

A tested phonological therapy in practice

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Abstract

The focus here is a detailed case description of a broad-based model for treating developmental phonological disorders. Successful treatment comprising 27 consultations over 17 months, of a girl aged 4;4 at the outset, with a moderate phonological disability, is examined in detail. The model's strength is in its combination of family education, metalinguistic tasks, phonetic production procedures, multiple exemplar techniques and homework. Treatment is administered in planned alternating therapy blocks and breaks from therapy attendance.

Introduction

In the field of speech-language pathology, the terms developmental phonological disorder and phonological disability broadly denote a linguistic disorder in children, manifested by the use of abnormal patterns in the spoken medium of language. The terms reflect the influence of clinical phonology upon the way in which many linguists and language clinicians now conceptualize children's speech sound disorders (Baker, 1997; Bernthal and Bankson, 1994; Fey, 1992; Grunwell, 1995; Pollock, 1994), especially in terms of generative and natural phonology (see Ingram (1997) and Grunwell (1997), respectively for reviews of the influence of these two schools of phonology). The first author's clinical and research fascination with phonological disability stems from experience as a speech-language pathologist, treating children with the disorder since the early 1970s. In that period, there have been two important paradigm shifts. First, linguistic theory has explicated the distinction between phonetics: the study

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of speech sounds; and phonology: the study of the rule-governed occurrence of sounds in a language (Ingram, 1976). The second shift in the field relates to the increasing status of the role of parents in the therapeutic process (Blosser, 1996; Crago and Cole, 1991; Crais, 1991; Fey, 1986).

Theoretical influences

The principles, or theoretical assumptions, on which any phonological therapy approach is based, derive first from a theory, or theories, of normal phonological development, that is, how children normally learn the speech-sound system through a combination of maturation (developmental readiness) and learning (Ball and Kent, 1997; Vihman, 1996). Arising from the practitioner's beliefs and assumptions about normal development, comes a theory of abnormal phonological development, that is, a theory of disorders, explaining why some children do not acquire their phonology along typical lines (Gibbon and Grunwell, 1990: 148). From such theories of normal and abnormal acquisition, a theory of intervention can evolve. The application of the theory to intervention depends on how the individual clinician understands, interprets, incorporates, adapts and modifies knowledge about normal and abnormal acquisition, and what theoretical assumptions are made in the process.

A theory of phonological therapy, that is, how best to accelerate phonological development, and hence speech clarity, beyond the progress expected with age in phonologically disabled children, must logically rely on assessment and intervention procedures that are congruent with the interventionist's theories of development, disorders and intervention. An emphasis on the need for congruence and consistency between phonological theory and the process and form of assessment and intervention does not imply, however, that the clinician cannot be theoretically eclectic. Indeed, many clinicians would agree with Grunwell (1985) who said:

... hybridisation of different theoretical approaches may lead to new insights for the theoretical phonologist as well as applicable management guidelines for the practitioner. (p. 4)

The development of the current model has been moulded and influenced by:

- 1) The work of Weiner (1981) and Blache (1982), concerned with clinical applications of distinctive features theory (for a commentary see Ingram (1997)), and their consequent contributions to the development of phonological therapy procedures and activities such as minimal

contrast therapy; and Hodson and Paden (1983) particularly for introducing auditory bombardment. Auditory bombardment is a procedure in which the client is provided with intensified, repeated, systematic exposure to multiple exemplars of phonological targets and contrasts. In the current model, auditory bombardment involves words with common phonetic features (e.g. all starting with a particular target sound), or minimally contrasted words exemplifying a phonological process (e.g. tea-key, tap-cap, etc. for velar fronting; or moo-moon, buy-bite, etc. for final consonant deletion; or top-stop, nail-snail, etc. for cluster reduction). Auditory bombardment is used on the basis that phonological progress is sensitive to phonological input (Ingram, 1989).

- 2) The theoretical contributions of the Stanford or cognitive model of phonological development (Ferguson, 1978; Kiparsky and Menn, 1977), and in particular Menn (1976), in the development of the interactionist-discovery theory, have been influential. The cognitive approach construed the child as 'little linguist'. In problem-solving mode, he or she met a series of challenges and mastered them, thereby gradually acquiring the adult sound system. Because the child was considered to be involved actively and 'cognitively' in the construction of his or her phonology, the term cognitive model was used. Phonological development was an individual, gradual and creative process (Ferguson, 1978). The Stanford team proposed that the strategies engaged in the active construction of phonology were individual for each child, and influenced by internal (characteristics and predispositions of the child) and external (characteristics of the environment) factors. The external factors might include the child's ordinal position in the family, family size, child-rearing practices and interactional style of the primary caregivers. Longitudinal studies revealed evidence of strategies such as children's active hypothesis testing and problem solving as a vehicle for phonological acquisition (Menn, 1981; Macken and Ferguson, 1983).
- 3) Fey and Gandour (1982), in regard to clinical applications of the cognitive and interactionist-discovery theory; and Fey (1992) for providing a functional framework for analysing the form of phonological therapy.
- 4) Ferguson (1978), Ingram (1976), and Stoel-Gammon and Dunn (1985), for the practical linkage between theories of phonological development, assessment and intervention.
- 5) Most significantly, Grunwell (e.g. Grunwell, 1981, 1985, 1992, 1995) for information and clarification of a range of clinical phonology theoretical and practical issues.

The therapy model

The current broad-based, family-centred, therapy model comprises five interacting, dynamic components. The components, included in therapeutic management in varying degrees according to individual differences within the child with phonological disability and his or her family, are: (1) family education; (2) metalinguistic tasks, focusing on aspects of linguistic awareness and phonetic and phonological processing; (3) traditional phonetic production procedures; (4) multiple exemplar techniques, including minimal contrast and auditory bombardment activities; and (5) homework activities, incorporating (1)–(4), above.

As an essential adjunct to discussion, parents are given a 40-page booklet: *Developmental phonological disorders: a practical guide for families and teachers*, since expanded (Bowen, 1997), containing detailed information, in accessible language for non-professionals, about the treatment approach. The disorder is defined and described, language development norms outlined, concepts such as developmental readiness, modelling and reinforcement explained, and the questions commonly asked by parents (and professionals unfamiliar with phonological approaches) addressed.

The duration of a treatment session is 50 minutes. Within this time-span, the child spends 30–40 minutes alone with the therapist. The minimum amount of parent participation at the clinic involves the parent joining the therapist and child for 10–20 minutes at the end of a session, or 10 minutes at the beginning and 10 minutes at the end, for the therapist to show the parents what to do for homework. The maximum parent participation entails the parent being actively involved in a treatment ‘triad’ with their child and the therapist, for approximately half of the treatment session. These segments of parent participation require the child’s continued involvement, in order to demonstrate properly what should happen during home-practice. Parents play a major role in intervention in terms of homework during therapy blocks, and ongoing management during the breaks.

Efficacy study

The model, once devised, was trialed and modified over a three-year period. Clinically, it appeared to be an efficient and effective means of treating children with developmental phonological disorders. However, a belief in the efficacy of a trusted but untested therapeutic model, based on clinical observations and impressions, is insufficient justification for

continuing its development and application, or for promoting it to other clinicians as a worthwhile approach. Therefore, a rigorous study of its effectiveness was needed.

Fourteen randomly selected children (mean age 4;1) were treated, and their progress was compared with that of eight untreated control children (mean age 3;10), in a longitudinal matched groups design. Analysis of variance of the initial and probe severity ratings of the phonological disabilities, 3–11 months apart, showed highly significant selective progress in the treated children only ($F(1, 20) = 21.22, p < 0.01$). Non-significant changes in receptive vocabulary ($F < 1$) pointed to the specificity of the therapy.

Measurement

The main dependent variable in the therapy efficacy study was the improvement in phonological development of the treatment group beyond the progress expected with age. Hence, it was crucial to attempt to develop a reliable means of recording and quantifying the severity of the children's phonological disabilities, and of recording and measuring change. Two ways of measuring the phonological characteristics of the subjects were applied namely, incidence category scores and the sum of phonological deviations procedure. Additionally, two ways of measuring the severity of phonological disability in children were developed: a severity rating procedure, and a clinically applicable severity index with a high correlation ($r(79) = 0.87, p < 0.01$) with the severity ratings of experienced speech-language pathologists. The first three measurement systems are described here to facilitate understanding of the way Nina's progress is displayed in Tables 1 and 2.

1) The incidence category scores were based on the commonly applied procedure (e.g. Grunwell, 1985; Stoel-Gammon and Dunn, 1985) of dividing the number of actual occurrences of a deviation by the number of potential occurrences, and expressing the result as a percentage. The scores were then allocated to five categories:

Category 5	80–100%	occurrence of the phonological deviation
Category 4	60–79%	occurrence of the phonological deviation
Category 3	40–59%	occurrence of the phonological deviation
Category 2	20–39%	occurrence of the phonological deviation
Category 1	≤ 19%	occurrence of the phonological deviation.

In the study, the reliability of allocation of percentage of occurrence scores ranged from 80% to 99% ($\bar{x} = 91\%$).

- 2) The sum of phonological deviations procedure provided a broad indication of the severity, or otherwise, of a phonological disability. It involved tallying the sum of deviations in the incidence categories, but ignoring the distinction between categories. Deviations from 15% to 19% for Category 1 for the initial assessment, and phonological deviations from 5% to 19% for Category 1 for subsequent assessments were included (i.e. deviations < 15% were not included in the sums of deviations of the children's initial assessment data, and subsequent deviations < 5% were not included). Nina's initial sum of deviations was five (see Tables 1 and 2). Reliability of the identification of the children's phonological deviations was high, with inter-observer agreement at 97% across all the children.
- 3) The severity rating scale depended on the judgement of the severity of each child's phonological disability by four volunteer speech-language pathologists, all experienced clinicians in the area of phonological disability, and referred to here as 'the raters'. The raters allocated the children's phonological assessment data to one of four severity rating bands:

a severity rating of 1	phonological system within normal limits
a severity rating of 2	mild phonological disability
a severity rating of 3	moderate phonological disability
a severity rating of 4	severe phonological disability.

The mean severity rating for each phonological assessment was calculated by adding the scores assigned by the four raters, and dividing the sum by four. Rater 1 gave Nina a severity rating of 3.00 (moderate phonological disability) at her initial assessment, while Raters 2–4 allocated her phonology to category 4.00 (severe phonological disability). Her severity rating score was calculated thus: $(3 + 4 + 4 + 4)/4 = 3.75$. Hence, her severity rating was 3.75 (moderate phonological disability). Interobserver agreement was acceptable ($\bar{x} = 75\%$ with a range of 50–100%).

Assessment

Any child's phonology with a severity rating of 3.00 or more was submitted, minimally, to at least the following three analytical procedures of the PACS (Grunwell, 1985), or their equivalent: (1) the phonetic inventory (the phonetic characteristics of the child's output phonology); (2) the contrastive assessment (the phonetic and phonological matches and

mismatches, and hence the communicative potential of the output phonology); and (3) the developmental assessment (the developmental status of the child's output phonology). As the children's phonology improved, their assessments became less exhaustive.

Terminology

Fey (1992) presented a structural plan for analysing the form of language intervention approaches in terms of (1) their hierarchy of goals: basic, intermediate and specific; (2) the intervention procedures: for example, homophony confrontation, inventory expansion, auditory bombardment, phoneme segmentation, and lexical and grammatical innovation; and (3) the intervention activities: for example, games and tasks. Fey's analytical framework captured the clear distinction between intervention approaches, intervention procedures and intervention activities. The clear and useful distinctions between the aspects of the therapy model (e.g. the distinctions between levels of goals, and those between approaches, procedures and activities), suggested by Fey, are used in this case study.

Case study of Nina

Nina was chosen for a detailed case description because she represented a typical response to the therapy approach, and because incidents and issues that arose in the course of her management are commonly encountered in the day-to-day clinic routine.

Nina was referred by her parents for speech and language assessment at the age of 4;4. She had not been previously assessed or treated by a speech-language pathologist, and her parents reported that they had not been in the habit of correcting her speech, because they found it very difficult to understand what she was saying, and because they were at a loss to know where to begin correcting. In common with other children in the study, she was a monolingual speaker of Australian English with normal hearing, and her language skills, other than phonology, were within the average range. For example, mean length of utterance in morphemes (MLUm) was 5.30 and her standard score on the Peabody picture vocabulary test-revised (PPVT-R) (Dunn and Dunn, 1981) was 115. Aspects of her history and participation in therapy are summarized in Table 1.

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Nina was an energetic, determined and somewhat anxious little girl, whose mother described herself as ‘a worrier’. Nina’s mother often commented that she had ‘no support’ (i.e. emotional and practical support) from her husband in bringing up their three children because he worked very long hours and was overseas a great deal. Nina had persistent separation anxiety at preschool and at home, and had a history of psychosomatic symptoms. Her mother reported continual difficulty in getting Nina to come willingly to therapy, though this was difficult to believe from her presentation at the clinic, since she always arrived happily and had to be coaxed to leave for preschool.

From the outset of therapy, Nina was quite aware of her poor intelligibility. She would never repeat an utterance if asked for clarification,

Table 1 Nina’s history and therapy participation summary

Initial consultation age	52 months
Initial severity rating	3.75 moderate phonological disability
Initial Peabody picture vocabulary test (R) standard score	115
Initial mean length of utterance in morphemes (MLUm)	5.30
	Initially Nina spoke very rapidly, and was self-conscious about her speech.
Number of consultations	27
Number of treatments	22
Number of assessments	5
Duration of therapy	17 months
Age at discharge with phonology within normal limits	69 months
Attendance	Nina’s mother accompanied her to all consultations. She reported continual difficulty getting Nina to come happily to therapy. Once she arrived she was fine, but then had to be coaxed to leave for preschool.
Homework	Nina’s mother kept good records of homework participation. During therapy blocks she did 18 × 5-min homework sessions per week at home one-to-one with her mother, and one 5-min session per week at pre-school one-to-one with her teacher. Her speech book was sent to school once a week during therapy blocks on the same day each week.
Therapy blocks and breaks	Block one: nine consultations. Break: 10 weeks. Block two: eight consultations. Break two: 10 weeks. Block three: eight consultations. Break three: 14 weeks Block four: three consultations. [Break three was 14 weeks instead of 10 weeks due to chickenpox]

but would say, 'Doesn't matter' ([ˈdæməənə]), and become silent and unhappy for a few moments. Nonetheless, she was surprisingly intelligible at single word level and at short phrase level in context, but at phrase level out of context she was largely unintelligible to everyone, including her family. She usually marked regular 's' and 'es' plurals with a schwa (e.g. glass [gat] glasses [gatə]), and generally spoke very rapidly.

Examples from Nina's initial phonological sample (CA 4;4)

ship	[tɪp]	magic	[ˈmæwdɪt]	chocolate	[ˈtɒkət]
fish	[tɪt]	mask	[mat]	chocolates	[ˈtɒkətə]
fast	[tat]	match	[mæt]	glass	[gat]
stop	[tɒp]	fridge	[fɪd]	glasses	[ˈgatə]
sun	[tʌn]	jelly	[ˈdæʒi]	queen	[kin]
snow	[təʊ]	garage	[ˈgæʒɪd]	queens	[kinə]
story	[tɔɪ]	lady	[ˈjeɪdi]	clown	[tan]
worry	[wɔɪ]	ladies	[ˈjeɪdi] no schwa	glove	[gʌd]
marry	[mɔɪ]	sorry	[tɔɪ]	gloves	[gʌdə]
carry	[kɔɪ]	string	[tɪŋ]	left	[l t]
smile	[paɪu]	river	[wɪdə]	vase	[bad]

[kəˈnaɪ hæb wʌnəˈdɛn / ɪtæˈmæənə ɪt ɪt ,wʌd ə ˈjaɪjəʊ / aɪ ta ,wɔɪ tɪtəd aɪ ˈjaɪk tən bəʊt tə ,teɪn]

'Can I have one of them? It doesn't matter if it's red or yellow. I don't worry because I like them both the same'.

Therapy block one

Phonological assessment data were gathered over one assessment session, comprising the metaphon screening assessment (Dean et al., 1990) and a 220-word sample, largely of spontaneous utterances, which was submitted to analysis. Her sum of phonological deviations was five, and her severity rating 3.75 (moderate phonological disability), with the following phonological deviations in evidence:

- **incidence category 5: 80-100%, three phonological deviations**
 - stopping of fricatives
 - stopping of affricates
 - cluster reduction syllable initial word initial (SIWI)
- **incidence category 4: 60-79%, one phonological deviation**
 - cluster reduction syllable final word final (SFWF)

- **incidence category 3: 40–59%, one phonological deviation**
gliding of liquids.

The over-riding feature of Nina's productive phonology was her restricted phonetic inventory, especially the absence of fricatives. Affricates were also absent from her speech output, although she was stimulable for /tʃ/. The consonants in her repertoire were /p/, /b/, /t/, /d/, /k/, /g/, /m/, /n/, /ŋ/, /h/, /w/ and /j/. She was stimulable for /tʃ/ and /l/, but not for /s/, /z/, /f/, /v/, /ʃ/, /ʒ/, /θ/, /ð/, /dʒ/ and /r/. Using the hierarchy of basic, intermediate and specific goals suggested by Fey (1992), the basic goals in therapy were to facilitate the cognitive reorganization of Nina's phonological system, and to improve her intelligibility. The intermediate goals (first and second), were, therefore, to expand her inventory and target fricatives and affricates, and to establish plosive:fricative:affricate contrasts in meaningful contexts. The specific goals for phonetic production training were /s/ and /tʃ/. The intervention procedures used to address these specific goals were multiple exemplar activities (minimal contrasts therapy and auditory bombardment) and metalinguistic tasks of judgement of correctness, both involving plosive:fricative:affricate contrasts.

Because one of the intervention activities, which would be used extensively in Nina's management, involved rhyme matching using meaningful minimal contrasts, a metaphonological rhyme-matching card game was taught. In teaching the rhyme-matching card game, /r/ vs /w/ minimal contrasts were used, thereby introducing perception (not production) of liquid versus glide contrasts at a single word level (e.g. run vs won) as a third intermediate goal.

By session four, Nina was producing /s/, /z/, /ʃ/, /f/ and /tʃ/, and the beginning of phonological generalization (from one syllable position to another, and from one phoneme to another) was apparent. In sessions five and six, consonant clusters SIWI were targeted for intervention, with /s/ vs /st/ and /t/ vs /st/ SIWI as exemplars, using multiple exemplar training, judgement of correctness games, and rhyme matching, but no production practice. At the same time, /l/ SIWI was introduced as a production target.

Session seven saw the introduction of /s/ vs /sp/ and /p/ vs /sp/ SIWI and /t/ vs /st/ SFWF as specific goals, but still not for production practice. In sessions eight and nine, Nina was showing productive phonological generalization from /st/ and /sp/ to /sm/ and /sk/, and lexical generalization to other words containing these targets, at a single word level. Nina's mother reported no generalization outside the clinic, beyond saying the words correctly during homework sessions. Session 10 comprised an assessment, and discussion with Nina's mother of management during the

ensuing 10-week break. Analysis of a 150-word spontaneous speech sample (see examples below) showed that her phonetic inventory was complete. Stopping of affricates had reduced from 100% to 66%, gliding of liquids from 50% to 25%, cluster reduction SIWI from 88% to 78%, and cluster reduction SFWF from 66% to 33%.

During the break, Nina's parents were to reinforce correct use of consonant clusters and fricatives. The reason that they were not instructed to reinforce the contrastive use of affricates, even though it had been a therapy target, was that Nina was tending to produce them with lateral air escape which her mother was unable to discern. This lateralization of /tʃ/ and /dʒ/ began when /l/ was introduced as a production target, in sessions five and six and was probably a form of over-generalization. Nina's mother sought, and was given, reassurance about the lack of functional generalization outside the clinic. It was emphasized that gradual phonological progress was to be expected. An unexpected development at this point was that whilst Nina's mother was, to some extent, disappointed with progress, her father was aware of considerable gains, and telephoned to say how pleased he was with Nina's improved phonology.

Examples from speech sample after 10 weeks (CA 4;7)

ship	[sɪp]	magic	[mæwʔ'dɪt ^h]	chocolate	[ˈtɔʔkət]
fish	[fɪʃ]	mask	[mɑs]	chocolates	[ˈtɔʔkət]
		note	[-ts]		no schwa
		SFWF			
fast	[fɑs]	match	[mæt ^h]	glass	[gwɑt ^h]
stop	[stɒp]	fridge	[fɪʒ]	glasses	[ˈgwɑtə]
					schwa
sun	[stʌn]	jelly	[ˈdʒeɪjɪ]	queen	[twɪn]
snow	[stəʊ]	garage	[ˈgæɪɪdʒ]	queens	[twɪnə]
					schwa
story	[tsɔwɪ]	lady	[ˈleɪdɪ]	clown	[twaɪn]
worry	[wɔɪ]	ladies	[ˈjeɪdɪdɪz]	glove	[blʌd]
			no schwa		
marry	[mɔɪ]	sorry	[stɔɪ]	gloves	[glʌd]
					no schwa
carry	[kɔɪ]	string	[stɪŋ]	left	[j t]
smile	[spaɪu]	river	[ˈwɪzə]	vase	[bɑdʒ]
					note [-dz]
					SFWF

Therapy block two

Session one was an assessment. Previous gains with the phonetic inventory and production of clusters had been maintained, and syntactic generalization (from single words to phrases and sentences) was beginning for consonant clusters, with variability, for example:

glass	[gwat ^h] [glat ^h]	clown	[twan] [kwan] [klan]	fast	[taf] [tast]
glove	[glʌd ^h] [glʌz] [blʌd]	stop	[tsɒp ^h] [stɒp]	queen	[twin] [kwin]
snow	[snou] [stou]				

Stopping of affricates had gone back up to 100% (remembering that affricate use had not been reinforced during the break) and liquid gliding had reverted to 50%. However, stopping of fricatives had reduced from 100% to 87%. Nina was no longer lateralizing any fricatives. She was producing occasional correct /l/ clusters. For economy, it was decided to target liquids and clusters SIWI jointly by using minimal contrasts and auditory bombardment words comprising stops or fricatives + /l/ (i.e. /pl/, /bl/, /kl/, /gl/, /sl/ and /fl/) contrasted with /l/ SIWI. The effect on Nina's phonology within the clinic was dramatic. By the end of the therapy block, fricatives were established in all initial positions including initially in /sl/ and /fl/ clusters. The stopping process remained at only 11%, and gliding of liquids had reduced to 25% again. Cluster reduction SIWI stood at 64% and SFWF at 33%.

At the end of therapy block two, Nina's parents were experiencing open conflict, of which Nina was aware, surrounding their differing perceptions of how she was progressing. A taped language sample, which Nina's mother made at home voluntarily, supported her report of little generalization outside the clinic. Anxious to comment, Nina's father maintained the opposite view, despite objective evidence, and redoubled his efforts to encourage and reassure Nina about her speech, although still unable to be actively involved in bringing her to therapy or participating in homework.

Therapy block three

Activities to teach metaphonological knowledge of phoneme-grapheme correspondences or sound-symbol relationships, for example, recognizing that the letter 's' corresponded with /s/ were incorporated, as was an activity directed at improving self-monitoring and self-correction abilities. The idea of self-correction was introduced at home, by her mother, with the routine outlined in the Appendix included in Nina's speech book for homework. Her parents also reinforced appropriate speech-rate.

The most prominent aspect of Nina's phonology by this stage was her omission of /s/ and /z/ where it served a morphological function, and her preference for a schwa replacement to denote plurals and possessives, for example: glass [gwat^h]; glasses ['gwatə]; Jeff [dzet^h]; Jeff's [dzetə]; Jeffrey [dzɛti]; Jeffrey's [dzɛt^hiə]. Lexical and grammatical innovations (Shriberg and Kwiatkowski, 1980), utilizing plurals (-s, -z) and third person regular present tense (he runs) and possessives (dad's hat) morphemes to facilitate the emergence of new phonological contrasts were used to target consonant clusters SFWF. A judgement of correctness game was played in which Nina took the role of teacher and corrected the therapist's use of these grammatical morphemes. For example, using third person regular present tense, the therapist would say 'He run for his buns' and Nina would 'correct' the utterance to 'He runs for his buns'. Other examples included 'She gets to the vet's', 'He hums for the mums' and 'She knows it's a rose'. The sillier the sentences, the more Nina appeared to enjoy the activity, and the more she actively played with language (Crystal, 1996) and rehearsed spontaneously new phonological contrasts.

Also utilizing rhymes to facilitate correct responses, but using plurals, she would correct utterances such as 'Nina draws lot of dots' (lots of dots), 'Nina ate ton of buns' (tons of buns) and 'Nina has boat of goats' (boats of goats). She loved playing this game and busied herself drawing lots of dots, tons of buns, and so forth, saying the rhyming words correctly, repeatedly and with enjoyment, often employing metalanguage to invent and talk about the rhymes (for example, 'These all rhyme with each other don't they? Like lot of dot and lots of dots' and 'Did you know rhyme bime is a rhyme too? Only I told daddy it was a bime and he did say bes it is a bime! Bime bime, see!' and even, 'I used to say lotta a dotta. That rhymes but it's not the right way to say it').

The assessment at the end of block three, when Nina was aged 5;1, revealed cluster reduction SIWI 64%, cluster reduction SFWF 33%, gliding of liquids 25% and stopping of fricatives SFWF 11%. A taped spontaneous language sample (requested by the clinician) from home confirmed that Nina was now generalizing her new phonological skills to other situations, and that there was little difference between within-clinic and out-of-clinic productive phonology. With this improvement, came a general acceptable 'slowing down' of Nina's speech rate, and parental agreement that Nina was progressing well phonologically. This pattern of improvement persisted for the remainder of therapy, with all within-clinic gains generalizing rapidly to all other communicative contexts, and her parents remaining in agreement.

Home management during the third 10-week break consisted of general reinforcement of intelligibility, praising Nina for making spontaneous revisions and repairs, and modelling corrections as appropriate, and continuing to comment favourably when her speech rate was appropriate. The break had to be extended to 14 weeks because Nina and her two siblings were consecutively housebound with chickenpox.

Therapy block four

Nina had one combined assessment/therapy session after her probe assessment at 5;1, aimed at her /r/ /w/ sound replacement, and was then placed on review. When re-assessed six months later, at 5;7, the phonological deviations remaining in her output phonology were gliding of liquids at 20% and cluster reduction SIWI at 33%. Clusters and liquids were, therefore, largely established, and she received no further therapy. When she was followed up again, two months later at 5;9, no phonological deviations, or phonemic replacements, were apparent in Nina's phonology. Her gradual progress is shown in Table 2.

Follow-up at 6;5 and 6;7

When Nina was discharged from therapy, her mother confided that she was anticipating separation problems and learning difficulties, once she started school. Luckily, difficulties with the first stages of reading acquisition were quite quickly overcome with appropriate help.

The mild problems Nina had with early reading acquisition were associated with four months of escalating school-refusal. At 6;5, in her second year of infants' school (year 1) her reading age was 5;9 (grade average, 6;9). She received nine weeks, twice-weekly individual reading remediation with a specialist teacher. When re-tested at 6;7, on the Woodcock test (Woodcock, 1987), Nina's reading skills were age-appropriate and approximated the grade average (word identification SS 109; word attack SS 96; passage comprehension SS 103). With the improvement in her reading, came a reduction in her reluctance to go to school.

Her mother remained very concerned about Nina's general progress and requested the assessment and management advice of a clinical psychologist. Accordingly, the Wechsler preschool and primary scale of intelligence-revised (the WPPSI-R, Wechsler, 1974) was administered,

Table 2 Nina's progress in therapy

Age	Incidence category 5 80-100%	Incidence category 4 60-79%	Incidence category 3 40-59%	Incidence category 2 20-39%	Incidence category 1 < 19%	Sum of phonological deviations	Descriptive severity rating	Severity rating
4;4	3	1	1	-	-	5	Moderate	3.75
4;7	1	2	-	2	-	5	Moderate	3.50
4;9	2	1	1	1	-	5	Moderate	3.00
5;1	-	1	-	2	1	4	Mild	2.25
5;7	-	-	-	2	-	2	Mild	2.00
5;9	-	-	-	-	-	-	Normal	1.00

with the following result: performance scale 85–103; verbal scale 83–99; full scale 84–98. A child behaviour checklist was completed and analysed, and it showed that Nina's anxious and nervous behaviours placed her in the clinical range for internalizing behaviours and for behaviour overall. She showed a high degree of performance anxiety, and was (as previously observed) subject to psychosomatic symptoms.

Discussion

To recapitulate, Nina attended therapy for 17 months from the age of 4;4, when she had a moderate developmental phonological disorder and a severity rating of 3.75, to the age of 5;9, when her phonology was age-appropriate. She had a total 27 consultations, 22 of which were treatments. Her pattern of attendance, always with her mother, was: block and break one: nine consultations, then 10 weeks break; block and break two: eight consultations followed by 10 weeks break; block and break three: eight consultations and 14 weeks break; and block four: three consultations.

All of Nina's homework was with either her mother or her preschool teacher, with her father providing interested encouragement on weekends when he was at home (about six days per month by report). Nina was already in bed asleep by the time he arrived home on weeknights. Nina did 18 5-minute homework sessions per week with her mother, who kept excellent records of this aspect of the therapy. Additionally, the speech homework book went to preschool once a week on the same day during therapy blocks. Her teacher supervised 5 minute practice one-to-one with Nina, once a week, and gave incidental encouragement and modelling at preschool.

There was a constant atmosphere of parental disagreement about Nina's progress until the end of her third therapy block, with her mother heavily involved in therapy and homework, and her father, vitally interested in her progress but too committed at work to be present or active in therapy sessions or homework, commenting influentially from an observer's perspective. All homework was carried out with care, but Nina's mother was more inclined to correct mismatches than reinforce correctly produced targets. Her father's optimism may not have been very influential, because he was rarely present. Nina was aware that there was conflict between her parents relating to her speech, for example, she made this comment at the beginning of her third therapy block, 'My mummy says I'm not trying to be a good talker and my daddy says I am too'. Her cautiousness in her first two therapy blocks in experimenting with her

phonology was probably anxiety-based and may have partly accounted for slow socio-environmental generalization early in therapy.

We turn now to a brief discussion of the nature of the therapy approach. What is it about the therapy that makes it 'broad-based' and 'phonological'? Discussing the desirability of broad-based models of phonological intervention Kamhi (1992: 261) emphasized the need for treatment methodologies with some explanatory value, that took into account both the phonetic (motor) and phonological (linguistic) levels in assessment and intervention. It is in this sense that the model is broad-based. It takes into account the components necessary for the formulation of a model of phonological development proposed by Stoel-Gammon and Dunn (1985): auditory perceptual, cognitive, phonological and neuromotor; tackling the problem of phonological disability at the three levels of phonology identified by Ingram (1976): underlying representations of speech sounds, phonological rules or processes and phonetic representations.

The procedures and activities related to phonological development, integral to the model, and considered to be phonological fall into two groups. First multiple exemplar techniques, including auditory bombardment (Hodson and Paden, 1983), and minimal meaningful contrasts activities (Weiner, 1981; Blache, 1982). These techniques are used in naturalistic games and activities where communicative context, intent, and effectiveness are highlighted, in order to facilitate the child's discovery of phonology rules (Menn, 1976; Menyuk et al., 1986; Kiparsky and Menn, 1977; Fey and Gandour, 1982). In the second group of phonological procedures are various metalinguistic tasks, for example, homophony confrontation (Weiner, 1981), lexical and grammatical innovations using new words, and plural and past tense morphemes to facilitate the emergence of new phonological contrasts (Shriberg and Kwiatkowski, 1980), and phoneme-grapheme correspondence awareness (Allerton, 1976), used to facilitate awareness of systematic sound patterning.

The procedures related to phonological development, and integral to the model, but not in themselves phonological, are: parent education, phonetic production training, the blocks-and-breaks scheduling of consultations, parent participation and homework.

The strengths of the model are the particular combination of techniques used, the way in which information is disseminated to parents and teachers, the planned blocks and breaks scheduling of appointments, the methods used for measuring severity and for recording progress, and the degree of family participation in therapy programmes.

For some families, bringing a child to therapy is grossly inconvenient. Personal, social and emotional factors such as other commitments, financial considerations, health and individual differences (including emotional resources), operate singly or collectively to influence people's decisions about how involved they can become in therapy. In a multicultural society, cultural, religious or political influences will result in people having individual views of how much outside (the family or culture) intervention or professional help they see as appropriate for their child, and modify attendance accordingly. Case management of children with developmental phonological disorders must be conducted taking such factors as individual freedom of choice, and the cultural biases of both the service delivery system and the clinician into account (Crago and Cole, 1991; Crago, 1992; Nettelblatt, 1995).

Nina provided an example of steady progress phonologically, despite her mother's anxiety and poor parental unanimity regarding her linguistic development, and the interruption to therapy attendance caused by an outbreak of chickenpox in the family. Although they were unfortunate for Nina, the difficulties encountered in her management typified the unwelcome factors that regularly occur in case management in the day-to-day running of a speech and language clinic. There was, therefore, much to be learned from her experience. Fortunately, despite the associated problems, Nina's phonology improved gradually, apparently in response to the therapy. Our aim here has been not so much to demonstrate treatment efficacy, but to present a detailed case description of one child's response to an empirically supported, broad-based phonological therapy methodology for developmental phonological disorders (Bowen, 1996).

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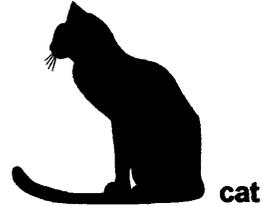
Appendix: The 'fixed-up-ones' routine. Revisions and repairs or 'self-corrections'

As adult speakers we continually make little mistakes when we speak. We barely notice these mistakes at a conscious level, but quickly correct ourselves, on-line, and go on with what we are saying. Children with a phonological disability are generally not very good at self-correcting. They find it difficult to monitor their speech (i.e. listen to it critically) and make necessary revisions and repairs. This is probably because they don't know where to start! At home this week, introduce the idea of a 'fixed-up-one', or the process of noticing speech mistakes and then saying the word(s) again more clearly. Go through this routine two or three times, and talk about fixed-up-ones. Have fun making up other 'mistakes' that need correcting. Remember not to distort the sounds by over-emphasizing them.

'Listen, if I accidentally said "hort" when I meant to say "horse" it wouldn't sound right would it? I would have to fix it up and say "horse". Did you hear that fixed-up-one? First I said "hort", then I fixed it up and said "horse" '.



'Listen, if I said "tat" it wouldn't sound right. I would have to fix it up and say "cat" '.



'If I said "cup of cotee" instead of "cup of coffee" I would have to do a fixed-up-one again. I would have to think to myself, "It's not cup of cotee, it's cup of coffee". Did you hear that fixed-up-one?'



' "Pane" isn't right, is it? I would have to do a fixed-up-one and say "plane" '.



'What if I said "buttertie" for this one? I would have to do a ...' [fixed-up-one].



'Would I have to do a fixed-up-one if I said "edertant" for this one?'

