Virtually every book on articulatory-phonological disorders contains a brief discussion of phonetic transcription. In such a section, the symbols and diacritics of the International Phonetic Alphabet are listed together with a comment on the importance of accurate transcription for the assessment procedure. This underplays its importance, however; accurate transcription forms the basis for the diagnosis of articulatory-phonological impairments. If clinicians cannot correctly identify and transcribe the productions of their clients, their therapy will not be as goal directed as it should be.

Nevertheless, in training and in clinical practice, phonetic transcription seems to be one of the most neglected areas of study. Although transcription skills are as indispensable as they are difficult to master, the chance to learn them is often limited to one undergraduate course. This meager knowledge base is seldom systematically expanded or revisited in other courses or in most clinical experiences. Many practicing clinicians simply do not feel comfortable with phonetic transcription and therefore, unfortunately, use it as infrequently as possible.

Phonetic transcription is more than just transposing perceived sounds into “strange” symbols; it is above all a process of fine-tuning one’s auditory perception for the purpose of...
CHAPTER 3

successful clinical intervention. Perceptual skills improve with systematic efforts to listen carefully to, and to differentiate accurately between, subtle changes in sound quality. Although this is not a workbook on phonetic transcription (this section does not offer nearly enough information for such a course), phonetic transcription will be emphasized and treated in considerably more detail than is usually the case in textbooks on articulatory-phonological disorders.

The first goal of this chapter is to introduce the International Phonetic Alphabet as the notational system used to document norm productions of vowels and consonants of General American English. However, the transcription of disordered speech requires more than that. It needs additional signs, diacritical marks, that can be added to basic transcription symbols to indicate aberrant sound values. They provide a means of documenting irregular articulatory events. Therefore, this chapter’s second goal is to present and discuss some of the more common diacritical markers. Clinical comments are included to exemplify the use of these diacritics. The third goal of this chapter is to examine the clinical implications of phonetic transcription, including the use of diacritics. Examples are provided to demonstrate how phonetic transcription can be used in the assessment process. Familiarity with, and the proper use of, phonetic transcription is seen as an invaluable tool for the diagnosis and treatment of articulatory-phonological impairments.

PHONETIC TRANSCRIPTION
AS A NOTATIONAL SYSTEM

Speech is a fleeting event, existing for only the shortest period of time—so short, in fact, that if we don’t employ artificial means to preserve speech, we couldn’t prove that it had ever existed, even immediately after the event. Historically, all writing systems were invented to make speech events last longer, to preserve them.

Traditional writing systems do a great job in preserving what has been said, but they fall grossly short in indicating how it has been said, even though this can be just as important. For example, a speech pathologist needs to document the details of a child’s aberrant sound realization. There are no letters in our alphabet for laterally produced s-sounds, for instance. Professionals clearly need more information about how a specific speech event has been executed than about what has been said. For these special purposes, all traditional writing systems are useless. Special ones had to be invented to serve these needs. Phonetic transcription systems were devised in order to document real actualizations of speech events.

Today, the frequently revised International Phonetic Alphabet (IPA) is probably the most widely accepted transcription system in the world (see Figure 3.1). The International Phonetic Association, founded in 1886, published the first IPA in 1888. The International Phonetic Alphabet offers a one-to-one correspondence between phoneme realizations and sound symbols. However, at the same time, many additional signs can be used to identify modifications in the original production. Generally, the IPA serves the professional interests of speech-language pathologists well. Its symbols capture much of what we are interested in. Occasionally, one may be forced to add to the inventory of available symbols in order to characterize an aberrant production. That, though, is to be expected, because phonetic transcription systems are typically designed to transfer standard (but highly impermanent) speech events adequately into (more durable) readable signs. In aberrant speech, just about anything can happen, and this may well necessitate additional characters for un-
**CONSONANTS (PULMONIC)**

<table>
<thead>
<tr>
<th>Plosive</th>
<th>Bilabial</th>
<th>Labiodental</th>
<th>Dental</th>
<th>Alveolar</th>
<th>Postalveolar</th>
<th>Retracted Palatal</th>
<th>Palatal</th>
<th>Velar</th>
<th>Uvular</th>
<th>Pharyngeal</th>
<th>Glottal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plosive</td>
<td>p b</td>
<td>t d</td>
<td>t q</td>
<td>c j</td>
<td>k g</td>
<td>q g</td>
<td>?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nasal</td>
<td>m m</td>
<td>n n</td>
<td>n η</td>
<td>n η</td>
<td>N</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trilled</td>
<td>B B</td>
<td>t r</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tapped</td>
<td>f f</td>
<td>t r</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plosive</td>
<td>φ β</td>
<td>f v</td>
<td>θ δ</td>
<td>s ι j</td>
<td>x y h</td>
<td>s ι j</td>
<td>θ δ</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lateral fricative</td>
<td>f f</td>
<td>t r</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approximant</td>
<td>u</td>
<td>ility</td>
<td>ility</td>
<td>ility</td>
<td>ility</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lateral approximant</td>
<td>l</td>
<td>ility</td>
<td>ility</td>
<td>ility</td>
<td>ility</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Where symbols appear in pairs, the one to the right represents a voiced consonant. Shaded areas denote articulations judged impossible.

**CONSONANTS (NON-PULMONIC)**

<table>
<thead>
<tr>
<th>Clicks</th>
<th>Voiced implosives</th>
<th>Ejectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bilabial</td>
<td>b b</td>
<td>p p</td>
</tr>
<tr>
<td>Dental</td>
<td>d d</td>
<td>t t</td>
</tr>
<tr>
<td>Alveolar</td>
<td>s s</td>
<td>l l</td>
</tr>
<tr>
<td>Postalveolar</td>
<td>? ?</td>
<td>? ?</td>
</tr>
</tbody>
</table>

**VOWELS**

<table>
<thead>
<tr>
<th>Front</th>
<th>Central</th>
<th>Back</th>
</tr>
</thead>
<tbody>
<tr>
<td>Close</td>
<td>j i u w</td>
<td></td>
</tr>
<tr>
<td>Close-mid</td>
<td>e ø ö e</td>
<td></td>
</tr>
<tr>
<td>Open-mid</td>
<td>æ æ æ æ</td>
<td></td>
</tr>
<tr>
<td>Open</td>
<td>æ æ æ æ</td>
<td></td>
</tr>
</tbody>
</table>

Where symbols appear in pairs, the one to the right represents a rounded vowel.

**OTHER SYMBOLS**

- M Voiceless labial-velar fricative
- W Voiced labial-velar approximant
- Q Voiced labial-palatal approximant
- H Voiceless epiglottal fricative
- X Voiceless epiglottal fricative
- Epiglottal plosive

**DIACRITICS**

Diacritics may be placed above a symbol with a descender, e.g. j

**SUPRASEGMENTS**

- Primary stress
- Secondary stress
- Long
- Half-long
- Extra-short
- Minor (foot) group
- Major (intonation) group
- Syllable break
- Linking (absence of a break)

**TONES AND WORD ACCENTS**

- Extra high
- High
- Mid
- Low
- Extra low
- Rising
- Falling
- Downton
- Global rise
- Global fall

---

**Figure 3.1** The International Phonetic Alphabet (revised to 2005). Copyright 2005 by the International Phonetic Association.

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usual articulatory events. If such an additional characterization becomes necessary, the specific phonetic value of any added sign must, of course, be described precisely and in detail. If other professionals cannot reliably "read" the transcribed materials, they cannot accurately retransform the symbols into the original phonetic events; that is, they still won’t know how the sound was actualized. Under such circumstances, any phonetic transcription becomes pointless.

Phonetic transcription is a purely descriptive enterprise. It is nothing but the “spelling out” of an actual speech event by means of special symbols invented to represent the sounds of the utterance in question.

Occasionally, beginning transcription materials consist of lists of orthographically presented words (book, table, snail, and so on) that students then have to transfer into phonetic symbols. Such a practice can be misleading. It supports the mistaken notion that there is a prescriptive part to phonetic transcription, that it provides some guiding principle about how words are supposed to be pronounced. This is also suggested by dictionaries: Each entry tells the reader how to spell a word correctly, and the following symbols indicate how the word “should be” pronounced. There is, of course, nothing wrong with spelling out how words are commonly pronounced, but any jump from how they are pronounced to how they should be and are pronounced has nothing to do with the idea behind, and practice of, phonetic transcription.

**WHY USE PHONETIC TRANSCRIPTION?**

Accurate phonetic transcription is an indispensable clinical tool for speech-language pathologists. That is why it has to be taken so seriously, especially when dealing with the assessment and remediation of impaired articulation and phonology. Without a reliable record of how a child or adult realized a particular speech sound, we simply do not have enough information for goal-directed intervention. Phonetic transcription provides a reasonably accurate written record of what was said and what it sounded like.

Admittedly, phonetic transcription is somewhat troublesome and time consuming. In addition, it certainly has its own problems. Some rules have to be strictly observed in order to overcome these problems. The first thing any aspiring transcriber has to understand is that the human ear is not a microphone. We are unable to receive only; we must always perceive; that is, people automatically judge and interpret incoming acoustic signals based on their experience with those signals. In respect to spoken language, this means that when listening to the incoming acoustic signal, the listener unwillingly “distorts” it in the direction of former experiences, including how the listener would have produced it. This “built-in” tendency is the greatest danger to any serious transcription effort. Any higher degree of accuracy achieved while listening to and then describing the how of its production is very difficult to attain if perceptual biases rule transcription efforts. To overcome the tendency to “interpret” what was heard requires considerable goodwill, patience, and special training.

There are several other problems that must be considered when using phonetic transcription. For example, many circumstances can affect our transcription, such as the age of the client or an unusual vocal quality. Other factors may produce large variations in the inter- and intra-judge reliability of transcriptions, including the intelligibility of the client.
(Shriberg and Lof, 1991), the position of the sound in the word (Philips and Bzoch, 1969; Shriberg and Lof, 1991), and whether narrow or broad transcription is used (Shriberg and Lof, 1991). Shriberg and Kent (2003) provide an excellent overview of the sources of variation and the factors that affect the reliability of phonetic transcription. These problems are very real, and caution must be exercised when using phonetic transcription. On the other hand, we cannot simply disregard transcription because of its inherent problems or use a private system of noting sound realizations. Instead, the importance of developing good, reliable transcription skills should be stressed. They will prove to be an invaluable resource in the assessment and treatment of articulatory-phonological disorders.

**Diacritics**

Diacritics are marks added to sound transcription symbols in order to give them a particular phonetic value. The set of basic phonetic transcription symbols represents language-specific typical productions. Because speech-language pathologists deal mostly with aberrant articulatory events, it follows that diacritical markers are of special importance when characterizing the speech of their clients. Diacritics are needed to note the clients’ deviant sound qualities.

Numerous diacritics are noted in Figure 3.1. Although these diacritics have functioned fairly effectively, extensions to the IPA (extIPA) were diacritics developed specifically to address the transcription of disordered speech. The extIPA symbols, first published in 1990, were revised in 1997. Figure 3.2 is a list of the extIPA symbols. The following discussion on diacritics includes only those frequently used by clinicians. Readers should refer to Figures 3.1 and 3.2 for special transcription needs as they develop.

**Diacritics Used with Consonants**

*Changes in Place of Articulation for Consonants.* These symbols describe deviations from normal tongue placement for consonants.

**Dentalization.** Dentalization refers to an articulatory variation in which the tongue approaches the upper incisors. It is marked by [ˌ] placed under the IPA symbol. For example, the symbol [d] stands for a coronal-alveolar voiced stop. A dentalized realization results when a child places the tip of the tongue not against the alveolar ridge, as the IPA symbol indicates, but against the inside of the upper incisors. A dentalized realization is transcribed as

\[ [d] = \text{dentalized } [d] \]

[ŋ] occurs quite often as the result of co-articulation. Compare [d]-productions in the words *widow* and *width*. The articulatory influence of the following [θ], an addental or even interdental sound, will probably “dentalize” normally alveolar [d] realizations. Dentalized s-sounds, [s] and [z], frequently occur in the speech of children (Van Riper, 1978; Weiss, Gordon, and Lillywhite, 1987).

**Palatalization.** Another modification of consonant articulation is *palatalization*. Only sounds for which the palate is not the place of articulation can be palatalized. Therefore, palatalization can occur with sounds that have a place of articulation anterior or posterior to the hard palate region. If the place of articulation is the alveolar ridge or the upper incisors, palatalization occurs if the anterior portions of the tongue approach prepalatal or mediopalatal portions of the palate, that is, when organ and place of the production are articulated somewhat posteriorly. For velar consonants, palatalization indicates the movement of the place
**CONSONANTS (other than those on the IPA Chart)**

<table>
<thead>
<tr>
<th></th>
<th>bilabial</th>
<th>labiodental</th>
<th>dental/bilabial</th>
<th>labiodental</th>
<th>lingual/bilabial</th>
<th>interdental</th>
<th>bidental</th>
<th>alveolar</th>
<th>velar</th>
<th>velopharyngeal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plosive</td>
<td>p</td>
<td>b</td>
<td>p̊ b̊</td>
<td>p̈ b̈</td>
<td>t</td>
<td>d</td>
<td>t̊ d̊</td>
<td>p̊ b̊</td>
<td>p̈ b̈</td>
<td></td>
</tr>
<tr>
<td>Nasal</td>
<td>m̊ m̈</td>
<td>n̊ n̈</td>
<td>f̊ v̊</td>
<td>t̊ d̊</td>
<td>f̊ v̊</td>
<td>θ̊ θ̈</td>
<td>θ̊ θ̈</td>
<td>f̊ v̊</td>
<td>f̊ v̊</td>
<td></td>
</tr>
<tr>
<td>Trill</td>
<td>f̊ v̊</td>
<td>f̊ v̊</td>
<td>θ̊ θ̈</td>
<td>θ̊ θ̈</td>
<td>θ̊ θ̈</td>
<td>θ̊ θ̈</td>
<td>θ̊ θ̈</td>
<td>θ̊ θ̈</td>
<td>θ̊ θ̈</td>
<td></td>
</tr>
<tr>
<td>Fricative: central</td>
<td>f̊ v̊</td>
<td>f̊ v̊</td>
<td>θ̊ θ̈</td>
<td>θ̊ θ̈</td>
<td>θ̊ θ̈</td>
<td>θ̊ θ̈</td>
<td>θ̊ θ̈</td>
<td>θ̊ θ̈</td>
<td>θ̊ θ̈</td>
<td>θ̊ θ̈</td>
</tr>
<tr>
<td>Fricative: lateral</td>
<td>m̊ m̈</td>
<td>n̊ n̈</td>
<td>m̊ m̈</td>
<td>n̊ n̈</td>
<td>m̊ m̈</td>
<td>n̊ n̈</td>
<td>m̊ m̈</td>
<td>n̊ n̈</td>
<td>m̊ m̈</td>
<td>n̊ n̈</td>
</tr>
<tr>
<td>Fricative: lateral+central</td>
<td>m̊ m̈</td>
<td>n̊ n̈</td>
<td>m̊ m̈</td>
<td>n̊ n̈</td>
<td>m̊ m̈</td>
<td>n̊ n̈</td>
<td>m̊ m̈</td>
<td>n̊ n̈</td>
<td>m̊ m̈</td>
<td>n̊ n̈</td>
</tr>
<tr>
<td>Fricative: nasal</td>
<td>m̊ m̈</td>
<td>n̊ n̈</td>
<td>m̊ m̈</td>
<td>n̊ n̈</td>
<td>m̊ m̈</td>
<td>n̊ n̈</td>
<td>m̊ m̈</td>
<td>n̊ n̈</td>
<td>m̊ m̈</td>
<td>n̊ n̈</td>
</tr>
<tr>
<td>Percussive</td>
<td>ẘ ẅ</td>
<td>v̊ v̈</td>
<td>ẘ ẅ</td>
<td>v̊ v̈</td>
<td>ẘ ẅ</td>
<td>v̊ v̈</td>
<td>ẘ ẅ</td>
<td>v̊ v̈</td>
<td>ẘ ẅ</td>
<td>v̊ v̈</td>
</tr>
<tr>
<td>Approximate lateral</td>
<td>l̊ l̈</td>
<td>l̊ l̈</td>
<td>l̊ l̈</td>
<td>l̊ l̈</td>
<td>l̊ l̈</td>
<td>l̊ l̈</td>
<td>l̊ l̈</td>
<td>l̊ l̈</td>
<td>l̊ l̈</td>
<td>l̊ l̈</td>
</tr>
</tbody>
</table>

**DIACRITICS**

- labial spreading: 
- dentolabial: 
- interdental/bidental: 
- alveolar: 
- lingual/bilabial: 
- strong articulation: 
- weak articulation: 
- reiterated articulation: 
- velopharyngeal friction: 
- whistled articulation: 
- ingressive airflow: 
- egressive airflow:

**CONNECTED SPEECH**

- (.) short pause
- (.) medium pause
- (..) long pause
- f loud speech [(r loud r)]
- ff louder speech [(r loud r)]
- p quiet speech [(p kwast p)]
- pp quieter speech [(p kwast p)]
- Allegro fast speech [(allegro fast allegro)]
- Lento slow speech [(lento slow lento)]
- Crescendo, ralentando, etc. may also be used

**VOICING**

- pre-voicing: 
- post-voicing: 
- partial devoicing: 
- initial partial devoicing: 
- final partial devoicing: 
- partial voicing: 
- initial partial voicing: 
- final partial voicing: 
- unaspirated: 
- pre-aspiration:

**OTHERS**

- indeterminate sound: 
- indeterminate vowel, plosive, etc.: 
- indeterminate voiceless plosive, etc.: 
- silent articulation: 
- sound with no available symbol: 

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*Figure 3.2* ExtIPA Symbols for Disordered Speech (revised to 1997). Copyright 2002 by the International Clinical Phonetics and Linguistics Association. Reprinted with permission.

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and organ of articulation in the direction of the palate, to a more anterior articulation. Palatalization causes a typical change in the quality of the sound(s) in question. The diacritical mark for palatalization is a superscript \( j \) added to the right of the basic IPA symbol:

\[
s' = \text{palatalized } [s] \\
t' = \text{palatalized } [t]
\]

**Velarization.** Velarization refers to the posterior movement of the tongue placement (in the direction of the velum) for palatal sounds. The diacritical mark for velarization is a superscript \( \gamma \) placed to the right of the IPA symbol. Thus \( t' \) is a velarized \( [t] \). An exception is the so-called dark \([l]\), which in General American English is usually heard in word-final positions, for example in *pull* or *shawl*; also as a syllabic, such as in *little* or *bottle*; preceding a consonant, exemplified by *salt* or *build*; and following high-back vowels \([u]\) (loop) or \([u]\) (look) (Bronstein, 1960; Carrell and Tiffany, 1960; Small, 2005). The velarization in these cases is often so prominent that even main phonetic characteristics of \([l]\), the articulation of the tongue tip against the alveolar ridge, are sometimes no longer present. In such a case, the velarization actually replaces the typical apico-alveolar l-articulation. The velarized production is an allophonic variation of \([l]\). Velarized \([l]\)-productions are transcribed \([l]\):

\[
f[u]l = \text{velarized } [l]-\text{sound}
\]

**Lateralization.** \([l]\) is the only lateral in General American English. It cannot be lateralized because it is a lateral already. If during any consonant production other than \([l]\) air is released laterally, we speak of lateralization. Not too seldom, \([s]\) becomes lateralized. Articulations of \([s]\) and \([z]\) require a highly accurate placement of frontal parts of the tongue *approximating* the alveolar ridge. This precarious position must be maintained throughout the entire sound duration, a motorically difficult task, especially for young children. To make things easier, children sometimes establish direct contact between the organ and place of articulation. Under these circumstances, the airstream cannot, of course, escape centrally any longer. In an attempt to maintain the fricative effect of \([s]\), the child now releases the air laterally into the cheeks. The result is a conspicuous \([s]\) variation, a lateral lisp. Lateralization is considered a primary articulation; the resulting sound can be categorized as an apico-alveolar lateral fricative. According to the IPA, \([l]\) is the voiceless apico-alveolar fricative, and \([b]\) is its voiced counterpart.

\[
[sip] \rightarrow [l]tp = \text{a lateralized } [s] \\
[zip] \rightarrow [l]yp = \text{a lateralized } [z]
\]

The extIPA symbols also provide symbols to distinguish between productions that demonstrate both lateral and central airflow (as opposed to just lateral). The symbols for those are

\[
[su] \rightarrow [lu] = \text{a voiceless alveolar fricative with lateral and central airflow} \\
z[u] \rightarrow [lz] = \text{a voiced alveolar fricative with lateral and central airflow}
\]

**Clinical Comments**

Dentalized, palatalized, and lateralized \([s]\) realizations are frequent distortions noted in children. In some children, the dentalized \([s]\) may co-occur with a “th” for “s” substitution \( ([s] \rightarrow [\theta]) \), as in the following production:

“Santa Claus” \([\thetaæn tə kləz] \) for \([sæn tə kləz] \)

The too-fronted tongue position of the child’s \([s]\)-productions may fluctuate slightly, so that it is
perceived at times as [s], at other times as [θ]. It is interesting to note, however, that certain children may also use this dichotomy systematically: [θ] may be realized initiating words or syllables, while [s] is produced terminating words or syllables, for example. Such a possibility should be considered in our assessment.

Differentiating between dentalized, palatalized, and lateralized [s]-productions may seem difficult at first. However, there are clear perceptual qualities that distinguish the three forms of [s] actualization. Dentalized [s]-sounds, [s], have a “dull” quality; they lack the sharp, high-frequency characteristic of typical [s]-productions. On the other hand, lateralized [s]-sounds, [l], have a distinct noise component to them that is typically as disagreeable as it is conspicuous. Palatalized [s] variations, [s'₄], approach perceptually a [ʃ] quality. Palatalization of [s] is marked by the anterior portions of the tongue approaching parts of the palate resulting in a somewhat posterior placement of the organ and place of articulation. Comparing the production features of [s] to [ʃ], one notes that [ʃ] realizations also require a more posteriorly placed organ and place of articulation (apico-alveolar [s] versus coronal-prepalatal [ʃ]).

Voice Symbols
Devoicing of Voiced Consonants. Under normal circumstances, vowels and more than half of our consonants are voiced. If these sounds become devoiced in a speech sample, it needs to be marked. In cases of total devoicing, the IPA symbol for the voiceless counterpart of the voiced sound, its unvoiced cognate, is usually indicated:

\[ [ʃus] \text{ for “shoes”} \]
\[ [bret] \text{ for “bread”} \]

Partial Devoicing. Often, however, the sound in question is only partially devoiced. The diacritic for partial devoicing is a small circle in parentheses placed under the sound symbol:

\[ [ʃuz] \]
\[ [bret] \]

The extIPA also differentiates initial devoicing [ʃ] and final devoicing [ʃ].

Voicing of Voiceless Consonants. Voiceless consonants may also be voiced, especially if they occur between two vowels. A casual pronunciation of eighteen might serve as an example. If voiceless consonants become totally voiced, the segment is transcribed with the respective symbol:

\[ [eɪ tn] \rightarrow [eɪ dtn] \]

Partial Voicing. If voiceless consonants become partially voiced, the diacritical mark is a lowercase v in parentheses under the respective sound symbol:

\[ [eɪ tv] \text{ for “eighteen”} \]

Initial and final partial voicing are [ʃ] and [ʃ], respectively.

CLINICAL COMMENTS
Partial voicing and devoicing are difficult to discern and to transcribe correctly. The first impression of transcribers is often some minor qualitative variance—the sound is somehow “off.” Such a first impression is usually a good reason to focus subsequently on the voicing–devoicing opposition. This two-step procedure makes it easier to arrive at the difficult judgment: partially voiced or partially devoiced.

Also, in General American English, there is a tendency to devoice (or partially devoice) final consonants. The following are examples from Daniel, age 4.7.

“stove” [stoiv] \rightarrow [stoif] total devoicing
“slide” [sla'd] \rightarrow [sla'd'] partial devoicing
“flag” [flæg] \rightarrow [flæg] partial devoicing
“nose” [nɔs] \rightarrow [nɔs] total devoicing

The general devoicing tendency in final positions suggests that realizations like these should probably not be considered aberrant productions.
Aspiration and Nonaspiration of Stop-Plosives.
Stop-plosives (as well as other consonants) are often described according to two parameters: fortis and lenis. Fortis refers to relatively more articulatory effort, whereas lenis refers to comparatively less. Most voiceless sounds are realized as fortis consonants, whereas voiced sounds are usually articulated as lenis productions. (One can note the increased articulatory effort on the level of air pressure by contrasting [t] and [d] with a hand in front of the mouth.) The sudden release of the articulatory effort in fortis stop-plosives leads typically to aspiration. This aspiration is noted by using a small superscript \( h \) following the voiceless stop-plosive sound:

“table” \([t^h\text{e}\text{b}əl]\)

Stop-plosives, which are normally aspirated, are not marked unless the aspiration is excessive.

Voiceless stop-plosives that are typically aspirated may be produced without this fortis aspiration. In this case, the diacritic for unaspirated stops, \([\cdot]\), could be added.

“pie” \([p^\cdot\text{a}^\cdot]\)

This example indicates that a normally aspirated [p] has occurred without aspiration.

Unreleased Stop-Plosives. Stop-plosives can be modified in yet another manner. Unreleased consonants result when the articulatory closure is maintained and not—as usual—released. Although voiceless unreleased stops are more obvious because of their loss of aspiration, voiced stops can be unreleased as well. Unreleased stops typically occur at the end of an utterance or at the end of one-word responses. To indicate an unreleased articulation, the diacritical mark \([\cdot]\) is added:

Boy, was it hot.
\([b\text{ɔ}\cdot\text{w}\cdot\text{ɪ}\cdot\text{t}\cdot\text{ɔ}^\cdot]\)

Unreleased consonants should be noted during the simultaneous transcription of a client’s speech. Just listening to and transcribing from tape recordings can be misleading because, when taped, unreleased consonants can sound similar to consonant omissions. Confusing this production variation with a final consonant deletion could lead to an inaccurate diagnosis. During live transcriptions, we can hear and at least partially see the actual articulation. This provides a much better basis for our judgment: unreleased consonant production or consonant deletion.

The following transcriptions come from an articulation test of Billy, age 4;3:

“cup” \([k^\cdot\text{p}\cdot]\) \(\rightarrow\) \([t^\cdot\text{p}\cdot]\)
“music” \([m^\cdot\text{ju}\cdot\text{z}^\cdot\text{ɪ}\cdot\text{k}\cdot]\) \(\rightarrow\) \([\text{m}^\cdot\text{u}^\cdot\text{d}^\cdot\text{ɪ}^\cdot\text{k}\cdot]\)
“book” \([b^\cdot\text{ʊ}^\cdot\text{k}\cdot]\) \(\rightarrow\) \([b^\cdot\text{ʊ}^\cdot\text{k}\cdot]\)
“feet” \([f^\cdot\text{ɪ}^\cdot]\) \(\rightarrow\) \([f^\cdot\text{ɪ}^\cdot]\)
“watch” \([w^\cdot\text{ɑ}^\cdot\text{t}\cdot\text{ʃ}\cdot]\) \(\rightarrow\) \([w^\cdot\text{ɑ}^\cdot\text{t}\cdot\text{ʃ}\cdot]\)
“sandwich” \([s^\cdot\text{æ}^\cdot\text{n}^\cdot\text{w}^\cdot\text{ɛ}\cdot\text{t}\cdotj^\cdot]\) \(\rightarrow\) \([g^\cdot\text{æ}^\cdot\text{m}^\cdot\text{ɪ}^\cdot\text{t}\cdot]\)

Unreleased consonants seldom warrant therapeutic intervention. Billy’s case was different. Coming in addition to his many articulation errors, they contributed substantially to a decrease in his intelligibility.

Syllabic Consonants. Unstressed syllables easily become reduced syllables. This means that their vowel nucleus practically disappears. If the vowel nucleus is reduced, the following consonant becomes a syllabic; that is, it becomes the peak of that syllable. This is especially the case in unstressed final syllables
when a nasal or the lateral [l] follows the preceding vowel (Heffner, 1975). The proper diacritic mark for such an occurrence is a straight line directly under the syllabic consonant.

\[ \text{fiʃn} \rightarrow \text{fiʃɔn} \rightarrow \text{fiʃn} \]

---

**CLINICAL COMMENTS**

In spontaneous speech, adults often reduce the unstressed final syllable, as in the following example:

He broke the bottle.

[hi bro\t\d\a b\t]\]

In spontaneous speech, and often during an articulation test, children will also demonstrate the use of syllabics. For example:

“little” [li\t]

“scratching” [skra\ t\n]

The boy is fishing; he has a fishing pole.

[\d\a b\o iz fiʃn \hi hæz \a fiʃn po\o]]

While such syllabics, obviously, need to be noted and transcribed, they are considered norm realizations.

---

**Labialization/Nonlabialization of Consonants.**

Consonants, with the exception of [ʃ] and [w], are typically unrounded. Lip rounding is a production feature of both of these consonants. If a normally unrounded consonant is produced with lip rounding, this is referred to as labializing the sound in question. When the [ʃ] is produced without lip rounding, this is a nonlabialized production. The diacritic for labialized consonants is a superscript \w placed to the right of the symbol in question. The diacritic for labial spreading \↔ is placed under the symbol in question to indicate nonlabialization. Labialized consonants can be the result of assimilation processes, as in the following example:

“soup” [s]\wup = labialized [s]

Labialization of normally unrounded consonants due to assimilation is noted, but it is not considered a speech sound problem. On the other hand, [ʃ] is usually produced with at least some degree of lip rounding. The following example indicates [ʃ] without lip rounding:

“ship” [ʃ\p] = nonlabialized [ʃ]

Unrounded [ʃ] realizations can also be due to assimilation; however, there are children who unround [ʃ] in all contexts. This should be noted and is considered an aberrant production.

---

**CLINICAL COMMENTS**

Rounded [s]- and unrounded [ʃ]-sounds are frequent sibilant realizations of children. These may be aberrant productions or context-based assimilation processes. The following is an excerpt from a transcription of Matt, age 4:6:

The boy is swinging really high.

[\d\a b\o iz s\wθŋ\n r\l\i h\a\t]

My mommy made vegetable soup.

[ma\l m\m\i me\d v\d\s\ba\l s\wup]

In addition to Matt’s unorthodox pronunciation of vegetable, we note that his [s]-sounds are rounded. In the given context, they may be just assimilation processes regressively influenced by the rounding of the following [w] or [u].

This does not seem to be the case in Chris’s transcription, based on an articulation test and a spontaneous speech sample.

“fish” [\t\f] \rightarrow [\t\f]

“watch” [\w\t\f] \rightarrow [\w\f]

“chicken” [\t\f\k\n\n] \rightarrow [\f\k\n\n]

“shovel” [\f\v\l\n] \rightarrow [\f\v\l]

At lunch I ate a peanut butter sandwich.

[\ə \l\n\n \a\t \e\t \a \p\n\n \b\t\a \t\a\f \w\f]

I wish I had some new tennis shoes, like Michael Jordan.

[a\l \w\f \a\h\d s\m nu \t\n\n uz \l\k \m\k\l \j\r\d\n]
Chris, in contrast to Matt, unrounds his “sh”-sounds even when they precede a rounded vowel, as in the word shoes. He also occasionally uses [ʃ] for [s]- and [tʃ]-sounds.

**Derhotacization.** Derhotacization is the loss of r-coloring for the consonant [r] and the central vowels with r-coloring, [ɛ] and [ɔ]. Derhotacized central vowels are transcribed as [ɜ] and [ə]. However, [r], as in rabbit, can lose its characteristic r-coloring as well. Children often substitute a [w] for this sound. Another possibility is the [u], which is a voiced labiodental approximant. The [u] sound lacks the high-back tongue position of [w], a labio-velar approximant; however, comparable to the [w], [u] demonstrates a lack of r-coloring.

**Diacritics Used with Vowels**

**Rounding/Unrounding of Vowels.** There are vowels that are normally rounded and others that are normally unrounded—[u] versus [i], for example. The rounding or unrounding of the lips is an important feature of vowel realizations. However, for several reasons, some clients may delete or inappropriately add these characteristics. This results in a distortion of the respective sound quality. The IPA system offers two symbols to indicate rounding and unrounding of vowels. The signs are placed directly under the vowel symbol in question and consist of a small c-type notation, which indicates unrounding (or less rounding than is considered normal) when open to the right. When this c is inverted, creating an opening to the left, it denotes rounding (or more rounding than is normally the case):

- [u] = unrounded [u]
- [ɛ̃] = rounded [ɛ̃]

**Changes in Tongue Placement for Vowels.** Deviations in tongue positioning affect vowel as well as consonant articulations. Different vowel qualities are established essentially by different sizes and forms of the vocal tract. Two main factors determining these sizes and forms pertain to the location of the raised portion of the tongue (front and back dimensions) and to the extent to which the tongue is raised in the direction of the hard or soft palate (high and low dimensions).

**Raised/Lowered Tongue Position.** The IPA system offers a set of diacritics that signals the direction of tongue heights on the vertical plane leading to deviations from norm vowel productions. The diacritic [r] under the vowel symbol marks a lower elevation, whereas the diacritic [ɻ] under the vowel marks a higher elevation of the tongue than is normally the case for the production of the vowel in question. For example,

[s ɻ t]

would state that the high-front elevation of the tongue for standard [i] articulation has not been reached in this realization; that is, the tongue articulation was lower than normal, resulting in a perceptible off-quality for [i]. Trying to describe our auditory impression of this sound, we would say that it shifted in the direction of (but not reaching) the sound quality of [e].

Similarly, the transcription

[b ɻ t]

would indicate a higher-than-normal elevation of the tongue for [i], resulting in a quality that approaches [i] characteristics.

The same principle applies to all vowels. A question that logically follows is whether it makes a difference which symbol we use if the vowel is somewhere in between two qualities. In other words, do a raised [e] ([ɛ̃]), and
CHAPTER 3

a lowered [i] ([ɪ]) signify the same vowel quality? The answer is no. Therefore, in our previous example, one has to make a decision as to whether this vowel realization sounded more like an [e]- or an [ɪ]-type vowel. Based on the transcriber’s auditory perception, the basic vowel quality must first be chosen, and then the modifying diacritic mark should be added to it.

Advanced/Retracted Tongue Position. There are also diacritics signaling tongue variations on the horizontal plane that lead to deviations from norm productions. They indicate a tongue position that is too far forward or too far back for a norm production of the vowel in question. The diacritic for vowels produced with a tongue elevation more advanced than usual is [+]1. More retracted protrusions are marked by the diacritic [-]. Both are placed under the vowel symbol: [ɛ], for example.

Nasality Symbols. During the production of most General American English speech sounds, the velum is elevated to block the escape of the expiratory air through the nasal cavity. There is only one exception to this rule: the nasals. This is what—quite correctly—the textbooks tell us. However, in reality, the conditions are not always so clear-cut. If a nasal follows a vowel, for example, nasality often seeps into the vowel segment; the preceding vowel becomes nasalized:

[tæn] → [tān]

As long as the nasality doesn’t overstep the boundary line of natural assimilatory processes, this nasality remains unmarked. Speakers and listeners perceive these variations as normal. However, if the nasality is perceived as being excessive, or hypernasal, we need to place the “tilde” (which you may have encountered in Spanish language classes) over the respective sound(s). As speech-language specialists, we encounter hypernasality prominently in the speech of clients with dysarthria and cleft palates.

Denasality is also encountered in the speech of our clients. The symbol for denasality is the tilde with a slash through it, placed above the nasal consonant:

ni → nī

This symbol refers to a reduction of nasal quality. Only nasal consonants can be denasalized. If nasal consonants are perceived as having a
total lack of nasal quality (having a completely oral quality), then the symbol for the resulting homorganic voiced stop is used:

\[
\text{ni} \rightarrow \text{di}
\]

**CLINICAL COMMENTS**

One of the characteristics of African American dialect is the total regressive assimilation of postvocalic nasals (e.g., Haynes and Moran, 1989; Wolfram, 1986). The assimilation process is regressive in that the nasal following the vowel changes the characteristic of the preceding vowel into a nasalized vowel. It is considered a total assimilation process because the postvocalic nasal consonant is totally gone. The following examples demonstrate this process:

- “pen” [\(\text{p} \varepsilon \text{n}\)] → [\(\text{p} \varepsilon \tilde{\text{n}}\)] → [\(\text{p} \varepsilon \tilde{\text{}}\)]
- “thumb” [\(\text{θ/\text{v}} \text{inverted m}\)] → [\(\text{θ/\text{v}} \text{inverted} \tilde{\text{m}}\)] → [\(\text{θ/\text{v}} \text{inverted} \tilde{\text{}}\)]

These pronunciations were noted on an articulation test from a child, age 4;3, speaking African American dialect:

- “broom” [brum] → [bru]\(\tilde{\text{}}\]
- “airplane” [\(\varepsilon \text{a} \text{ pl} \varepsilon \text{n}\)] → [\(\varepsilon \text{a} \text{ pl} \tilde{\text{e}}\)]
- “sandwich” [\(\text{s} \text{a} \text{ n w} \text{t} \text{f}\)] → [\(\text{s} \text{a} \text{ w} \tilde{\text{t}} \text{f}\)]
- “clown” [kl\(\text{a} \text{ n}\)] → [kl\(\tilde{\text{a}}\)]

The total regressive assimilation process (“broom,” “airplane,” and “sandwich”) and the vowel change (“clown”) are dialectal in nature. In African American dialect, they represent a regular pronunciation possibility.

**Diacritics for Stress, Duration, and Syllable Boundaries**

**Stress Markers.** Every multisyllabic word has its own stress pattern, which may or may not be realized in a regular manner by our clients. The main purpose for all stress realizations is to emphasize certain syllables over others, thus creating a hierarchy of prominence among them.

**Primary Stress.** The order of prominence is actualized by differences in loudness, pitch, and duration, the loudness differences being the most striking of the three. Generally, two different loudness levels are observed. The loudest syllable is said to have the *primary* stress. It is marked by a superscript short straight line in front of the respective syllable.

- “syllable” [\(\text{s} \text{i} \text{l} \text{o} \text{ b} \text{a} \text{l}\)]
- “railway” [\(\text{r} \text{e} \text{l we} \text{r}\)]
- “superior” [\(\text{s} \text{e} \text{p} \text{r i } \text{ s} \text{e} \text{r}\)]

**Secondary Stress.** The next loudest syllable bears the *secondary stress*. It is indicated by a subscript short straight line in front of the syllable in question.

- “supermarket” [\(\text{s} \text{u} \text{p a} \text{r i} \text{m a} \text{r k} \text{e}\)]
- “signify” [\(\text{s} \text{i} \text{g n a} \text{f a i}\)]
- “phonetic” [\(\text{f o} \text{n e ti k}\)]

Some people find it difficult to distinguish between subtle loudness differences. For them, it may be of help to know that in General American English, different loudness levels characterizing stress go usually (but not always) hand in hand with changes in pitch. Thus, the louder the syllable, the higher the pitch. To pay attention to pitch differences first, then, may aid in discriminating between differing levels of loudness in stressing. It is also helpful to know that many (but again not all) words in General American English have their primary (or secondary) stress emphasis on the first syllable. A third possibility for those with difficulty in distinguishing stress differences is to vary systematically the loudness in each of the syllables of the word in question, [\(\text{d} \text{z e} \text{ lo} \text{e}\)] versus [\(\text{d} \text{z e} \text{ lo} \text{e}\)], for example. Typically, one version of that particular word will sound clearly more acceptable than the other. By a process of elimination,
then, one can often ascertain the appropriate stressing pattern.

**CLINICAL COMMENTS**

Clients with dysarthrias have typical difficulties with stressing. The following transcription exemplifies such a possible displacement of stress.

<table>
<thead>
<tr>
<th>Norm speaker:</th>
<th>Dysarthric speaker:</th>
</tr>
</thead>
<tbody>
<tr>
<td>“birthday”</td>
<td>[brəθˈdeɪ]</td>
</tr>
<tr>
<td>“umbrella”</td>
<td>[ˈʌmbrələ]</td>
</tr>
</tbody>
</table>

**Duration Symbols.** Sounds take up different amounts of time in continuous speech. We are so used to these measurable differences in sound duration that we register changes in these typical lengths automatically as “too short” or “too long.” If that is our perceptual impression, we have to indicate it by means of diacritic markers. Normal (i.e., inconspicuous) sound duration remains unmarked.

**Lengthening.** Longer than normal duration is signaled by either one or two dots following the sound symbol in question. The more dots, the longer the sound.

- [fit] standard vowel duration
- [fiːt] slightly longer than normal vowel duration
- [fiːt] clearly longer than normal vowel duration

**Shortening.** Shorter than normal speech sound productions also occur. Different degrees of shortening are, as a rule, not indicated. The diacritic mark for any shortened sounds is [˘] placed above the respective sound symbol.

Shortening of sounds can lead to cutting off a portion of their phonetic properties. Young children with still unstable [s]-sounds sometimes shorten the (normally fairly long) segments to something that may sound like the release portion of [t]. If onset and holding portions of [t] are also identifiable, the obvious transcription would be [t]. However, if that is not the case—that is, if we indeed had an [s]-impression—we would transcribe this as [ʃ].

**Syllable Boundaries.** Syllable boundaries are indicated by a period placed between the syllables.

- “reliable”  [ri.laɪ.ə.bəl]  
- “attention”  [ə.ten.ʃən]

**Additional Symbols.** The following symbols are not diacritics but are often used when transcribing aberrant speech.

**Glottal Stop.** The glottal stop ([ʔ]) is produced when a closed glottis is suddenly released after a buildup of subglottal air pressure. The release of air pressure creates a popping noise. The glottal stop is considered an allophonic variation of some stop-plosive productions and can serve to release vowels in stressed syllables (Edwards, 2003) or separate successive vowels between words (Wise, 1958):

- “oh”  [oʊ] releasing a vowel
- “Anna asks”  [ænə ʔæskz] separating successive vowels

Some children with articulatory or phonological impairments use the glottal stop as a sound substitution (Stoel-Gammon and Dunn, 1985).
Bilabial Fricatives. The voiceless ([φ]) and voiced ([β]) bilabial fricatives are not phonemes of General American English but can also be used as sound substitutions in aberrant speech. Both sounds are produced by bringing the lips together so that a horizontally long but vertically narrow passageway is left between them for the voiceless or voiced breath stream to pass (Heffner, 1975).

Palatal Fricatives. The voiceless [ç] and voiced [ʒ] mediodorsal-mediopalatal fricatives may be heard as substitutions for [ʃ] and [ʒ]. These sounds are characterized by a more posterior tongue articulation than for [ʃ] or [ʒ]. Thus, both organ and place of articulation are shifted from coronal-postalveolar (or prepalatal) to this mediodorsal-mediopalatal position. The voiceless [ç] sounds similar to a voiceless [ʃ].

Postdorsal-Velar Fricatives. Some children, when attempting to produce the postdorsal-velar stops [k] and [g], may not raise the tongue sufficiently to create a complete closure. In this case, a fricative may result. The symbols for the postdorsal-velar fricatives are [x] for the voiceless sound and [ɣ] for its voiced cognate.

Postdorsal-Uvular Stops. These sounds may again be heard by a child who is attempting to produce [k] or [g]. In this case, the client produces a stop-plosive, but the place of articulation is too far back in the mouth, resulting in a sound that might be perceived as having a “guttural” quality. The voiceless postdorsal-uvular stop is transcribed [ʁ], and its voiced counterpart is noted as [ʁ].

Flap, Tap, or One-Tap Trill. The flap, tap, or what is also known as the one-tap trill ([ɾ]), is a frequent allophonic variation of [t] and [d]. This variation often occurs when stop-plosives are preceded and followed by vowels, as in city or butter. A single tap of the tongue tip against the alveolar ridge or with a gesture of the tongue tip in that direction characterizes these sounds (Wise, 1958).

“butter” [bæɾə]
“ladder” [læɾə]

Clinical Implications

Phonetic transcription and, especially, its diacritic marks appear at first glance complicated to handle and difficult to remember. The obvious question arises as to how these diacritics could be helpful in our assessment and therapeutic process. The answer is threefold.

First, accurate phonetic transcription involves ear training, a sharpening of our auditory discrimination abilities. These skills are indispensable for clinical expertise, something that can never be emphasized enough. Second, phonetic transcription, and especially the use of diacritic markers, provides a generally agreed on, professional way to note certain deviations from norm productions. This system allows clinicians to communicate freely with other professionals within the field of communication sciences and disorders. Transcription symbols can be translated back into actual speech events in the same way that musicians can read notes and translate them back into tunes. Third, by being aware of the many variations that can occur, accurate phonetic transcriptions open up diagnostic possibilities that we might not have considered without this knowledge. If we don’t know what to
listen for—unreleased stops or partial devoicing, for example—we might not identify some of the abnormal variations.

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**CLINICAL APPLICATION**

**The ExtIPA and Multiple Interdentality**

Multiple interdentality, a label dating back to at least the 1930s (Froeschels, 1931, 1937), may often be seen in our clinical population. It is used to describe an immature speech habit in which children produce [t], [d], [l], and [n] with their tongue tip too far forward. In other words, the tongue tip is between their teeth—that is, an interdental production. According to the ExtIPA chart (see Figure 3.2), we see that there is a way to transcribe these sounds in the following manner:

\[
[t], [d], [l], [n]
\]

Children with multiple interdentality often have difficulty with [s] and [z] as well. These sounds are also produced interdentally and end up sounding like “th” sounds, thus [θ] and [ð].

[s]-sound realizations illustrate well how the use of diacritics can have valuable practical consequences for assessment and intervention. Knowing what to listen for, we find that what once sounded like simply a distorted [s] can now be specified as the actual aberrant form presented: a palatal versus a lateral versus a dentalized [s]-distortion, for example. All these variations can be noted using the respective diacritic markers. In addition, aside from the clarification the notation system provides, detailed knowledge about actual realizations is indispensable for the assessment and successful remediation of [s] errors. By establishing that the [s] appears distorted, we are saying only that its typical production is “off.” We have addressed the acceptability issue of the sound realization, but not its aberrant production features, the most important information for clinical purposes. However, by comparing the child’s actual articulatory features with the known features for regular [s]-productions, we will know precisely which placement characteristics need to be changed therapeutically.

By identifying an [s]-distortion as a palatal [s], for example, detailed information that can be used when planning therapy is given. A palatal [s] is produced with the tongue tip too far back in the direction of the palatal area. Due to this tongue position, the palatal [s] has a [ʃ]-like quality. All other production features are usually in accordance with norm [s]-articulations; the lateral edges of the tongue are raised, and the sagittal grooving necessary for the [s] is present as well. It may be possible, therefore, that the child needs only to move the tongue tip to a more anterior position to produce a regular [s]. Applying this knowledge, therapy becomes not only more goal directed but also much simpler—with the consequence of saving time and possible frustration.

The advantage of knowing how the child actually produces the distorted speech sound becomes even more obvious if we compare two distorted sound productions, one palatal [s] ([s]) and one dentalized [s] ([s]), for example. The [s] is characterized by a tongue placement too far forward. In this case, the child needs to move the tongue back, posteriorly, to obtain a regular [s]. This would be in direct contrast to the procedure necessary for the [s], in which fronting of organ and place of articulation becomes necessary. Detailed knowledge of the client’s production features, then, proves to be an important asset leading to expedient and thorough therapeutic intervention.

Theoretically and practically, the importance of the preceding discussion seems rather obvious. Its essential ingredient is our ability to note and differentiate between changes in sound quality as the basis for our reme-
Andy, age 6;2, was referred to the speech-language specialist by his classroom teacher. According to the teacher, his main problem seemed to be his “speech,” which she described as being somewhat difficult to understand and containing many sound errors. After a thorough appraisal, the speech-language specialist was concerned that Andy might have a phonological disorder. When first listening to Andy’s spontaneous speech, in addition to his w/r substitutions, she thought that he used \( \theta \) realizations for th-, s-, and sh-sounds. The clinician was worried that Andy was not able to differentiate between these phonemes. She had to admit, though, that there had been some qualitative differences between the productions that she could not quite describe. She decided to continue with her assessment, paying special attention to these sounds. She also used some pictures that pinpointed the th-, s-, and sh-sounds in an elicited speech sample. After carefully listening to Andy’s actual productions and later to the recording, the clinician arrived at the following results:

**One-Word Articulation Test Results**

<table>
<thead>
<tr>
<th>Norm Production</th>
<th>Actual Production</th>
<th>Word Examples</th>
<th>Transcriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>[s], [z]</td>
<td>[s], [z]</td>
<td>sun</td>
<td>[sʌn] → [sʌn]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>bus</td>
<td>[bʌs] → [bʌs]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>zoo</td>
<td>[zu] → [zu]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>all consonant clusters with [s]</td>
<td>[s] + consonant → [s] + consonant</td>
</tr>
<tr>
<td>[ʃ]</td>
<td>[ʃ]</td>
<td>shoe</td>
<td>[ʃu] → [ʃ vou]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>fish</td>
<td>[ʃip] → [ʃip]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>dishes</td>
<td>[dʒæz] → [dʒæz]</td>
</tr>
<tr>
<td>[θ] correct</td>
<td>[θ]</td>
<td>thumb</td>
<td>[θʌm] → [θʌm]</td>
</tr>
<tr>
<td>[ð] correct</td>
<td>[ð]</td>
<td>feather</td>
<td>[feðə] → [feðə]</td>
</tr>
</tbody>
</table>

Selected Spontaneous Speech Sample:

I have a red toothbrush. My mommy tells me every night to brush my teeth.

[æ t hav a wed tuθbwɔθ ma t mɔm mi evri na t tu bwɔθ ma t tiθ]

Today in school we made an art picture.

[tuəd i n skul wi me t an o t piksə]

We cut out all sorts of things with scissors and pasted them on this sheet of paper.

[wi kɔt aθt oI sOwats av θIKz wiθ sIzæz ænd pɛʃtæd dɛm an dIs sI t av peIpə]

Andy did actually differentiate between the th-, s-, and sh-sounds with a dentalized production—[s], [z] for /s/ and /z/, a palatalized [s] for /ʃ/, and correct “th” realizations. In this case, careful transcription made a large difference in the outcome of this assessment.
SUMMARY

Assessment procedures and results should be accurate, professional, and accomplished in an accountable manner. This chapter introduced the International Phonetic Alphabet (IPA) as a widely used system that can provide these requisites for the assessment of articulatory and phonological disorders. The IPA system was developed to document actual phonetic realizations of speech events. It is a means of transferring highly impermanent speech events into more durable graphic representations. Such a system offers the speech-language specialist a way to substantiate assessment results as well as to communicate effectively with other professionals. Transcription should never be considered just an option; accurate transcription is a necessity for professional evaluations.

To increase the effectiveness of the IPA system, certain diacritic markers are used to add production details to the meaning of the basic symbol. These markers are indispensable to the documentation of many of the unusual realizations of our clients. One current diacritic system used for disordered speech, the ExtIPA, was introduced. Such diacritics were itemized, explained, and exemplified in the second section of the chapter. This section also offered clinical comments on many of the diacritics as well as actual phonetic transcriptions utilizing these marks.

The last section of this chapter demonstrated how phonetic transcription and the detailed knowledge acquired through its use in assessment procedures also benefits the intervention process. First, the accuracy needed for the transcription task promotes the fine-tuning of perceptual skills, a clinical proficiency that will, by its very nature, enhance the likelihood of successful intervention. Second, the specificity gained through phonetic transcription, including diacritics, translates into a far more goal-directed treatment approach, which increases clinical efficacy.

CASE STUDY

The following transcription is from Jordan, age 5;6. The first transcription is broad transcription, the second one is narrow transcription.

**Broad Transcription**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>sit</td>
<td>[sɪt]</td>
<td>soap</td>
</tr>
<tr>
<td>sing</td>
<td>[sɪŋ]</td>
<td>soup</td>
</tr>
<tr>
<td>sock</td>
<td>[sɒk]</td>
<td>summer</td>
</tr>
<tr>
<td>sun</td>
<td>[sʌn]</td>
<td>bus</td>
</tr>
<tr>
<td>miss</td>
<td>[mɪs]</td>
<td>toss</td>
</tr>
<tr>
<td>goose</td>
<td>[ɡʊs]</td>
<td>race</td>
</tr>
<tr>
<td>house</td>
<td>[hɔʊs]</td>
<td>pass</td>
</tr>
<tr>
<td>zoo</td>
<td>[zu]</td>
<td>zap</td>
</tr>
<tr>
<td>bees</td>
<td>[biz]</td>
<td>news</td>
</tr>
<tr>
<td>rose</td>
<td>[roʊz]</td>
<td>trees</td>
</tr>
</tbody>
</table>

**Narrow Transcription**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
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</tr>
<tr>
<td>rose</td>
<td>[roʊz]</td>
<td>trees</td>
</tr>
</tbody>
</table>

What additional information do the diacritics provide? Do you see a pattern for the palatalized versus dentalized [s] and [z]?
1. What is the difference in production between a dentalized [s], [s], and a [θ]? Which articulatory features would you need to change to produce a standard [s]? How would you explain this to a child?

2. What are the production features of [ʃ] ↔ [ʃ]? What would you do to change the production to a standard [ʃ]? Are there any vowel contexts you could use to assist in acquiring this standard production?

3. The following transcription is from a child, age 4;2. Label the diacritics and state which ones are context related and which ones would be considered aberrant productions.

   [a’ wan tu ɡoʊ ðu ɡə bitʃ’]
   I want to go to the beach.

   [sæli ˈɛd wi kəd’ ɡoʊʊ]
   Sally said we could go.

4. Put in the syllable boundaries and the primary stress markers for the following words:
   - outspoken
   - inspiration
   - national
   - monumental
   - October

5. Identify the following symbols. For each, describe when they could be used as sound substitutions.

   [x]   [ʔ]   [lyoghlig]   [jcurlytail]

6. IPA stands for which of the following?
   a. International Phonetic Association
   b. International Phonetic Alphabet
   c. both a) and b)
   d. none of the above

7. The voiced labiodental approximant is transcribed as
   a. [β]   c. [v]
   b. [γ]   d. [j]

8. Which one of the transcriptions would indicate “bird” without the r-coloring on the vowel?
   a. [bɛɾ/ɛd]   c. [bd]
   b. [bɛɾ/ɛd]   d. [bɛɾ/ɛd]

9. Which one of the following transcriptions indicates excessive aspiration?
   a. [kʰip]   c. [kʰp]
   b. [kʰp]   d. [kip]
10. The transcription [ŋ] would indicate which one of the following?
   a. a vowel position that is too far forward
   b. a vowel position that is too far back
   c. a vowel that is less rounded than is usual
   d. a vowel that is more rounded than is usual

WEBSITES

www.phonologicaldisorders.com
This website, created by the author of this textbook, contains review exercises for phonetic transcription. Examples are also given of additional articulation test results which show how to use phonetic transcription. Links are given to other websites and resources.

www.paulmeier.com/ipa/charts.html
This website was designed by Eric Armstrong of York University, Toronto, Canada, and voiced by Paul Meier of the University of Kansas, United States. It includes the International Phonetic Alphabet and is an interactive website in which you can hear the diphthongs and triphthongs of American English and British English (Received Pronunciation). It is very interesting and user-friendly.

http://web.uvic.ca/ling/resources/phonlab/ipatut/index.html
This is considered a tutorial site for the International Phonetic Alphabet from the University of Victoria, Canada. There are also several other related websites. This one gives the viewer the opportunity to click on the various IPA symbols and hear the vowel sound or the consonant sound. The consonants are imbedded in a vowel-consonant-vowel environment. For beginners using phonetic transcription or for those who would like to familiarize themselves with non-American English sounds, it is a great website.

www.ic.arizona.edu/~lsp/IPA.html
This website is a tutorial from the University of Arizona and it includes vowels, consonants, and examples of several American English dialects. If you go to the homepage, information about American and Canadian dialects is given.

http://www2.arts.gla.ac.uk/IPA/pulmonic.html
This is a webpage from the University of Glasgow, Scotland, United Kingdom, that provides dozens of links to many different topics, including, for example, the International Phonetic Alphabet, movement of the articulators, and online phonetic courses. It is a good resource for several different topic areas in phonetics and phonology.

FURTHER READINGS