Human communication is primarily experienced through the use of language, a fundamental capacity that drives interpersonal interaction and the ability to learn. In its many forms (written, verbal, gestural signs, or tactile) language skills are used to share ideas, feelings, wants, needs, and emotions. Delays in the development of language and speech during the first 3 years of life can lead to difficulties in the ability to communicate and socialize with important childhood figures. They prevent the child from fully interacting with and learning from his/her environment. Parents eagerly anticipate achievement of language milestones. A child who does not speak or does not speak clearly raises concern about his/her ability to function effectively.

Speech and language delays are common childhood problems affecting 3% to 10% of children, and occur three to four times more frequently in boys than in girls. When these delays persist beyond 3 years, they are classified as impairments.

<table>
<thead>
<tr>
<th>CME EDUCATIONAL OBJECTIVES</th>
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<tbody>
<tr>
<td>1. Recognize the importance of speech and language therapy in common developmental disabilities.</td>
</tr>
<tr>
<td>2. Review available therapies for common speech and language disorders and the criteria for appropriate referral.</td>
</tr>
<tr>
<td>3. Describe the speech pathologist’s role in the treatment of speech and language disorders as well as other common developmental disabilities</td>
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</tbody>
</table>

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The pediatrician is frequently the first to detect a speech and language delay in the course of routine developmental surveillance or the first professional consulted by concerned parents. Speech and language pathologists can be very valuable consultants to pediatricians in the diagnosis and remediation of these disorders.

General approaches to developmental speech and language delays depend on the specific causative disorder. They may involve remediation to teach the child strategies for comprehending spoken language and responding with appropriate linguistic or communicative behavior. This article reviews common childhood speech and language delays seen in isolation or in association with other developmental disabilities including hearing impairments, global delays, and autism. It focuses specifically on the types of interventions speech and language pathologists offer to ameliorate these conditions. By understanding available therapies, the pediatrician will be better able to assist his/her patients when questions arise regarding these specialized therapeutic modalities and their effectiveness in young children.

**LANGUAGE DISORDERS**

"Language disorders" is a term that represents a heterogeneous group of either developmental or acquired disabilities principally characterized by deficits in comprehension, production, and/or use of language. Language disorders are often chronic and may persist throughout the person's lifetime. The symptoms, manifestations, and severity of the problems change depending on time and task. The American Speech and Hearing Association defines a language disorder as any disruption in the ability to acquire, comprehend, or produce spoken or written language. Children who have language disorders may have difficulty with acquiring the rules (form), the vocabulary (content), and/or the interpersonal aspects of communication (use).

Although there are commonalities in language impairments across the population, individual developmental disabilities carry with them specific language characteristics. Disorders of language can be characterized as central, those that occur as a result of a central process such as a genetic or developmental disorder; peripheral, those that occur as a result of a peripheral sensory impairment, such as a hearing loss; and environmental, those that occur as a result of an ecological factor, such as a behavioral disorder (elective mutism) or neglect and abuse. In the last category, documented delays are consistently observed, but causative links are not supported by research.

Language aspects of four common childhood disorders will be discussed. This is by no means an exhaustive list, but rather an attempt to identify important trends in defining a language disorder and choosing the appropriate therapeutic program to fit the need. Table 1 (see page 473) summarizes four common language disorders, mechanisms for referral, and suggested treatment techniques.

**Developmental Language Disorder**

In the case of a developmental language disorder, children are largely following a typical trajectory, but delays are present across all three areas: form, content, and use. Children may present as young as 18 months, but usually the pediatrician is made aware of this at about 2 years. After a thorough evaluation to determine the degree and type of deficit, therapy should be initiated targeting clearly delineated goals and utilizing specified methodologies for treatment. The most successful approaches involve the parent or caregivers in the intervention. With very young children, parent training geared toward encouraging and creating as many opportunities to talk and to respond to the output of others is the key to a successful intervention. Particular techniques have proven effective when used in concert with classic behavioral principles. Choosing enticing, interesting, and engaging experiences will likely draw the child into the setting and create a motivation to communicate.

Imitation, when used with young children, validates the child's production as meaningful and relevant, and creates an environment where the child learns to repeat and reframe that which has been modeled. Imitation is the fastest and most reliable way to secure the attention of the child with even the most profound delays. Once that attention is garnered, learning opportunities abound. Expansion refers to imitating the child's production and adding a bit more. When expanding an utterance, it is important to keep in mind that the goal is providing feedback about what the child has just said, while offering a slightly more advanced or more grammatically correct version of the same idea. For example, if the child were to say, "ball" with an open-handed reach, a clinician might respond, "gimme ball" or "want ball." Parallel talk refers to a modeling technique in which the clinician provides the language most salient to the child's own experience. It is a low-pressure opportunity to offer the words for the action or the intention, without requiring a response. A child who is handing the caregiver an empty bottle as a request might be told, "more" or "want juice." The key to this technique is to observe the child carefully so as to map his/her true intention onto the language model. Self talk is a similar modeling technique designed to map language onto intention in which the clinician or parent offers a monologue about his/her own experience.

**Language Aspects of Autism Spectrum Disorders**

The most recent research in the field of autism spectrum disorders (ASD) confirms that children on this spectrum are as heterogeneous a group as typically developing children. Therefore, it is important to note that as in all cases of language de-
## Approaches to the Treatment of Language Disorders

<table>
<thead>
<tr>
<th>Disorder</th>
<th>When to Refer for Evaluation and Treatment</th>
<th>Treatment Techniques</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developmental Language Disorder</td>
<td>Less than 12 months: if there are significant feeding issues or lack of babbling.</td>
<td>Imitation; parallel talk; modeling; self talk; parent training</td>
</tr>
<tr>
<td></td>
<td>12 to 18 months: if the child does not say 10 to 20 words by 18 months.</td>
<td>Imitation; parallel talk; modeling; self talk; parent training</td>
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<td></td>
<td>18 to 24 months: if the child does not have about a 300-word vocabulary and speak in 2- to 3-word sentences.</td>
<td>Imitation; parallel talk; modeling; self talk; parent training</td>
</tr>
<tr>
<td></td>
<td>2 to 3 years: if the child does not have about a 1,000-word vocabulary and speak in 3- to 4-word sentences.</td>
<td>Imitation; parallel talk; modeling; self talk; parent training</td>
</tr>
<tr>
<td></td>
<td>3 to 4 years: if the child does not have about a 1,500-word vocabulary, speak in 4- to 5-word sentences, and speak about events and objects not in the immediate environment.</td>
<td>Imitation; parallel talk; modeling; self talk; parent training</td>
</tr>
<tr>
<td>Pervasive Developmental Disorders</td>
<td>As soon as the impairment is recognized.</td>
<td>Applied behavioral analysis (ABA); developmental individual relationship based (DIR); picture exchange communication system (PECS)</td>
</tr>
<tr>
<td>Hearing Impairment</td>
<td>As soon as the impairment is recognized.</td>
<td>American Sign Language (ASL); auditory verbal therapy</td>
</tr>
<tr>
<td>Global Developmental Delays</td>
<td>As soon as the impairment is recognized.</td>
<td>Imitation; parallel talk; modeling; self talk; parent training; ABA</td>
</tr>
</tbody>
</table>

Principles and learning theory. Probably the best-known ABA is the Lovaas method, which when performed well combines discrete trials with attempts to generalize to more natural settings. Throughout the years, many programs have adapted those principles to fit the confines of speech and language therapy. Verbal behavior and relationship development intervention (RDI) are two well-known protocols that accomplish that goal.

ABA is especially effective for initiating the prerequisite skills underlying many important developmental and cognitive tasks such as the discrete skills of attending, imitation, receptive/expressive language, pre-academics, and self-help. It adheres to strict principles of behavior modification. ABA requires 1:1 instruction and a high degree of intensity (10 to 40 hours per week) to achieve research levels of effectiveness. Important components include reinforcing desired behaviors and extinguishing unwanted behaviors. The program focuses on discrete trials, which make it possible to break skills down into small component parts, rendering them teachable to children with varying levels of abilities. Anecdotally, there are reports of gains in IQ, language comprehension and expression, and adaptive skills.

The fundamental principle of the DIR model is to help children with ASD connect ideas and develop a logical understanding of the world. The method rests on the principle that skills for communicating are best developed within the context of a social interaction. DIR identifies six stages of emotional development children need to develop to form the foundation for more advanced learning. Floortime is the approach used to enable a child to move from stage to stage. Floortime uses short, but frequent personal interactions to facilitate mastery of developmental skills. Multiple interveners help to build flexibility and enhance interactions. Floortime is rela-
TABLE 2.

Characteristics of Speech Disorders

<table>
<thead>
<tr>
<th>Speech Disorders</th>
<th>Sample Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluency</td>
<td></td>
</tr>
<tr>
<td>Stuttering</td>
<td>Multiple sound, syllable, or word repetitions (&quot;s s s sam&quot;); sound prolongations (&quot;sssssam&quot;); sound blocks (&quot;Silent struggle — sam&quot;); body movements (ie, blinking, facial grimaces)</td>
</tr>
<tr>
<td>Cluttering</td>
<td>Problems with speech rate (too fast or choppy); normal dysfluencies (rephrasing utterances, interjections, minimal repetitions); articulation problems; disorganized language</td>
</tr>
<tr>
<td>Voice</td>
<td></td>
</tr>
<tr>
<td>Quality</td>
<td>Hoarseness, strained voice, breathy voice, dysphonia</td>
</tr>
<tr>
<td>Pitch</td>
<td>Too high or too low for age and gender, monopitch</td>
</tr>
<tr>
<td>Volume</td>
<td>Too loud or too soft</td>
</tr>
<tr>
<td>Articulation</td>
<td></td>
</tr>
<tr>
<td>Childhood Apraxia of Speech</td>
<td>Problems with multi-syllabic words; later developing sounds present while earlier developing sounds may be missing; able to produce sounds or words correctly on some occasions but not others; problems producing vowels; problems with intonation</td>
</tr>
<tr>
<td>Neuromuscular Disorders</td>
<td>Imprecise or unclear articulation (slurred speech); deficits in speech muscles (jaw, tongue, lips, etc); feeding and/or swallowing problems; drooling</td>
</tr>
<tr>
<td>Phonological Disorders</td>
<td>Sound substitution for a group of sounds (ie, &quot;tea&quot; for &quot;sea&quot;, &quot;tirt&quot; for &quot;shirt&quot;)</td>
</tr>
<tr>
<td>Structural Disorders</td>
<td>Enlarged adenoids; cleft lip and/or palate; missing teeth</td>
</tr>
<tr>
<td>Functional Speech Disorders</td>
<td>Common isolated sound substitutions (ie, lisps, &quot;wobot&quot; for &quot;robot&quot;, &quot;weaf&quot; for &quot;leaf&quot;)</td>
</tr>
</tbody>
</table>

Hearing Impairment

Determining the type (sensorineural, conductive, or mixed) and classification (mild, moderate, severe, or profound) of hearing loss is of primary importance when considering the speech and language therapy needs of the hearing impaired child. Information about age of onset, age of the child, and type of habilitation all factor into decisions about a therapeutic program. Research has proven that, like with most disorders, the earlier the intervention the better the outcome. In cases where amplification is appropriate, the sooner it is provided, the more positive the speech and language outcomes. Questions about Cochlear implants, amplification, and auditory trainer systems are best answered by a certified audiologist in conjunction with an otolaryngologist. Approaches to therapy are typically divided into aural/oral, an auditory-verbal approach, which emphasize residual hearing, speech reading and speech, and manual, which emphasizes sign language.

Teaching a child to use American Sign Language (ASL) provides him/her with a visual system, which will enhance early communication, especially in families with multiple hearing impaired members who employ a manual system. When a child accustomed to communicating with ASL enters a mainstream educational setting, accommodations are often necessary. Without the knowledge of English grammar, vocabulary, and syntax, children who only use sign language often experience academic difficulty and may require programs similar to those offered to bilingual children.

Auditory-verbal therapy is designed to maximize auditory learning for children with hearing impairments. Through a combination of individual therapy and ongoing parent education, the child de-
velops the ability to use hearing as the primary sensory modality and to communicate using spoken language. This method is highly individualized and requires the active participation of the family. Through a series of listening experiences, the child learns to hear and discriminate sounds, words, and sentences. The advantage of the auditory-verbal approach is that, unlike ASL-training, once a child reaches school age, he or she is already using the same language system employed in the academic setting. One disadvantage is that difficulties communicating with other members of the deaf community who are not competent lip readers or who do not use spoken language are likely to occur.

Global Delays

Global delays are a frequent cause of language difficulties. A globally delayed child usually demonstrates receptive and expressive language delays as well as delays in gesture language. In general, the more severe the generalized delays, the slower the acquisition of communicative language. Furthermore, language in the context of global delays is frequently more delayed than other areas of development. Interest in communicating with others may be present but slowed in both timing and expression. Language interventions may include similar techniques to those noted in children with developmental language disorders. Language therapy goals may include improving the nature and quality of adult input to the child as well as consideration of a group setting or classroom where language can be modeled for the child through peers, speech therapists, and special education teachers. Language therapy should progress in a developmental sequence.

A child usually progresses from using single words to phrases and sentences. In this natural progression, the role of the speech therapist is to assess the current stage of development and assist the child in reaching the next level. Therefore, language interventions, like educational interventions, should be seen as helping maximize a fixed potential but not curing the disability. Despite this fixed potential, children with communication disorders in the context of global developmental delays make progress with speech and language services.

Speech Disorders

Despite adequate language skills, a child may not be able to communicate properly because of a speech disorder. Speech is divided into three components: fluency, voice, and articulation. A problem in one or more of these areas affects the child’s intelligibility. Recognizing speech problems and knowing when to refer is an important role of the primary pediatrician. Table 2 (see page 474) summarizes the characteristics of common speech disorders.

Fluency Disorders

Fluency disorders are divided into two types: stuttering and cluttering. Stuttering consists of repetitions, prolongations, and/or blocks, which interfere with the natural flow of speech. Stuttering tends to emerge between 2 to 6 years. Most young children stutter when beginning to speak in longer and more complex utterances. They may display normal dysfluencies such as phrase repetitions ("look at look at that"), interjections ("I see the uh baby") or reformulations ("Where’s the ... give me that."). Some children may also display occasional syllable or word repetitions of up to two units ("Ca can you see that?"); "Mom mom give me that") sound prolongations ("Toooommy is here") or blocks (silent struggles followed by word).

When a child displays multiple sound or syllable repetitions ("s-s-s-sam") as well as more frequent prolongation of sounds and blocks and/or the presence of secondary behaviors such as blinking, facial grimaces, or other body movements, clinically significant stuttering is suspected, and a referral should be made to a speech-language pathologist. Children with a family history of stuttering should also be referred as soon as there is a concern because these children are at higher risk of developing clinically significant stuttering. Behavioral approaches have been found to be highly effective in eliminating stuttering in preschool children. Treatment for school-age children is more involved and less effective. Therefore, early referral to a speech-language pathologist is highly recommended.

Cluttering is a lesser known and less common fluency disorder, which consists of problems with speech rate and normal dysfluencies (rephrasing of utterances, interjections such as "um") as well as articulation problems, language formulation, and/or attention problems. Cluttering usually occurs along with stuttering, although it can also occur alone.

One distinction between someone who stutters and one who clutters is that the former is aware of the dysfluencies while the latter is not. Clutterers are not bothered by their speech difficulties and do not feel they have a problem speaking. Treatment for cluttering should focus on increasing self-awareness of dysfluencies as well as normalizing rate. Focus on language organization and articulation problems may also be needed.

Voice Disorders

Voice disorders consist of problems with the quality, pitch, or volume of the voice. Vocal quality may present as hoarse, breathy, or strained. There may also be loss of voice or aphonia. Pitch may be too high or too low for the age and gender of the child or it may be flat or monotone, lacking the typical intonation contours present in speakers. Volume refers to a voice that is too loud or too soft. Children presenting with voice problems should first be evaluated by an otolaryngologist to determine the cause of the problem. Once a diagnosis is established, the otolaryngologist will determine if medical intervention, voice therapy, or a combination of both will be needed.
There are a variety of approaches for the treatment of voice disorders. Symptomatic voice therapy addresses vocal symptoms via various techniques such as respiration training or reduction of harsh vocal onset. Physiologic voice therapy consists of vocal exercises, which aim to improve laryngeal muscle and respiratory function. Psychodynamic voice therapy investigates and addresses any psychosocial causes for voice problems. Voice therapy may also include the targeting of environmental changes. This may be preventive or rehabilitative and involves reducing behaviors that are causing vocal damage. Finally, holistic voice therapy consists of a combination of any of the aforementioned methods.16

Articulation Disorders

Articulation problems cause children to present with poor intelligibility. Their speech is difficult to understand because of inadequate productions of sounds, such as sound substitutions, omissions, or distortions. The reasons for their poor intelligibility may vary and, as a result, so may the treatment prescribed. What follows is a description of the five types of speech impairments and their best-known corresponding treatments. It should be noted that articulation disorders often consist of a combination of these types.

Childhood Apraxia of Speech

The American Speech-Language-Hearing Association (ASHA) defines childhood apraxia of speech (CAS) as: “a subtype of severe childhood speech sound disorder due to unidentified neurodevelopmental differences likely of genetic origin.”17 CAS affects the sequencing of sounds during speech. Some but not all children with CAS may additionally present with orofacial apraxia (difficulty with volitional non-speech oral movements) or limb apraxia. Making a diagnosis of CAS is difficult because there is currently no gold standard for doing so. CAS shares many features with other speech disorders, and features may also vary across age and severity level. Current research suggests the following characteristics as most likely to be associated with CAS: difficulty producing multisyllabic words, atypical sound development (later developing sounds may be present while early developing sounds may be absent), inconsistent sound productions (able to produce certain sounds or words on some occasions but not others), problems producing vowels, and problems with prosody (stress, intonation).

CAS is also associated with language deficits, especially in the areas of grammar and phonological awareness. Deficits in phonological awareness as well as the severity of speech impairment place children with CAS at a higher risk of reading problems when they start school.

Speech treatments for CAS include approaches that incorporate principles of motor learning where repeated speech practice is provided during varied moments.18 Tactile-kinesthetic cues are another treatment approach. One such approach is Prompts for Restructuring Oral Muscular Phonetic Targets (PROMPT), where the PROMPT certified speech-language pathologist provides oral tactile cues to facilitate the production of specific speech sounds at varying levels. PROMPT is helpful for children with CAS as well as other types of speech disorders.19 In more severe cases of CAS, augmentative and alternative communication (AAC) may be necessary. AAC consists of various types of aided (i.e., communication board) and unaided (i.e., sign language) approaches.20

Neuromuscular Disorders

Articulation problems may also be present because of deficits in the muscles used for speech. Children with cerebral palsy and Down syndrome often present with dysarthria, a neurological disorder that affects the muscles used for respiration, articulation, phonation, and resonance. Dysarthria can cause speech as well as swallowing problems.

Isolated oral motor weaknesses may also be present in children, resulting in poor jaw control, reduced lip and cheek movement, and/or poor tongue and jaw dissociation. Neuromuscular speech disorders tend to result in sound distortions, making speech sound imprecise and unclear.

Treatment for neuromuscular speech disorders consists of approaches that address the muscle deficits present. The PROMPT treatment, for instance, can be used to increase jaw stability and increase lip, cheek, and tongue movement during speech. Oral motor therapy is used for children with feeding problems as well as drooling and speech problems. Oral motor therapy focuses on increasing sensory awareness, strength and coordination for the muscles involved in feeding, control of oral secretions, and speech. It should be noted that the use of non-speech oral motor therapy to treat speech disorders is controversial because empirical evidence is currently lacking on the effectiveness of non-speech oral motor treatment to treat speech impairments.21 In the most severe cases of neuromuscular problems, augmentative and alternative communication may need to be considered.

Phonological Disorders

Phonological disorders are problems with the linguistic organization of sounds. As a result, the child displays difficulty producing certain sound groups. For instance, children may demonstrate the process of stopping where they substitute a group of sounds with other sounds (i.e., “sea” becomes “tea,” “shirt” becomes “tin”). A higher severity of phonological impairment has been found to place children at increased risk for reading problems.22

Treatment for pure phonological disorders consists of cognitive-linguistic approaches where the focus is on training sound groups rather than isolated sounds. The Cycle Approach23 is one such treatment, which addresses a category of sound errors. For instance, the
process of stopping, which may include errors in a group of sounds (s, f, sh, z) would be addressed.

Structural Disorders
Articulation problems can also be caused by deviations in the structure of the oral cavity. Children born with a cleft palate, for instance, produce sounds with a nasal quality because of the leakage of air into the nose. Another structural problem is enlarged adenoids, which may cause an open mouth posture and forward tongue thrust that results in sound substitutions (lisp) and/or distortions (inaccurate production of t, d, n, and l sounds).

Structurally based speech problems are best treated in collaboration with medical and dental professionals. When speech therapy is implemented, it typically follows a traditional articulation approach. This approach consists of auditory discrimination of the target sound and proceeds to include production drills at the sound level followed by drills at the syllable, word, phrase, sentence, and conversation level, respectively. Accurate sound production can be achieved via a variety of methods, such as imitation, phonetic placement, or successive approximations.24

Functional Speech Disorders
The term functional speech disorders refers to difficulty producing isolated sounds without any identified structural, neurological, or linguistic cause. Typical sound errors are lisps (if no structural cause) and common substitutions for r (robot becomes wobot), and l ("leaf" becomes "yeaf"). Functional speech disorders are present when a sound substitution is no longer acceptable for the age of the child. These speech errors respond well to traditional articulation treatment.

CONCLUSIONS
Pediatricians play a very important role in the diagnosis and treatment of young children with developmental language and speech disorders. Frequently, they are the first professionals to recognize or to be contacted by parents who have concerns about their child’s ability to communicate. Prompt identification of language disorders has been shown to improve outcomes. Understanding the different types of therapeutic modalities for conditions such as global developmental disorder, autism, hearing impairment, or speech disorders can be very important in helping the family access appropriate services such as ABA, PROMPT therapy, or specialized schools. The family, speech and language pathologist, and pediatrician can work together to provide a long-term educational plan for the child. Many developmental disabilities do not “disappear.” They can have a significant impact on the child’s life in his/her socialization and educational experiences beyond the toddler and preschool years. Maximizing communication can have a positive impact on the child’s overall functioning in his/her environment and world.

REFERENCES