LSHSS

Clinical Forum

Prologue

The Use of Nonspeech Oral Motor Treatments for Developmental Speech Sound Production Disorders: Interventions and Interactions

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Party horns…blow ticklers…bubbles…straws… Items such as these are being used by speech-language pathologists (SLPs) across America to treat a wide range of communication disorders (Lof & Watson, 2008). In comparison to more traditional approaches to speech remediation, these treatments are atypical in that they employ *non*speech tasks as an indirect means of modifying speech production. The widespread use of nonspeech oral motor treatments (NSOMTs) to treat developmental speech sound production disorders has elicited spirited debate (to put it mildly) among SLPs and communication scientists (cf. Beckman, Clark, Forrest, Riski, & Robbins, 2003; Shelton, 2005). Given the controversial nature of these approaches, there is an urgent need for some degree of consensus regarding the applications and limitations of NSOMTs (Forrest, 2002). Accordingly, the purpose of this prologue is to provide a context for the articles that make up this clinical forum by examining the intervention process in general terms and identifying factors that may interact to limit the effectiveness of any given treatment approach.

ABSTRACT: **Purpose:** The use of nonspeech oral motor treatments (NSOMTs) in the management of pediatric speech sound production disorders is controversial. This article serves as a prologue to a clinical forum that examines this topic in depth.
Method: Theoretical, historical, and ethical issues are reviewed to create a series of clinical questions that should be considered before one incorporates new methods into clinical practice.
Conclusion: Speech production disorders are complex and multifaceted. Speech-language pathologists are encouraged to advocate on behalf of clients by adopting the highest standards of clinical practice and by evaluating treatment options in a systematic, critical, and ethical manner.

KEY WORDS: phonological disorders, ethics, treatment outcomes, treatment procedures, oral motor treatment

Complexity and Causality

Speech can be viewed as the product of a complex series of interrelated processes. Production of even a simple phrase entails formulation of a communicative goal (intent), consideration of other pragmatic factors (e.g., directness, formality), selection of lexical items, assignment of semantic roles, construction of a syntactic frame, morphological inflection, application of phonological rules, development of a motor plan, and execution of the coordinated phonatory and articulatory events that are requisite for intelligible human speech (Levelt, 1989).

Many theories and models of speech production have been proposed to account for the complexity of the communicative process (see, for example, Harrington & Tabain, 2006; Kent, Adams, & Turner, 1996; Levelt, 1989; Löfqvist, 1997). One challenge to such models is the need to reconcile the interaction between the cognitive–linguistic and motor systems. As Kent et al. noted, "Because speech

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is a modality of language, it cannot be separated from its role as language expression" (p. 6). Linguistic factors impact normal speech production; likewise, linguistic factors also may contribute to speech production disorders. Folkins and Bleile (1990), for example, proposed the term *phonomotor disorders* to highlight the inextricable nature of linguistic *and* motoric factors in speech production disorders.

Given the complex nature of speech production, it follows that disorders may be associated with inadequacies at any one of several levels. For example, there are many plausible explanations for a child's production of [bæ] for /bæθ/:

- The word may be stored incorrectly in the lexicon.
- A hearing loss may limit perception, causing the speaker to be unaware of the /θ/.
- A phonotactic rule (positional constraint) may prohibit syllable codas.
- A phonological rule may delete /θ/ in word-final position.
- Transfer of dialectal or linguistic differences may impact the phonetic realization of /θ/.
- A motor planning problem may impede articulation of [θ].
- A structural anomaly may interfere with articulation of [θ].
- A neurological problem may preclude articulatory movements for [θ].

In some cases, an individual's speech problem involves more than a single explanation. For example, a child with a structural challenge (e.g., cleft palate) may have concomitant difficulty mastering the phonological rules of the language (Howard & Pickstone, 1995). Often, it is impossible for the SLP to identify a definitive basis for the speech disorder (see Chapter 4 of Bernthal & Bankson, 2004, for a review).

Individual variability, too, has challenged the development of theories and clinical management programs (Baker & McLeod, 2004). Studies have sought to replicate treatment effects across homogeneous groups of children. In study after study, it has been shown that treatment outcomes vary to some degree, even when the exact same treatment paradigm is used with carefully matched children presenting with equivalent speech patterns (e.g., Elbert & McReynolds, 1978; Powell & Elbert, 1984; Williams, 1991). In terms of treatment, the published research clearly indicates that one size does *not* fit all.

Finally, there is much evidence to support the assertion that individuals with speech disorders are heterogenous. The work of Shriberg and colleagues (2005), for example, differentiates among diagnostically distinct subgroups of children with speech sound production disorders. In a series of articles, these investigators identified and systematically studied seven subtypes of pediatric speech sound disorders (Shriberg et al., 2005). This line of research is important, at least in part, because it provides an operational framework that will allow the systematic study of treatment effects across subgroups. This approach also is consistent with the basic tenets of evidence-based practice (Lass & Pannbacker, 2008; Shriberg, 2003).

Resourcefulness and Responsibility

The complexity of speech production and the diverse nature of speech disorders imply a need for a variety of treatment approaches. In the earliest years of the profession, there were few treatment options. The traditional perceptual motor approach popularized by Van Riper (1939) was widely used to treat developmental speech sound disorders, regardless of etiology (Hoffman, Schuckers, & Daniloff, 1989). In the years that followed, other approaches were tested and then described in the literature. Some of these approaches emphasized sensory motor aspects of speech production (notably McDonald, 1964), whereas others borrowed from linguistics and introduced treatment approaches based on distinctive feature theory (McReynolds & Bennett, 1972). Milisen (1973) argued that the diverse nature of speech sound disorders favors an eclectic approach to treatment. Because such disorders may be attributable to different causes, no single treatment can be expected to ameliorate the speech errors of every client.

The past 35 years have witnessed many changes in our conceptualization of speech production errors. Significant advances have been made in theories of phonology (e.g., Ball & Kent, 1997; J. A. Barlow & Gierut, 1999; Bernhardt & Stoel-Gammon, 1994) as well as speech physiology (e.g., S. M. Barlow, 1999; Hardcastle & Hewlett, 1999). Accordingly, many new treatment approaches have been developed for children with speech sound production disorders (cf. Hodson & Edwards, 1997; Kamhi & Pollock, 2005; Williams, 2003).

These new treatment options allow for greater flexibility, enabling SLPs to select the treatment approach that is most likely to address the specific type of disorder. Thus, if the speech disorder is associated with motor execution (i.e., articulation), then a motor-based speech production treatment would be logical. Such treatments may employ traditional clinical methods to elicit and stabilize sound production at the isolation, syllable, word, and sentence levels (e.g., Powell, Elbert, Miccio, Strike-Roussos, & Brasseur, 1998). Instrumental biofeedback approaches use technology, such as electropalatography, to provide the child with visual information regarding tongue placement and to effect improved articulation (e.g., Dagenais, 1995; Gibbon, Stewart, Hardcastle, & Crampin, 1999).

Other treatments may be optimal for children whose speech problem is associated with faulty lexical specification or phonological rules. For example, SLPs may emphasize the contrastive nature of the target using minimal pairs (e.g., *bow* vs. *boat,* as described by Weiner, 1981), maximal oppositions (e.g., *see* vs. *bee,* as described by Gierut, 1989), or multiple oppositions (e.g., *two* vs. *Sue, coo, chew,* and *true,* as described by Williams, 2000). Alternatively, SLPs may use a cycles approach that includes auditory bombardment and activities that cycle among the sounds that are affected by error patterns (Hodson & Paden, 1991). Metaphonological approaches (e.g., Howell & Dean, 1991) target phonological skills by enhancing conceptual awareness of sound properties and then using that knowledge as a framework for speech enhancement. Another treatment approach emphasizes the role of phonological complexity to predict generalization outcomes and to maximize the efficiency of treatment (e.g., Gierut, 2001). Clearly, the SLP of the new millennium has many treatment options from which to choose.

The proliferation of novel treatment methods is testament to the resourcefulness and creativity of SLPs; however, the development of new treatment methodologies also carries a responsibility for systematic evaluation to ensure the effectiveness, efficiency, and safety of treatment. As Shelton (1978) once observed, "There is no regulatory agency comparable to the Federal Drug Administration to test behavioral treatments, but that does not relieve professionals of the responsibility for carefully testing their services" (p. 165). Unfortunately, SLPs have been less successful than professionals

in other fields in this regard. Research exists to support the efficacy of certain approaches to the treatment of speech sound production disorders; however, data evaluating the efficiency of one treatment relative to another remain quite scarce (Gierut, 1998).

When faced with new treatment options, SLPs have an obligation to seek answers to several key questions before incorporating the methods into clinical practice. Such questions may include the following:

- Is the treatment consistent with accepted theories of communication and learning?
- Does the new treatment "work" (i.e., does it effect positive change beyond what might be expected due to extraneous variables such as maturation)?
- Does the new treatment work better than more established options (i.e., does it effect greater change or equivalent change in a shorter period of time)?
- For whom does the treatment work?
- How much treatment is optimal?
- Are there contraindications to the implementation of the treatment?
- What is the ratio of benefit to cost?
- At what point is it ethical to consider the treatment appropriate for clinical use?

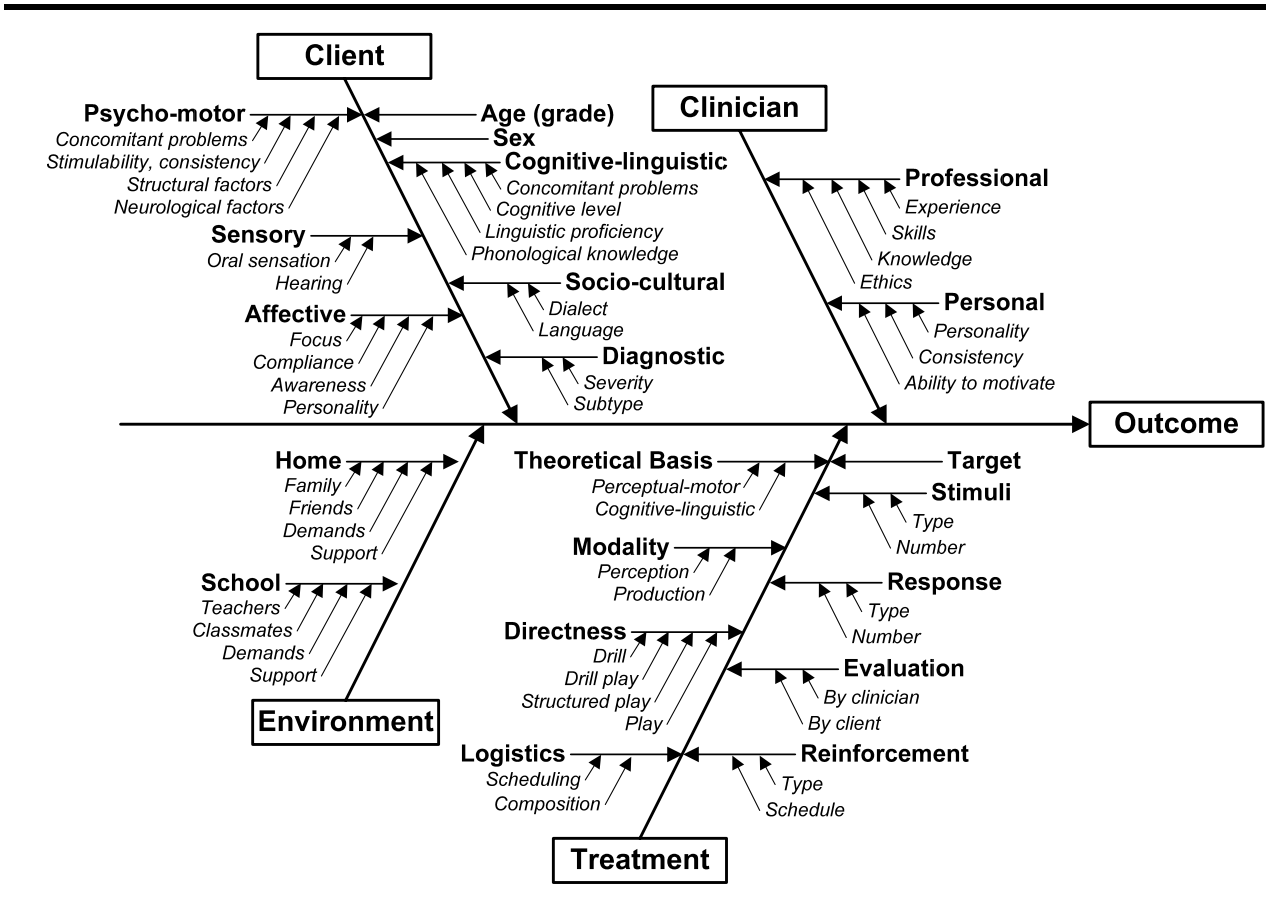
To answer these questions, SLPs must critically evaluate the intervention method and the nature of evidence that is provided for its support (Lum, 2002).

Even if the literature provides some degree of empirical support for a given treatment, there remains a professional and ethical obligation to evaluate the effectiveness of the treatment with the individual client (American Speech-Language-Hearing Association [ASHA], 2003; also see discussions in Bain & Dollaghan, 1991; Baker & Bernhardt, 2004; Olswang & Bain, 1994). In this respect, clinical accountability (i.e., systematic evaluation of clinical outcomes) is, essentially, a type of clinical research (Douglass, 1983). The responsibility for evaluating treatment effects is not limited to researchers; it is a responsibility that is shared by clinicians and researchers alike (Fey & Johnson, 1998). Although resourcefulness in the development of new treatment approaches may be viewed as positive, SLPs cannot abdicate responsibility for evaluating those treatments scientifically as a precursor to widespread implementation.

Participants and Paradigms

Many factors may interact to affect the success of a treatment. Among these factors are the characteristics of the participants (i.e., the client, the clinician, and others in the environment) and the treatment paradigm itself (Baker & Bernhardt, 2004). Figure 1

Figure 1. Cause and effect diagram illustrating selected sources of variance that may impact the outcome of intervention for children with developmental speech sound production disorders.



is a cause and effect diagram (inspired by Ishikawa, 1985) that models some of the factors that are likely to impact treatment outcomes.

First, there are many client-specific variables (such as age, diagnosis, and capability) that may impact the effectiveness of a given treatment approach. Research has investigated many of these variables, including stimulability, oral sensation, consistency, and so forth (Bernthal & Bankson, 2004). Concomitant problems, such as hearing loss or language impairment, are likely to impact the outcome of treatment, as are affective variables (e.g., attention, motivation, and effort; Kwiatkowski & Shriberg, 1998).

Second, the client's environment can play an important role in the outcome of treatment. Concerned parents and teachers who provide support and consistency are likely to enhance treatment outcomes. Certain treatment options entail intensive home programs and may fail if there is insufficient cooperation (Bowen & Cupples, 1999).

Third, the knowledge and skills of the clinician may impact the effectiveness of the treatment. Although the importance of personal skills is acknowledged in the clinical education literature (e.g., McAllister & Lincoln, 2004), little research exists to examine the impact of the clinician's personality on treatment outcomes. It seems possible, however, that individuals with certain personality characteristics may be more comfortable—and more successful—using some treatments over others. In other cases, however, clinician–client interactions may be problematic and can limit the effectiveness of even the most promising treatment option.

Finally, treatment variables are many and complex. SLPs must consider the theoretical basis of the intervention, the treatment modality, and the interaction style as these factors are likely to interact with client attributes. Logistical factors (such as scheduling, frequency, length of session) and composition (individual, small homogeneous group, small heterogeneous group, etc.) also may impact the outcome of intervention. The specific methods used to elicit and stabilize correct productions also must be considered carefully (Shriberg & Kwiatkowski, 1982).

Given that many of these variables may interact during the treatment process, it is unlikely that research will ever tease out the relative contributions of each individual factor. This observation only serves to underscore the importance of clinical accountability and systematic assessment of treatment outcomes. To evaluate specific outcomes, one must test treatment paradigms under controlled conditions with carefully chosen (and described) participants (Lum, 2002).

Ethics and Experimentation

SLPs have an ethical obligation to protect the welfare of the client, to be professionally competent, and to provide accurate information regarding communication disorders and their management (ASHA, 2003; Irwin, Pannbacker, Powell, & Vekovius, 2007). Familiarity with clinical research findings is important because it enables one to identify the most appropriate treatment options for an individual case. Evidence-based practice provides a useful framework to evaluate treatments and to guide clinical decision making in accordance with ethical standards of practice (Lass & Pannbacker, 2008).

There is a great need for controlled experimentation to evaluate the effectiveness and efficiency of treatments through the systematic application of scientific methods (Lum, 2002). Experimental treatment studies may be conducted in clinical settings; however, care must be taken to ensure that legal and ethical practices are followed (O'Toole, Logemann, & Baum, 1998). It would be unethical, for example, to experiment with human participants without their informed consent (Irwin et al., 2007). Nevertheless, some clinical procedures are used routinely without full disclosure that the treatment is not validated, and this practice has been questioned on ethical grounds (Lum, 2002).

But when does a treatment stop being experimental? Unfortunately, the effectiveness of treatment paradigms is established gradually, and no treatment is likely to be effective for all clients. In the absence of definitive criteria, one clinician's experimental paradigm is likely to be another clinician's mainstream treatment (Finn, Bothe, & Bramlett, 2005). This clinical conundrum is not new. Acknowledging that clinicians must make treatment decisions on the basis of available data, Siegel and Ingham (1987) argued that "one criterion must surely involve whether the therapeutic approach fits current theoretical views of the disorder and the normal behavior from which it deviates" (p. 103).

Considerations and Conclusions

Speech production is complex, and there are many reasons why an individual may have trouble producing speech sounds appropriately. Research has shown that speech sound disorders are not homogeneous; instead, several subtypes have been identified. There is a great need for research to determine the effectiveness of competing treatments with different diagnostic subgroups, as well as studies examining interactions among factors that might impact the effectiveness of a treatment (i.e., attributes of the client, clinician, treatment, and environment). Finally, ethical principles are applicable to both research and clinical practice.

These theoretical, empirical, and ethical considerations are important for the critical evaluation of controversial practices in general, and for NSOMTs in particular. As noted previously, there is a need for some degree of consensus regarding the applications and limitations of NSOMTs. In response to this need, this clinical forum was initiated to summarize historical and theoretical motivations for NSOMTs, to document current clinical trends, to evaluate existing scientific support, and to identify future research needs.

The series begins with an article authored by Ruscello, who provides an operational definition for NSOMTs. This contribution also describes common NSOMT procedures, examines their theoretical bases, and provides a critique of relevant research. Next, Lof and Watson report the results of a national survey exploring the clinical use of NSOMTs. Their study explores the rationales and educational practices that motivate clinical use of such treatments, as well as SLPs' beliefs regarding NSOMT procedures. Lass and Pannbacker then evaluate NSOMTs within an evidence-based practice framework. They summarize the principles of evidence-based practice and evaluate support to help guide responsible clinical practice. Finally, the epilogue (Powell) provides tentative answers to clinical questions underlying the use of NSOMTs with children who have speech sound disorders. Collectively, these articles encourage SLPs to advocate on behalf of clients by adopting the highest standards of clinical practice and by evaluating treatment options in a systematic, critical, and ethical manner.

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