Mind-Body Awareness for Singers

Unleashing Optimal Performance

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Contents

Foreword

THE ROLE OF THE TEACHER AND COACH

Like most other singers/voice teachers, Dr. Leigh-Post had long pursued competence at many of the respected methods of body-to-mind connections like the Alexander technique, Feldenkrais, yoga, body-mapping, performance psychology, Wesley Balk, and so on. Although she enjoyed much success, the questions persisted. Is there something we are missing? Why balance boards and balls? Is there a pivotal link between movement techniques and singing? Or if singing is the movement, how should this movement be perceived and executed? Her resolve to disentangle this puzzle led to several years of purposeful, wide-ranging reading and study of those scientists, philosophers, and psychologists whose research focused on performance skills.

Dr. Leigh-Post's cognitive kinesthetic awareness (CKA) and singing research study addressed the questions regarding the relationship between movement and singing and the correlation, if any, between a predilection for a markedly developed bodily-kinesthetic intelligence and the efficacy of cognitive awareness methods for the study of vocal technical skill. After determining a list of generally accepted premises, an extensive list of questions ultimately emerged to focus the study on the role of cognition and singing. This empirical approach to the research provided a format for considering a number of theories and practices from a variety of disciplines—anatomy, psychology, neurology, pedagogy, and so on. From these we hoped to gain a greater understanding of the complex interaction between the mind and body that is singing and the role of the teacher and vocal coach in this process.

Implementation of a variety of cognitive bodily-kinesthetic awareness methods revealed that the key to unleashing bodily-kinesthetic intelligence in singing involves activation of the vestibular and auditory systems and maintenance of an ideal performing state characterized by vigilant attention and an absence of anxiety. Relating cognitive bodily-kinesthetic awareness to learning and memory, imagery and creative expression, and optimal performance provides critical means to understanding the complex interaction between the mind and body that is singing.

For example, our monitoring and correcting processes consist, in part, of a continuous looping of an imaged goal, to initiation of action, to monitoring and correcting the image, followed once again by initiation of action and monitoring and correction. Cognitive bodily-kinesthetic awareness facilitates the efficacy of this process for not only conscious correction but also the self-correcting processes of the unconscious brain.

There are two critical cognitive elements of the monitoring and correcting processes: a highly developed sense of bodily awareness that facilitates the flow of information between mind and body, and the planning processes that utilize sensory information to correct or *refine* the image for the task at hand. For example, if the singer perceives a need for clearer tuning of a pitch with the orchestra, the singer will clarify the image of the pitch desired, thereby selectively correcting the imaged goal and its motor response. It is important to note that getting the goal right is critical; cognition is critical. By imaging the goal in this way, we tap into our body's intelligence that unconsciously self-corrects breathing and posture as well as the fine audiomotor skills of phonation and articulation. Furthermore, there is no dialogue such as "that was terrible," or "I'm afraid I won't get this next pitch." Attentional focus on correcting and polishing, on planning what comes next, also calls on our body's intelligence to keep us in optimum performance mode. This is necessarily absent of anxiety.

Successful teachers of singing (getting good results) are doing a lot of things right. What understanding the neurophysiological systems will do for us is make our teaching even more efficient and

effective. Because this is an understanding of the neurophysiological systems and singing, it may be applied effectively at any point in the training and performance of singing, be it in the early stages of learning or in the performance of well-learned repertory. For example, one of the lines that I enjoyed (from one of Karen's early drafts) was about balance being a function of the vestibular ear. On the long way to the bus stop after an appointment, I used my "vestibular ear listening," and lo and behold, I walked better. Can you believe that?

Once the goal is set, it must be communicated to the body. But mind-body communication does not happen the way we thought. We must *not* direct our body on *how* to accomplish the task at hand. We are ill equipped to *consciously* issue the hundreds of thousands of instructions required to utter even the simplest of sounds. Have you ever heard singers report that they sing better in performance because they just forget about *how* they are singing and think of *what* they are singing about? This response is frustrating, of course, because we cannot build a technique on *not* thinking about how we sing—or can we?

Take a moment for mind-body communication. Take a moment for communication of the conscious goal (task) to the unconscious systems that control proprioception, respiration, audition, phonation, and articulation. If we apply the principle of "take a moment" used in the Alexander technique to singing, if we set our mind on the task at hand (the auditory-phonatory goal that is to sing a phrase) and take a moment until we feel the *impulse* to sing, we tap into our bodily-kinesthetic intelligence and allow the systems to respond to the thousands of signals from our unconscious brain.

The skill of the coach and teacher lies in understanding *where* the interruption of the flow occurs and redefining the goal for *that* moment. The primary role of the teacher and coach is in guiding the student in *planning*, in setting the right goal for the moment—in getting the student thinking right.

—*Shirlee Emmons*

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The Role of Cognition in Sensorimotor Processing for Optimal Performance: "I Think, Therefore I Sing!"

If awareness is a state of consciousness characterized by an ability to integrate sensations from our environment and ourselves with our immediate goals to guide behavior, and is therefore essential to optimal performance, what is the role of cognition, the conscious and unconscious executive functions of the thinking mind, in maintaining awareness during the various stages of sensorimotor processing? How do our thoughts influence the heightened awareness, or mindfulness, associated with optimal performance?

The complexity of mind-body communication is evident as we recognize the extent to which sensory and motor processing, as well as the whole of behavior processing and a significant share of sensory and cognitive processing, occur unconsciously. So much so, in fact, that upon learning of this research on the role of cognition in singing, a behaviorist and amateur singer exclaimed, "But that would mean singing is cognitive!" Of course, absent the ability to execute behavior automatically and intuitively, we would be unable to articulate speech and singing at a rate "faster than we can think" (about 140,000 signals per second) (Perkins & Kent, 1986). Moreover, we would be unable to free the mind to use higher cognitive functions, such as the imagination, to expertly guide complex behaviors, such as the fluid expression of our thoughts and emotions through the art of singing. Yet maintaining awareness and cognitive attentional focus on the task at hand, or "piloting our automation," is universally recognized as critical to achieving and maintaining optimal performance in an ideal performing state (absent of anxiety).

The ensuing discussion explores the role of cognition and body awareness within the framework of sensorimotor processing for singing, or, simply put, the planning processes that guide singing behavior and the perception of one's own voice while singing. Key concepts from cognitive psychology and neuroscience relative to sensorimotor processing for singing are presented, including diagrams and practical-application exercises that provide an opportunity for us to associate the function of our neural anatomy and the language of cognitive neuroscience with the experience of singing. Framing mind-body awareness and singing as sensorimotor processing more accurately represents how the conscious, thinking mind interfaces with our unconscious sensory and motor-processing systems. Moreover, it provides a language that more accurately describes what we as singers experience from our internal perspective as performers, thus adding to the external perspective of the observing scientist and the useful but often misinterpreted metaphorical descriptions and demonstrations relied upon in our field. Empowered with this knowledge, we can train the mind to work *with* our nervous system—and thus our systems of singing—to unleash optimal performance at any skill level and enjoy an ideal performing state characterized by heightened awareness, vigilant attention, and equilibrium or calm. In so doing, we free our conscious mind to enjoy the highest of cognitive functions—the imagination—and thereby create an endless stream of multimodal images to guide our bodies in an effortless

succession of fluid movements. For the artist, imagery, the phenomenal product of our imagination, is a conscious and cognitive function of the working memory that, it would seem, cannot be delegated to automated behavior (see Chapter 3, "When Perception Turns to Planning—Images and Imagery," p. 69).

WHAT IS SENSORIMOTOR PROCESSING?

Sensorimotor processing is the processing of neural information involving sensory and motor systems, functions, and pathways for the purpose of executing the task at hand in accordance with behavior outcome goals. To better understand how sensorimotor processing works, it will be useful to track the various functions of the sensorimotor processing loop for a common goal in singing behavior, such as pitch matching (see Table 1–1, page 4; see Figure 0–10 for a diagram of auditory pathways).

> **Key Point:** Sensorimotor processing takes time. It takes about a second, or a "beat," from the impulse to act (mind to body) to a conscious perception (body to mind) that a task has been executed. In addition, the generation of a simple motor plan of action has been estimated to begin 1 to 10 seconds prior to the impulse to act.

Sensorimotor Processing Loop

The various functions of sensorimotor processing may be categorized as sensory information processing (input), planning, and motor output (Figure 1–1).

Sensory information, or "input" processing, involves the processes by which sensory information from a stimulus event in our environment or ourselves is received, transmitted, interpreted, and then perceived as a mental representation or image with the potential to be stored as knowledge. Planning of voluntary behavior is a cognitive process requiring accurate definition of our immediate goal

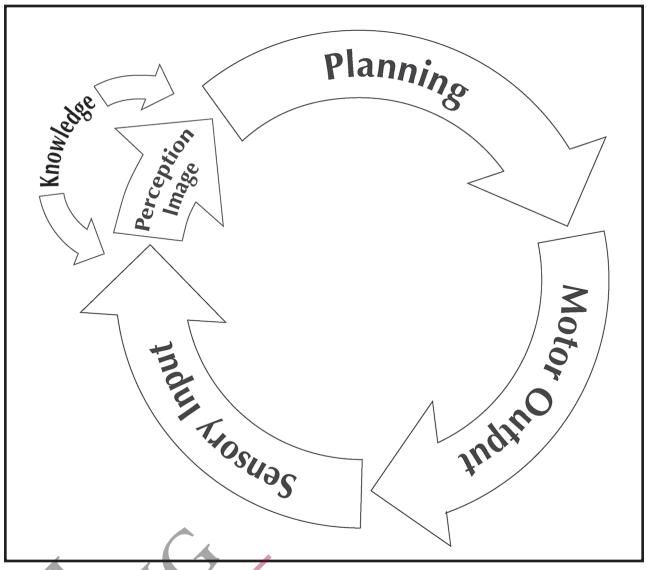

Figure 1–1. Sensorimotor processing loop. Courtesy of Alex Johnson.

for the task at hand, as well as the ability to recall knowledge and generate a mental representation, or image, to guide intuitive performance of that task. Moreover, artistic performance requires the ability to mentally manipulate that image for a phenomenal (one of a kind) experience. Behavior, or motor output processing, involves the largely unconscious response of passive and active motor controls to a stimulus, or plan of action. That behavior in turn stimulates our sensory information processing systems, which monitor and correct behavior according to the imaged plan of action and past experience or knowledge.

> **Key Point:** The stimulus-response phenomenon is a basic attribute of the brain and nervous system without which normal life would be impossible (Dickman, 2007).

Systems of Singing

Uppermost in the systems of singing is the brain, where cognitive functions operate both consciously

and unconsciously. The hierarchy of the interdependent behavior, or motor output systems, begins with the postural systems and continues with the respiratory, phonatory, and articulatory systems (Figure 1–2). The sense organs of the inner ear, which process feedback information (stimuli) from these behavior systems, are separated according to their distinct and separate functions. When we sing, the auditory system receives and processes sensory information stimulated by phonation assound, whereas the vestibular system processes this information as motion. In addition, as a sensory and motor integration system, the vestibular system uses this information to both monitor and correct our physical balance (postural orientation to gravity and space) during the complex behavior of singing.

Given the cyclical nature of sensorimotor processing and the reciprocal nature of our nervous system in general, we could begin our discussion of the function, behavioral purpose, and voluntary application of these systems at any point. However, because the role of the conscious and cognitive mind is to process perceptual information as knowledge and to use this knowledge to plan and guide voluntary behavior, we begin with sensory information processing (Chapter 2), followed by the processes for planning voluntary behavior (Chapter 3) and executing motor output (Chapter 4). The role of the conscious and cognitive mind in influencing optimal performance of voluntary behavior for the whole of sensorimotor processing and maintenance of an ideal performing state is then summarized in Chapter 5, "Putting It All Together," including practical-application exercises based on the principles of what & when planning, metamonitoring, and rhythmic entrainment.

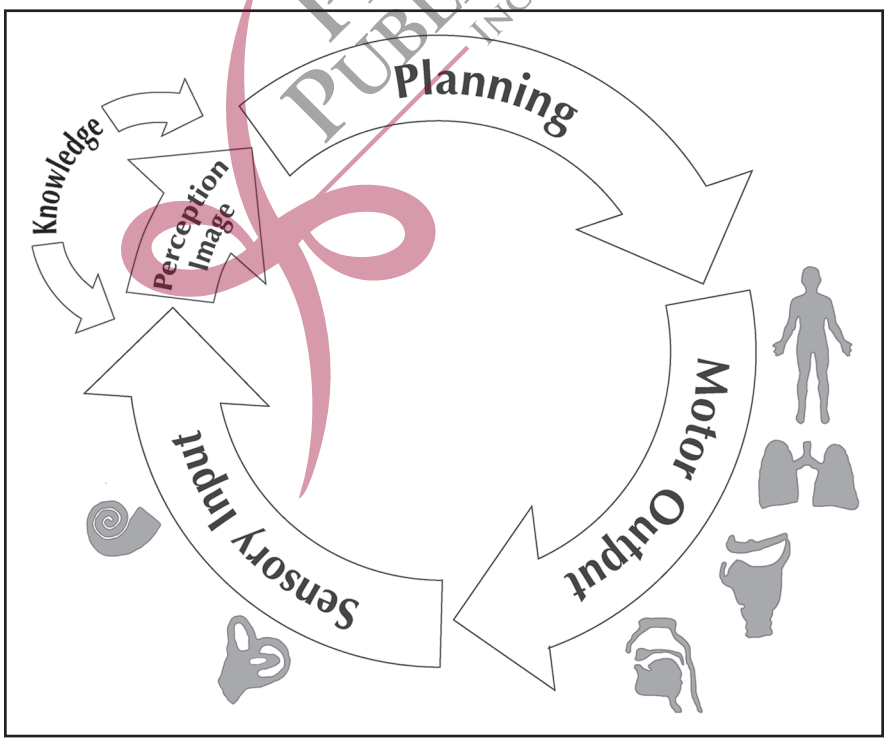

Figure 1–2. *The systems of singing and sensorimotor processing loop. Courtesy of Alex Johnson.*

Table 1–1. Sensorimotor Processing Goal: To Match a Demonstrated Pitch

Task at hand	*Sensory input*
We prepare for a task.	General Arousal Reticular activating system (RAS) alerts brain to indiscriminate incoming information.
A pitch is sung or played.	Stimulus event
We choose to listen to the pitch model.	Attentional focus on select information (cognitive and conscious)
The auditory signal reaches our ears.	Auditory Reception (unconscious) Vibrations received by the sensory organs (cochlea) are transduced into neural signals and transmitted via the peripheral auditory nerves to the auditory nuclei in the brainstem. These signals continue along neural pathways, and after many stations along the way, to the thalamus where they are ultimately projected to the auditory cortices in the temporal lobes.
We hear the sound in our mind's ear.	Auditory Perception (conscious)
We choose to remember this information.	Auditory image (mental representation) is associated with existing knowledge (e.g., name) and stored as a neural trace in immediate short-term auditory memory.
	Planning voluntary behavior
We decide to sing the same pitch.	Willed intention (conscious)
We recall and inner sing the modeled pitch.	Recollection and auditory imagery—pitch is "held" in auditory working memory.
We feel readied and sense the impulse to act (set-go!).	Motor plan of action is prepared and projected to the cortex.
	Motor output
We sing the pitch.	Execution of Singing Behavior (unconscious) • Includes self-correction.
	Sensory input
We listen to the sound of our own voice and notice adjustments until we intuitively *know* we have matched the pitch.	Feedback Monitoring (conscious and unconscious) • Attended information (conscious) • Self-correction (unconscious) • Perception (conscious and unconscious)

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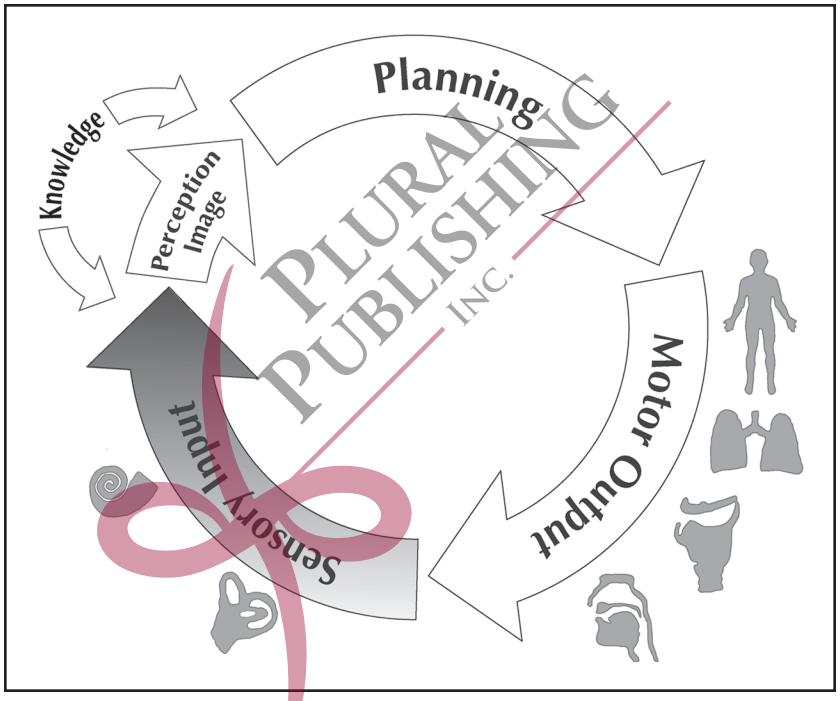
Sensory Information Processing: Perception of Our Environment and Ourselves



Sensorimotor processing loop. Courtesy of Alex Johnson.

If awareness is a state of consciousness characterized by an ability to integrate ***sensations from our environment and ourselves*** *with our immediate goals to guide behavior; and if our perception of that behavior may be stored as knowledge that may in turn be recalled as a mental representation or image to guide voluntary behavior, how does the conscious and cognitive mind influence the receptivity and perceptual accuracy of sensory information?*

Our sensory systems provide a rich confluence of information about our world in a wonderfully complex process that engages our nervous system at every level. Sensory information processing occurs consciously and unconsciously, actively and passively, and cognitively and noncognitively; it is selective and limited, and requires interpretation and memory; it is influenced by context and perspective, experience, and emotion; it is the source of all knowledge and stimulates our imagination; and it is a neurophysiological and biopsychological process that exists in space and occurs over time.