

Part 1

The Art of Intervention

Children who are deaf or hard of hearing face many challenges when learning to communicate. Communication difficulties can lead to problems with academic and social-emotional development. Helen Keller was once asked which was her greater challenge, her hearing loss, or her visual loss. She remarked that her hearing loss was more of a challenge because, while a vision loss separates one from things, a hearing loss separates one from people. We learn to communicate through our contact with others and through that communication we learn social and academic knowledge and skills.

Part 1 of this book consists of five chapters that are organized to reflect the developmental nature of children and the processes of listening to and using spoken language. For example, if you are working with a five-year-old child who is receiving services for the first time, it is appropriate for you to start with activities and skills associated with infants and toddlers. The science is the same for the newest learners; the art is in making early skills available through age-appropriate activities. As you read through these chapters, you may want to refer to Part 2: The Science of Intervention for more details about the reasons why you need to organize the environment in the ways we suggest. The chapters in Part 1 are as follows:

Chapter 1, “Listening and Spoken Language Interventions: A Model and Activities for Helping Children,” identifies our *Model of Auditory, Speech, and Language Development*. In this chapter you will learn about the components of spoken communication you need to address and a format for thinking collectively about the components.

Chapter 2, “Early Detection and Intervention for Infants and Toddlers,” discusses the approaches, practices, techniques, and strategies you will need to work with very young children with hearing loss.

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Chapter 3, “Interventions for Preschoolers,” presents the approaches, practices, techniques, and strategies needed for working with children who are developmentally in the three to six age range.

Chapter 4, “Interventions for Children in the Primary Grades,” identifies the needs of young school attendees.

Chapter 5, “Developing Literacy Skills in Children With Hearing Losses,” begins the discussion of how language and literacy are intertwined as well as the challenges that hearing loss imposes on literacy acquisition.

As a teacher in general or special education, your job is to (1) help children with hearing losses learn to communicate, and (2) help impart social and academic information while they learn to communicate. It’s important you do this in supportive and creative ways. While the process is not always easy, it is always exciting.

Listening and Spoken Language Interventions **1**

A Model and Activities for Helping Children

Children who can hear learn spoken language because they listen to it all the time. They listen to themselves and they listen to others. A child who is born with a hearing loss, however, must be taught to listen. We hear with our ears but we listen with our brains. A child who is deaf or hard of hearing must organize sounds in a way that makes sense.

The best way to help a child organize sounds is by relating them to language. Language is the master organizer of our world of thoughts, ideas, words, and sounds. The primary objective of this chapter is to provide a model that general and special education teachers may use to organize the components of listening to spoken language so that children will learn to understand and use them. This *Model of Auditory, Speech, and Language Development* is presented in detail in this chapter.

Spoken language is learned most easily through listening. In past years the concept of “learning to listen” to spoken language was called *auditory training* (Erber, 1982). This has been replaced by other designations such as *auditory brain development*, the term we use in this book, or *auditory perceptual development*. However you label it, learning to listen to language is a process best begun at birth and conducted over many years. During the process of learning to listen, children must perceive differences in spoken language that range from very large differences to very small. For example, a car horn is very different from a brother’s laugh. The more experience a child has with listening, the smaller the differences in language he will be able to hear. A more experienced listener will

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hear the difference between “wipe your feet” and “go to sleep.” These patterns are far too similar for new language listeners to differentiate.

A large part of learning to listen to language is the development of the *auditory feedback loop*. Children need to learn to listen to themselves and how they talk so that they can monitor their spoken language. The auditory feedback loop is a necessary precursor to babbling and supports all future spoken language development. See Chapter 6 for an in-depth explanation of the auditory feedback loop.

Teachers will see two different populations of young children with hearing loss. The first population needs intensive stimulation; the second population needs extensive remediation. A well-prepared, intensely stimulating environment can foster the natural emergence of listening and spoken language. This has been referred to as *facilitated language learning* (Desjardin, Eisenberg, & Hodapp, 2006) or *incidental language learning* (McConkey-Robbins, 1998), which follow patterns of normal development.

There are other deaf and hard of hearing children who are not able to master spoken language at typical rates due to reasons such as learning disorders, language deprivation, or a late start developing a visual language from poor models. These children need more direct instruction, or *didactic instruction*, which is more remedial in nature.

If you have a child who does not have a usable listening or language base in your classroom, you will need to become more didactic or direct in your instruction. Work very closely with a highly qualified teacher of the deaf. In this book, we assume that you are working with young children with hearing loss who are acquiring spoken language through listening.

LISTENING CHALLENGES THAT CHILDREN MUST OVERCOME

During auditory brain development, teachers must organize spoken language stimuli into discrete skills. We do this so that the message we ask the child to listen to is comprehensible to her brain. A child’s hearing loss artificially creates a set of filters that we must consider when working with the child. Auditory brain development is the process of chipping away at these filters, which include:

- **Thinking about sounds.** The child must think about and then organize sounds. The process of organizing occurs by learning to detect, discriminate, identify, and comprehend what is heard (Erber, 1982). First, the child has to realize that sounds are there. Next, he has to know that one sound is different from another. After that, he learns that the sounds are associated with different objects or events. Finally, he needs to understand what the sounds mean. If a child’s thinking filter can detect but not discriminate, you may say, for example, “See the bee,” but she doesn’t know if you said, “See the bee” or “See the tree.”
- **Components of speech and language.** We have vowels and consonants; we have words and phrases; and we have strings of words that make up sentences. We can speak in a happy voice or a sad voice. Various

parts of speech make up these features, along with prosody and intonation. If a child's language filter is only three words long and we say, "Time to take your bath. Get your rubber ducky and come here," the child's brain might hear only "bath ducky here." This may cause the child to think you want her to give her ducky a bath.

- **The world outside of the child.** There is an interaction between what is happening in the child's head and what is happening in the external world that he can see and touch. The more closely auditory information matches what is happening in the real world, the easier it will be for the child to acquire spoken language. For example, if the child is trying to hear the difference between "banana" and "apple," you wouldn't put a pear in front of him. Similarly, if you were trying to teach him to perceive the subtle difference between "a tree" and "a bee," you would not have the radio playing in the background.
- **Child actions.** Babies are capable of certain actions, while toddlers have a greater repertoire. Preschoolers have an even larger set of behaviors they can evoke with the school-age child the most sophisticated of all. It would not be appropriate to ask a school-age child to stop sucking on a bottle when she hears a sound. Conversely, you would not expect a three-month-old baby to draw a circle around a word. The actions we observe that tell us what a child can hear must match what she is developmentally able to do.

Awareness of the Whole Child

Teachers must consider all the needs of the whole child who is putting this listening and language puzzle together. This child has emotions. If he is unhappy, he won't care about your instruction. If he is sick, he may not have the energy to listen. If he is visually impaired, he may not be able to see or manipulate materials. If the home and school languages differ, he may be overwhelmed. The child also brings a whole set of world experiences to the language learning task. Some children have had lots of experiences, while others have not had as many. The more experiences a child has, the larger a base we can draw upon when teaching him to communicate.

Here's a pop quiz. Pick the label (letter) that best goes with the description (number).

Box 1.1 Pop Quiz

Match the numbers to the letters.

- | | |
|--|--------------------------------------|
| 1. Pointing to a picture | a. Thinking about sounds |
| 2. The "p" sound in the word "pat" | b. The world outside the child |
| 3. A box of beanie babies | c. Components of speech and language |
| 4. Noticing that "ball" and "jump" sound different | d. Child actions |

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If you chose the following, you were correct: 1d, 2c, 3b, 4a. In the remainder of this chapter you will learn in greater detail about each of the four areas we consider when providing intervention.

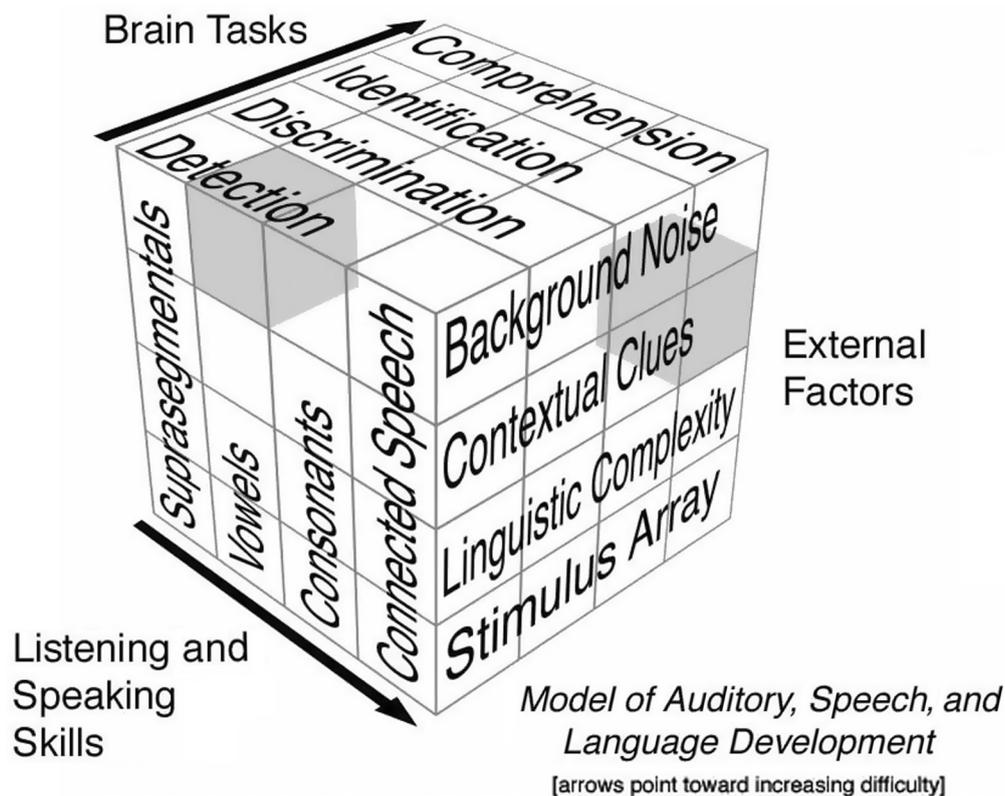
MODEL OF AUDITORY, SPEECH, AND LANGUAGE DEVELOPMENT

We designed the *Model of Auditory, Speech, and Language Development* presented in this chapter to assist teachers in thinking about the many parts of speech, language, and listening that they must manage during spoken language instruction. The *Model of Auditory, Speech, and Language Development* (Figure 1.1) tells us that the brain (brain tasks) processes meaningful speech and language (listening and speaking skills) in a variety of contexts (external intervening factors and child actions). For example, we might have an objective that looks like this: *Marius will demonstrate discrimination (brain task) between the vowel sounds -oo- and -oa- (listening and speaking skill) when given a closed set of three objects such as a boot, a toy boat, and a toy bear (external factor, in this case, size of set) by pointing to the correct picture (child action).* In this lesson the teacher might show Marius three toys (boot, boat, bear), saying one of the three words (e.g., boat). We would then hope to see Marius pointing to the toy the teacher said.

Here's another example: *Marissa will demonstrate comprehension (brain task) of two-syllable -ing words (listening and speaking skill) said by the teacher when given a picture containing the word (external factor, in this case, contextual cues) by saying (child action) the word that the teacher is describing.* In this lesson we would see the teacher giving Marissa a picture of a lake scene with maybe a boat and kids swimming near the shore. The teacher would say, for example, "Listen. Someone is moving through the water. His arms are turning. He is kicking. What is he doing?" Our expectation is for Marissa to say, "Swimming." Figure 1.1 demonstrates how three of these components (brain task, listening or speaking skill, and external factors) come together for a good lesson plan.

The *Model of Auditory, Speech, and Language Development* provides a structure for determining appropriate objectives. Think of the brain tasks as progressing from the front of the model to the back of the model in terms of difficulty (first we detect; then we discriminate; then we identify; then we comprehend). Think of listening and speaking skills as instructional targets that progress from the left side of the model to the right in difficulty. First we notice suprasegmental patterns, followed by vowels, then consonants, and then connected speech. But that's not the whole story. As we move a skill along the levels, each level develops simultaneously in the child's listening repertoire. The external factors, shown on the right side of the cube, are situation specific. In addition, there are always child behavioral tasks involved in every lesson that are not reflected on the model. When setting a goal, think of the following pattern:

The child will demonstrate (brain task) a (listening and speaking skill) when (external factor) by (child action).

Figure 1.1 *Model of Auditory, Speech, and Language Development*

SOURCE: Illustration by James Poulakos, Mustafa Elsayy 2005.

Imagine now that you can pick out individual blocks from the three-dimensional model above. Locate the darkened block on the front face of the model. This might be telling us that Shantia will demonstrate that she detects (brain process) the vowels -a- and -oo- (listening and speaking skill) when associated with specific toys in the classroom such as “aaaaaa” for airplane and “oooo” for fire truck (external factors of context and background noise) by placing a ring on a spire (child’s behavior or action). This is the sequence you will always follow in describing your objectives. See if you can come up with an example objective for the second block embedded in the back face of the model.

Parameter 1: Brain Tasks

Brain tasks tell us how a child’s brain responds to sounds. Listening requires the child to think about what he hears; it is a thinking skill. In order to teach a child to listen, we must first understand what we expect him to think; that is, what we expect his mind to do with the information. There are four brain tasks: detection, discrimination, identification, and comprehension. The whole goal of auditory training is to teach the child to comprehend, or understand, information that he hears. Each of the different components of listening contributes to the development of comprehension. Activities must be meaningful and have

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sufficient content to make them useful to the child. Brain task development does not occur in a locked-step fashion. While you are helping the child comprehend (understand the meaning of) at one level (e.g., phrases of different length), you may also be helping him discriminate (detect the difference) at a different level (e.g., words with the same vowel).

Detection

Essential Question #1

Does the child hear the sound? Can he detect both the presence and absence of a sound? Does he demonstrate a response to a stimulus? Can he detect a range of sounds? Have you established a conditioned play response? Is there evidence of a spontaneous alerting response?

The first component, or parameter, of brain tasks is *detection*; that is, the ability to respond to the presence of a sound or not to respond when there is no sound. We need to establish responding and nonresponding very quickly during auditory development. The child must learn to wait to respond to a sound; otherwise you may not be able to determine whether the child is actually hearing something or is just guessing. Children who do not have this response will wait for a certain amount of time to respond to a stimulus, but eventually they will not be able to wait any longer and will perform the expected behavior. If they are really listening for a sound, however, they will wait until they hear the stimulus before engaging in the behavior at hand. Waiting is not a problem if they truly are listening.

When developing this response to sound, you must focus first on the sounds that you expect the child can hear based on his aided audiogram. As explained in Chapter 6, an aided audiogram is a picture of a child's hearing response when he is wearing his hearing aid or cochlear implant. It is important to start auditory brain development with sounds we know the child can hear. For children over age one, you will teach a "conditioned play response"; that is, to react (e.g., throw a bean bag, stack a block) upon hearing a sound. You will also stimulate the development of spontaneous alerting responses that indicate that the child has heard the sound even when not specifically cued to listen. For example, when the child hears a sound, she may stop what she is doing and look for a sound, or she may vocalize, indicating that she has heard something. To develop the spontaneous response, have a third person in the room make a sound. Call the child's attention to the sound by describing the sound (e.g., "Oh look. She has a toy cow that says, 'moo.' I heard that moo. Did you?"). All children must have the ability to spontaneously alert to sound before you can begin working on any other level.

Example of a detection activity: *Victoria will demonstrate detection (brain task) of the presence of various vowel sounds (listening and speaking skill) when the teacher provides a familiar stimulus (external factors) by dropping a block in a bucket (child action).*

Figure 1.2 Child Demonstrates Sound Detection by Placing a Ring on a Spire



SOURCE: Photographed by John Zimmermann.

Discrimination

Essential Question #2

Discrimination is mostly used as a remedial tool for speech perception activities. But before we can do this, we need to answer several questions. Does the child indicate in some way that he knows that two sounds are the same or different? Does he indicate that he is listening for differences among sounds? Can he respond differently to different sounds?

Once a child is able to detect speech, we move that skill along to the next brain task level. There, we ask the brain to tell the difference between or among sounds. This is called *auditory discrimination*. Auditory discrimination is defined as “the ability to perceive similarities and differences between and among sounds, to listen for differences among sounds, and to respond differently to different sounds” (Erber, 1982, p. 41). We want to determine if the child can tell that two sounds are different and if so, can he respond to these sounds in different ways. For example, “cow” versus “elephant” is a pattern that compares one syllable versus three syllables. At this level we might only be interested in whether or not he can tell that “elephant” is a longer word than “cow.” If the child imitates an elephant’s trunk movement when you say, “elephant” and a cow mooing when you say, “cow,” then we know he can tell there is a difference in syllable length in these two sounds. The child may not know quite yet what the words are, but that comes

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next. For now, we are satisfied in knowing that the child can indicate to us in some way when he hears that the words are of different lengths.

It's important to note here that we move rapidly out of this brain task and into the task of identification, because auditory development activities are best conducted when sounds are meaningful to the child. Often we use this level of discrimination as a remedial tool. For example, when the child makes a speech error such as "tat" for "cat," you might say, "Listen, you said 'tat.' I said 'cat.' Can you hear the difference?" The purpose of using discrimination as a tool is for the child to compare two signals: a correct one and an incorrect one. This is the beginning of what is called "auditory self-monitoring" or "auditory feedback" which involves learning to modify one's own speech based on what one hears. For very young children who are just learning to listen, however, discrimination in its most basic forms may be actual objectives.

Example of a discrimination activity: *Ahmed will demonstrate discrimination (brain task) between words with and without a final-s/z ending (listening and speaking skill) such as cat/cats, dog/dogs, tree/trees when the teacher says cat/cat versus cat/cats (external factor) by holding up his finger if the words are different and not holding up a finger if they are the same (child action).*

Figure 1.3 Child Discriminates Words With and Without Final-s Endings



SOURCE: Photographed by John Zimmermann.

Identification

Essential Question #3

Can the child understand labels associated with a speech stimulus by copying what was said or pointing to an object, picture or word?

Once the child is able to discriminate sounds, we begin to help her attach meaning to the sounds. We accomplish this through identification activities. Another word for identification is *recognition*. The child recognizes an acoustic pattern as the label for a specific object, event, person, or action. The goal is for the child either to repeat what she heard or to point to a picture or a printed word that represents the stimulus. Here's an example: You may be working with a child on a task where she is shown three objects, each of which represents a particular sound. Our objective is for her to identify the correct object or repeat the stimulus (e.g., jump, shhh, or beep-beep-beep) when she hears the teacher produce the sound. This is called auditory identification or auditory association.

Example of an identification activity: *Maisha will demonstrate identification (brain task) of words of differing length (listening and speaking skill) when given a choice of three objects (external factor) by imitating speech or selecting the object (child action) that goes with stimulus presented, such as a boy, a baby, and grandfather.*

Comprehension

Essential Question #4

Can the child make higher-level associations between sounds and events or objects? Does he understand the meaning of what you are saying? Can he answer questions appropriately? Can he follow directions?

Comprehension is the primary goal of listening instruction. Our whole focus is to make sure the child understands what he hears. Comprehension occurs when the child demonstrates the ability to understand the meaning of speech and when his response is quantitatively different from the stimulus presented. Another word for comprehension is *understanding*. Because comprehension is a process, we write comprehension goals differently from other goals. We must depend on the child's responses to demonstrate comprehension.

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Another word we can associate with comprehension is *reformulation*. When doing a comprehension activity, we ask the child to listen and then to reformulate the information in some way that lets us know he understands it. The child will demonstrate comprehension by doing some action or changing the task around in a quantitatively measurable or visible way. This action will become the objective of your lesson. In other words, we know that the child understands what we have said because he *does* something appropriately related to the stimulus. For example, if you say, “Wash your hands” versus “Sit down,” we can assume the child comprehends what we said if she does the correct task.

Following directions and answering questions appropriately are two good ways of showing that comprehension has occurred. You are looking for some indication that the child has derived meaning from what you have said. You want to know not only that she can hear the stimulus but also that she can understand the language or meaning of the stimulus.

Auditory comprehension is composed of the following four components: auditory memory, following one-step commands with one critical element, auditory sequencing, and auditory integration. *Auditory memory* is demonstrated when the child remembers what she has heard (e.g., teacher reads a story, child acts out the story). *Following one-step commands with one critical element* involves using one word to instruct the child to act out something in a story or game such as “jump” or “push.” Once the child can act out one-word instructions our next objective is *auditory sequencing*, where the child must remember things in order, such as two-step commands or two actions in a story, building eventually to three and four commands or actions. The final comprehension skill involves *auditory integration*, where the child must think about the language she has heard for the purpose of integrating language and thinking. For example, we might ask, “What color do you get when you mix blue and yellow?” This is by far the most difficult level of comprehension, but it is also the whole point of why we do auditory training. In order to reach this level, the child needs adequate perception of sound as well as knowledge of language. Without the ability to integrate listening, language, and thinking, the child will be at a disadvantage in developing spoken language and in being successful upon entering school.

Example of a comprehension activity: *Josette will answer “what” and “where” questions (child action) about a story (listening and speaking skill) that the teacher reads to her (external factor).*

Figure 1.4 Children Answer Questions About a Story

SOURCE: Photographed by John Zimmermann.

Remember, comprehension objectives are written differently from other brain task objectives because it is a process. Comprehension *is* the brain task, but it is measured by what the child produces. It involves actively *thinking with language* internally.

Parameter 2: Listening and Speaking Skills

Listening is the foundation of spoken language. If you want a child to learn to speak the language of his home and culture, then you must teach him to learn to listen to that language. We start with the brain tasks above, but the brain has to have some information to think about. The information we give a child's brain to think about in auditory training is meaningful, spoken language. Spoken language objectives (both the listening side of the coin and the speaking side of the coin) form the core of instructional units or targets and may be broken into categories. Remember, we artificially separate out spoken language skills so we can be sure that what we are asking the brain to think about is comprehensible; that is, it is in a small and meaningful enough unit that the brain will be able to pay attention to it.

The components of listening and speaking skills are suprasegmentals, vowels and diphthongs, words, phrases, and connected speech. They are the building blocks of spoken language, our main targets or objectives.

Suprasegmentals

Essential Question #5

Does the child demonstrate that he hears the differences among patterns of sound that are composed of differing durational, stress, intonational, or phrasing elements?

The first and simplest level where children learn to perceive differences inherent in spoken language is the suprasegmental level. At the suprasegmental level we work on: pattern perception, duration patterns, stress (requiring duration and intensity pattern changes), intonation (requiring duration, intensity, and pitch pattern changes), and phrasing (requiring intonation pattern changes). See Chapter 6 for in-depth information on duration, intensity, and pitch.

Pattern perception requires the child to do something different based on the presentation of two different sound patterns. We may ask the child to listen to the difference between a long sound and a short sound or an intermittent sound and a prolonged sound. For example, we can use the stimulus “pull” versus the stimulus “throw the bean bag,” where we might have the child pull some Pop-It beads or throw a bean bag based on which pattern he has heard. It is not necessary for the child to understand what “pull” means or what “throw the bean bag” means, only that he recognizes that one pattern goes with one action and the other pattern goes with another action. He can do the activity just by recognizing the pattern.

Perception of duration requires the child to listen to durational patterns beginning with simple patterns such as the one described above, and then moving into durational patterns associated with long versus short sounds such as “ruff” versus “meow.” Even if the child can’t hear the frequency changes she can still determine that one is short and one is longer. The objective isn’t vowels per se, but vowel pattern duration. With older children, we return to working on duration in the form of syllable accent. The accent on syllables is not conveyed by loudness but by duration, so older children can work on listening to and saying words such as **pre-sent** and **pre-sent** or **con-tent** and **con-tent**.

Perception of stress refers to the accenting done across a sentence, such as “Put **that** there,” referring to the object versus, “Put that **there**,” referring to the location. In this instance the child would have to identify whether the stress caused the focus of the sentence to be on the object or on the location. Stress perception requires a combination of duration and intensity patterns. Listen to yourself as you say “that” and “there” in the examples above. You will notice that the words are not only louder but longer as well when they are the stressed word of the sentence.

Perception of intonation refers to the rise and fall of inflection within a sentence, such as the rising intonation of a yes/no question. Perception and production of intonation require duration, intensity, and pitch changes across a phrase. It includes activities that help the child listen to the entire speech

envelope, or the intonational ebb and flow of a particular spoken utterance. For example, we would have different ebb and flow when we say, "George is Norm's best friend," if we meant it as truth versus if we meant it sarcastically.

Perception of phrasing requires the listener to understand that certain words go together, such as the phrase "in the car," which we actually run together quite rapidly in normal speech. Understanding and using phrasing is dependent upon good intonational perception and use. In the real world, when people speak to us or when we speak, we run words together. Think of the phrase "OK. I have got to go." In the real world we would phrase it in a pattern something like "nnn K, Iguttago." You can see why it would be difficult for a developing child to figure out this sentence if he had to pay attention to each word rather than to the entire pattern.

Example of a suprasegmental activity: *Andy will demonstrate identification (brain task) of common two and three element intonation patterns (listening and speaking skill) associated with everyday experiences (external factor of context) when given three pictures (external factor of closed set) by pointing (child action) to the correct picture.*

Figure 1.5 Children Identify Spoken Language Patterns



SOURCE: Photographed by John Zimmermann.

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In this lesson the teacher has a folder of a dozen different captioned pictures taken of everyday experiences in the classroom. Examples are: Line up. Sit down. Time for lunch. Wash your hands. Turn off the lights, please. Push your chair to the table. The teacher sets out three pictures, being careful to pick phrases of three different lengths (e.g., Line up. Wash your hands. Turn off the lights, please.). She reads the captions under the picture to the child, and has him repeat them. Then, covering her mouth, she says the caption and asks Andy to point. Andy's correct response will earn him a puzzle piece, all of which he can put together at the end of the session.

*Vowels and Consonants***Essential Question #6**

When helping a child listen to the differences between vowels and consonants, do you provide a sufficiently noticeable difference by working between vowel or consonant categories before working within vowel or consonant categories?

Vowels and consonants are the *segmental sounds* of speech, as opposed to the suprasegmental sounds (i.e., intensity, duration, and pitch). Another word for a segmental sound is an *elemental* sound. Segmental aspects of speech are the frequency components of vowels or the manner, place, and voicing of consonants that differentiate one speech sound from another. See Chapter 6 for more information on the components of speech. When developing lesson activities, it is important to ensure the distinctions between the sounds are audible. It is easy to incorporate too many aspects of a sound, such as duration or intensity, into a lesson. Remember, we are artificially breaking down the sounds to make the differences apparent.

Also, we do not want to confuse the child by adding in suprasegmental information, such as making one vowel sound longer and the other shorter. If we did that, the child would probably respond to the difference in duration rather than the difference in the way the two vowels sounded. When working on any particular listening skill, it is always good practice to keep the stimuli constant and not add in too many confounding characteristics.

In determining whether a child can hear the differences between vowels, you must carefully review the child's audiograms. Find out as much information about the frequencies the child can hear. Look at the first and second formants of the vowels as they relate to the audiologic information you have about the child to determine how much of the sound the child can hear. See Chapter 6 for more information on formants and audiograms.

The vowels listed on Table 1.1 are arranged from easiest to hear to hardest to differentiate. The easiest sounds to hear are the diphthongs because of the transition that occurs when saying them. The next easiest sounds are the Group 1 sounds because the second formants of these sounds fall in the lower frequencies. The Group 2 vowels are more difficult to hear because they have a mid-frequency

second formant. The Group 3 vowels—where the second formants fall in the higher frequency ranges—are the most difficult to hear. Say these groupings to yourself and you should be able to detect both changes in frequency and changes in tongue location.

When you begin helping students, listen to the difference between vowels. Start with a diphthong, and compare it to a Group 3 sound because the differences are more noticeable. Listen to yourself say “i-e” as in *pie* and “a-e” as in *pay*, repeatedly alternating the two as in “i-e, a-e, i-e, a-e.” Now listen to yourself say, “i-e” as in *eye* and “-i-” as in *pin* repeatedly as in “i-e, -i-, i-e, -i-.” Which pair sounds and feels most different? Yes, the second set. This is the kind of contrast we want to present to the child.

Always work on contrasts between groups before you begin to work on contrasts within groups because all of the sounds within a group have similar second formants and will sound similar to the child with a hearing loss. You want the child to have successful listening experiences before giving him the challenging experiences. Between-group comparisons are much easier to make than within-group comparisons.

Table 1.1 Frequency Information for Vowels

<i>Level of Difference</i>	<i>Category</i>
F2 (available)	Diphthongs: i-e, a-e, oa, ou, u-e, oi
↓	Group 1 vowels: aw, -oo-, oo
F2 (difficult to hear)	Group 2 vowels: -o-, -u-, er
	Group 3 vowels: ee, -a-, -i-, -e-

SOURCES: Biedenstein, Davidson, and Moog (1995); Denes and Pinson (1993); Erber (1982); Ling and Ling (1978).

When helping a child learn to listen to consonants, you must consider their relative frequency (Hz) patterns. Table 1.2 presents groups of consonants that range from the lowest frequencies to the highest frequencies. Although nasal sounds are the lowest in frequency, they are also very soft sounds and can be difficult for the child to hear. Be sure to take extra care in providing sufficient loudness to the child when working on the lowest frequency sounds. Regarding high-frequency sounds, children with cochlear implants will be able to hear those sounds (assuming their devices are optimally set); however, some children with hearing aids may not have sufficient hearing to bring these higher sounds into an accessible range. Again, remember to look at a child’s audiogram relative to the frequency characteristics of a sound to understand how best to proceed. As with the vowels, always have the child listen to between-group contrasts before listening to within-group contrasts. See Chapter 6 for more information on these concepts.

When working on vowels and consonants, it’s important to take into consideration that some speech sounds are loud and some are quiet. Sometimes strong sounds can mask or overpower weaker sounds. You may be able to compensate for this by increasing the intensity of the weaker sound. If you cannot do this, then you will probably need to choose a different contrast for developing the sound. See Chapter 6 for information on intensity of sounds.

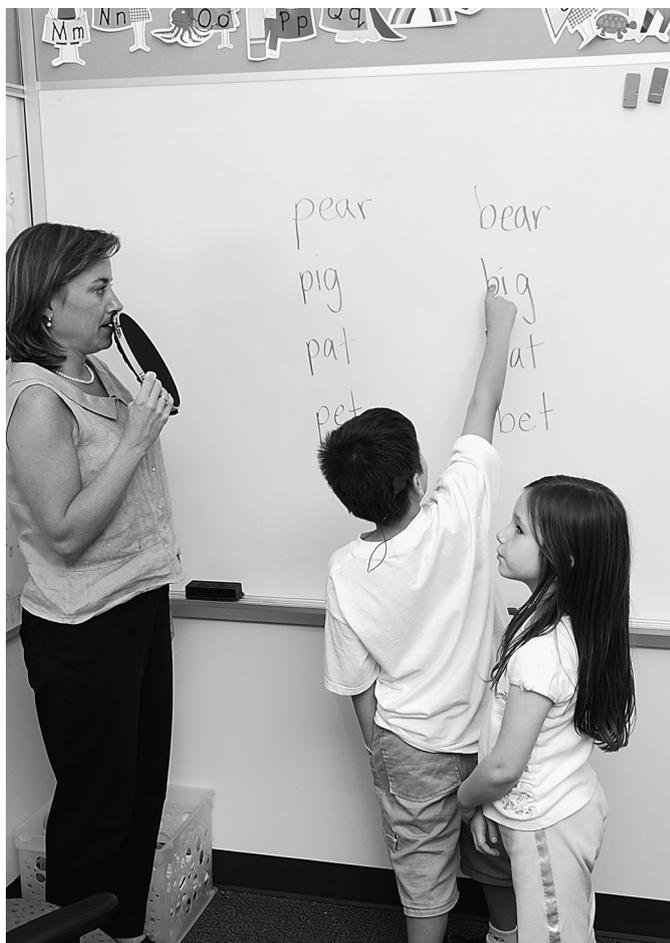
Table 1.2 Frequency Information for Consonants

<i>Frequency Level</i>	<i>Consonants</i>
Low-frequency consonants	m, b, d, n, -ng
High-frequency consonants	voiceless th, s, f, k, g, h, p, t, sh, ch
Mid-frequency consonants	r, l
Consonants with low- and high-frequency components	z, zh, v, voiced th, j

SOURCE: From *The Speech Chain: The Physics and Biology of Spoken Language* by Peter B. Denes and Elliott N. Pinson, copyright © 1993 by W. H. Freeman and Company. Reprinted by permission of Henry Holt and Company, LLC.

Example #1 of a segmental activity: *Steven will demonstrate identification (brain task) of minimal pairs of voiced and voiceless plosives (listening and speaking skill) when given a choice of two words (external factor of closed set) by pointing to the correct word (child action).*

In this activity, we would see the teacher write pairs of words such as pear/bear or pig/big for Steven to see. The teacher says all the words to Steven and has him attempt to say them back, working on getting the words into his personal feedback system. Finally, the teacher says one of the words in the pair, and Steven points to the word she said (see Figure 1.6).

Figure 1.6 Child Discriminates Between Words Starting With /b/ or /p/

SOURCE: Photographed by John Zimmermann.

Example #2 of a segmental activity: *Ariel will demonstrate identification (brain task) of the long vowels i-e and o-e (listening and speaking skill) in single syllable words (external factor of context) when shown three objects (external factor of size of set) by picking the correct object and repeating the word (child action).*

In this lesson the teacher uses toys representing words that have diphthong sounds in them. Sample objects are plastic replicas of a fly, a pie, a rake, a cake, a boat, and a rope. The teacher pulls the toys from a box, goes over the words with the student, and verifies that she understands what to do with each object (such as eat the pie or rake leaves). The teacher sets out one object corresponding to each diphthong in a set of three and then says, “Give me the _____.” If Ariel gives her the correct object, she gets to pretend to be the teacher on the next turn.

Connected Speech

Essential Question #7

Can the child identify critical elements in connected discourse? Can she identify elements in practiced sentences, in conversation, and in connected discourse tracking?

The final level of speech perception where you will do specific auditory development activities is the level of connected speech, or spoken language per se. This is where your language and speech goals will merge most obviously. Connected speech includes words, phrases, sentences, and longer discourse.

Once the child is able to hear the differences among various suprasegmental patterns, and when he has developed a listening repertoire of vowels and consonants in words, we ask him to respond to phrases and sentences. We begin by limiting the number of critical elements he must address. For example, we have the child listen for two critical elements (blue shoe versus red sock) before we have the child listen for three critical elements (big yellow star versus little green heart). A second form of connected speech (i.e., connected language) that we have the child listen to is *practiced* sentences. Examples include songs or poems or very short stories that we have written on chart paper. Although the sentence may include a number of elements, we might ask the child to focus only on a particular phrase or word grouping. For example, we might ask him to recall the last few words of a line of a poem, or we might ask him to remember “fee, fi, fo, fum” when listening to the story of *Jack and the*

Beanstalk. After the child is able to hear messages in practiced sentences, we might ask him to engage in spontaneous conversations where we provide the topic. Finally, we will ask the child to tell us what we said when we have not provided the topic of the conversation.

Connected discourse tracking is a specific teaching strategy that uses storybooks that are on a language level appropriate for the students. At the first level, the teacher reads the story and then asks the child to describe what occurred in the story. At the next level the teacher asks the children to follow along in their books, pointing to the words as they are read. At the highest level of difficulty, the teacher would read a phrase or sentence, then pause and have the child repeat exactly what he heard. This technique can be used to carry over important language goals or speech targets.

Example of a connected speech-language activity: *Cody will demonstrate identification (brain task) of the targeted connected-speech phrases “in a box/tree/car” and so on (listening and speaking skill) from the book Green Eggs and Ham (external factor of closed set) when read by the teacher in a quiet room and one-to-one interaction (external factor of minimal background noise) by completing the target speech phrase (child action).*

In this lesson, Cody and his teacher will have read and discussed the story several times prior to this experience. They will have developed picture charts that represent the concepts “in a house,” “in a box,” “in a car,” “in a tree,” “in the dark,” and “in the rain.” In this lesson the teacher reads the story, and then Cody points to the picture and repeats the phrase when the teacher reads the target phrase.

Speech Perception Categories

A good way to determine the level of perception to begin your listening activities is to use the results of speech perception testing conducted by the audiologist and the results of tests such as the *Early Speech Perception Test* (ESP; Moog & Geers, 1990). These tests help to place children into one of six categories (see Table 1.3). They will give you information both about what the child can do successfully and what you need to focus on as a target or objective.

Perception of connected speech and language is only one side of the coin. We must also carefully examine the normal developmental stages and phases of language itself. Language develops sequentially in the following manner: preverbal communication, preinflected communication, simple sentences, compound sentences, complex sentences, and finally compound-complex sentences.

Parameter 3: External Factors

It is important to carefully control any external factors surrounding the lesson that make it more or less challenging. Note in the model (Figure 1.1) that there is no arrow on this parameter. This is because external factors do not

Table 1.3 Speech Perception Categories

<i>Category</i>	<i>Characteristic</i>
0	No detection of speech
1	Detection
2	Pattern perception
3	Beginning word identification
4	Word identification through vowel recognition
5	Word identification through consonant recognition
6	Open-set word recognition

SOURCES: Cheng, Grant, and Niparko (1999); Geers (1994); Moog and Geers (1990); Staller, Beiter, Brimacombe, Mecklenburg, and Arndt (1991).

occur along a continuum but rather all four are present in some way during any classroom listening task. Many categories of external factors exist that can influence a lesson. The child's current health status is another factor addressed earlier in the chapter but not identified in our model. Illnesses, middle ear problems, and other physical factors will affect the child's ability to perform a task. In this model we have identified only those factors over which the teacher has control that commonly influence the environment in which the lesson is being conducted and the materials being used. It is important that you understand the unique nature of the child with whom you are working so that you may account for other external factors not mentioned here.

In general there are four broad categories of external factors: the background or physical environment in which the lesson is being conducted; the linguistic environment in which the listening or speaking skill is couched; the contextual environment associated with the materials used and actions of the teacher; and the stimulus array. All of these provide the framework that you will establish before you ask the child to apply a brain task to an intended listening and speaking skill. While you work on the different levels of perception and the different skill levels, you also manipulate the context in which a task is set. Listening becomes harder as you increase the brain task and type of skill. It is also harder when the environment, materials, and teacher actions are manipulated as well. When you work on a new skill or a new level, you need to back off on the difficulty of the other components to keep the listening challenge within the child's grasp. For example, if the child is just beginning to listen to the difference between a pattern of three elements and a pattern of two elements, then you would want to have a closed set of options from which to choose rather than leaving the choices open-ended. Tasks should be challenging but not out of reach; comprehensible, but not confusing.

Stimulus Array

Essential Question #8

Is the child able to respond to an open-set stimulus array, or does he need a closed or a limited set? Does the child need to have materials modified?

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One component of the environment you want to control is the *stimulus array*, that is, the material that is sitting in front of the child. We can modify this stimulus by controlling the size of the set. Sets of materials can be open or closed. A *closed set* has a specified number of responses from which to choose. The student is aware that you will say something that relates to one of the pictures or manipulatable objects in front of him or a specific topic under discussion (e.g., zoo animals). For example, if you want the child to listen to one and three syllable differences, you might use the names of students in the class. The child is already familiar with these names and the number of choices is limited. You might say, “Sam” versus “Anthony.” Here, the child is not overly challenged because only a small number of possibilities exist. You can increase and decrease the size of the set to change the level of difficulty of the listening task.

In a *limited set*, the child has natural, situational, or contextual cues that define the set but you have not actually told him what the possible answers are, as is the case with a closed set. For example, when reading a book with a cow and sheep, the child can probably figure out that you aren’t going to say the word “football.” Another example would be a task where all the pictures represent “ch” words but the child does not know the sentence within which you are going to put the word. He has a frame of reference for what you are going to say but does not know the exact words you will choose.

In an *open set* the situational and contextual cues are minimal. The child has no cues as to what you are going to say. When you are doing open-set tasks you can switch topics a lot. For example, you might talk about one topic for two or three conversational turns but then would switch the topic so that the child must be on his toes to listen for what you are saying.

Another way we manipulate the stimulus array is by type of object. Objects can be real (real peaches), three-dimensional (plastic peaches), pictorial (pictures of peaches or drawings of peaches), or representational (as in the spoken word, “peach,” or the written word, **peach**). When children are very new to the listening experience or are very young, they benefit from materials that are more real than virtual or representational.

We can also modify the materials we are using by adapting them in some fashion. Color-coding, making material tactile, categorizing, classifying, reorganizing, graphing, charting, and writing are only some of the ways that teachers manipulate materials to enhance the concepts they are trying to help young children grasp.

Example of a size of set activity: *Cara will demonstrate discrimination (brain task) between two-syllable and three-syllable phrase patterns (listening and speaking skill) when given a closed set of two items in the stimulus array (external factor) by pointing to two or three blocks (child action).*

In this lesson the teacher chooses two- and three-syllable words or phrases with which Cara has had experience. These include the names of stores that she is familiar with such as Target, Wal-Mart, Dairy Queen, or Pizza Hut. The teacher

sets two blocks to Cara's left and three blocks to Cara's right. She shows pictures of the stores and helps Cara count out the number of syllables in their names using the blocks. After doing this for all the store names, the teacher sets out one picture of a two-syllable store name and one of a three-syllable store name. She instructs Cara to push the set of two blocks toward her if the name has two syllables and to push the set of three blocks toward her if the name has three syllables. Next, the teacher takes out two pictures (one with a two-syllable phrase and the other with a three-syllable phrase), covers her mouth with a screen, and says one of the store names. Cara points to the picture and pushes the correct pile of blocks to the teacher and the teacher replaces the blocks. The teacher replaces the picture with another having the same number of syllables. The size of the set is kept at two choices. After the lesson is over, Cara plays with her pile of blocks.

Linguistic Complexity

Essential Question #9

At what linguistic level is this child? What are the key traits of that linguistic level? In what basic level of complexity must I place stimuli: single words or phrases? Can my child respond to stimuli in carrier phrases, and where within the phrase should the stimulus reside? How many elements can the child retain?

Another external factor you must address is the complexity of the language in which you place the stimulus. The easiest level is the single-word level. To make a task a little more challenging, the teacher uses a carrier phrase and asks the student to identify the word at the end of the phrase or sentence. An example would be: "Find the car, find the shoe, or, give me the car, give me the shoe." A more difficult level contains the word in the middle of the sentence such as, "Put the cow in the barn. Put the horse in the barn." In these levels, the child has to listen for only one critical element; that is, the carrier phrase remains the same and the stimulus word is the only thing that changes.

In the next higher level, we increase the number of critical elements the child must listen to, such as "Put the cow/horse/sheep (1) in the wagon/field/barn (2)," so that two critical elements change. After the child masters this, the teacher increases the difficulty by making three things changeable—for example, "Put the brown/black/white (1) cow/horse/sheep (2) in the wagon/field/barn (3)"—then four—for example, "Put the big/little (1) brown/black/white (2) cow/horse/sheep (3) in the wagon/field/barn (4)"—then more. As the number of elements increases, so does the grammatical difficulty. It is important that you become familiar with the grammatical aspects associated with the major stages of grammar: preinflected phrases (e.g., Daddy go bye-bye?), simple sentences, compound sentences, complex sentences, and compound-complex sentences. If your child is not able to understand simple sentences, then do not place a stimulus word within a compound sentence.

Example of a linguistic complexity activity (two critical elements): *Destiny will demonstrate comprehension (brain task) of the meaning of “in” and “on” and a noun (listening and speaking skill) when the teacher identifies locations within the phrase “the _____” (external factor) by placing an object in that location (child action).*

In this lesson we see Destiny and her teacher playing with a Press-and-Peel farm set. The teacher hands Destiny a farm animal piece such as a chicken and makes sure that Destiny knows the locations (“Show me the barn; the house; the coop”). Covering her mouth with a screened hoop, she tells Destiny to put the chicken “in the barn.” Destiny responds appropriately by sticking the chicken to the barn. As a reward, the teacher lets her choose the next farm animal, and they continue the game.

Contextual Cues

Essential Question #10

Does the child need a lot of verbal, visual, pictorial, or situational cues, or does she understand auditory tasks within minimal context?

Another area that you can manipulate to make a task harder or easier is the amount of contextual cues you give. For example, you might start by saying that you are going to talk about the girls in the class. You would follow this by saying, “Sally has a pretty red bow in her hair,” and ask the child to repeat what he heard, or you might have a less specific context such as, “Now we are going to talk about people in school.” You would still talk about Sally and her bow, but you have given a less specific context to the child. You can also take advantage of situational cues. For example, if it is recess time and everyone is getting ready to go out, you might ask the child to listen to and repeat, “Put your coat on.” The child would know from the context that you aren’t going to say, “Go brush your teeth.” Finally, you can use storybooks or pictures as stimuli for listening. These would give the child the context so that if you were looking at a picture of children on a playground, he could predict that you wouldn’t say something like, “My aunt got a new red car.”

Example of a contextual cues activity: *Armel will state (child action implying the brain task of comprehension) the name of an object in a category (listening and speaking skill) when the teacher gives a category such as fruit or toys (external factor of open set).*

Note that the category is a limited set (e.g., category names: fruit, animals, toys, etc.), but Armel must generate an answer. Armel and his class have been studying categories of things around the house. In this activity the teacher has given each child a stack of cards with words such as apple, fish, ball, shirt on them. She covers her mouth and says, “Who has a fruit?” The child with a fruit shows his card and names it (e.g., apple).

Background Noise

Essential Question #11

Is the child able to listen in all levels of noise from quiet to competing messages?

We live in a noisy world, and children need to learn to listen within the context of noise. When a child is first listening, however, we need to make sure that there are no external distractions. If the child is not able to ignore sounds in the environment, you may want to do some initial listening activities in a quiet room. Once the child has achieved a listening goal in quiet, then you can make your lessons a little more challenging by increasing the competing noise. Noise levels are described as quiet (no other sounds), soft ambient noise (a sound-treated room with other activities occurring), normal ambient noise (a regular room with other students in it), loud ambient noise (a room with loud equipment such as an air conditioner in it, or near the gymnasium), and competing noise (such as the cafeteria). To make an activity easier, check to see that you are not competing for the child’s attention with distracting noise in the room. Children live and play in a big world outside of the therapy room or classroom. To make any task harder, increase the amount and type of ambient noise. You can make any of the activities described above harder by turning a radio on softly in the background, or by doing the activity in a different location.

Parameter 4: Child Actions

Essential Question #12

Are the activities you are asking the child to do age and interest appropriate?

One parameter that our model does not depict is the real child who is learning to listen. Whenever this child engages in speech and language tasks in various contexts of difficulty, he is not simply going to sit there passively. He is going to *do* something. Children, or all humans for that matter, have no choice but to engage in some kind of behavior. Therefore, be sure to ask the child to perform age-appropriate behavior.

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Child behavioral tasks associated with each lesson are determined by the age, skill level, cognitive level, and physical challenges facing the child. For example, we would not expect a six-month-old to place plastic objects into appropriate categories. Nor would we ask a visually impaired child to look at two pictures and choose the correct one. This again is something that the teacher must take into consideration when designing an activity. Actions may include, but are by no means limited to pointing, showing, changing, drawing, making, moving, writing, saying, rearranging, dropping, throwing, pushing, jumping over, crawling under, standing beside, rolling, taking, sorting, and hundreds of other real actions. The more enticing the action, the more likely it is that you will maintain the child's interest in what you are doing. Listening is a skill that is used in every aspect of the human experience, not just when we are sitting at a table in front of the teacher. For this reason, make your activities and child actions as real and fun and meaningful as you can.

Finally, we come back full circle to the whole child. In addition to all the factors of spoken language development and all the factors associated with the development of a good lesson, remember, we are dealing with a real person. This little person may come from a home where English is not the spoken language. She may have additional disabilities that limit her ability to use her cognitive, sensory, or motor skills. She may have come to the listening and language learning task later than other children. She may be distractible, tired, hungry, sad, bored, temperamental, or confused. Her parents may differ in their ability to participate in the process. She may have siblings with other, greater needs, which take precedence over her communication development. Never forget that you are working with a special, unique individual.

SUMMARY

This chapter presents 12 sets of essential questions to help organize the parameters for spoken language intervention. The parameters include brain tasks, speech and language skills, external factors, and child actions. The sets of questions are:

1. Does the child hear the sound? Can he detect both the presence and absence of a sound? Does he demonstrate a response to a stimulus? Can he detect a range of sounds? Have you established a conditioned play response? Is there evidence of a spontaneous alerting response?
2. Discrimination is mostly used as a remedial tool for speech perception activities, but before we can do this, we need to answer several questions. Does the child indicate in some way that he knows two sounds are the same or different? Does he indicate that he is listening for differences among sounds? Can he respond differently to different sounds?
3. Can the child apply a label to a speech stimulus by copying what was said or pointing to an object, picture, or word?
4. Can the child make higher-level associations between sounds and events or objects? Does he understand the meaning of what you are saying? Can he answer questions appropriately? Can he follow directions?

5. Does the child demonstrate that he hears the differences among patterns of sound that are comprised of differing durational, stress, intonational, or phrasing elements?
6. When helping a child listen to the differences between vowels and consonants, are you providing a sufficiently noticeable difference by working between vowel or consonant categories before working within vowel or consonant categories?
7. Can the child identify critical elements in connected discourse? Can she identify elements in practiced sentences, in conversation, and in connected discourse tracking?
8. Is the child able to respond to an open-set stimulus array, or does he need a closed or a limited set? Does the child need to have materials modified?
9. At what linguistic level is this child? What are the key traits of that linguistic level? In what basic level of complexity must I place stimuli: single words or phrases? Can my child respond to stimuli in carrier phrases, and where within the phrase should the stimulus reside? How many elements can the child retain?
10. Does the child need a lot of verbal, visual, pictorial, or situational cues, or does she understand auditory tasks within minimal context?
11. Is the child able to listen in all levels of noise from quiet to competing messages?
12. Are the activities you are asking the child to do age and interest appropriate?

Keep these questions in mind as you read through the intervention chapters, which focus on planning and conducting appropriate activities to help children listen to and use spoken language.