Learning Rediscovered

Treatment plans that optimize learning

Part I

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(Editor's note: This is the first of a two-part series. Next week, the second part of the series will address the integration of multiple modalities into clinical practice.)

The primary job of the speech-language pathologist is to facilitate the development or rehabilitation of speech and language skills in individuals who are not acquiring these functions through typical means or who have deficits in these functions due to acquired injury. We do this through carefully planned treatment programs aimed at promoting learning of speech and language structures or functions.

Whether our plan is to facilitate accurate articulation of /r/, correct usage of the regular past tense "-ed," or the ability to access vocabulary words, treatment is always geared toward optimizing functional outcomes and generalizing our clients' learning to new contexts. Thus, learning is a central goal of our clinical endeavors.

More than 70 learning style models have been proposed to account for how individuals learn new information. One of the earliest and most popular is the visual, auditory, kinesthetic (VAK) model.

Essentially, the VAK model suggests that all individuals have preferences for how they intake, analyze, and interpret information. Some make sense of the world based on how things look and prefer to process information visually. Others have a strength for processing information auditorily and make sense of the world based on what things sound like. A third group likes to experience information. These kinesthetic learners make sense of the world based on how things feel to them.

While people may have a preferred modality, they use all three to process information. Research has found that retention and learning are enhanced when information is presented in more than one modality.

The VAK model of learning has been applied to children with attention deficit hyperactivity disorder based on the belief that a more engaging and interactive environment will hold a child's attention and allow for greater opportunities to process information.

Despite criticism for lack of substantial evidence or theoretical support, there is something to consider about learning based in multisensory modalities.

The brain is the root of all behavior and is a sensorimotor organ at its most basic level. It is highly specialized in gathering sensory information, relaying it to the three primary sensory regions of the brain, and integrating this information before planning, preparing and executing a motor response.

These integration skills are at the heart of all speech and language functions. They are evident from the very early stages of infant development.

Very young infants also are capable of recognizing an incongruence in sensory information. For example, by 5 months of age, children were found to experience the same auditory illusion as adults when presented with confounding visual information, known as the McGurk effect.

Specifically, when hearing a voice over a speaker saying "ba" but simultaneously seeing a video of a person mouthing the syllable "ga," individuals tend to perceive the sound as "da," a distortion of the auditory signal created by the incongruent visual information being processed at the same time. Such a skill may be a precursor to babbling and later speech comprehension and production.
Being able to watch a person's mouth and lips while hearing sounds provides infants with an accurate model on which to base their own production.

Abundant literature points to deficits in the acquisition of speech and language skills when one or more sensory modality is deficient. For example, children born with impaired hearing but exposed to oral language alone typically show deficits in the acquisition of linguistic structures requiring a high level of auditory discrimination, such as phonology. Deficits in such structures as secondary meanings of vocabulary, syntax, pragmatics and literacy should not necessarily be suspected, as these functions are not as dependent on fine-grained distinctions in auditory input. However, deficits in each of these areas have been noted in children with hearing impairments who are learning oral language.

Children born blind or with impaired vision also show delays in language acquisition.

Impairments in the tactile domain are much more complex and conflated. Unlike the research on children with visual and hearing impairments, where the direction of cause and effect is relatively straightforward, the direction of the relationship between tactile and language deficits is unclear.

Researchers typically have investigated haptic (i.e., touch) discrimination in children with language deficits rather than investigating language functions in children with haptic deficits. As such, it is difficult to determine any cause-and-effect relationship.

However, basic sensory discrimination is fairly well developed by the middle of the first year of life, when speech and language functions are barely getting off the ground. Since tactile discrimination precedes the development of speech and language, it is possible that a similar relationship exists between tactile deficits and language delays and may be comparable to those found between language delays and auditory/visual deficits.

Additionally, children who present with somatosensory deficits, such as hyper- or hypo-sensitivity to tactile information, often have other confounding conditions, such as autism, pervasive development disorder, fragile X syndrome, fetal alcohol syndrome and prematurity. Each presents as a common risk factor for speech and language delays, making it difficult to decipher the contribution of sensory deficits to delays in speech and language functions.

Despite these limitations, evidence has demonstrated a relationship between speech and language deficits and tactile-kinesthetic deficits. Researchers have found poor haptic discrimination and recognition in children with speech and language deficits, particularly specific language impairment (SLI).

Given the natural tendency of the brain to construct meaning by integrating information from multiple modalities, clinicians should consider incorporating visual, auditory and kinesthetic modalities into their treatment activities to optimize learning.

References


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