

Special Forum on Phonology



Evaluating Articulation and Phonological Disorders When the Clock Is Running

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The clinical evaluation of communication is a key element in the therapeutic process. This paper describes an approach to an initial clinical evaluation of a preschool-aged child referred to a clinic for problems in communication. Topics addressed in the evaluation include: What is the purpose of the evaluation? In which setting should the evaluation be held? What aspects of the client's background may contribute to his or her possible communication disorder? How are speech and language assessed in only 60 to 90 minutes? How is hearing assessed? What information should be conveyed to the client's

family? The author's general approach to clinical evaluation emphasizes the importance of nonstandardized assessment procedures for obtaining the case history and for collecting and analyzing speech and language samples. The author focuses on linguistic-motor aspects of articulation and phonology disorders and emphasizes the importance of evaluating both the child's major speech errors as well as his or her better speech-making abilities.

Key Words: assessment, phonology, phonological disorders, speech disorders

A clinical evaluation involves making a series of decisions, including answering the following questions:

1. What is the purpose of the evaluation?
2. In which setting should the evaluation be held?
3. What aspects of the client's background may contribute to his or her possible communication disorder?
4. How do I assess each area of speech and language in only 60 to 90 minutes?
5. How do I assess hearing?
6. What information should I convey to the client's family?

Purpose of the Evaluation

The referral indicates that Bobby's communication disorder lies in the area of articulation and phonology. Because the time for the evaluation is short, it is tempting to follow the lead of the referral source and to focus the diagnostic efforts solely on the supposed area of deficit. I have learned to resist this temptation, because a problem in speech may sometimes be just the first signal of a larger, more encompassing developmental difficulty. For example, suppose a 4-year-old child experiences difficulty pronouncing word initial [f]. Is this the full extent of the child's communication problem, or is it only the first signal of a communication disorder that may also include

language reception problems—and may in the future include reading and spelling difficulties? Because speech is an early developing communication system, it is often the first manifestation of more pervasive problems that may appear in the future. For the sake of caution, then, other areas of communication must also be assessed even though the problem seems to be in the area of articulation and phonology.

The need to assess more areas than articulation and phonology shapes what I hope to accomplish in an initial evaluation. Sixty to 90 minutes usually is not enough time to completely understand the nature of an articulation and phonology problem even when no other areas of communication are being assessed. In fact, it becomes impossibly short when in the same time frame the evaluator must also assess language reception and expression, voice, fluency, hearing, and the oral mechanism. Rather than attempting (and most times failing) to completely understand the nature of the communication deficit, a more reasonable goal is to determine if Bobby has a communication problem sufficient to warrant therapy and if so, to learn something about the general nature of the problem. This leaves a more complete understanding of the communication deficit to a later date, perhaps concurrent with and as part of therapy. For example, I will undertake phonological awareness testing during a session early in therapy if I discover during today's evaluation that Bobby has a communication disorder (Bird, Bishop, & Freeman, 1995).

Setting

The next clinical decision is where to hold the evaluation. If the evaluation is undertaken in a preschool setting or in Bobby's home, I can obtain a better representation of his typical performance. However, many distractions exist in such settings, and time is short. Also, preschools and homes differ, and standardized tests typically require administration in a standard environment. Both for reasons of standardization and time, I select a quiet therapy room, and will rely on parent and teacher reports, if they exist, to obtain insights into Bobby's performance in more typical settings. The therapy room I select is large enough to be comfortable for the parent, the child, and me, and it is relatively bare and sparsely furnished. I keep the room simple and clean, knowing that otherwise the child may decide he'd rather interact with the toys than with me.

Background Information

The first thing I do when Bobby and his parent (his mother, let's suppose) enter the evaluation room is introduce myself. If Bobby appears uneasy, I ask him if he likes to play. This is a trick question, of course (after all, what child DOESN'T like to play?), but children usually answer, yes, they like to play, and then I show them some toys I have left out for that purpose. Of course, if I suspected Bobby was non-compliant rather than uneasy, I would skip this question to avoid giving the child a chance to say, no, he doesn't like to play.

As Bobby settles in, I sit with his mother. The first question I ask is usually either, "How can I help you today?" or "What brings you in today?" I begin with this question to better understand the reason for the visit and to determine what the family wants me to accomplish. Along with this question, I double-check the referral source early in the interview by asking the parent to describe the nature of the child's communication difficulty.

My next step is the parent interview. In addition to helping me understand how Bobby's background and living situation might affect his communication development, performing the interview early in the session gives Bobby a chance to check me out and to become more comfortable with the evaluation setting. It also gives me an opportunity to observe Bobby, obtain a general idea of his intelligibility (if he speaks), and observe how he interacts with his mother.

Many clinics use standard case history forms, which certainly have value. I like to ask the parents questions in person in addition to any forms they have submitted. Many times I learn as much observing how a person responds to a question as I do from the response itself. If the parent has already completed a case history form, I tell them that although they have already answered some of the questions I will ask, hearing them answer some of these questions in their own words will help to make sure we have the right picture.

The topics I address fall within four general categories: communication development, birth/medical history, social development, and educational history. I don't address the topics in any set order, but for convenience I usually ask all the questions within a single topic before going on to the

next. I don't treat the division of questions as dogma, though. If I forget to ask a medical question when I am asking the medical questions, for example, I simply go back and ask it later.

A clinician could ask literally thousands of questions about a potential client's communication, birth/medical, social, and educational histories. Given the severe time limits, it is better to avoid "fishing" and focus instead on those questions that assess topics known to influence communication development. In addition to asking questions directly pertinent to communication, it is important to ask questions that parents are able to answer. For instance, I usually don't ask, "Does your child understand what you say?" because almost all parents will tell you they do, even for children in the second year of life, when we know many children don't understand everything said to them. Sample questions for all four areas appear in Table 1.

Communication History

These questions are to determine if Bobby has displayed evidence of communication delay in the attainment of major communication milestones. The primary questions I ask are at what age did the child (a) babble? (b) say his first three different words? (c) combine words into two and three word sentences on a regular basis? and (d) speak in short sentences, though some of the words might be missing? I ask about babbling because research indicates it is important for later speech and language development (Locke, 1993). Similarly, the second question addresses an important, often well-remembered milestone in the development of expressive vocabulary, while the third and fourth question focus on significant, often recalled milestones in the development of syntax (Bates & Goodman, 1997; Brown, 1973; Paul & Jennings, 1992).

Birth/Medical History

The questions in the birth/medical history are designed to discover any medical factors that might have affected communication development. For the birth history, I ask if there were any complications during the pregnancy or delivery. I also ask if the baby was born full-term, and how long mother and child were in the hospital after the child was born. The latter question gives me a sense of whether there were medical difficulties sufficiently great to require extended hospitalization. A stay of more than 2 or 3 days may signal an area that needs to be explored in more depth.

Also in this section of the evaluation, I ask if the child has ever been hospitalized, which tells me if there have been any serious health problems. I also ask if the child has had any ear infections, and, if so, how many, because we have data that indicates a connection between middle ear problems and language development. Because medications and a wide range of medical conditions affect communication development, I ask if Bobby has formerly been on or is currently on any medications other than antibiotics, and if he has any identified syndromes or medical conditions. Lastly, I ask if the child is currently healthy. Once I forgot to ask this last question and found out during the evalua-

TABLE 1. Topics and questions in the client's history.

General Topic	Specific Questions
Communication	When did the child babble on a regular basis? When did the child first speak three different words? What were they? When did the child start saying two and three word sentences on a regular basis? When did the child begin to speak in sentences, even though some of the words in the sentence may have been missing?
Birth/Medical	Were there any complications during the pregnancy? Was the baby full-term? How long did the baby remain in the hospital after delivery? Does the child have any diagnosed medical conditions? Does the child take medications on a regular basis? Has the child ever been hospitalized? Has the child ever had an ear infection? How is the child's present health?
Social	Who are the members of the child's family? Who are the main people with whom the child interacts?
Education	Has the child ever attended any type of day care or preschool? Did he or she receive any special services? Is the child currently enrolled in any educational program? Does he or she receive any special services?

tion that the child's speech contained a pattern that replaced nasal stops with oral equivalents, only to discover later that the child had a cold. I also caught the child's cold, which emphasized to me the need to ask this question as well as reminding me to follow universal health care precautions a little more diligently.

Social History

The purpose of asking about the social history is to determine if Bobby has had opportunities to communicate and if he resides within an environment sufficiently stable to foster healthy communication development. The question is one of stability rather than of composition. A stable environment can be maintained by many different compositions of people, a mother and father, grandparents, same-gender couples, or single parents. Questions I might include are: Who in the immediate family does Bobby interact with regularly? Does he play with children outside the immediate family? How many times a week? Depending on the results of the medical part of the interview, I might also ask if the child has ever been hospitalized for any lengthy periods of time in the past. Hospitals, while good places to recover physically, are not ideally suited to a child's social and communication needs. Due to the busy schedules of the hospital staff, a child is often required to communicate on someone else's schedule rather than when the child has something to say. This type of social isolation may result in later behavior problems as well as delays in communication development (Fridy & Lemanek, 1993).

Education History

The goal in obtaining an education history is to discover if Bobby has received formal schooling, including special services. I am particularly interested in discovering if he is in school, and if he has received special services in the past or is receiving them at the present time. Both types of information may give valuable insights into Bobby's communication development, or, at the least, keep me from making recommendations for services that he may already be receiving. Sometimes, a parent will say that the child is receiving special services, but they wish for me to perform an evaluation as a second opinion, without seeing other reports. Asking for a second opinion is within a parent's rights and, in such cases, I follow the parent's request not to view previous reports or to make contact with Bobby's clinicians.

Assessment of Speech and Language

Sometime during or after obtaining the case history, I let the parent know what I'll be doing during the session. This is my chance to reiterate the parent's concerns, and let her know that I will be testing to get a better idea about her child's communication. I also let her know that how her child does in this room is only important to the extent that it reflects his typical performance. So, if she sees something either unusual or very typical of Bobby's usual performance, she should let me know. I also ask if she prefers to stay in the room or to leave. Some children do better with their mother present, others with her gone. If Bobby is in preschool, it is likely he will do fine without her. Even so, if

Bobby seems to become uncomfortable, begins to have behavioral problems, or simply requests to have his mother present, I will likely invite Mom back into the room.

I assume for this evaluation that Bobby attends preschool and that his mother leaves the room after the parent interview. Since Bobby is in preschool, I can use his familiarity with a school setting to organize the session. I tell him that we'll work and play today, and that the table is for working and the floor is for playing. I add that he's played a bit while I talked with his mother, and now we'll do a little school work at the table. I ask him if he likes pictures (another trick question, since I've yet to meet a child who doesn't like pictures), and ask him to sit at the table so I can show him a book of fun pictures.

I typically begin this phase of the evaluation with the Peabody Picture Vocabulary Test-III (Dunn & Dunn, 1997). This is an extremely valuable test for children who are appropriate for the norms, since it is moderately correlated with verbal intelligence and also because of the central role of vocabulary in language learning. The PPVT-III, being a receptive test, does not require verbal responses from Bobby, which allows him a little more time to become relaxed with me before having to speak.

Of course, in addition to being a valuable test, the PPVT-III can also be a rather boring one. For this reason, after completing the test, I quietly assess the child's attention and, most often, I ask the child if he or she would like a little play break. We take the break on the floor "play area."

While Bobby plays, I work. At first, the work mostly consists of listening. As I listen, I ask myself what percentage of his speech I am able to understand in spontaneous conversation. What errors am I hearing? How does his voice sound—Typical? Hoarse? Too high or low pitched? How is his fluency? If I hear disfluencies, do they appear appropriate to his age? Are there any secondary characteristics? I make these judgments based on clinical intuition and experience. I use this approach in the interest of time. For example, although there are several good procedures to measure intelligibility, time does not permit such assessments in an initial evaluation in which all other areas of communication are assessed as well. For similar reasons, I do not perform computer analyses of speech samples. After the appropriate software has been developed which allows computers to recognize handwritten phonetic transcriptions, such analyses may become feasible in typical clinical settings and would allow clinicians to bypass the labor intensive step of copying or reading a hand written transcription into a typed format for a computer program to analyze.

While I listen, I also begin to write down sentences Bobby makes as he plays and as we chat. I don't have time to obtain a 50-utterance speech sample for all the children I evaluate. However, if I begin to note a large number of difficulties with expressive language, I shift the evaluation to focus on that domain. For such children I obtain a 50-utterance sample, either during the initial evaluation or some later time, typically concomitant with therapy.

For the purposes of this evaluation, I assume that during the play session I determine that Bobby's speech is approximately 50% intelligible in spontaneous connected

speech, that his speech contains a number of errors, and that his expressive language, fluency, and voice appear appropriate for his age. Based on these results, I shift the focus of the evaluation to articulation and phonology. After approximately 5 minutes, I say play time is over and tell Bobby that it is time to come to the table to do more schoolwork. We clean up and return to the table

Assessment of Articulation and Phonology

The extent to which the evaluation of articulation and phonology is guided by the clinician's theoretical assumptions is amazing. As the papers in this forum suggest, differences in theoretical assumptions often result in very different types of articulation and phonological assessments. My conception is that for most children near Bobby's developmental and chronological age, the cause of articulation and phonological problems lies in the linguistic-motor domain. That is, I think the most likely reason for Bobby's articulation and phonological problem is that he cannot "shape his mouth" to make the sounds, syllables, and stress patterns of the language (Bleile, 1995). Within this perspective, therapy activities such as distinguishing perceptually between minimal pairs, identifying pronunciation errors in words in stories, as well as old-fashioned discrimination training, have value, not because Bobby cannot hear the difference between sounds, but because they help him focus attention on differences between sounds that he already perceives (Bleile, 1995).

Having a linguistic-motor view of articulation and phonological disorders, I focus the articulation and phonological section of the evaluation on Bobby's production abilities. Even with a focus on production, I recognize that I have no hope of understanding everything about Bobby's articulation and phonological difficulties within the time constraints of an initial evaluation. From the case history I have already determined the family's conception of Bobby's possible communication difficulties. From the "play time," I already have a good idea regarding Bobby's level of intelligibility and a list of his major speech errors. My goal for the articulation and phonological portion of the assessment of the evaluation is twofold: (a) to determine if Bobby's articulation and phonological development is appropriate compared to his peers, and (b) to decide on possible treatment targets, should therapy be indicated. Given the time pressures, this portion of the evaluation is likely to last 10 to 15 minutes.

Major Speech Errors

The purpose of this part of the evaluation is to make certain that I have identified Bobby's most prominent speech errors. The goal of the exploration is to help decide if therapy is warranted and to begin to identify possible treatment targets. To accomplish these interrelated goals, I typically use pictures from a standardized test, and then compare the results to normative data (Bleile, 1995; Smit et al., 1990). Only rarely do I administer an entire normative test, because such instruments can be lengthy and contain many items that I do not need to test. To illustrate,

a standardized test may contain a hundred or more items, many of which (in an appropriate desire for completeness) test early acquired sounds and others beyond what I might expect given the child's level of development. For example, testing the oral stops ([p b t d k g]) in three word positions requires eighteen items. Completing these items for a child whose speech difficulty may lie with consonant clusters or late acquired fricatives, for example, requires time that I do not have in a busy evaluation. Further, a standardized test, because it typically attempts to capture a child's performance across a wide array of sounds, may not probe any individual sound in sufficient depth for clinical purposes.

To avoid such lengthy testing, I focus on those errors that seem likely to have clinical significance. A 4-year-old child is likely to pronounce many linguistic units in error, only some of which have clinical significance. To illustrate, partial devoicing of syllable final obstruents is a common casual speech phenomenon in both children and adults and, as such, is an extremely unlikely therapy target. Likely candidates for clinical importance are errors that affect sounds with high frequencies of occurrence, early developing sounds, sounds containing errors sufficiently unusual to draw attention to the child's speech, and sounds in words that are important to the child or his family (Bleile, 1995).

To confirm that I heard the error correctly during play, I use the appropriate pictures from a standardized test. The resulting information is then used to compare the child's performance to developmental age norms, which could be useful in justifying the need for therapy. For example, using this procedure I might discover Bobby was unable to pronounce a certain word initially. In the report I would indicate that Bobby was unable to pronounce the sound word initially to picture stimuli, a task that children are typically able to accomplish at a certain year and month of age

Better Abilities

The major goal of this section of the evaluation is to help select treatment targets from among Bobby's major speech errors. To accomplish this, I determine if Bobby ever shows a better ability to pronounce those sounds and sound patterns he normally pronounces in error than he typically demonstrates in casual speech. That is, does

Bobby have any capacity to correctly pronounce sounds and sound patterns that he typically pronounces in error? While any error could be a suitable target for therapy, children typically experience less frustration when the target is an error that they have at least some capacity to pronounce. All other things being equal, since most preschoolers are remarkable for a low frustration point in the face of clinic failure, I often select therapy targets for which a client shows some production capacity.

In the interest of conserving time, I restrict probes of better abilities to those errors that are likely to have clinical significance. Typically, I probe for better abilities at the word level. The advantages of the word level is that a child Bobby's age typically understands the concept of word (which allows the clinician to discuss words with Bobby during therapy), the phonetic complexity of words can be manipulated (which allows the therapy lesson to be focused on specific targets while controlling the phonetic complexity of the rest of the word), and words are used both inside and outside of therapy (which may facilitate generalization of treatment targets to other settings). However, seeking better abilities at the word level is more a preference than an absolute rule. If Bobby's attention and motivation seems sufficient for the task, I would likely probe for better abilities at the levels of the syllable and isolated sound. Alternately, if Bobby's difficulty seems to involve combining words together, I would likely probe for better abilities in short phrases.

The methods I use to assess a child's production capacity are listed and defined in Table 2. These methods include imitation, key positions, key words, and phonetic placement and shaping. The methods are listed in the order in which they typically are performed. However, nothing precludes changing the order or using one method in exclusion of the others. To illustrate the general procedure, if Bobby produced [s] incorrectly, I might ask him to repeat words in error immediately after me (imitation) (Powell & Miccio, 1996). For example, if Bobby pronounced *sea* as [ti], during imitation, I might say, "Repeat after me. *Sea*." If he says the sound correctly during imitation, I place a check, star, or arrow next to it.

The same basic procedure is followed for the other possible treatment targets: probe, followed by a check or some other sign to indicate whether or not the probe was successful. Next, I might probe for key positions by asking Bobby to say [s] in phonetic contexts that facilitate some

TABLE 2. Assessment of better abilities.

Types of Better Abilities	Definition
<i>Imitation</i>	The ability to say a phonological unit correctly during delayed or immediate imitation.
<i>Key Environment</i>	A phonetic environment in which a person successfully pronounces a phonological unit.
<i>Key Word</i>	A word or a limited number of words in which a person successfully pronounces a phonological unit.
<i>Phonetic placement and shaping</i>	Techniques that physically direct a person to pronounce a phonological unit.

children (see Appendix). For example, for some children [s] is facilitated in word and syllable initial position before a high front vowel, or in word and syllable final position after either a vowel or [t]. For this part of the testing, I might say to Bobby, "I'm going to say some words. Some will be real words and some will be silly words. You say the words after me. *Oats*. Now you say it."

After that, I might probe for key words that contain sounds that Bobby typically produces in error. To continue the [s] example, if Bobby's sister is named *Sue*, I might ask to repeat his sister's name. Similarly, if Bobby likes comics, to probe for word-initial [s] I might ask him to say *Superman*. Additionally, I might scrutinize my transcriptions for any words with correctly pronounced word-initial [s], and I might ask Bobby's mother later in the evaluation if Bobby ever says words beginning with the [s] sound in any words, including the names of other family members, favorite toys and foods, and so forth. Lastly, I would not likely attempt phonetic placement and shaping exercises for a child of Bobby's age.

After completing these probes, I perform a short examination of the oral mechanism. Because the speech mechanism is highly flexible and adaptable, only gross abnormalities interfere with speech production. I focus the oral mechanism examination on discovering if any such exist. I begin by letting Bobby know that I want to look in his mouth. I examine his face, looking for any asymmetries, and then, wearing gloves, briefly examine Bobby's oral and nasal cavities following simple guidelines (Bleile, 1995). The initial oral mechanism examination typically requires several minutes to complete.

Hearing

After completing the oral mechanism examination, Bobby would be sent to audiology for a hearing screening. This typically requires 10 to 15 minutes. This is my chance to review the parent interview, score the PPVT-III, look over my transcriptions, and, in general, organize my thinking. If I find I still have some evaluation questions that need to be answered, I might do further testing after Bobby returns from audiology. If not, I will meet with Bobby's mother again to convey the evaluation results.

Conveying the Results

After completing the testing, I ask Bobby's mother to return to the evaluation room so I can convey the evaluation results to her. I have Bobby wait elsewhere under the careful eye of a clinician or experienced office staff. Information in the discussion with Bobby's mother includes diagnosis (including a subjective determination of level of severity), short- and long-term prognosis, recommendation on whether or not to offer therapy, and any suggestions for the family, when appropriate.

I begin the discussion by reiterating the parents' reason for seeking the evaluation. I explain that a report will be written describing the results of the evaluation, but that I also want to let her know in person. I then present the findings and attempt to answer any questions that might

arise. After I feel Bobby's mother understands the diagnosis, I present the short and long-term prognoses for improvement. In my clinical experience, the best predictors for both short- and long-term gains in articulation and phonological development are family support, availability of services, good motivation and attention on the part of the child, and the presence of the treatment target in the child's phonetic repertoire. Naturally, a child with better cognitive abilities and with less severe articulation and phonological problems is likely to make quicker treatment gains than one with less cognitive capacity and more severe involvement. As part of this discussion of prognosis, I indicate that children with articulation and phonological disorders are at risk for problems in reading and spelling.

Parents rarely ask (though they probably should, given the time and expense of therapy) which therapeutic approach promotes the best prognosis for short- and long-term outcomes. The good news is that a wide variety of approaches have been found to promote good short- and long-term outcomes in articulation and phonology. Studies support the efficacy of a variety of "traditional," generative, distinctive feature, and phonological process approaches (Compton, 1975; Gierut, 1989; McReynolds and Bennett, 1972; Van Riper, 1978). The bad news is that it is difficult at present to decide which approach is "best" for an individual client. Further, virtually all existing efficacy studies are based on subjects without cognitive and other developmental impairments, which limits the populations to which the results can be generalized. Great need exists for efficacy studies focusing on articulation and phonological disorders that contrast specific approaches as well as studies whose subjects include children with developmental impairments.

Many times parents ask if there is anything they can do at home or while waiting for their child to start therapy. In such cases, I offer simple suggestions for parents to use at home. Lastly, I ask if there are questions and let Bobby's mother know that sometimes questions come up after going home or, even later, after reading the report. I explain that if that happens, she should feel free to call me.

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Appendix

Likely Bets for Key Environments

Word-Initial Consonants

1. A best bet for word-initial consonants is a two-word phrase in which the first word ends with a consonant and the second word begins with a vowel, as in **it is**. In this context, the final consonant of the first word tends to “migrate” to the beginning of the next word, as in the pronunciation of **it is** as **i tis**.

Voicing

1. A best bet for voiced consonants is before a vowel, as in **bee**.
2. Another best bet for voiced consonants (especially voiced fricatives) is between vowels, as in **diver**.
3. A best bet for voiceless consonants is at the end of a syllable or word, as in **bit**.

Velar Consonants

1. A best bet for velar consonants is at the end of a syllable or word, as in **peak**.
2. Another best bet for velar consonants is before back vowels in the same syllable, as in **go**.
3. Another best bet for velar consonants is when another velar consonant occurs in the same syllable, as in **king**.

Alveolar Consonants

1. A best bet for alveolar consonants is before front vowels in the same syllable, as in **tea**.

Nasal Consonants

1. A best bet for nasal consonants is before a low vowel, as in **mad**.

“s”

1. A best bet for “s” is after [t], as in the nonsense syllable **[tsi]**.
2. Other best bets for [s] are before [i], as in **see**, and in syllable and word final position after a vowel, as in **bus**.