The CATESOL Journal

MARSHA J. CHAN
Sunburst Media, Sunnyvale, CA

Embodied Pronunciation Learning: Research and Practice

This article summarizes research on body language, embodiment, and the incorporation of proprioception, physical movement, gestures, and touch into second language education, particularly with regard to the pronunciation of English. It asserts that careful attention to breathing, vocalization, articulatory positions, pulmonic and tactile pressures, pitch and duration, scope and synchrony of body movements, in addition to the systematic use of gestures, enables more effective pronunciation. It presents ways that teachers of English can embody features of pronunciation—making them more perceptible and representing them in clear and obvious ways to enhance perception, pronunciation, and retention. Classroom techniques described include pronunciation workouts such as breath training and articulator exercises; the use of simple devices, hands, and fingers to illustrate aspects of articulation and prosody; and larger body movements, such as the "Stress Stretch," "Haptic Syllable Butterfly," and "Rhythm Fight Club" to improve stress and rhythm.

Cognition is essential in the act of speaking, since the brain first forms verbal concepts and then controls their execution. Similarly, listening is an active cognitive process that is perfected through time. In other words, developing speaking and listening skills in a second or foreign language requires cognitive resources and entails acquiring expertise that becomes increasingly automatized. Once cognitive resources are developed for the second language (L2), physical skills are invoked to produce the sounds and rhythms of speech. Scores of muscles in the head and neck are directly involved in speech. These speech muscles must be coordinated to perform speech actions. For actions to become automatic, deliberate practice and multiple

repetitions are required (Kjellin, 1999). Pronunciation, a significant component of speaking, is one of the speech actions that requires both cognitive control and automatization.

All human physical activities that are extended in time tend to be rhythmic, whether breathing, running, knitting, peeling potatoes, or speaking (Brown, 1990). In addition to the muscles that actually produce speech sounds, the body performs other movements that act in synchrony with spoken language. Big muscle movements coincide with stressed words and syllables in normal spoken language. The employment of large muscle movements to enhance the perception and production of speech can have a positive effect on foreign language learners' comprehension and recall of oral language (e.g., Burri, Baker, & Acton, 2016; Chan, 2016; Dahl & Ludvigsen, 2014).

The development of pronunciation skills is substantially more effective when integrated with conscious gestures and other body movement. For the purposes of this article, I will consider *embodied pronunciation* to refer to body movement that involves physical sensations perceptible through visible, auditory, kinesthetic, and proprioceptive modalities, and that expresses, signifies, or enhances one or more aspects of oral language. Further, I will contend that by focusing attention on embodiment, pronunciation learning and teaching can be enhanced.

The Importance of Gestures

Actions Speak Louder Than Words

A review of body language research helps provide context to the understanding of body language in L2 acquisition and, in particular, spoken language. In 1952, Birdwhistell pioneered the field of *kinesics*, that is, "facial expression, gestures, posture and gait, and visible arm and body movements" (Padula, 2009, p. 584). Yet, in their volume analyzing conscious body language, Morris, Collett, Marsh, and O'Shaughnessy (1979) lamented that the importance of human gestures had been greatly underestimated, and that the science of gestures lagged far behind the science of linguistics. Fortunately, since those years, much more research on nonverbal communication has been conducted by cognitive scientists, psychologists, applied linguists, sociologists, and educational researchers. For example, Pennycook (1985), discussing the importance of paralanguage (which at the time was defined as including vocal qualifiers, intonation, and body language) in the classroom, noted that our bodies convey information constantly during any interaction. Bolinger (1983) advanced the concept that intonation and gesture are fundamentally tied together, describing intonation—the rise and fall of pitch as it occurs along the

speech chain—as being paralleled by rising and falling facial and body movements. Goldin-Meadow (1999) posited that gestures can stand as substitutes for speech, and they can serve as both a tool for communicating to listeners and as a thinking tool for speakers. Kendon (2004) conducted studies showing how gesture and speech are interrelated in conversations, suggesting that these two forms of expression—body movement and spoken language—are integrated. McNeill (2005) argued that speech and gesture share an unbreakable bond. In this view, gestures not only carry meaning, but they are co-expressive with synchronous speech. In other words, gestures cannot be omitted without loss of meaning or function. Gentilucci and Dalla Volta (2008) reviewed neurophysiological and behavioral evidence that arm gestures and spoken language are controlled by the same motor control system. Finally, the finding that "gestures—more than actions—appear to make people pay attention to the acoustics of speech" was a major determination by a US-Netherlands research collaboration (Acoustical Society of America, 2012).

Gestures and Language Learning

In learning a second or additional language, gestures are also important. Kellerman (1992) reviewed evidence of the effects of kinesic behavior on listening in the first language and suggested that body movement should be visible in videotaped listening material as an aid in foreign language classes. McCafferty and Stam (2008), in their research on L2 speakers, argued that gestures are multifunctional, with the same gesture often serving different functions depending on the speaker's purpose. Nonlinguistic messages conveyed through nonverbal behaviors have a powerful impact in L2 classrooms (Chamberlin-Quinlisk, 2008). Producing gestures along with speech (i.e., during the encoding process) was found to make information more memorable than without gesture (Cook, Yip, & Goldin-Meadow, 2010). Sime (2008) provided evidence that students attributed meaning to their teachers' gestures; they identified gestures that enhance comprehension, gestures that facilitate processes of learning, and gestures that give feedback. In a comparison of the degree to which native-language speakers and foreign language learners understood a spoken message with and without gestures, Dahl and Ludvigsen (2014) found that seeing gestures while listening had a positive effect on foreign language learners' performance, and that listening without seeing gestures had a negative effect on their comprehension and recall. An analysis of one ESL teacher's spoken definitions and the manner in which the teacher crafted and choreographed his definitions to meet the needs of the students found that the teacher's gestures (a) reinforced the meaning

of verbal utterances, (b) disambiguated the meaning of lexical items, and (c) established gestural cohesion across turns at talk (Belhiah, 2013).

The importance of nonverbal communication in teaching both concrete objects and abstract notions in new words and grammatical concepts is readily applied by experienced L2 teachers by using any of the four dimensions of gestures specified by McNeill (2006): *iconic* (illustrating a specific action or object), *metaphoric* (representing an abstraction), *deictic* (pointing to people, places, or things in real or abstract space), or *beat* (rhythmic or quick beating of a finger, hand, or foot for emphasis or to introduce new themes). Language teachers may accompany their speech with gestures, for example, by moving the arms and hands above the head to indicate the shape and height of a *tower*, stretching the arms out sideways away from both sides of the torso for *expansive*, thrusting a hand over the shoulder with the fingers curled and the thumb pointing backward for *past tense*, moving one's body adjacent to a desk to indicate *next to*, and extending in sequence one, two, and three fingers to indicate *first, second, third*. According to Goldin-Meadow, Nusbaum, Kelly, and Wagner (2001), such practices involving the use of gestures free up cognitive resources and thus improve student performance.

Embodiment

Embodiment has had many definitions. Sapir (1921) wrote that speech is an embodiment of a unified thought and that linguistic embodiment is essential for a concept to exist. Lakoff (2012) explained how in 1975 he was shaken out of the old view that the mind and language were separate—a disembodied cognition view—to an understanding that all concepts, literal and abstract, are embodied. In a keynote address at the inaugural International Convention of Psychological Science in Amsterdam, Lakoff (2015) stated emphatically, "You can only have meaningful thought through connections to the body; that is absolutely necessary." Rohrer (2011) noted that embodiment involves habits of speech, movement, and hearing; these patterns are acquired through many years of social practice, with both social and physiological components. A view of pronunciation as consisting simply of the sounds of a language from one person's mouth to another person's ears ignores the importance of motility of each part of the body that influences speech, as well as use of the body as a choreographic element in instruction. On the other hand, employing an embodied pronunciation approach in a systematic manner provides a teaching and learning environment with great potential for promoting clearer speech and more successful communication.

Proprioception

Have you ever walked down the hall to your bedroom in the dark without losing your balance? With your hands hidden beneath a table, can you use one hand to put a ring on the fourth finger of the other hand? When you drive an automobile, are you able to place your foot on the accelerator while keeping your eyes on the road ahead? If so, you are using the sense of *proprioception*. Proprioception is the unconscious perception of movement and spatial orientation arising from stimuli within the body. In humans, these stimuli are detected by nerves within the body, as well as by the semicircular canals of the inner ear.[1] Highly skilled baseball players, dancers, and golfers can coordinate their muscles, tendons, and ligaments to achieve proper positioning in order to perform desired actions while maintaining balance. Through training, athletes develop a strong sense of the relative position of their own body parts and strength of effort being employed in movement. Proprioception, discussions of which go back to the 1500s,[2] is an overlooked sense in societies that place greater value on seeing and using the written word. As Walker (2014) explained, proprioception is related to movement yet is subtly distinguished from it: "Imagine trying to walk, gesture, or eat if you had no sense of where your limbs were without looking at them." Becoming cognizant of and activating the proprioceptive sense can have an important impact on embodied pronunciation.

Although not typically viewed as an athletic endeavor, speech is a complex motor task that involves many different muscles and body parts; thus, in order to speak well, articulate clearly, and pronounce intelligibly, it can be important to address the whole body. In his training approach to the biodynamics of voice and speech, Lessac (1965) advocated an organic sensory learning process, claiming that we need to "learn to 'feel' our voice and speech through certain unfamiliar, kinesthetic and vibratory sensations" (p. 60). He further stated that we "must learn to ignore the auditory mechanism and rely instead on a new sensitivity to—and a new concentration on—other perceptions: the vibratory, kinesthetic, and tactile sensations that travel principally by the facial and trigeminal sensory and motor cranial nerves" (Lessac, 1967, pp. 15-16). In a similar vein, Underhill (2012) recommended approaching pronunciation instruction physically, encouraging teachers to "help learners to reconnect with the muscles that make the difference." Finally, Odisho (2007) described a multisensory, multicognitive approach to pronunciation learning, noting that ear-training should be supplemented with

a) eye-training (i.e., visual orientation of pronunciation through

seeing and visualizing sound production and the accompanying dynamics of body and facial gestures); b) neuro-muscular training (i.e., tactile orientation or how to kinesthetically and proprioceptively sense and feel sound production and its dynamics; and c) brain training (cognitive orientation or how to psycholinguistically and consciously perceive, recognize, retrieve and produce the sounds and their underlying dynamics). (p. 6)

In her book on the extraordinary qualities of the human voice, Karpf (2006) tells the story of how a teacher of singing, upon first viewing with the aid of a dental mirror his uvula and glottis move in the act of phonation, was filled with wonder and excitement. That was in 1854 when his eyes first viewed the formerly hidden speech organs. Nowadays, with MRI techniques such as those developed at the Beckman Institute (2015), the organs of human speech are readily visible.[3] Nevertheless, when people speak, they are typically unaware of what their lips, tongue, teeth, jaw, glottis, vocal cords, and lungs are doing or where they are at any given moment in the stream of speech. Yet they can express themselves perfectly, pronouncing words and connecting them in coherent phrases.

Embodied Pronunciation Practices

As emphasized by many pronunciation specialists (e.g., Chan, Brinton, & Gilbert, 2018; Grant, 2014; Murphy, 2017; Yoshida, 2016), to become an effective pronunciation teacher, it is necessary to have a basic knowledge about phonology—the facts of pronunciation—as well as a basic philosophy of pronunciation and basic skills to teach the pronunciation of the target language—in this case, English (Brinton, 2014). The following embodied pronunciation techniques are meant to build on an existing framework of fundamental knowledge about pronunciation.

Pronunciation Workouts

Influenced by the research on how speech and movement are interconnected, and encouraged by my classroom attempts to employ multiple senses in demonstrating how sounds are produced, I constantly highlight the physicality of pronunciation in my own pronunciation teaching. I also encourage other teachers and learners to do the same, telling them, "We are athletes of the mouth" (Chan, 2013a). Accordingly, my coaching of pronunciation learning and modification has elements similar to those of a physical education class. In my work, I describe numerous physical warm-up activities (Chan, 1994a). I also demonstrate these activities on my Pronunciation Doc-

tor YouTube Channel,[4] leading participants through various body exercises to prepare for and improve performance in pronunciation during spoken-language activities such as conversation, oral presentation, and dramatic interpretation.

Breath Training. Because control of the lungs plays an important role in sending air through the vocal folds and resonating cavities, I believe breath training to be one of the fundamental pronunciation workouts. Honda (2008) describes three functional units of speech: "generation of air pressure, regulation of vibration, and control of resonators" (p. 7). Teaching learners how to breathe deeply and fully from the diaphragm is not a usual practice in an English class; however, when done appropriately, it can allow participants to relax, center themselves, and become mindful of their bodies as instruments of voice. They see and feel (a) the movement of the belly as the diaphragm expands and contracts while sending air through the trachea; (b) the rise and fall of the chest as they fill their lungs with air; and (c) the difference in tense and lax muscles in the neck and shoulders. Deep breathing has the additional benefits of centering participants' attention, creating a mindful awareness of what they are directly experiencing through the senses, and separating pronunciation learning from other concerns.

Articulator Workouts. Additional pronunciation warm-up exercises train other organs of speech. Participants become aware of their sensations—micro-movements, vibrations, tension, resonance—as they make different motor progressions and sounds, activating, stretching, and moving the jaw, cheeks, lips, throat, tongue, and nose. A few examples follow.

The Jaw Stretch

The oral cavity is expanded by parting the lips, opening the mouth, lowering the chin, stretching the ligaments at the temporomandibular joints—the back of the jaw—as for a yawn, and dropping the floor of the oral cavity by lowering the posterior pharyngeal part—or the back third—of the tongue while vocalizing. Performers feel the muscular contractions and sense the changes in pitch, timbre, and resonance of the sounds emanating from within while increasing proprioception of their speech apparatus.[5]

The Tongue Waggle

The tongue waggle is performed by parting the lips, letting the tip of the tongue hit the inside upper front teeth as it extends outside the mouth, and retracting the tongue inside the mouth. This action is repeated slowly and deliberately at first to stretch the tongue. Later the

speed increases so that the tongue waggles in a rapid manner in order to increase flexibility.[6]

The Lip Trill

After the upper and lower lips are manually loosened, the lips are closed as for the sound /m/, and the jaw is relaxed so that the upper and lower teeth are separated. Next, the vocal cords vibrate, and the vibration is sent from the throat through the nasal passage and the loosely touching lips. Then air is inhaled into the lungs through the nose. Finally, the lip trill is executed by exhaling through the lips during continued phonation, causing the upper and lower lips to vibrate rapidly against each other.[7]

Given these types of regular trainings, in which students become more acquainted with their articulators, they begin to develop a sense of proprioception of their speech apparatus. Like other parts of our bodies, our vocal organs learn to assume new positions when properly trained. Making speech sounds requires delicate control and quick movements of the tongue: The more automatic the movements are and the more fluid the sounds, the more fluent the speech. To produce the sounds intelligibly in connected speech, a speaker needs to activate muscular components relevant to the target language, gain a proprioceptive sense of where the articulators are in relation to each other, and control how the breath supports sound production. Performing pronunciation workout exercises can enhance a speaker's articulation and fluency, just as playing scales and chords on the piano can help develop the agility and fluidity for playing a piece of music.

Simple Devices to Enhance Perception

Since verbal descriptions, whether written or oral, are inadequate to address the complex dimensions of producing sound, it is helpful to provide other ways for learners to understand features of pronunciation. In some cases simple devices serve well to illustrate aspects of articulation and prosody. For example, percussion instruments can serve to amplify the sensation of stress and rhythm in the stream of speech. These can be borrowed from "real" musical instruments, such as drums and cymbals, or everyday found objects, such as sticks and bottles. In the case of aspiration, the puff of air when /k/, /p/, and /t/ begin a stressed syllable can be illustrated with a feather, a lit match, or a thin piece of paper (Celce-Murcia, Brinton, & Goodwin, 2010). Gilbert (1978) described how to use a kazoo, a small musical instrument that imparts a buzzing quality to the human voice, to isolate the intonation of speech from its segmental aspects. This simple gadget is typically made of light metal or plastic with a side hole covered

by a thin membrane that vibrates and makes pitch and rhythm more perceptible to language learners. As an expansion on the use of latex sheeting described by Gilbert (1978), a rubber band can be stretched between two hands to demonstrate with a physical sensation the differences in vowel duration of individual words (e.g., *leaf—l e a ve)*, different syllables in a multisyllablic word (e.g., *mis-ta-ken*), and important words in a phrase (e.g., *I did my homework in the afternoon*). Chan (2013b) provides a description with links to video clips showing both teacher and students using this simple gadget to enhance the perception and production of vowel length and rhythm.[8] To support learners' perception of tongue position in articulating vowels and liquid consonants such as /l/ and /r/, Gilbert (1978) and Yoshida (2016) recommend procuring a dental mold consisting of an upper and lower jaw with teeth and then using a hand covered by a red sock to give a three-dimensional presentation of the relationship of the tongue to the teeth, jaw, gum ridge, and hard palate. Gadgets for pronunciation are useful, but they may not always be available when a teacher needs them in class. The next sections present methods to embody pronunciation that do not rely on gadgets. Instead, the hands and other body parts are employed to demonstrate or signify both articulatory and prosodic elements of speech.

Using Your Hands to Facilitate Pronunciation

After a teacher is familiar with both segmental and suprasegmental features of speech, the hands can be used to construct a model of the mouth, as illustrated in Chan (2007). The hands can also be used to provide haptic (that is, touch-based) gestures that correspond with syllables, stress, and rhythm. Moreover, hands can trace prosodic contours, indicating pitch and intonation patterns. The following is a sampling of gestures that have been purposefully designed to serve specific instructional functions.

1. To show the position and proximity of teeth, tongue, gum ridge, and the roof of the mouth, the teacher starts with the upper body and head turned to one side, for example, to the students' left (i.e., so that the learners understand that the gestures show a side view of the mouth). The teacher places the hand that is farther away from the learners out front, palm down, in a slightly curved form, and indicates parts of the palm that represent the gum ridge (near the base of the fingers), the roof of the mouth (the central part), and the velar (or back) region (near the heel), and explains that the fingers represent the upper teeth. The teacher places the

hand that is nearer the learners below the first hand to represent the tongue. As the parts of "mouth" hand are named and the "tongue" hand is moved, the teacher's own mouth is opened wide and the tongue is pressed on each of the associated parts of the mouth.

2. To illustrate the difference between continuant and noncontinuant sounds, the teacher uses two distinct gestures. To indicate the continuant quality of nasals, sibilants, fricatives, liquids, and all vowels, the teacher holds one hand in front of the torso, palm facing inward, and moves it smoothly in a forward, circular, fluid motion. The teacher pronounces a continuant sound while synchronously circulating the hand in this manner. To contrast a continuant with a noncontinuant sound, the teacher circulates the hand as described for the continuant, and then holds the hand still in front of the torso for a noncontinuant while pronouncing contrasting sound pairs, such as /f/-/p/, /θ/-/t/, /v/-/b/, /ʃ/-/ʧ/.
3. To indicate stressed and unstressed syllables, the teacher pronounces a multisyllabic word, extends a hand in full view of the learners, and ensures that the hands open and close in synchrony with the syllables: (a) OPEN: The fingers are extended far apart from each other on a stressed syllable, and (b) CLOSED: The fingers are pressed together so that they either touch at the tips or form a fist, on an unstressed syllable. For example,

ac-tive	[OPEN—closed]
re-**act**	[closed—OPEN]
ac-**ti**-vi-ty	[closed—OPEN—closed—closed]

4. To indicate intonation, the teacher traces the pitch contour with the arms extended out in front, moving the fingers from the teacher's right to left (learners' left to right) synchronously while pronouncing a statement or question:

Can you feel the rhythm?

Yes, and the intonation.

As we have seen, the hand can be used in numerous ways to help students more successfully articulate L2 segmental (vowel and consonant) and suprasegmental features (rhythm, stress, linking, blending, and other aspects of connected speech). Using the auditory, visual, tactile, and kinesthetic techniques described, teachers can amplify stu-

dents' cognitive and perceptive sensibilities to the consonants, vowels, and prosodic features of English.

Using Fingers to Differentiate Sounds

Yet another use of the hands is to ascertain learners' ability to perceive differences in the L2 sound system and to assist them in producing the target feature. Here, learners can be given limited options and asked which option they heard, indicating their answer using their fingers to indicate the number of the option. This technique provides the teacher with visible feedback as to students' ability to perceive segmental or suprasegmental features, and it should follow classroom presentation and practice as a quick test of whether further focus on the sound feature is needed. When the students' perceptive ability has been established, the gestures may be used by students to identify the sound feature as they speak. As explained in more depth below, the teacher can give an oral prompt with two to five choices (depending on the proficiency of the students and the learning point), asking learners to display their answer by holding up one to five fingers corresponding to the options. An example of possible teacher-talk is provided in the first example of each section that follows.

Possibilities With Two Choices. (1) Two vowel sounds: "We've practiced words such as *hat-hot, map-mop*. Now I'd like to see how well you can distinguish between these two vowel sounds. I'll say a word. Hold up one finger if you hear the first vowel, /æ/ as in *hat*. Hold up two fingers if you hear the second vowel, /ɑ/ as in *hot*. After you hold up your fingers, I'll say the word again and show the answer by holding up my fingers." Teachers may use words that they have already practiced, or for more advanced students, words that were not yet practiced, thus not committed to short-term memory. For multisyllabic words, modify the instructions, "… if you hear the first vowel, /æ/ as in *hat* in the stressed syllable." For example, *moderate* /ɑ/, *commander* /æ/. Other options include: (2) Two consonant sounds, such as /b/ or /v/? (3) Intonation, such as rising or falling? Even or rising? (4) Word stress: Stress on the first or the second syllable? (5) Same or different consonant / vowel / intonation pattern?

Possibilities With Three Choices. (1) "I'll say two words, one of them twice. Which word do you hear only once, the first, second, or third word? For example, if I say *street—straight—straight*, hold up one finger." (2) "I'll pronounce a word with even, rising, or falling intonation. Hold up one finger if you hear even intonation (no pitch change), two fingers if you hear rising intonation, and three fingers if you hear falling intonation (on the stressed syllable if it's a multisyllabic word)."[9]

Even	*Rising*	*Falling*
		
tonight	Tonight?	Tonight.
		
at ten	At ten?	At ten.

Possibilities With Three or More Choices. (1) "I'll pronounce a word with one to five syllables. Hold up the same number of fingers as the number of syllables you hear." Examples *act* [1], *re-act* [2], *re-ac-tion* [3], *ac-ti-va-tion* [4], *re-ac-tio-na-ry* [5]. (2) "I'll pronounce a word with two or more syllables. Listen for the stressed syllable. Hold up one finger if the first syllable is stressed, two fingers if the second syllable is stressed, and so on." Examples: ***ac****-tive* [1], *re-**act*** [2], *ac-**ti**-vi-ty* [2], *ac-ti-**va**-tion* [3]. Depending on their proficiency, learners can be asked to pronounce words and simultaneously hold up the number of fingers corresponding either to syllables (in the first example) or to the stressed syllable (in the second example).

In each case, the learners use finger gestures to demonstrate their ability to discriminate particular phonological or prosodic features; this allows the teacher to assess their perception in order to determine whether more practice is needed or if they have mastered the topic well enough to move on to a new one. The teacher can also use finger gestures as a nonverbal indicator for a learner's self-correction. For instance, if a learner pronounces ***com****-mit-tee* and holds up one finger, the teacher can hold up two fingers to give a hint to stress the second syllable: *com-**mit**-tee.*

The "Stress Stretch"

While the hands are useful for indicating voicing, place and manner of articulation, aspects of connected speech (e.g., linking), and assessing students' listening discrimination, moving the whole body in systematic ways can further illustrate for learners the prosodic elements of spoken language. The following embodied-pronunciation approaches accompany and enlarge upon nonverbal behavior that occurs naturally during conversation. Movements of all parts of the body—not only the hands and arms—are closely related to sentence stress, as Bull and Connelly (1985) discovered when studying the gestures and vocal stress of pairs of discussion partners. Since we know that big muscle movements coincide with stress in spoken English, taking advantage of this phenomenon by systematically employing big muscles can help learners understand how stress works in English.

The Stress Stretch is a whole-body gesture activity, described in Chan (1994b, 2016) and exemplified in Chan (2013c);[10] it complements and amplifies other techniques for indicating stressed syllables. You may have noticed how naturally people move to the beat of music and voice. People listening to music nod their heads, tap their toes, and slap their thighs on the downbeat. Speakers open their mouths and eyes more and raise their eyebrows on important words and stressed syllables. The Stress Stretch incorporates movement and rhythm of large body muscles with stress and intonation in oral language in a purposeful and systematic way. The employment of these intentional instructional gestures is helpful for beginners who are acquiring the stress and intonation of English words and phrases as well as for intermediate to advanced learners who lack sensitivity to auditory input or have difficulty internalizing stated rules or patterns of stress and intonation. The Stress Stretch can reach these learners in ways that purely verbal means cannot.

The purposes of the Stress Stretch are for learners to:

- Gain awareness of stressed syllables in spoken English;
- Associate stress with vowel length, clarity, and pitch;
- Internalize these suprasegmental features into body memory;
- Activate and link kinesthetic, tactile, visual, and auditory learning modalities; and
- Be able to pronounce multisyllabic words with proper stress and intonation.

To employ the Stress Stretch technique, the teacher sits on a chair facing the learners, carefully pronounces a multisyllabic word, and simultaneously rises to full height on its primary stressed syllable and sits (or remains seated) on its unstressed syllable(s). Examples:

pro-**fes**-sor	[sit—STAND—sit]
en-gi-**neer**	[sit—sit—STAND]
ob-ject (noun)	[STAND—sit]
ob-**ject** (verb)	[sit—STAND]
pos-si-**bi**-li-ty	[sit—sit—STAND—sit—sit]

The teacher takes care to say each word rhythmically, fluently, and naturally. The body movements are synchronized with the sound of the word. The vowel sound is vocalized from the moment the body begins to rise and the vibration is continued through the peak of the word at a higher pitch in the full standing position. The

pulmonic pressure from the chest and the vibration of the vocal cords are felt and noticed. After sufficient demonstration, students follow the teacher verbally and nonverbally. Next, they stretch and pronounce together with the teacher. In order to have students focus on the sensation of stretching their bodies, vibrating the vowel in the stressed syllable longer than the others, and touching the chair lightly while pronouncing unstressed syllables, they look at the teacher and not at the words on a page. The teacher encourages them to use all their senses to feel the pitch change, vowel length, and rhythm. The rise and fall of the body during the Stress Stretch emulates the rise and fall of vocal pitch, albeit in a more dramatic way than Bolinger (1983) described for natural speech. If the teacher is referring to a word list, it should be displayed on a chart in the back or on the side of the room in large letters so the teacher can see it while keeping the students in primary view, and all participants can focus on perceiving the movements and not be distracted by looking away. Not only does watching the teacher's gestures enhance students' comprehension of what they hear, but their performance of the body movement while speaking helps them embody the sound and sensation of the words and phrases.

As with other intentional instructional gestures, the Stress Stretch can be used for presenting, correcting, practicing, anchoring, and solidifying pronunciation. When a student makes a lexical stress error during the stream of speech, the teacher can draw attention nonverbally—by performing the Stress Stretch silently on the errant word—to provide a cue that assists the student's self correction. In this way, the gesture needs no words, as Goldin-Meadow (1999) observes, "substituting for speech and clearly serving a communicative function" (p. 419). When students are participating in group work, they may also activate the Stress Stretch on new vocabulary without the teacher's explicit direction. This phenomenon is reflected in a study by Smotrova (2017) that describes a teacher's facilitation of students' identification and production of elements of pronunciation—syllables, word stress, and rhythm—by using reiterative gestures, and that shows how these gestures were then appropriated by the students as a learning tool to begin gaining control over suprasegmental features.

The performance of gestures by learners solidifies their understanding and demonstrates their comprehension to the teacher, with whom they construct interactional alignments (Matsumoto & Dobs, 2017). Whether done individually, in pairs, or chorally with the whole class, the expansion and reduction of body height coinciding with lexical stress or discourse prominence serves to provide salient information to the speakers' bodies that might otherwise go "over their heads"

if left only in textual or auditory form. The actual physical production of gestures facilitates all cognitive processes more effectively than the mere viewing of gestures, demonstrating that gesture can serve as an effective cognitive aid for L2 word learning (Morett, 2014). The next section describes additional embodied pronunciation techniques.

Haptic Gestures for Pronunciation Teaching

We often express our understanding through the metaphor of touch, such as: "She's got a handle on that." "It took them a while to get the hang of it." "He has a very good grasp of the problem." "We caught onto the idea pretty quickly." Touch is an important way that humans interact with the environment to understand both objects and events. Not only is touch the primary way we communicate with a newborn child, it has also been determined to be critical for physical, emotional, and cognitive development (Goleman, 1988). The field of haptics encompasses the study of touch and human interaction with the external environment. Minogue and Jones (2006) reviewed the use of haptics in education, considering the development of young children, older children, adolescents, and adults in fields as varied as biological science, physical science, and computer science. These researchers called haptics an untapped sensory modality.

Acton (n.d.) describes the role of haptic methodology in language instruction: "In about 40 years in the field I have had just one idea: that the systematic use of body movement is essential to effective and efficient pronunciation instruction." He defines haptic pronunciation teaching as "using gesture, touch and movement to teach pronunciation of English (or any language)." In a report on a haptic integrated system for classroom pronunciation instruction, Acton, Baker, Burri, and Teaman (2013) describe pedagogical movement patterns (PMPs), which involve the hands moving across the visual field in locations that are associated with specific sounds or processes (e.g., pitch), the hands touching each other or a part of the body to coincide with lexical or focal stress, and the integration of such movements with vocalized pronunciation. Haptic-integrated English pronunciation instruction uses touch and movement in teaching intonation, rhythm, conversational discourse, and selected consonants in place of formal phonological rules. Burri, Baker, and Acton (2016) describe haptic pronunciation gesture-plus-touch movements that help learners differentiate between stressed and unstressed vowels, group and highlight prominent syllables in words and collocations (e.g., *get up*, *sit down*), and recognize word-level tone patterns or intonation.

"Syllable Butterfly PMP." This haptic practice aims to increase learners' (a) memory for phrases and longer words, (b) ability to

memorize texts, (c) fluency in dialogues, and (d) intelligibility of spoken word grouping. Kielstra (2017) describes the PMP:[11]

> At the start, the left hand rests on the outside of the right shoulder muscle … and the right hand is placed on the front of the left forearm muscle. … The right hand gently taps on the left forearm muscle … for unstressed syllables, and the [left] hand taps firmly on the right shoulder on stressed syllables. Students initially practice these gestures with a set of key words/phrases within the one to seven syllable range group (e.g., Where's your brother? He went to the movies.). The primary goal of the PMP is to help the student focus on the felt sense of syllable grouping and the phrase-level stress of English rhythm. In this sense, the contrast between the light tap on the elbow and strong tap on the deltoid muscle is more distinct or pronounced. (p. 278)

"Rhythm Fight Club." This haptic technique uses controlled, boxing-like gestures to assist students in perceiving and producing word stress accurately when learning vocabulary.[12] According to Burri et al. (2016), the "purpose of the [Rhythm Fight Club] is to compact the syllables of speech, especially the unstressed syllables, creating a much more conversational 'felt sense' for the learner" (p. 24). To indicate word stress, the teacher squeezes a ball with an arm positioned at a 90-degree angle. When pronouncing a stressed syllable, the arm punches forward, and the hand squeezes the ball. When pronouncing an unstressed syllable, the arm jabs a short distance either backward or forward. For example,

va-lid	[**PUNCH**—jab back]
va-**li**-di-ty	[jab back—**PUNCH**—jab back—jab forward]

Though the use of nonverbal haptic behaviors in the classroom to establish a warm atmosphere and to motivate students to participate in learning is advocated by many, including Hişmanoglu and Hişmanoglu (2008), there are some caveats. In discussing the use of tactile communication or haptic interventions, they advise language teachers to be careful. They cite a number of researchers who distinguish high-contact, touch-oriented societies (e.g., Filipino, Latin American, Turkish) from societies that are low contact and not touch oriented (e.g., Chinese, Japanese, Korean); the former may perceive the teacher's haptic behavior as normal while the latter may perceive it as abnormal and uncomfortable. They also point out that in Islamic cultures, touching between people of the same gender is approved,

but touching between genders is not allowed. Thus, while integrating embodied pronunciation methods into instruction, teachers need to remain constantly aware of the individuals, the classroom dynamics, and the attitudes students express toward these activities. In terms of systematically investigated empirical research, Minogue and Jones (2006) expressed a need for further studies on the value of adding haptic feedback to the complex process of teaching and learning.

Conclusion

An understanding of the human body as an instrument of speech and the employment of embodied pronunciation techniques can help language learners develop both perceptive and productive skills, not only in the oft-mentioned auditory realm, but also in the tactile, kinesthetic, and proprioceptive realms. Acquiring an intelligible pronunciation of a language is not only a matter of what one does with the mouth, nor is it reliant solely on listening with the ears. Although these two parts of the body are extremely important, pronunciation can be learned well only when it is integrated with greater bodily awareness, movement, and sensation. Through explicit learning and self-monitoring, language teachers can become more conscious of the appropriate use of gestures and other nonverbal language in general. And in particular, they can learn to employ well-developed, systematic, consistent, and meaningful body movements in their classrooms so as to guide their learners to clearer and more intelligible pronunciation.

Author

Marsha J. Chan, BA, MA, Stanford University, Mission College professor emerita, is cofounder of CATESOL's Teaching of Pronunciation Interest Group and winner of teaching, presentation, and publication excellence awards. Her interests include teaching pronunciation and accent modification. She creates printed and digital learning materials, publishing free videos as Pronunciation Doctor at www.youtube.com/user/pronunciationdoctor.

Notes

[1]Proprioception. (n.d.). *Dictionary.com Unabridged*. Retrieved from http://www.dictionary.com/browse/proprioception

[2]Source: https://en.wikipedia.org/wiki/Proprioception#History_of_study

[3]See, for example, https://beckman.illinois.edu/news/2015/04/new-super-fast-mri-technique.

[4]To view, visit http://www.youtube.com/pronunciationdoctor.

[5]To view, visit https://youtu.be/-uVHVqwNums.
[6]To view, visit https://youtu.be/8SfdBRPCMuc.
[7]To view, visit https://youtu.be/wgQ4HBVutgk.
[8]To view, visit https://marshaprofdev.blogspot.com/2013/04/stretching-content-words-with-rubber.html.
[9]Source: Chan (2009, p. 25).
[10]To view, visit https://www.youtube.com/watch?v=PWJv-l6OvAY.
[11]To view, visit https://vimeo.com/61190793.
[12]To view, visit https://vimeo.com/61195605.

References

Acoustical Society of America. (2012, May 8). Gestures fulfill a big role in language. *Science Daily*. Retrieved from http://www.sciencedaily.com/releases/2012/05/120508152000.htm

Acton, W. R. (n.d.). *HICPR: Haptic-integrated clinical pronunciation research and teaching* [Blog]. Retrieved from https://hipoeces.blogspot.ca

Acton, W., Baker, A., Burri, M., & Teaman, B. (2013). Preliminaries to haptic-integrated pronunciation instruction. In J. Levis & K. LeVelle (Eds.), *Proceedings of the 4th Pronunciation in Second Language Learning and Teaching Conference* (pp. 234-244). Ames: Iowa State University.

Beckman Institute. (2015). *New super-fast MRI technique: Singing 'If I Only Had a Brain'* [Video file]. Retrieved from https://beckman.illinois.edu/news/2015/04/new-super-fast-mri-technique.

Belhiah, H. (2013). Using the hand to choreograph instruction: On the functional role of gesture in definition talk. *Modern Language Journal, 97*, 417-434. doi.org/10.1111/j.1540-4781.2013.12012.x

Bolinger, D. (1983). Intonation and gesture. *American Speech, 58*(2), 156-174. doi.org/10.2307/455326

Brinton, D. (2014). Epilogue to the myths: Best practices for teachers. In L. Grant (Ed.), *Pronunciation myths: Applying second language research to classroom teaching* (pp. 235-242). Ann Arbor: University of Michigan Press.

Brown, G. (1990). *Listening to spoken English* (2nd ed.). London, England: Longman.

Bull, P., & Connelly, G. (1985). Body movement and emphasis in speech. *Journal of Nonverbal Behavior*, *9*(3), 169-187.

Burri, M., Baker, A., & Acton, W. (2016). Anchoring academic vocabulary with a "hard-hitting" haptic pronunciation teaching technique. In T. Jones (Ed.), *Pronunciation in the classroom: The overlooked essential* (pp. 17-26). Alexandria, VA: Teachers of English to Speakers of Other Languages.

Celce-Murcia, M., Brinton, D. M., & Goodwin, J. M. (with Griner, B.). (2010). *Teaching pronunciation: A reference for teachers of English to speakers of other languages* (2nd ed.). Cambridge, England: Cambridge University Press.

Chamberlin-Quinlisk, C. R. (2008). Nonverbal communication, gesture, and second language classrooms: A review. In S. McCafferty & G. Stam (Eds.), *Gestures: Second language acquisition and classroom research* (pp. 25-44). New York, NY: Erlbaum.

Chan, M. (1994a). Pronunciation warm up. In K. M. Bailey & L. Savage (Eds.), *New ways in teaching speaking* (pp. 202-204). Alexandria, VA: Teachers of English to Speakers of Other Languages.

Chan, M. (1994b). Stress stretch. In K. M. Bailey & L. Savage (Eds.), *New ways in teaching speaking* (pp. 252-253). Alexandria, VA: Teachers of English to Speakers of Other Languages.

Chan, M. (2007). *Using your hands to teach pronunciation* (2nd ed.) [DVD]. Sunnyvale, CA: Sunburst Media.

Chan, M. (2009). *Phrase by phrase: Pronunciation and listening in American English* (2nd ed.). Sunnyvale, CA: Sunburst Media.

Chan, M. [Pronunciation Doctor]. (2013a, January 26). *Pronunciation is a physical act. Let's do warm-up exercises!* [Video file]. Retrieved from https://youtu.be/YDinQsEgR4I

Chan, M. (2013b). Stretching content words with a rubber band [Blog post]. Retrieved from https://marshaprofdev.blogspot.com/2013/04/stretching-content-words-with-rubber.html

Chan, M. [Pronunciation Doctor]. (2013c, October 5). *Marsha Chan's stress stretch* [Video file]. Retrieved from https://www.youtube.com/watch?v=PWJv-l6OvAY

Chan, M. J. (2016). The stress stretch for prosodic improvement in English words and phrases. In J. Levis, H. Le, I. Lucic, E. Simpson, & S. Vo (Eds.), *Proceedings of the 7th Pronunciation in Second Language Learning and Teaching Conference* (pp. 181-185). Ames: Iowa State University.

Chan, M. J., Brinton, D. M, & Gilbert, J. B. (2018, February 16). What language teachers must know to teach pronunciation [Blog post]. Retrieved from https://marshaprofdev.blogspot.com/2018/02/what-language-teachers-must-know-to.html

Cook, S. W., Yip, R. K, & Goldin-Meadow, S. (2010). Gesturing makes memories that last. *Journal of Memory and Language, 63*, 465-475.

Dahl, T., & Ludvigsen, S. (2014). How I see what you're saying: The role of gestures in native and foreign language listening comprehension. *Modern Language Journal, 98*(3), 813-833. doi.org/10.1111/j.1540-4781.2014.12124.x

Gentilucci, M., & Dalla Volta, R. (2008). Spoken language and arm gestures are controlled by the same motor control system. *The Quarterly Journal of Experimental Psychology*, *61*(6), 944-957.

Gilbert, J. (1978). Gadgets: Some non-verbal tools for teaching pronunciation. *TESL Reporter, 11*(2), 6-7.

Goldin-Meadow, S. (1999). The role of gesture in communication and thinking. *Trends in Cognitive Sciences, 3*(11), 419-429.

Goldin-Meadow, S., Nusbaum, H., Kelly, S. D., & Wagner, S. (2001). Explaining math: Gesturing lightens the load. *Psychological Science, 12*(6), 516-522.

Goleman, D. (1988, February 2). The experience of touch: Research points to a critical role. *The New York Times*. Retrieved from http://www.nytimes.com/1988/02/02/science/the-experience-of-touch-research-points-to-a-critical-role.html

Grant, L. (Ed.) (2014). *Pronunciation myths: Applying second language research to classroom teaching*. Ann Arbor: University of Michigan Press.

Hişmanoglu, M., & Hişmanoglu, S. (2008). The use of body language in foreign language learning and teaching. *Journal of Social Sciences, 19*, 165-178.

Honda, K. (2008). Physiological processes of speech production. In J. Benesty, M. M. Sondhi, & Y. A. Huang (Eds.), *Springer handbook of speech processing* (pp. 7-26). Berlin, Germany: Springer. https://doi.org/10.1007/978-3-540-49127-9_2

Karpf, A. (2006). *The human voice: How this extraordinary instrument reveals essential clues about who we are*. New York, NY: Bloomsbury.

Kellerman, S. (1992). "I see what you mean": The role of kinesic behaviour in listening, and implications for foreign and second language learning. *Applied Linguistics, 13*(3), 239-258.

Kendon, A. (2004). *Gesture: Visible action as utterance.* Cambridge, England: Cambridge University Press.

Kielstra, N. (with Acton, W.). (2017). A haptic pronunciation course for first-year ESL college students. In J. Murphy (Ed.), *Teaching the pronunciation of English: Focus on whole courses* (pp. 262-284). Ann Arbor: University of Michigan Press.

Kjellin, O. (1999). Accent addition: Prosody and perception facilitate second language learning. In O. Fujimura, B. D. Joseph, & B. Palek (Eds.), *Proceedings of LP '98* (Vol. 2, pp. 373-398). Prague, The Czech Republic: The Karolinum Press. Retrieved from http://olle-kjellin.com/SpeechDoctor/ProcLP98.html

Lakoff, G. (2012). Explaining embodied cognition results. *Topics in Cognitive Science, 4*(4), 773-785. doi.org/10.1111/j.1756-

8765.2012.01222.x

Lakoff, G. [PsychologicalScience]. (2015, April 7). *How brains think: The embodiment hypothesis* [Video file]. Retrieved from https://youtu.be/WuUnMCq-ARQ

Lessac, A. (1965). *The use and training of the human voice: A new approach to the bio-dynamics of voice and speech*. New York, NY: Author.

Lessac, A. (1967). *The use and training of the human voice: A practical approach to speech and voice dynamics* (2nd ed.). New York, NY: DBS Publications.

Matsumoto, Y., & Dobs, A. M. (2017). Pedagogical gestures as interactional resources for teaching and learning tense and aspect in the ESL grammar classroom. *Language Learning, 67,* 7-42. doi.org/10.1111/lang.12181

McCafferty, S., & Stam, G. (Eds.). (2008). *Gestures: Second language acquisition and classroom research*. New York, NY: Erlbaum.

McNeill, D. (2005). *Gesture and thought*. Chicago, IL: The University of Chicago Press.

McNeill, D. (2006). Gesture and communication. In A. Anderson (Ed.), *Encyclopedia of language and linguistics: Psycholinguistics* (2nd ed., pp. 58-66). Amsterdam, The Netherlands: Elsevier. https://doi.org/10.1016/B0-08-044854-2/00798-7

Minogue, J., & Jones, M. G. (2006, Autumn). Haptics in education: Exploring an untapped sensory modality. *Review of Educational Research, 6*(3), 317-348.

Morett, L. M. (2014). When hands speak louder than words: The role of gesture in the communication, encoding, and recall of words in a novel second language. *The Modern Language Journal, 98,* 834-853. doi.org/10.1111/modl.12125

Morris, D., Collett, P., Marsh, P., & O'Shaughnessy, M. (1979). *Gestures: Their origins and distribution*. Briarcliff Manor, NY: Stein and Day.

Murphy, J. (Ed.). (2017). *Teaching the pronunciation of English: Focus on whole courses.* Ann Arbor: University of Michigan Press.

Odisho, E. Y. (2007). A multisensory, multicognitive approach to teaching pronunciation. *Linguística: Revista De Estudos Linguísticos Da Universidade do Porto, 2*(1), 3-28.

Padula, A. (2009). Kinesics. In S. J. Littlejohn & K. A. Foss (Eds.), *Encyclopedia of communication theory* (pp. 584-583). Thousand Oaks, CA: Sage. http://dx.doi.org/10.4135/9781412959384.n217

Pennycook, A. (1985). Actions speak louder than words: Paralanguage, communication, and education. *TESOL Quarterly, 19(2),* 259-282.

Rohrer, T. (2011). Speaking without thinking: Embodiment, speech technology and social signal processing. In A. Esposito, A. M. Esposito, R. Martone, V. C. Müller, & G. Scarpetta (Eds.), *Toward autonomous, adaptive, and context-aware multimodal interfaces: Theoretical and practical issues* (pp. 8-22). Berlin, Germany: Springer.

Sapir, E. (1921). *Language: An introduction to the study of speech.* New York, NY: Harcourt, Brace.

Sime, D. (2008). "Because of her gesture, it's very easy to understand"—Learners' perceptions of teachers' gestures in the foreign language class. In S. McCafferty & G. Stam (Eds.), *Gestures: Second language acquisition and classroom research* (pp. 25-44). New York, NY: Erlbaum.

Smotrova, T. (2017). Making pronunciation visible: Gesture in teaching pronunciation. *TESOL Quarterly, 51*(1), 59-89.

Underhill, A. (2012, August 28). Proprioception and pronunciation [Blog post]. Retrieved from http://www.adrianunderhill.com/2012/08/28/proprioception-and-pronunciation/

Walker, E. (2014, October 27). Proprioception: Your sixth sense: Why movement and sensation are inextricably linked. *Helix Magazine.* Retrieved from https://helix.northwestern.edu/article/proprioception-your-sixth-sense

Yoshida, M. T. (2016). *Beyond repeat after me: Teaching pronunciation to English learners*. Alexandria, VA: Teachers of English to Speakers of Other Languages.