



Multi-Input and Melodic Learning

A White Paper

**Eliot Levinson, Ph.D
and
Kathleen Florio**

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The Power of Multi-Input and Melodic Learning

Multi-Input Learning (MIL) is such a simple, common-sense concept that we generally don't consciously think about it and consequently miss out on its potential as a powerful instructional tool. When deployed in the classroom, MIL is an approach to instruction that produces measurably better outcomes for students—that is, deeper and more sustained learning—with implications for achievement in subject areas across the curriculum.

What Is Multi-Input Learning and How Does Melodic Learning Relate to It?

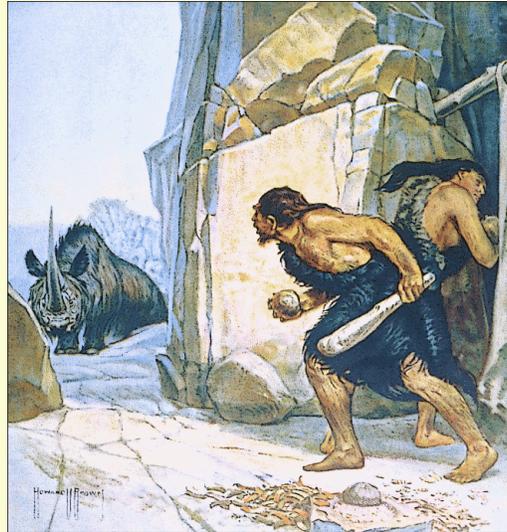
As humans, we learn by taking in information through all of our senses. Our understanding of the world is, at the most basic level, a multisensory experience, as we naturally engage several senses simultaneously, absorbing the sights, sounds, smells, tastes, and textures of the many things we encounter in our everyday environment. Indeed, few if any experiences are “unisensory,” and so the unisensory approach that typifies much instruction (for example, oral presentations with no visual or hands-on elements) actually contradicts our natural predisposition toward multisensory learning. It's an “artificial” approach that closes off the multiple channels through which we normally take in information.

Multi-Input Learning derives its power from the delivery of simultaneous signals to the brain—that is, visual, auditory, kinesthetic, and other stimuli. A highly effective version of Multi-Input Learning is Melodic Learning (ML), which adds tonal and rhythmic stimuli to the mix. These two components are key factors in Melodic Learning's success as an instructional approach. As a simple example, think about how most of us learned our ABCs—with the help of a catchy tune; or how the sing-song rhythms of nursery rhymes have been used for countless generations to introduce counting skills.

The complex tonal and rhythmic elements of Melodic Learning are unique to humans—for example, no other creatures respond to music throughout their lives and for varied purposes¹—and so they can be considered essential aspects of human nature. The deep developmental roots of these stimuli are easily called to mind by the image of prehistoric humans responding to their environment and its opportunities and dangers. For example, we can imagine the caveman sensing an oncoming stampede not first by sight, but rather by the recognizable rhythm of beating hooves in the distance. Similarly, the unmistakable tonality of the

¹ Patel, A. (n.d.). Grey matters, p. 1.

shrieking of wild birds likely provided the first warning of oncoming danger in the form of predators.



As classroom strategies, it is important to understand how Multi-Input Learning and Melodic Learning differ from the “multiple intelligences” approach presented by Howard Gardner beginning in the 1980s, and the resulting “learning styles” that many educators have come to understand and address in their attempt to serve diverse students. In many cases, instructional approaches based on multiple intelligences and learning styles have the effect of placing students in silos, with labels such as “visual learners,” “auditory learners,” “kinesthetic learners,” and so on. This suggests the need to prepare separate lesson plans or provide materials geared toward individual students—for example, charts and diagrams for visual learners, or audio files for auditory learners. In contrast, MIL and ML engage all students at once, because activities and materials simultaneously draw upon the various sensory channels of learning.

Learning Styles Derived from Multiple Intelligences



In this sense, MIL and ML are more in line with what we know about brain activity. During what we might think of as “unisensory” events (for example, looking at a picture), brain scans show activity in various parts of the brain, indicating the involvement of multiple senses and engagement of both the right and left hemispheres.² In fact, the brain has evolved in a way that suggests that “encoding, storing, and retrieving perceptual information is intended by default to operate in a multisensory environment.”³

Language and Melodic Learning

Although it is easy to associate Melodic Learning’s tonal and rhythmic elements with music, it is important to understand that they are not limited to music but are also basic components of spoken language. For this reason, music and language have been described as “supportive sisters,” involving complementary systems of structured communication.⁴ Both are “auditory ... highly patterned, and internally consistent.”⁵

The overlaps between language and music are evident from the moment of birth. We know, for example, that normal language development in infants includes “pre-speech” phases, such as crying, cooing, and babbling, with distinctive tonal elements.⁶ These distinctions explain why, for example, a caregiver can distinguish between a baby’s cry that signals pain and one that communicates fatigue—the tone is a critical part of the communication. Young children can imitate the rhythm and “musical contours” of language long before they can say words. As development progresses, the consonant and vowel sounds of language are placed within the musical context of language—tone, pauses, stress, and timbre—that is already established.⁷

This convergence of music and language has major implications for instruction and learning in the classroom. Building upon research that has found that “it is ... likely that learners can use the same ... learning mechanisms in both linguistic and musical tasks,”⁸ it explains the rationale that supports Melodic Learning as a highly effective approach for instruction across the curriculum. In addition, referring back to Gardner’s multiple intelligences, the convergence of music and language contradicts any attempt to segregate what might be labeled as

² Stansell, p. 10.

³ Shams & Seitz, p. 5.

⁴ Stansell, J. W. (2005). The use of music for learning languages: A review of the literature.

⁵ Saffran, J.R. (2003). Musical learning and language development.

⁶ Stansell, p. 7.

⁷ Stansell, p. 6.

⁸ Saffran, p. 3.

“linguistic intelligence” and “musical intelligence.” Instead, research suggests that the two work together, producing strong outcomes overall.⁹

How Do Multi-Input and Melodic Learning Produce Better Outcomes in the Classroom?

Before explaining how Multi-Input Learning and Melodic Learning can improve classroom outcomes, some clarification is in order. When we talk about “better outcomes,” we are not talking about the kind of superficial knowledge that may contribute to an acceptable test score and is then quickly forgotten, but rather about deep learning that is *sustained over time*. Numerous simple examples typify this kind of learning, such as the nursery rhymes and childhood songs we can still remember as adults (an effect that is displayed even by people affected by Alzheimer’s disease), or the folk songs and other oral traditions that are passed from generation to generation in otherwise minimally literate populations, as in remote areas of Appalachia.

What accounts for the power of Multi-Input Learning and Melodic Learning to have such lasting effects? Several factors come into play, including the following:

- **Activation of multiple senses** means that several sensory channels in the brain are open for input. Because Melodic Learning adds tonal and rhythmic elements to Multi-Input Learning, the multiplier effect is even greater, as more parts of the brain are activated, across both right and left hemispheres. While the brain’s sensory-processing channels have limited capabilities individually, their combined capability delivers large amounts of information to short-term memory for later transfer to long-term representations.¹⁰
- **Engagement**, an essential element in learning, is increased through Melodic Learning, as students who might otherwise be disengaged are instead ready—and eager—to receive information. The reinforcing overlaps between language and music help explain why this is so. For example, researchers have found that “music and language ... share the distinction of being two of the stimuli that are most interesting to developing humans. Along with faces, young infants are most consistently engaged by speech and by music (making singing a particularly welcome combination of face, speech, and music).”¹¹ Although, as noted earlier, Melodic Learning is a broad framework that is not limited to using music and singing as memory devices, responsiveness to the central

⁹ Stansell, p. 9.

¹⁰ Shams, L., & Seitz, A.R. (2008). Benefits of multisensory learning, p. 7.

¹¹ Saffran, p. 1.

components of tone and rhythm helps to explain why engagement takes place.

- **Emotion** plays a role in learning, as we tend to remember things that are experienced within an emotional context. Melodic Learning, with its tonal and rhythmic elements, produces pleasurable emotions that create a receptive environment for the information being transmitted.
- **Motivation** is a powerful engine for learning, and it makes sense that students who are engaged and experiencing positive emotions are also more motivated to address the learning tasks at hand.
- **Repetition** reinforces learning, as is obvious in the athlete who practices the same motion over and over again, and the actor who repeats lines many times to gain fluency in delivering them on stage. But while many rote, repetitive learning tasks can be boring, Melodic Learning can make repetition enjoyable, as positive emotions are generated.

Positive self-perception is the likely cumulative effect of the Melodic Learning experience, and this, in turn, generates continued engagement and motivation, leading to a productive cycle of learning. As the cycle continues, knowledge and skill deepen over time, and sustained learning is the outcome.

What the Research Shows

Beyond the observable evidence of the power of Multi-Input Learning and Melodic Learning, research evidence on multisensory experiences supports the case for their effectiveness. For example, various studies of *Sesame Street*—a program that engages youngsters with colorful characters and numerous multisensory elements, including rhymes and songs—show improved skills and sustained gains in learning among viewers compared with nonviewers. Particularly notable are the following points uncovered in the research:

- Gains occurred in such specific areas as alphabet and numbers, as well as in broad domains such as sorting and classification, and relationships.
- Positive effects appeared across gender, socioeconomic status, and other factors.
- Indicative of sustained learning, positive effects were identifiable among older students who had watched *Sesame Street* and other educational television programs as young children; specifically, “high school students

who had watched more educational television—and *Sesame Street* in particular—as preschoolers had significantly higher grades in English, mathematics, and science in junior high or high school. ... These effects held true even after the effects of students’ early language skills and family background variables were removed statistically.”¹²

Research on music and language adds to the evidence supporting Melodic Learning. For example, we know that songs tend to extend or emphasize the “normal vocal contours” of speech—things like emphasis and duration of sounds; and in this way, “music emulates the way caregivers speak to their children... which has been shown to increase their understanding and acquisition of language.”¹³ The critical point here is the notion of *increased understanding*, because it underpins the idea that ML leads to deeper, more sustained knowledge.

In making the case that music and language should be studied together, researchers have offered the following rationale: “Music codes words with heavy emotional and contextual flags, evoking a realistic, meaningful, and cogent environment, and enabling students to have positive attitudes, self-perceptions, and cultural appreciation so they can actively process new stimuli and infer the rules of language.”¹⁴ This conclusion supports the earlier point about the ability of ML to generate positive emotions and self-perceptions, which make students more receptive to learning.

Delving deeper into the strong confluence of music and language, we find that brain imaging shows an overlap in the areas of the brain involved in the two domains.¹⁵ Thus neurobiology supports the connection that lies at the heart of Melodic Learning. And the rhythmic element of ML has an unquestionable link with kinesthetic learning—learning prompted by body movement. The implications are significant, because “when you move to a beat, you anticipate the music, you demonstrate flexible responses ... it’s a robust response, [and] it’s cross-modal”¹⁶—that is, music “engages many brain functions.”¹⁷

Who Can Benefit from Melodic Learning?

Given the primal nature of the elements of Multi-Input Learning and Melodic Learning, gains in achievement are likely to appear across the total student population, encompassing all genders, ethnicities, and ability levels. This

¹² Fisch, S.M. (2005). Children’s learning from television, pp. 10–11.

¹³ Stansell, p. 12.

¹⁴ Stansell, p. 35.

¹⁵ Patel, p.

¹⁶ Patel, p. 2.

¹⁷ Patel, p. 3.

expectation rests upon the observation that the tonal and rhythmic elements are part of *human nature*, evident in responsiveness at the earliest stages of human development.

Nevertheless, it is important to note significant implications for subgroups. Specifically, we can expect ML's positive effects to be most pronounced among populations with strong musical and other oral traditions, and among those for which other instructional approaches have previously yielded disappointing results, including African American males and others.

Can Melodic Learning be Applied Across the Curriculum?

Language—speaking, reading, writing, listening, and understanding—is the foundation of learning in *all* subject areas. Students need to be able to communicate and understand—via language—whether they are grappling with a math problem, learning about the causes of World War II, or examining the life cycle of a frog. Thus it makes sense that improvements in language skills will lead to improvement across the curriculum, as students gain more from their reading and listening, understand content, and can articulate their thoughts via speaking and writing. Because it recognizes and optimizes the interconnectedness of language and music, the Melodic Learning version of Multi-Input Learning has a place in every subject area.

Again, research supports this stance. We know from the research on music and language that “children are drawn to nursery rhymes, rhythmic activities, and songs as key texts in building concepts of reality.”¹⁸ Obviously, “building concepts of reality” is part of learning throughout the curriculum. Furthermore, the studies of educational television mentioned earlier show enhancement of learning in language, science, math, and, more generally, in problem solving, which has implications for success in many different subject domains.

While the broad advantages of ML are important to note, research that is more targeted also suggests intriguing possibilities. For example, studies on the use of computer-generated virtual-reality environments have shown the success of this kind of multisensory approach in teaching complex, abstract concepts in science. In one case, students who struggled to understand Newtonian principles related to mass, velocity, and energy reported that activities that presented information simultaneously through visual, auditory, and haptic (touch/pressure) channels helped their understanding.¹⁹

¹⁸ Stansell, p. 37.

¹⁹ Dede, C., Salzman, M.C., Loftin, R.B., & Sprague, D. (1999). Multisensory immersion as a modeling environment for learning complex scientific concepts.

Given its applicability across all student demographic groups and across the curriculum, Melodic Learning can inspire an assortment of implementation strategies. For example, it can be used to help struggling readers become more fluent once they've mastered phonics, to help gifted students stay engaged and motivated, and to teach otherwise challenging material that needs to be committed to memory. Regarding the latter, a case in point comes from the highly successful and popular educational television venture *Schoolhouse Rock!*—originally a series of animated musical films that aired during Saturday morning programming (now produced for direct-to-video release and viewable via YouTube). Covering assorted topics in math, grammar, science, and history, the catchy tunes of *Schoolhouse Rock!* proved to be an effective and almost effortless way to accomplish what would have otherwise been dreaded rote learning, as noted in this recollection by Christy Glaubke, the current director of the Children and the Media program at Children Now:

I was a sophomore in high school when my history teacher sternly warned the class that we would have to memorize the entire preamble to the U.S. Constitution. To illustrate what a daunting task it would be, she began to recite it for us, "*We the people of the United States of America, in order to form a more perfect union ...*" Within seconds nearly every kid in my class was singing, verbatim, the entire preamble. We had already learned it—by watching ABC's *Schoolhouse Rock!* on Saturday morning television. ... I have never forgotten the look of utter shock on Sister Mary Margaret's face ...²⁰

Products that Incorporate Melodic Learning

A number of innovative companies are already using the principles of MIL to develop new, highly effective instructional software products. These include the following:

- **ST Math+Music®** from MIND Research Institute adds a research-based music curriculum to the spatial and temporal reasoning skills that are the foundation for teaching and illustrating math concepts in kindergarten through 4th grade. (http://mindresearch.net/cont/programs/prog_stmm_desc.php)
- **Flocabulary** software products incorporate hip-hop music into curriculum materials for reading, vocabulary, writing, social studies, math, and science. (<http://www.flocabulary.com/>)
- **Earworms mbt® Rapid Languages** uses a “musical brain trainer” to teach foreign language. (<http://www.earwormslearning.com/intro.html>)

²⁰ Glaubke, C. (2009, Feb. 16). "From *Schoolhouse Rock!* to Rock Bottom: The Current State of Children's Educational Television. <http://cmch.typepad.com/cmch/2009/02/from-schoolhouse-rock-to-rock-bottom-the-current-state-of-childrens-educational-television.html>

- **TUNEin™ to READING** from Electronic Learning Products is a literacy software product that helps readers develop vocabulary, fluency, and comprehension. (<http://www.tuneintoreading.com/TUNEin-To-Reading>)

Conclusion

The methodology of Melodic Learning is the best way to ensure engagement, learning, and retention of knowledge for all students, across the curriculum. It draws upon our most elemental modes of responsiveness, and it optimizes the brain's capacity for taking in and processing information and storing it in long-term memory. As an added benefit from the educator's perspective, it eliminates the need to segregate students into groups or categories based on learning styles because it embraces all learning preferences at once.

Simply stated, as the most effective version of Multi-Input Learning, Melodic Learning provides a powerful tool for *everyone* in the classroom, on both sides of the teacher-learner relationship. It offers teachers an effective way to teach content in all subject areas, and it gives learners the ability to gain knowledge and understanding beyond the superficial level, with far-reaching implications for success not only in school, but in life as well.

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The Authors

- Eliot Levinson Ph.D is the CEO of the BLEgroup.
- Kathleen Florio is an education writer and editor who works with the BLEgroup and ASCD

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