The opportunity to elucidate a discussion of key issues in the area of central auditory processing disorder (CAPD) was the major impetus for pursuing this format of information exchange. The total forum, including the primary article, selected critiques, and rebuttal from the primary authors, provides a unique and revealing dialogue on this topic. It is also our belief that this exchange of information will serve as a useful educational tool to engage students in debate, to provide topics for seasoned clinicians to consider, and to highlight areas for researchers to shed light upon.

There is also a sense of optimism that the energy and enthusiasm contained herein will serve to invigorate this area. New ideas can be contemplated, weak ideas can be rejected, and better frameworks and protocols can be formulated, tested, and implemented. If a paradigm shift results, then based on the historical record, change will not come easy. Nevertheless, change is a valuable asset and can provide the much-needed momentum necessary for this field to grow in a meaningful way.

General Comments

Two groups of commentators (Katz & Tillery, 2005; Musiek, Chermak, & Bellis, 2005) were concerned that the use of multimodal testing was not within the scope of practice of clinical audiologists. This is an important point for consideration, and a scope of practice document from the American Speech-Language-Hearing Association (ASHA, 2004) provides guidance on this issue. It is our contention that use of multimodal testing is within the scope of practice of clinical audiology and should be used in the assessment of CAPD. The clinical domain we discuss below serves to illustrate our position and provides precedence for this point of view. Key features covered by the scope of practice document include the following:

1. The conduct and interpretation of behavioral, electroacoustic, and/or electrophysiologic methods to assess hearing, auditory function, balance, and related systems.

2. Measurement and interpretation of sensory and motor evoked potentials, electromyography, and other electrodiagnostic tests for purposes of neurophysiologic intraoperative monitoring and cranial nerve assessment. (ASHA, 2004, p. 5)

Probably the best example where multimodal testing is used routinely in contemporary audiologic practice is in the assessment of balance function (see Item 1 above). The underlying nature and complexity of balance-related disorders require that multimodal testing be used so that clinicians can delineate between vestibular, visual, ocular motor, somatosensory, and somatomotor processes that underlie these disturbances. We maintain that the expertise necessary to assess and to delineate balance disorders in a comprehensive manner is well within the purview, scope of practice, and skills of the clinical audiologist.

While assessment batteries and types of instrumentation can vary, the most common procedures used to evaluate for balance system dysfunction include electroneystagmography (ENG) and computerized dynamic posturography (CDP). Using ENG and based on one of the simplest of procedures (visual testing in the calibration process), clinicians can derive information about cerebellar function by inspecting waveforms for ocular dysmetria (overshoot), flutter, and opsoclonus. Visual smooth pursuit (sinusoidal) tracking and optokinetic testing are additional elements of the test battery that help to distinguish central oculomotor dysfunction from peripheral or central vestibular disease. While noting the contributions of visual and ocular motor testing in ENG, vestibular aspects of the test battery (e.g., bithermal caloric testing, positional and positioning tests such as Hallpike maneuvers, change in decubitus positions, head on neck changes) remain as key components in the examination.

Moreover, CDP allows clinicians to estimate the relative contributions of all three sensory inputs that contribute to...
balance function and provides the framework to assess for other factors such as sensory-motor integration and adaptive motor control abilities in the standing human. While a comprehensive review of this area is not possible in the limited space available for this interchange, experts in this area emphasize that CDP can help establish the “modality specificity” of the deficit and aid in formulating pertinent treatment and rehabilitation strategies (see Black, 2001; Shepard, 2002, for reviews). Moreover, inclusion of lower extremity somatosensory and motor-evoked potentials represents other areas that may be used to localize balance-related dysfunction to the spinothalamic, thalamocortical, and motor tracts of the nervous system, so that spinal cord and related dysfunctions associated with disturbances in gait, balance, and falling episodes can also be ascertained. The scope of practice document recognizes this (see Item 2) and also includes such measures in the service of neurophysiological intraoperative monitoring, which can enable clinicians to follow their patients from diagnosis through corrective surgery.

In retrospect, the clinical application of these multimodal procedures or variations thereof is not new; audiologists have used them for decades and have evolved into leaders in this field. The inclusion and continued use of multimodal testing paradigms are based on the strength of evidence that their contributions make to site-of-lesion testing and the fact that they also serve as a means for guiding treatment and for monitoring rehabilitation. The rationale for use of multimodal testing in improving the specificity of diagnosis in CAPD is similar to that used for multimodal assessment in diagnosing balance-related disorders. This is not an esoteric point, nor is the battery of multimodal tests used in assessing balance function limited to selected research institutes. Audiologists involved in the domain of multimodal testing of balance function can be found in virtually all settings where clinicians are employed (university medical centers, private practices, otolaryngology offices, university speech and hearing clinics, etc.). Indeed, it is also noteworthy that most, if not all, graduate training programs in audiology offer coursework as well as practical experience in this area. Taken together, this brief overview solidifies the notion that multimodal assessment is commonly used by clinical audiologists for evaluating balance disorders and represents an integral component of any educational training program at the graduate level.

In summary, to imply that multimodal testing is not within the scope of audiologic practice does not show a true understanding of the day-to-day work of professionals in this area. Indeed, just as multimodal testing has been used for decades to improve diagnostic specificity of balance-related disorders, multimodal assessment should now be applied in a similar manner to establish the specificity of diagnosis in the assessment of CAPD.

1. **Response to Katz and Tillery (2005)**

Katz and Tillery (2005) make the following two main points:

1. Clinicians should not abandon proven test batteries when an alternative does not exist.

2. Intra- and intertest comparisons in existing test batteries provide necessary validity checks so that demonstrating modality specificity is not necessary.

Although these are interesting foci worthy of consideration, we contend that Katz and Tillery have not provided the necessary or convincing evidence to support either of these points.

Katz and Tillery (2005) correctly note that we have not provided a validated multimodal test battery for routine clinical use. However, we submit that before validating a multimodal test battery, it is necessary to ensure that the paradigm being advocated has a strong theoretical foundation so that future work is on solid ground. Whereas the initial work of Cacace and McFarland focused more on theory then practice, we have provided many pragmatic examples demonstrating the proof of principle of our ideas. In the peer-reviewed publications cited in the primary article (Cacace & McFarland, 2005), we show that multimodal testing is indeed feasible and can be implemented in normal subjects, in children with learning problems, and in adults with brain damage.

We also emphasize that more powerful psychoacoustic methodologies need to be applied in the area of CAPD assessment. We strongly advocate that testing be under computer control and that such applications supercede other less than optimal testing paradigms, like those utilizing tape recordings or CD presentations of stimuli and tests.

Our concerns about the lack of evidence and validation of CAPD tests provided by Katz and Tillery (2005) are formidable. For example, Keller and Tillery (2002) are cited as providing evidence that CAPD testing is dependent on demonstrating a reliable and valid diagnosis. However, we could find no mention of reliability in this article. They cite Katz and Smith (1991) as support for the statement that their tests are “very effective and are able to predict and/or relate their results to school and communication problems.” Unfortunately, this is not a primary reference source but rather cites several book chapters and conference proceedings that, in general, show poor performance for children with learning disorders. The only citation from a refereed journal is to Stubblefield and Young (1975), who report a group effect for Staggered Spondaic Word (SSW) test errors in children with educational problems as compared with children without educational problems. This type of analysis does not address the sensitivity of the test for individuals, and more importantly, it does not demonstrate the specificity of the test for perceptual factors. Katz and Tillery (2005) also cite Keller and Tillery (2002) as showing that recommended therapy result in a significant improvement, yet this report involves only two case studies.

Application of the SSW test to identify auditory processing disorders in learning impaired children began in the early 1970s. According to Katz (1992), as experience with the SSW test developed, patterns of test performance in children with learning problems (functional deficits)
were found to be similar to performance observed in adults with known central nervous system lesions. These observations led to the development of a categorical model for CAPD, based in large part on the analysis of SSW test data, including various patterns of errors in competing and noncompeting words, order effects, reversals, and so on. This model identifies types of CAPD such as auditory closure decoding, tolerance-fading memory, integration, and organization. Even though anomalies associated with SSW test construction were recognized over 2 decades ago (see Freeman & Beasley, 1976) and despite the fact that testing was limited to the auditory sensory modality, Katz reported on these categorical CAPD typologies in various books and book chapters without providing any real details on how this feat was accomplished or what the available empirical evidence was to support this claim. Even on theoretical grounds, one might ask how thematic areas such as decoding, memory, integration, and organization would reflect auditory modality-specific abilities based on data derived from a single 10-min test. Take, for example, the subtype of tolerance-fading memory as a category of CAPD. First of all, it is difficult to conceptualize or to even reconcile what is meant by this terminology, how it fits into the contemporary memory literature, and/or how it was established and linked to brain dysfunction in individual participants. Moreover, the available evidence supporting this specific category of CAPD is insufficient to establish brain–behavior relationships by any scientific standard. Even after decades of test administration, credible data are still lacking relating SSW test performance to brain lesions and to tests of decoding, memory, integration, and organizational abilities.

Katz and Tillery (2005) also suggest that the SSW test has built-in validity checks. The examples they provide are based on two patients with low IQ test scores whose errors are limited to the competing word presentations in a specific ear. They suggest that it would be hard to relate these findings to language, cognition, or attention. However, alternative explanations are always possible. For example, we have previously discussed the role of hemispatial neglect (a deficit in spatial attention) in dichotic listening performance (McFarland & Cacace, 1995). Hemispatial neglect is most often related to visual deficits found in one hemifield, and it is often demonstrated with an “extinction” test that involves competing stimuli in the opposite hemifield. However, it is now recognized that hemispatial neglect is often a polysensory disorder involving unilateral neglect to both visual and auditory stimuli (see Paviani, Husain, Ladavas, & Driver, 2003, 2004, for reviews including discussion of dichotic tasks). Thus, although specific to a single hemifield and competing conditions, the defects reported by Katz and Tillery could be due to a polysensory neglect phenomenon. This alternative cannot be ruled out with testing that uses only auditory stimuli and the dichotic presentation of speech. Indeed, individuals with a supramodal hemispatial neglect have problems with dichotic listening tests due to the attentional demands necessary to succeed at this task.

In summary, neither the burden of proof nor strength of evidence requisites have been satisfied by Katz and Tillery (2005) to demonstrate that the tests they advocate actually work. As we discuss elsewhere (McFarland & Cacace, in press), a conclusive demonstration of the effectiveness of therapy requires double-blind controlled studies. To date, these types of studies remain to be performed.

2. Response to Musiek et al. (2005)

Musiek et al. (2005) provide a collection of comments grouped into five sections: (a) conceptual overview, (b) modality specificity and CAPD, (c) the gold standard, (d) brain organization: nonmodularity and the nature of CAPD, and (e) relationship between CAPD and “meaningful disability.”

In considering their commentary, we were impressed by the fact that it was not entirely consistent in either message or scope. On the one hand, Musiek et al. (2005) reject the concept of a modular auditory system, but they accept the view that CAPD should be modality specific. Similarly, they reject the notion that the CAPD construct should be related to practical activities such as school performance, yet they cite studies that discriminate children with learning disabilities from controls as support for the CAPD construct. Interestingly, the large-scale study that Musiek et al. reject as being pertinent to the area of CAPD (i.e., Watson et al., 2003) uses the same methodology that these authors repeatedly advocate in their commentary: interdisciplinary collaboration and multimodal assessment.

Modality Specificity

Musiek et al. (2005) suggest that the issue of modality specificity can be dealt with by demonstrating distinctive patterns of test performance across multidisciplinary tests. They also maintain the position that multimodal testing is not within the scope of practice for audiologists. Our position on the scope of practice issue differs from theirs, and the example of balance testing we discuss at the beginning of our rebuttal provides precedence and serves to refute their argument. Moreover, there are several problems with relying on other professionals to deal with the issue of modality specificity. First of all, there is no assurance that appropriate multimodal tests will be covered in a collaborator’s test battery. For example, many CAPD test batteries include dichotic listening paradigms. Dichotic listening tests present simultaneously competing stimuli to separate ears. Comparable test paradigms, such as the use of dichoptic presentations in vision, would not be evaluated in other modalities with most neuropsychological test batteries (Franzen, 2000). Thus, there is no guarantee that psychometrically balanced tests would be included with a multidisciplinary approach. Secondly, the test batteries used by other disciplines may have interpretive problems of an analogous nature to those we have suggested for CAPD test batteries. Most importantly, however, CAPD test batteries have generally not been
The Gold Standard

Musiek et al. (2005) suggest that lesion studies may provide a gold standard by which to evaluate CAPD tests. They cite research that evaluated lesion effects on various auditory tests. Aside from the issue of lesion specificity, these studies evaluated only auditory tests, so that the issue of modality specificity cannot be determined. For example, the study of Cranford, Stream, Rye, and Slade (1982) examined detection and discrimination for short-duration tones in patients with a variety of cerebral lesions. The study of Musiek, Baran, and Pinheiro (1990) evaluated a duration pattern test in patients with a wide variety of cerebral lesions. No attempt was made to correlate lesion location with test performance. The study of Baran, Bothfeldt, and Musiek (2004) found duration pattern, intensity discrimination, and auditory evoked potential abnormalities in a single patient who suffered a cerebrovascular accident. The authors state that this case demonstrated a correlation between damage to auditory regions and auditory test results. However, it is not clear how a correlation is established with just one observation. Thus, we feel that studies such as these fall short of providing a gold standard. Furthermore, based on arguments made in the primary article, we view test batteries that use only auditory stimuli as being incomplete and the diagnostic results obtained as being indeterminate. This approach does not allow for the issue of specificity to be addressed.

Additionally, issues related to the sensitivity and specificity of test performance are noted repeatedly throughout their commentary, but Musiek et al. (2005) fail to address how these metrics are of value when a gold standard is lacking. We have discussed this point in the primary article and more extensively in a book chapter (McFarland & Cacace, in press). The reference to Swets (1988) is the key citation for the readership of the American Journal of Audiology to examine for an incisive synopsis of the challenges posed when validating sensitivity and specificity effects of test performance in the absence of a gold standard.

Brain Organization: Nonmodularity and the Nature of CAPD

Musiek et al. (2005) state that their argument for nonmodularity of the auditory system is based on studies published by Poremba et al. (2003) and Salvi et al. (2002). These particular studies were also cited in a technical report from the ASHA Working Group on Auditory Processing Disorders (ASHA, 2005) and were thoroughly reviewed (see Cacace & McFarland, 2005). We do not interpret these studies in the same way as Musiek et al. (2005); specifically, our dispute with their interpretation can be appreciated by contrasting the view taken in the technical report with the experimental evidence presented by Poremba et al. (2003). The technical report (ASHA, 2005) states:

An extensive literature in neuroscience influenced the Working Group’s conclusion that the requirement of “modality-specificity” as a diagnostic criterion for (C)APD is not consistent with how processing actually occurs in the [central nervous system]. Basic cognitive neuroscience has shown that there are few, if any, entirely compartmentalized areas in the brain that are solely responsible for a single sensory modality (Poremba et al., 2003; Salvi et al., 2002). (p. 2)

However, the rationale for Musiek et al. (2005) citing Poremba et al. (2003) is not consistent with the actual data. According to Poremba et al. (2003),

The present results suggest that an auditory region resembling and paralleling the unimodal, ventral visual pathway extends through the entire length of the supratemporal plane together with the exposed surface of the superior temporal gyrus; like the ventral visual pathway, this auditory region appears to be modality specific, suggesting that it is dedicated to analyzing acoustic stimulus quality for purposes of stimulus identification and recognition, just as the ventral visual pathway does for visual stimulus quality. In contrast, other large auditory sectors overlap extensively with visual areas. (p. 570)

The conclusion derived from Poremba et al. indicates there are modality-specific auditory areas, modality-specific visual areas, and areas where both sensory systems overlap in the brain. These experimental findings follow the same neuroanatomical principles and underlying logic presented by Cacace and McFarland (2005). Nevertheless, because there is a dispute in interpretation, we urge the interested reader to review the original citations directly to determine their own perspective on this topic.

Relationship between CAPD and “Meaningful Disability”

Musiek et al. (2005) suggest that the role of the audiologist is not to predict future academic skills. They contend that posttherapy improvements on central auditory tests and other psychoacoustic measures should document the effectiveness and efficacy of CAPD intervention directed toward improving central auditory processes. However, performance on CAPD tests is not of interest unless it is related to practical aspects of individuals functioning in normal daily living (i.e., outside the audiology clinic). Interventions simply designed to improve CAPD test performance may have little practical impact.
Musiek et al. (2005) state that the study by Watson et al. (2003) is not relevant to whether current CAPD tests are actually associated with a meaningful disability. We disagree strongly on this point and are markedly opposed to dismissing this study outright. It is our belief that Watson and colleagues provided one of the most comprehensive and highly germane studies to the topic of sensory, cognitive, and linguistic variables that predict school performance. In fact, this study embodies the type of paradigm that Musiek et al. (2005) are specifically advocating: interdisciplinary assessment and multimodal testing. Indeed, the study led by Watson and colleagues was interdisciplinary because noted experts in the fields of audiology; optometry; clinical, experimental, and cognitive psychology; language development; speech pathology; special education; and cognitive science participated. It was multimodal because it included perceptual, cognitive, and linguistic tasks in both auditory and visual sensory modalities. Musiek et al. state incorrectly that auditory testing in this study was limited to “fine-grained auditory processing.” In fact, the types of tests used were those that children with CAPD reportedly have problems with (i.e., the subtests of SCAN that involve speech in noise and competing message testing). Briefly, Watson et al. (2003) performed a longitudinal multivariate design with 470 students entering the first grade in the Benton (IN) School District over a 3-year period. Scores from a battery of 36 tests assessing sensory (auditory and visual including tests of CAPD battery), linguistic (phonological processing, assessment of reading skills), and cognitive (school-administered tests) abilities were evaluated in terms of their ability to predict success in reading, math, and overall academic achievement. Interestingly, most auditory measures on which clusters of children showed deficits were standardized tests of the ability to understand speech under difficult listening conditions, as in the SCAN test. However, the analysis showed that the abilities tested by the SCAN test accounted for very little variance in reading achievement as measured by teacher-assigned grades. In sum, the Watson et al. (2003) study is one of the most comprehensive reports to date dealing with sensory, cognitive, and linguistic variables that predict school performance. Interested readers are encouraged to evaluate this work in its entirety.

Additional Concerns

In their commentary, Musiek et al. (2005) use wording that we take issue with. For example, they use descriptors such as “exclusively” modality specific, “complete” modality specificity, and “absolute” modality specificity as ways to describe our position. In fact, we have never used such descriptive terms. We interpret these alterations in terminology as a way to make modality specificity appear as an extreme position, when in fact, it is not.

Additionally, in cases where more than one sensory system is involved, such as multiple sclerosis (MS), Musiek et al. (2005) state, “A diagnosis of the [central auditory nervous system] deficit (and, thus, appropriate rehabilitation of that disorder) should not be withheld because other systems are involved” (p. 132). However, in cases of multiple system involvement, which may include blurred vision, gait disturbances, numbness, and tingling sensations, the potential for neurodegenerative disease must be entertained. In these instances, the correct choice of action is medical referral and treatment. In this context, it would be difficult to argue for auditory rehabilitation as a primary treatment option.


In the third critique, Rosen (2005) is concerned that modality specificity as a criterion for diagnosing CAPD is too loose since it would include modality-specific linguistic deficits. This would create a problem with designing analogous visual and auditory tasks that use visually presented text and auditorily presented speech as stimuli. This concern is also reflected in the definition of CAPD that was proposed by a working group of the British Society of Audiology, which specifically notes that deficits should be concerned with nonspeech sounds. However, we contend that modality-specific disorders of speech perception are accurately described under the rubric of CAPD. In fact, one could envision a variety of subtypes, which could include: pure-word deafness, auditory-specific spatial deficits, auditory-specific attention deficits, or auditory-specific temporal processing deficits. To arbitrarily exclude any of these areas would require some logical reasons, and as far as we can tell, such rationale has not been presented to support the case of auditory linguistic abilities. However, if it turns out that there are good reasons for restricting CAPD to nonverbal stimuli, then this qualifier could be added without negating the utility of modality specificity.

Rosen (2005) is also concerned that modality specificity is too strict a criterion for diagnosing CAPD, since it would exclude certain low-level deficits that occur in more than one modality. Examples include disorders in magnocellular pathways and demyelinating disease. In our view, the relevant issues contained herein center on how best to characterize these functional deficits.

The primary demyelinating disease of the nervous system is MS, but many other metabolic, genetic, and/or inflammatory disorders can result in disturbances of myelinization. As a rule of thumb, white matter disease in the nervous system is generally diffuse. In MS, for example, chronic lesions are characterized by gliosis and plaques distributed throughout the white matter of the optic nerves, optic chiasm and tracts, the brainstem, the cerebellum, the cerebrum, and the spinal cord. A distinctive site in the brainstem for plaque accumulation is the ventrolateral aspect of the pons at the root entry zone of the fifth cranial nerve. By definition and in order to make the differential diagnosis, multiple system involvement (visual, somatosensory, auditory, etc.) is required. Even when central auditory tracts are involved in this disease,
more often than not, auditory symptomatology is not the primary complaint. Characteristic symptoms of blurred vision, tingling sensations, paresthesias in the extremities, and gait abnormalities predominate. In fact, there can be problems with language and social-cognitive skills as well. While it is possible to focus on any one of these symptoms, to call this disease a CAPD would be questionable.

Functional deficits associated with involvement of magnocellular pathways have been postulated to be associated with developmental dyslexia. Developmental dyslexia is a neurodevelopmental disorder that manifests as a persistent difficulty in learning to read, despite having normal intelligence and having been offered a full range of remediation options in educational settings. In the area of developmental dyslexia research, two general theories predominate: the cognitive or phonological theory and the magnocellular theory. Both are recapitulated below based on the cogent review of Ramus (2004). Briefly, the cognitive theory centers on a specific deficit in the representation and processing of speech sounds; more specifically, it involves impairment in the ability to map letters into mental representations of corresponding speech sounds (i.e., the so-called grapheme-to-phoneme transformations). In this theory, other symptoms are considered comorbid factors without having any causal relationships to the reading disability. The alternative magnocellular theory focuses on specific sensory and/or motor symptoms and serves as a unifying framework, which implicates auditory temporal processing deficits, visual (magnocellular) dysfunction, and/or motor dysfunction as causes of reading disability.

The magnocellular hypothesis was originally proposed by Livingstone, Rosen, Drislane, and Galaburda (1991). It was postulated that the magnocellular division of the lateral geniculate nucleus of the thalamus was affected in dyslexia. This would presumably result in problems with visual stimuli of low spatial and high temporal frequencies. Subsequently, Galaburda, Menard, and Rosen (1994) reported that the magnocellular division of the auditory thalamus was also involved in dyslexia. Other thalamic nuclei also have magnocellular divisions, such as the dorsal medial thalamus (Giguere & Goldman-Rakic, 1988) and the ventral anterior thalamus (McFarland & Haber, 2001), which are also associated with frontal-limbic and motor functions, respectively. In addition, there are magnocellular divisions in other areas of the brain, such as the cholinergic magnocellular hypothalamic nucleus (Saper, 1984). The issue here concerns how best to describe a magnocellular disorder. For example, does it involve relatively specific effects on vision and audition (and their associated thalamic nuclei), or does it involve an assortment of deficits associated with the functions of large cells distributed throughout the central nervous system?

Characterization of any disorder is a form of hypothesis testing that should occur both at the level of group studies and at the level of the individual. Group studies provide knowledge about useful diagnostic categories and associated tests; individual studies provide knowledge about the specific diagnosis in an individual. In both cases, the modality-specific nature of effects provides useful and important information. Group studies determining the specificity of the deficits in dyslexia to sensory modality, temporal processing, and other dimensions that characterize stimulus materials will provide information necessary for the design and selection of tests to be used with individuals.

Rosen (2005) also suggests that there may be a problem with our excluding peripheral hearing impairment in a definition of CAPD. Examples he cites include potential central effects due to otitis media as well as coexisting peripheral effects. We do not rule out the possibility that auditory deprivation in early life secondary to otitis media, otitis media with effusion, and associated conductive hearing loss could result in a multitude of problems. These potentially adverse sequelae could include anatomical anomalies, electrophysiological dysfunction in specific auditory pathways, and psychoacoustic deficits in auditory processing that result in poor detection or discrimination of sounds in noisy environments (particularly binaural processing) and in verbally based learning disorders (e.g., Gravel & Ruben, 1996; Moore, Hartley, & Hogan, 2003). In fact, we have previously argued that the effects of otitis media could represent a situation whereby modality-specific perceptual deficits would be expected (Cacace & McFarland, 1998, pp. 365–366). However, available evidence indicates that auditory-related effects (performances on nonverbal tasks such as the masking level difference or comodulation release from masking paradigms) appear to be transient and recover over time. Furthermore, the general consensus from leaders in the field suggests that otitis media with effusion may not pose a substantial risk factor for later speech and language development or academic achievement as previously thought (Roberts et al., 2004). Nevertheless, early detection of hearing loss and continued vigilance on the part of clinicians are key components for limiting speech and language disorders from evolving into more serious disorders of communication.

In the beginning of his commentary, Rosen (2005) asks us to consider the analogy between how Winston Churchill must have felt when contemplating the treaty between Russia and Germany in 1939 and how clinicians currently feel when viewing the puzzling and often confusing task of evaluating children with disorders of acoustic information processing. It is fitting therefore that we reiterate and end with the quotation from Churchill that Rosen mentioned. In a display of rhetorical wit, Churchill said, “I cannot forecast to you the action of Russia. It is a riddle wrapped in a mystery inside an enigma: but perhaps there is a key.” Indeed, only time will tell if modality specificity will be the key strategic element to help solve the riddle of the CAPD enigma. Nevertheless, this concept is steadily evolving into a unifying framework, which is improving our understanding and helping to advance the area of acoustic information processing in a meaningful way. Much more additional research, however, is needed.
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