In the present context, the term “somatic” refers to the whole human being, or borrowing a term from Damasio (1994), the body-minded-brain. According to Damasio (1994):

the idea that it is the entire organism, rather than the body alone or the brain alone, that interacts with the environment often is discounted, if it is even considered. Yet when we see, or hear, or touch or taste or smell, body proper *and* brain participate in the interaction with the environment. (p. 224)

It would be safe to add, “when we speak,” to Damasio’s list of interactions. Every movement of the mind-body-brain entity requires coordination among and between a multitude of subsystems, with the result that “the nervous system’s organization is a network of active components in which every change of relations of activity leads to further changes of relations of activity (Maturana & Varela, 1992, p. 164).

Somatic education, therefore, refers to the process of learning new patterns of movement through coordination of mind, body, and brain, that takes into account the complex relationship of neural activity in different but related subsystems. As we grow, patterns of movement change and become habituated, often in ways which appear to be functional, but may not in fact be optimal (Alexander, 1932; Feldenkrais, 1972, 1985). This interaction is dynamic and non-linear and is influenced by both internal (self image, physiological structure) and external forces (environment, learned behaviors etc.). Through somatic education we can learn to recognize these habitual patterns and explore options for new more efficient patterns of movement. According to Feldenkrais (1972) in order to effect change in behavior

habits of body, feeling and mind must be changed from their established patterns . . . but a change in the way an act is performed, a change in its whole dynamics, so that the new method will be in every respect as good as the old (p. 22).

In other words, somatic education promotes the self awareness which is necessary to first become aware of the tension or discoordination, and then provides the means for alternative movement which allows for release of that tension. It is impossible to release tension unless it is first recognized and until an alternative for action is provided (Alexander, 1932; Feldenkrais, 1972).

**Theories of somatic education.** Examination of the work of Alexander , Rolf, and Feldenkrais, three proponents of somatic education and theory, provide insight into the role of somatic education in tension reduction. Alexander, an Australian orator, developed what is known as The Alexander Method. Through years of self observation, Alexander discovered that when his “use of the self” was good, the vocal problems that had halted his career abated. He felt better, moved better, and had restored use of his voice (Alexander, 1932). Alexander’s work is predicated on the belief that body and mind, mental and physical, cannot be separated in any form of human activity (Alexander, 1932). He noticed that the coordination between respiration, phonation, and articulation was influenced by the amount of freedom or tension within movement in the torso. Specifically, Alexander found that skeletal support, and most importantly the ability to inhibit “habitual” movements and substitute new, more optimal means of functioning, impacted phonatory patterns.

Alexander was convinced that “stuttering was one of the most interesting specific symptoms of a general use, namely, misdirection of the use of the psycho-physical mechanisms” (1932, p. 70). He believed that stuttering was not just a manifestation of discoordination of the head and neck region, but of the whole body. Alexander (1932) described working with a client who stuttered. He noted that his client exhibited preparatory struggling behaviors, which the client reported were prerequisite for “feeling that he could speak” (p. 69). Alexander described his client as exhibiting “a wrong use of the tongue and lips and certain defects in the use of his head and neck involving undue depression of the larynx and undue tension of the face and neck muscles” (p. 69). Through gentle manipulation, which provided a skeletal connection between head and spine, Alexander was able to guide the client to the experience of an improved coordination and feeling of reduced tension. Once he experienced the sensation of lengthening the spine and the head moving forward and up, the speaker could recall the feeling, when verbally directed, in order to inhibit the habitual tension upon initiating speech. Alexander discovered through his work that frequently the sensations clients reported as “feeling right” were not the optimal use, but rather the habituated pattern of use. He found that somatic education (or re-education) was necessary to replace the habitual usage pattern with a more optimal pattern.

Alexander viewed tension and resulting physical difficulties as the result of discoordination or the habituation of “faulty” patterns of movement. Rolf (1962), on the other hand, suggested that movement patterns can be viewed as reactions to physical trauma, as well as emotional mishaps:

An individual experiencing temporary fear, grief or anger, all too often carries his body in an attitude which the world recognizes as the outward manifestation of that particular emotion. If he persists in this dramatization . . . thus forming a habit pattern, the muscular arrangement becomes set . . . Once this has happened,

the physical attitude is invariable; it is involuntary . . . Such setting of a physical response also establishes an emotional pattern (Rolf, 1962, pp. 9–10).

This view of the impact of physical or emotional trauma affecting behavior patterns is similar to theories of stuttering as the result of emotional trauma (Freud, 1955a, 1955b; Gutzmann, 1879; Haase, 1846; Johnson, 1944; Klenke, 1862; Wolpe, 1958).

According to Rolf, the physical flow of movement is interrupted and habituated. Rolf believed that behavior patterns of the “integrated man” (similar to Alexander’s “use of the self”) were achieved by thinking of the body as a physical structure, such as a building, subject to gravitational pull. The “body masses must be able to counterbalance each other gravitationally and be free to adjust to changes in muscular volume or mass as the latter alters with movement” (Rolf, 1962, p. 11). Rolf suggested that muscular balance in relation to the gravitational forces was essential to personal integration, both physical and mental. Utilizing a technique of deep tissue massage which she later called Structural Integration, Rolf observed a change in the posture of the head and its relation to the shoulders and the spine. Specifically, the head was no longer supported with the external muscles attaching to the shoulder and the clavicles, but with the deeper muscles nearer the spine vertebrae. According to Rolf, clients reported greater ease of movement and a reduction in tension as a result of this treatment. Van Riper (1973) reported that two adults who stutter found that their stuttering improved subsequent to participating in Rolfing Structural Integration sessions. Although specific analyses were not presented, it was presumed that speech improved because of a new integration or coordination of the entire muscular system, which freed extrinsic laryngeal strap muscles from the necessity to support the head. The new postural alignment was believed to promote better respiration and allow for improved coordination of the phonatory, articulatory, and respiratory elements necessary for speech.

Feldenkrais, a physicist and chemist, built upon the ideas of Alexander and Rolf, among others, to develop what is now called The Feldenkrais Method®. This approach is designed to develop, through verbally directed movement or gentle touch, a functional awareness of the self in the environment and to facilitate learning necessary to develop optimal patterns for movement. According to Feldenkrais, tension is the result of the human need for stability. Unlike Alexander’s approach, in which conscious inhibition of movement is followed by a conscious redirection of new movement patterns, Feldenkrais believed that the neuromuscular system could be directly trained through slow, repetitive movement organized around a functional, biomechanically based outcome. For example, the basic movement of lifting and lowering the shoulder involves not only the movement of the entire shoulder girdle, but also the movement of the ribs, sternum, and the upper spine. Through gentle repetitive

movement of the shoulder and the head, the neuromuscular system can learn to allow coordinated movement of the spine, ribs, and sternum, frequently resulting in greater ease and range of shoulder movement, as well as decreased sense of upper-body, neck, and laryngeal tension. Feldenkrais believed that the ability to function efficiently in gravity would be limited without the ability to differentiate movement and integrate that movement into the whole (Feldenkrais, 1972). The freedom of movement of the head and neck is intrinsically related to the freedom of movement of the pelvis and the hip joints. It was his contention that humans learn movement by developing their internal sense of space, which he called awareness and which Alexander refers to as "use of the self" (Alexander, 1932; Feldenkrais, 1972).

**Neurological findings support the principles of somatic education.** A growing body of scientific work on the relationship between perception and neural networks echoes Feldenkrais' ideas and observations. Bernstein (1967) in the 1930s theorized that movement was organized around topological properties of space, or degrees of freedom, rather than specific muscles. Since then scientists have questioned how the individual parts of the neural networks of the brain relate to our phenomenological experience (see review in Ginsburg, 1995). Maturana and Varela (1980; see also, Lettvin et al., 1970) developed the idea that perception and action are inseparable and connected in neural networks. They found that the organism, in this case the brain, does not necessarily function as separate pathways but rather as an integrated whole. In the area of cognitive development, Thelen and Smith (1991) come to similar conclusions. Thelen observed that:

movements are always a product of not only the central nervous system but also of the biomechanical and energetic properties of the body, the environmental support, and the specific (and sometimes changing) demands of the particular task. The relations between these components is not simply hierarchical (the brain commands, the body responds), but is profoundly distributed, "heterarchical," self-organizing, and nonlinear (1995, p. 81).

Therefore change, through developmental and behavioral intervention, can be brought about by disrupting the stability (coordination) of the dynamics and allowing new solutions to emerge (Thelen, 1995).

An excellent example of dynamic variation within a somatic system can be found in the research by Hixon (1991), who showed that respiratory function is dependent upon our relationship to gravity. This is not merely based on whether we are standing or sitting, but also on how we organize ourselves to maintain balance between stability and instability in our actions. As we talk and move, the coordination of muscles must constantly change not only for speech, but also in relation to our constantly changing movements. Hixon (1991), following Rolf's notion of the relationship between the body and gravitational pull, postulated that:

every positional change requires a different solution to the mechanical problem of providing a given alveolar pressure. Indeed, the complexity of respiratory function in speech becomes staggering when consideration is given to the innumerable positions in which the body is oriented and reoriented with respect to gravity. In this regard it should be noted that whereas the influence of gravity is manifested in other parts of the speech apparatus with positional change, the functional adjustments that must be made by the respiratory pump far exceed those required in other parts of the speaking machinery. (p. 43)

Like Rolf, Hixon found that gravitational forces act in subtle ways on the body, resulting in slightly different muscle groups coordinating in slightly different ways depending upon position. Taking this idea one step further, the way we organize ourselves in gravity will influence greatly our ability to move easily in space, affecting not only respiration, but also the relationship between speech and respiration. When muscles do not coordinate appropriately in relationship to position, a feeling of tension results. This tension can restrict breathing, constrict the larynx and inhibit lingual movement.

The goal of somatic education is to develop awareness of differentiated movements, and to provide the skills necessary to develop coordination of movement. Once skeletal and muscular balance in relationship to gravity is achieved, the speaker's perception is one of relaxation and ease of movement. As noted above, Jacobson and Johnson postulated the need for dynamic, coordinated movement to create a sense of relaxation. However, without the second step provided by somatic reeducation, habitual patterns quickly reasserted themselves. Thus, the principles of somatic education may hold a key to improving the usefulness of relaxation in stuttering therapy. The potential efficacy of somatic learning lies in disrupting the dynamics of tension in the body and the rebuilding of new motor patterns by accessing the neuromuscular system through somatic awareness.

### **Stuttering Treatment and Somatic Education**

Somatic education, defined as learning optimal coordination of the muscles and skeletal structure in the gravitational field, results in the feeling of relaxation, greater ease of movement, and better coordination. If adults who stutter can learn new somatic patterns, relaxation or at least the reduction of tension can take place. Taken together with traditional stuttering therapy, such learning may well improve fluency and promote generalization. Relaxation as has traditionally been used in stuttering therapy changes speech patterns only as long as habitual patterns of movement do not reassert themselves. In somatic education, the learning of the neuromuscular system is such that new patterns of movement replace habitual patterns or provide alternative patterns of function. As has been demonstrated, relaxation is not "release of tension," but rather a feeling of freedom or ease of movement resulting from the optimal coordination of the whole system in relation to external forces.

**Implications for research.** Somatic education utilizing any of the methods described above is difficult to quantify. Coordination or interactions within a system are much more difficult to measure than only two isolated points. Yet the implications of somatic education in the treatment of stuttering, particularly the adult stutterer, suggest that well-designed, careful research should be carried out in this area. Ideally, this research should be jointly designed and facilitated by somatic practitioners (certified in the Feldenkrais Method®, the Alexander Technique, or Rolfing) in collaboration with speech language pathologists. Traditional research methods such as EMG for measuring muscle tension, measures of frequency, or type of disfluency, or even current attitude inventories, do not accurately measure the response to somatic education. They focus on single muscles or tasks, and are not designed to measure awareness and differentiation of the complex coordination between respiration, phonation, articulation and posture. Old questions need to be framed in new ways. Within the community of somatic practitioners there is active on going discussion of how to quantify the results; however, to date there are more questions than answers.

One preliminary attempt at assessing the results of somatic education in stuttering treatment was recently attempted by the present authors (Gilman, 1998). Two adult females with a history of chronic stuttering, and less than satisfactory response to traditional stuttering treatment approaches participated in an 8-week series of lessons in the Feldenkrais Method®. The experimental design was based on multiple baseline across subjects single-subject experimental design (Connell & Thompson, 1986; Kearns, 1986; McReynolds & Thompson, 1986). No traditional stuttering treatment was administered during this study. Subjects' speech fluency and speaking attitudes were assessed through treatment based on a number of standard formal and informal measures (e.g., frequency and duration of stutter, responses to standard attitude inventories as well as informal questionnaires developed by the authors for the purposes of study). Results indicated a minimal reduction in the measurable degree of disfluency; however, both subjects reported an enhanced ability to consciously respond to and reduce their level of anxiety and physical tension in specific speaking situations. Both subjects reported that they felt an increased awareness of their physical tension when speaking, coupled with an improved ability to release that tension during stuttering. As a result, they reported that they felt more 'in control' of their speech. Although further, more controlled research is certainly necessary to quantify and better describe these preliminary results, these two subjects seemed to be suggesting that the increased awareness of their movements provided a choice of action in different speaking situations, which they did not previously have. Results also indicate a degree of generalization outside of the treatment setting that they had not previously experienced in traditional stuttering therapy.

## CONCLUSION

Relaxation exercises have traditionally been a common component of many approaches to treating stuttering. This is likely due to the fact that excess physical tension is one of the most notable aspects of stuttering, and relaxation in any form tends to reduce this tension. As noted by Boome and Richardson (1947, p. 101) "tension is always present whenever the act of speaking involved a struggle, and this tension must be overcome and replaced by ease before the patient can feel any confidence in his ability to speak." Nevertheless, questions have been raised about the generalization of results from traditional relaxation treatments. When relaxation is viewed as a static process, that is, when the goal of relaxation is a lack of muscle tonus or a sense of heaviness, then short-term fluency may result, but transfer does not. If relaxation is viewed as a byproduct of somatic education, however, important clinical implications for the use of relaxation in stuttering treatment can be seen. In other words if tension is seen not in terms of specific muscle tonus, but rather how the hypertonicity relates to the dynamic organization of the whole person, a new approach to relaxation therapy begins to emerge. Rather than attempting to eliminate bad patterns of speaking or moving, theories and techniques of somatic education focus on teaching the client optimal, coordination patterns of movement, which may result in an increased sense of well being, relaxation, and ultimately, fluency.

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