# PHONOLOGICAL ANALYSIS SUMMARY AND MANAGEMENT PLAN

Elise Baker

Management of phonological impairment in children is one of the bread-and-butter tasks for paediatric clinicians. In the past, manual phonological analysis has been considered time-consuming. With the advent of computer-based phonological analysis tools however, time is no longer an issue. Rather, clinicians need to make sense of the analysis results, then make a series of management decisions. This paper presents a template for summarising the results of phonological analyses in addition to guidelines for making decisions regarding the selection of treatment targets and the identification of appropriate phonological intervention approaches. Suggested readings are provided for clinicians who would like to extend their knowledge in the areas of phonological analysis, treatment target selection and phonological intervention.
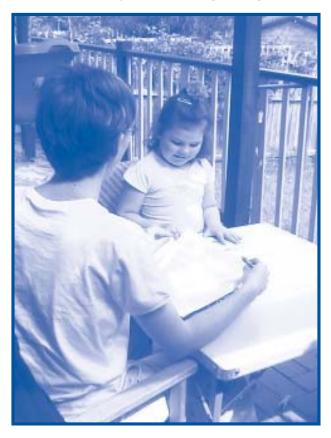
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   intervention,
   phonological analysis,
   treatment-target selection

**O**ne of the key tasks speech pathologists need to perform when managing phonological impairments in children is phonological analysis. Unfortunately, analysis can be one of the most daunting aspects of paediatric clinical practice. All too often phonological analysis is thought to be time-consuming and a barrier to getting on with the job of helping children become intelligible. However, as Bernhardt and Holdgrafer (2001) point out, inaccurate or incomplete analysis can result in intervention continuing for much longer than it needs to. Analysis helps elucidate patterns or problems underlying unintelligible speech. It provides ideas on "where to start" – that is, which phoneme or syllable-word problem to tackle first.

The past 25 years has seen a wealth of literature published on the topic of phonological analysis (e.g., Bernhardt & Stemberger, 1998, 2000; Grunwell, 1995; Khan & Lewis, 1986; Velleman, 1998; Weiner, 1979; Williams 2003). More recently, computerised phonological analysis programs (e.g., Long, Fey & Channell, 2002; Masterson & Bernhardt, 2001) have grown in popularity due to their efficiency. As Long (2001) points out that the average times for computerised phonological analysis "are so small (9–36 minutes) and the time savings compared to manual analysis so great, that it appears unreasonable not to use software for this purpose" (p. 414). Despite their great efficiency, such programs have one ironic drawback – they can provide too much information. The clinician needs to sort through the results of computerised analyses to identify the key problems for individual clients. In some cases, particularly unusual cases of phonological impairment, more in-depth manual phonological analysis may also be needed.

The purpose of this paper is not to provide clinicians with a guide to analysing children's speech, but merely to provide a template that can be used to summarise the wealth of information that can be provided by computerised phonological analyses. The template was specifically designed to summarise and in some areas supplement the results gained from a PROPH analysis (Long et al., 2002). PROPH stands for "Profile in Phonology" and is a computerised analysis derived from one component of the program *Computerized Profiling* (Long et al., 2002). *Computerized Profiling* is a freeware program available on the Internet at **www.computerizedprofiling.org**. The remainder of this paper will guide the reader through the accompanying "Phonological Analysis Summary and Management Plan". It is assumed that the clinician knows how to conduct a phonological analysis, either manually or electronically. Key references are provided in areas where clinicians may want to extend their knowledge, in order to complete the plan.



1. *Background information*: This section provides a brief summary about the client and the nature of the speech sample(s) on which results of the phonological analysis is based.
2. *Independent analysis*: An independent analysis provides the clinician with information about what the client can do – the consonant and vowels, syllable-word shapes, and syllable-stress patterns he or she can produce. It also considers what the child cannot do, and what they can do in limited ways in terms of inventory, positional and

sequences constraints. The convention for summarising syllable-word shape inventory is based on Grunwell (1985). For instance, $C_{0-2}VC_{0-2}$ means that across a given speech sample, the child is capable of articulating monosyllables comprising zero up to two consonants to the left of a vowel, and zero up to two consonants to the right of a vowel.

3. *Relational analysis*: A relational analysis provides the clinician with information about how the client's speech compares with the adult or target phonology. Within this section, tables are provided for reporting percent correct production of consonants, vowels and consonants according to various manners of articulation. A table of the phonological processes or speech patterns used by the client is also provided. It should be noted that some computerized programs like PROPH do not always accurately identify the patterns or processes in children's speech. For instance, although PROPH discriminates between stopping of early and late developing fricatives, it does not identify stopping of sibilants (stopping of /s, z, ʃ, ʒ/). The clinician occasionally needs to eye-ball the data to ensure that the processes identified by the program are consistent with the clinician's impression of the data.

4. *Additional factors to consider*: This section of the template prompts the clinician to consider a range of factors that may influence the order in which treatment targets are selected for intervention, or the type of intervention approach. The answer to each question is routinely obtained during a case history interview with the client's parents or caregiver, or during initial speech and language testing.

5. *Treatment targets*: This section of the template requires the clinician to decide which of the problems identified in the independent and relational analyses require intervention. The table is divided into two columns – treatment targets in order of selection for intervention, and treatment targets to be monitored for phonological generalisation. The table has been constructed this way for two reasons: first, to prompt clinicians to decide on the order in which intervention targets will be treated. As Gierut (2001, p. 229) points out, "the key to treatment efficacy for phonological disorders, may lie in the initial selection of target sounds for treatment". The second is to prompt clinicians to think about which phonological process or phonemes may improve indirectly as a result of response generalisation. A section has been included for clinicians to indicate whether the treatment target order is in line with the least or most knowledgeable approach to target selection. For more information on treatment target selection, readers are directed to two interesting papers: Gierut (2001) provides an overview of evidence in support of the least knowledge approach, and Rvachew and Nowak (2001) for evidence in support of the most knowledge approach. The right-hand column of the table is used to denote the patterns or phonological processes that may change as a result of phonological generalisation. See Gierut (2001) for further information on phonological generalisation in relation to treatment target selection.

6. *Intervention approach*: There are presently a multitude of approaches for treating phonological impairments of unknown origin in children. The approaches listed in section 6 of the template are a selection from the literature. Clinicians may wish to include other approaches they use, or add other approaches as they are published. Appendix 1 lists helpful readings for each approach.

7. *Plan for evaluating intervention*: The final section of the template provides clinicians with a framework for considering how they will evaluate intervention. Specifically,

the table in section 7 prompts clinicians to decide what they are going to measure (e.g., initial /s/ clusters in single words), the category the data represents (e.g., response generalisation data), the type of data (e.g., qualitative or quantitative measure of initial /s/ clusters), when it will be measured (e.g., every 4th session), where (e.g., in the clinic) and who will collect the data (e.g., the clinician). The table is based on Baker and McLeod (2001). Readers are directed to Baker and McLeod (2001) and Olswang and Bain (1994) for further information on evaluating the efficacy of phonological intervention.

In summary, the Phonological Analysis Summary and Management Plan may be used to summarise the results of phonological analysis, and direct clinical decision-making when managing phonological impairments in children. The plan represents one clinician's attempt to organise data and make sense of unintelligible speech prior to starting intervention. Templates have been developed by other clinical researchers, using alternative theoretical perspectives on phonology (e.g., Bernhardt & Stemberger, 2000; Velleman, 1998; Williams, 2003). The reader is encouraged to seek out such literature to develop a repertoire of approaches for analysing phonological impairment in children.

# References

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**Elise Baker** is a lecturer with the School of Communication Sciences and Disorders, The University of Sydney. She completed her PhD on the efficacy of intervention for phonological impairments in children and has a keen interest in aligning research with practice.

Correspondence to:

**Elise Baker, PhD**
*School of Communication Sciences and Disorders*
*The University of Sydney*
*PO Box 170, Lidcombe, NSW 1825*
*phone: (02) 9351 9748*
*fax: (02) 9351 9173*
*email: E.Baker@fhs.usyd.edu.au*



| Appendix 1. Phonological intervention approaches and suggested readings | |
|---|---|
| **Intervention approach** | **Suggested readings** |
| Minimal pairs | Elbert, M., Powell, T. Q. & Swartzlander, P. (1991). Toward a technology of generalisation: How many exemplars are sufficient? *Journal of Speech and Hearing Research, 34*, 81–87.<br>Tyler, A. A., Edwards, M. L., & Saxman, J. H. (1987). Clinical application of two phonologically based treatment procedures. *Journal of Speech and Hearing Disorders, 52*, 393–409. |
| Maximal pairs | Gierut, J. A. (1992). The conditions and course of clinically induced phonological change. *Journal of Speech and Hearing Research, 35*, 1049–1063. This paper provides a summary of Gierut's work on the development of the maximal pairs approach. References to her previous work are provided at the end of the paper. |
| Multiple oppositions | Williams, A. L. (2000a). Multiple oppositions: Case studies of variables in phonological intervention. *American Journal of Speech-Language Pathology, 9*, 289–299.<br>Williams, A. L. (2000b). Multiple oppositions: Theoretical foundations for an alternative contrastive intervention approach. *American Journal of Speech Language Pathology, 9*, 282–288. |
| Metaphon | Howell, J. & Dean. E. (1994). *Treating phonological disorders in children: Metaphon theory to practice*. London: Whurr.<br>Jarvis, J. (1989). Taking a Metaphon approach to phonological development: A case study. *Child Language Teaching and Therapy, 28*,16–32.<br>Reid, J., Donaldson, M.L., Howell, J., Dean, E., & Grieve, R. (1996). The effectiveness of therapy for child phonological disorder: The Metaphon approach. In M. Aldridge (Ed.), *Child Language*. Clevedon: Multilingual Matters. |

| Intervention approach | Suggested readings continued |
|---|---|
| Metaphonological intervention | Gillon, G. (2000). The efficacy of phonological awareness intervention for children with spoken language impairment. *Language, Speech and Hearing Services in Schools, 31*, 126–141.<br>Hesketh, A., Adams, C., Nightingale, C., & Hall, R. (2000). Phonological awareness therapy and articulatory training approaches for children with phonological disorders: a comparative outcome study. *International Journal of Language and Communication Disorders, 35*(3), 337–354.<br>Major, E., & Bernhardt, B. (1998). Metaphonological skills of children with phonological disorders before and after phonological and metaphonological intervention. *International Journal of Language and Communication, 33*(4), 413–444. |
| Cycles | Hodson, B. W. (1997). Disordered phonologies: What have we learned about assessment and treatment? In B. W. Hodson & M. L. Edwards (Eds.), *Perspectives in applied phonology*. Maryland: Aspen Publication.<br>Hodson, B. W., & Paden, E. P. (1991). *A phonological approach to remediation: Targeting intelligible speech* (2nd ed.). Austin: TX: Pro-Ed. |
| PACT Therapy | Bowen, C. & Cupples, L. (1998). A tested phonological therapy in practice. *Child Language Teaching and Therapy, 14*, 1.<br>Bowen, C. and L. Cupples (1999). Parents and children together (PACT): A collaborative approach to phonological therapy. *International Journal of Language and Communication Disorders, 34*(1), 35–83. |
| Language-based intervention | Hoffman, P. R., Norris, J. A., & Monjure, J. (1990). Comparison of process targeting and whole language treatments for phonologically delayed preschool children. *Language, Speech, and Hearing Services in Schools, 21*, 102–109.<br>Hoffman, P. R., Norris, J. A., & Monjure, J. (1996). Effects of narrative intervention on a preschooler's syntactic and phonological development. *National Student Speech Language Hearing Association Journal, 23*, 5–13.<br>Tyler, A. A. (2002). Language-based intervention for phonological disorders. *Topics in Language Disorders, 23*(1), 69–81. |
| Imagery | Klein, E. S. (1996a). *Clinical phonology: Assessment and treatment of articulation disorders in children and adults*. San Diego, CA: Singular.<br>Klein, E. S. (1996b). Phonological/traditional approaches to articulation therapy: A retrospective group comparison. *Language, Speech, and Hearing Services in Schools, 27*, 314–323. |
| Psycholinguistic intervention | Stackhouse, J., & Wells, B. (1997). *Children's speech and literacy difficulties: A psycholinguistic framework.* London: Whurr.<br>Stackhouse, J., & Wells, B. (2001). *Children's speech and literacy difficulties: Book 2, identification and intervention.* London: Whurr. |
| Nonlinear phonological intervention | Bernhardt, B. (1992). The application of nonlinear phonological theory to intervention with one phonologically disordered child. *Clinical Linguistics and Phonetics, 6*, 283–316.<br>Bernhardt, B. H., & Stemberger, J. P. (2000). *Workbook in nonlinear phonology for clinical application*. Austin, TX: Pro-ed. |
| Naturalistic speech intelligibility training | Camarata, S. (1993). The application of naturalistic conversation training to speech production in children with speech disabilities. *Journal of Applied Behaviour Analysis, 26*, 173–182.<br>Camarata, S. (1995). A rationale for naturalistic speech intelligibility intervention. In M. E. Fey, J. Windsor, & S. F. Warren (Eds.), *Language intervention: Preschool through the elementary years* (pp. 63–84). Baltimore, MD: Paul H. Brookes. |
| Phonotactic therapy | Velleman, S. L. (2002). Phonotactic therapy. *Topics in Language Disorders, 23*(1), 43–56. |
| Mnemonics approach for targeting polysyllabic errors. | Young, E. C. (1995). An analysis of a treatment approach for phonological errors in polysyllabic words. *Clinical Linguistics and Phonetics, 9*, 59–77. |
| Core vocabulary approach | Bradford, A. & Dodd, B. (1997). A treatment case study of inconsistent speech disorder. *Australian Communication Quarterly, Autumn*, 24–28.<br>Dodd, B. & Bradford, A. (2000). A comparison of three therapy methods for children with different types of developmental phonological disorder. *International Journal of Language and Communication Disorders, 35*(2), 189–209. |

# Phonological Analysis Summary and Management Plan

By Elise Baker, PhD, The University of Sydney

## 1. BACKGROUND INFORMATION

Client name:  _____

Date of birth:  _____

Date of sample:

  • Single words:  _____

  • Conversational speech:  _____

**Sampling stimulus** (*e.g., Name of published sampling tool, or description of informal task e.g., playdough for 10 mins*):

  • Single words:  _____

  • Conversational speech: _____

Language(s) spoken…                              Languages exposed to…

  _____        _____

## 2. INDEPENDENT ANALYSIS

**(a) Consonant inventory (SW = single words, CS = conversational speech)**

| Inventory consonant phones | Range of phones | | Marginal (1 or 2 occurrences) |
| --- | --- | --- | --- |
| | Singletons | Consonant clusters | Singletons    clusters |
| Initial | SW<br><br>CS | | |
| Medial | SW<br><br>CS | | |
| Final | SW<br><br>CS | | |

  **(Before completing constraints, ensure speech sample is adequate. A 'constraint' should not be due insufficient sampling.)**

• **Inventory constraints (phones NOT in inventory):**

• **Positional constraints (positions, phones limited to, e.g., /k, g/ SFWF only):**

• **Sequence constraints (CVCV and CCV… combinations limited to..):**

**(b) Vowel inventory**

                Complete vowel quadrilateral by circling vowels within client's phonetic inventory.
                Note any front / back / centring patterns.

• **Single vowels** (12 in total) :

   /i ɪ ɛ æ ɑ ʌ ə ɜ ɒ ɔ ʊ u /

(Words containing vowels: "he, hit, head, hat, hart, hut, hott<u>er</u>, heard, hot, bought, put, boot")