Upon occasion the Journal will publish statements by its Associate Editors that are relevant to the current state of affairs in their areas of editorial responsibility and that stem both from their own clinical and research expertise and from their experience in reviewing the wide range of manuscripts in their care. The first two of these statements are authored by John L. Locke, Associate Editor for Clinical Phonology, and by Robert H. Brookshire, Associate Editor for Acquired Aphasia.—J. M. C., Ed.

Journal of Speech and Hearing Disorders, LOCKE, Volume 48, 339-341, November 1983

CLINICAL PHONOLOGY: THE EXPLANATION AND TREATMENT OF SPEECH SOUND DISORDERS

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Most individuals with expressive communication disorders have at least some difficulty at the phonological level of language, that is, in their knowledge of phonetic segments and phonological rules, or in the ways they implement that knowledge. This difficulty typically impairs their intelligibility, and there are many whose speech cannot be understood at all. It is imperative that such individuals have access to competent professional help; and to be competent, clinicians must have access to helpful research. In this paper I will discuss some problems surrounding the conceptualization of children's speech sound disorders, suggest a solution to a major terminological difficulty, and stress the critical role of explanation in this important area of study and social service.

Research on Speech Sound Disorders

The early investigators evidently were less concerned with the nature of speech sound disorders per se than they were with the nature of the children who had them. The early literature contains few descriptions of disordered speech but many reports of children's performance on a variety of sensory, cognitive, motor, and perceptual tasks. Researchers apparently believed that if the problems with children could be found and put right, their speech would take care of itself, or at least be easier to deal with.

In time, researchers turned their attention to the nature of speech sound disorders themselves. Using the analytical procedures of generative linguistics, observers began to notice—in fact, seemed to be astonished by—the degree to which children's speech sound disorders were patterned. What had previously been called "multiple articulation problems" came to be interpreted as individual sound class problems which were merely manifested in the multiple members of those classes.

Whatever Became of Articulation Disorders?

With this new perspective came some terminological changes. People who had been using the word articulatory began to use the word phonological instead. For some, this was merely a change in labeling behavior. For others, the word phonological conveyed a different meaning. Where articulatory suggested peripheral speech-motor activity, the term phonological was used in reference to the speaker's knowledge of his or her sound system and the prearticulatory rules which express that knowledge. While the use of two terms called attention to a potentially useful clinical distinction, it is not clear that phonological was the best term to convey the meaning that was intended. Unfortunately, phonological (as a synonym for organizational) was so eagerly absorbed that it came into a use that was perhaps more general than the phenomena with which it was identified. As a result, some speech-language pathologists asked a perfectly sensible question: Whatever became of articulation disorders?

Levels of Phonology

I suspect that articulation disorders are alive and in distressingly good health. But it also seems that children's speech sound disorders can derive from problems at higher levels, for example, when children misidentify the phonetic cues to a phonological contrast or store nonadult forms in lexical memory (Locke, 1983). That there should be levels of speech sound disorder is logical, for phonology itself is constituted of theoretically separate levels ranging from the most central and cognitive to the most peripheral and motoric.1 Ironically, one of the ways we have recognized the presence of levels in the past has been by confusing them. For example, one of the leading causes of articulation problems was considered to be misperception. This would be paradoxical in the extreme, for if misperception were to cause nonadult speech patterns, it would be because misperception caused nonadult internal representations to develop. There would be no need in such cases to invoke an articulatory explanation.

1For Hyman (1975), phonology is “not only the physical properties of the attested sounds (that is, how they are made and what their acoustic correlates are), but also the grammatical properties of these sounds” (p. 1).
It seems we need a single, generic term for disorders involving the sounds of a language. Rather than invent a new word, my own practice has been to call them *phonological disorders* since the sounds of a language are properly a part of its phonology. If such an uncommitting term is used initially, diagnosticians can always label more specifically as they obtain the concrete evidence which permits them to do so.

**The Phonetics in Phonology**

There are several reasons why this solution seems appropriate. First, it is presently not clear that we are able to distinguish unambiguously among the levels of phonology in standard (adult) systems. As a basic principle, all languages must be producible and perceivable, and therefore consistent with the production and perception capabilities of humans. Given that such capabilities properly fall into the phonetic domain (and are taught in courses called “articulatory phonetics” and “acoustic phonetics”), it may be said that phonologies, to a degree, are the way they are because the human vocal and auditory systems have the properties they have. This can make it difficult to determine whether a given phenomenon is related more to the grammar of a sound system or to its physical properties (including articulation).

The patterns of voicing distinctions in languages illustrate the significant phonetic component of phonological systems and why it can be difficult to distinguish between articulation and organization. For example, laboratory research has shown that bilabial stops are associated with a larger oral cavity (Fant, 1960) and a greater passive expansion of the vocal tract (Ohala & Riordan, 1979) than are alveolar and velar stops. Using these anatomical facts, an aerodynamic model would predict that /b/ phones will in most cases be more voiced than /d/ and /g/ phones. Analysis of talkers’ voice onset times confirms this prediction (Smith, 1978). It is therefore interesting that languages, which were, of course, constructed by humans, also preserve this tendency in subtle ways. In the conversations of Bengali, Spanish, English, Kaiwa, and Swedish speakers there are more /b/ phones relative to /p/ than there are /d/ phones relative to /t/ and /g/ phones relative to /k/ (Locke, 1983). When we observe that children perceptibly voice /p/ more than /t/ and /k/, and devoice /g/ more than /d/ and /b/, as evidence reveals (Locke, 1983), are we to attribute this patterning to (a) phonetic principles (e.g., problems in manipulating air pressures levels, (b) environmental input (i.e., more exposure to fully voiced bilabials and devoiced velars in the speech of normal adults), or (c) contrastive pressures derived from children’s developing sense of the English lexicon (more /b/ and /k/ words than /p/ and /g/ words)?

**Interactions**

In many cases, it is likely that children’s difficulties in speech sound expression represent convergences or interactions among several phonological subsystems. Stampe’s (1973) phonological process notion explicitly recognizes such interactions. Though processes are regarded by many as abstractly organizational, Stampe defined them as mental events performed in behalf of articulatory difficulties. Like phonology itself, Stampe’s hypothesis involves the internalized sound system and its physical implementation.

**Interactions between levels and components of phonology** also are contemplated by Ferguson and Farwell (1975), for whom the ideal model of phonological development should de-emphasize the separation of phonetic and phonemic development, but would maintain in some way the notion of ‘contrast’, i.e., the distinctive use of sound differences. It would emphasize individual variation in phonological development, but incorporate the notion of “universal phonetic tendencies” which result from the physiology of the human vocal tract and central nervous system, as constrained by universal syntactic-semantic processes. It would emphasize the primacy of lexical items in phonological development, but provide for a complex array of phonological elements and relations—including the notion of “phonological rule” in the sense of synchronic sound change determined by classes of sounds, lexical items, or grammatical boundaries. (p. 437)

Such an integrated or holistic model also is needed for children’s phonological disorders. Let us imagine a child with a cleft palate who nasally emits obstruents but also develops compensatory articulatory gestures to reduce the emission, and additionally—as a child—merges /b/ and /w/ (partly for perceptual reasons), and /w/ and /r/ (mainly for motoric reasons), and deletes final voiced stops. How is such a child to be labeled? How is such a child to be “conceptualized”?

**Explanation in Clinical Phonology**

If developmental disorders are to be understood, our energies must increasingly be devoted to the scientific processes which elucidate development. We must observe with great care, record and measure with reliable equipment, and transcribe in fine alphabetic detail. Where perceptual means are insufficient, analysis by spectrography, palatography, and the like may be necessary. In some cases, readers must be allowed to inspect the raw data which underlie phonological classifications, and in all cases writing must be precise. In the interest of intellectual honesty, it may even be desirable for authors—in paraphrase of Lakatos (1970)—to state the exact conditions under which they would be willing to change their minds!

If clinical phonology is to command the respect of those in the other social sciences, it must not only be scientific in methodology but scientific in purpose. To many, this will mean that clinical phonology must at-

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This term is evidently gaining currency; it is the title of a recent book by Gronwell (1982).
tempt to explain phonological disorders. But to an unfortunate degree we have followed the example of the theoretical phonologists who

notice that one group of sounds do [sic] one thing whereas another group does the opposite. But rather than seek an explanation for this difference in behavior, they simply tack on different labels to the two groups, X and not-X, and then "explain" the behavior of a given sound or the whole group of sounds as being due to the fact that they are "X" (or "not-X"). (Ohala, 1974, pp. 251, 253)

At times we have said or been told that children do such-and-such because this "simplifies" the adult system. But is this the child's reason for doing something, or is it—in the opinion of the observer—the effect of the child's behavior? As Linell (1979) has commented, "The simplicity criterion is based on a metaphysical assumption that Nature is simple. Thus, it does not involve an empirical argument." (p. 73)

In Speech-Language Pathology we have a tradition of borrowing from other fields, and I am afraid we also have borrowed this tendency to label instead of explain, and to take our labels as explanations.³ For prior to the paradigm shift alluded to earlier, there were numerous attempts to explain children. Rather than attribute deviant utterances to deviant rules, the assumption of earlier investigators was that something must be different about the children themselves or what they had been exposed to. Now that we know techniques for investigating children and for analyzing children's speech it would be desirable to ask why this child is exhibiting that phonetic behavior. And in asking such questions, perhaps we should follow the empirical trail—whether it leads us into cognitive or physiological or social domains—and quit deciding in advance where it is that we want to go. In this connection, there is another statement of Ferguson and Farwell's (1975) that we clinical phonologists might do well to keep in mind:

Linguists approaching the study of child phonology have naturally tended to use theoretical constructs which have an important role in their general phonological theories. Thus European and American structuralists have tended to look for phonemes and distinctive features in child phonology, while generativists tend to look for unique lexical representations and phonological rules which operate on them. Our approach is to try to understand children's phonological development in itself so as to improve our phonological theory, even if this requires new theoretical constructs for the latter. (p. 437)

ACKNOWLEDGMENT

The author is indebted to Michael Smith for his helpful remarks on an earlier version of the manuscript.

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