

PHONOLOGICALLY DISORDERED CANTONESE-SPEAKING CHILDREN

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ABSTRACT - Speech disordered children are not a homogeneous group in terms of aetiology, severity, surface error patterns or response to specific treatment approaches. In this paper we describe the speech error patterns of 17 monolingual Cantonese-speaking children. Two had difficulties articulating specific speech sounds; eight showed a delayed pattern of development in their errors were appropriate for a younger child acquiring phonology normally; five used unusual (non-developmental) phonological rules (as well as some normal developmental ones); and two showed inconsistent patterns of errors. The possible nature of the deficits underlying each of these surface error patterns is discussed.

Kamhi (1992) argues that such cross-linguistic studies can provide evidence concerning the variety of factors that influence phonological development and disorder. One important question is the extent to which the ambient language influences the type of developmental error patterns used (Ingram, 1991). Error patterns shared by languages might provide evidence for innate or 'natural' phonological processes (Stampe, 1969). Language specific error patterns might reflect children's cognitive-linguistic solutions to marking differences between words within a language's phonetic and phonological structure. Comparisons of phonologically disordered children who are acquiring different languages should allow the evaluation of classification systems of phonological disorder and provide evidence concerning the effect of the ambient language on disordered development.

There is considerable evidence that phonologically disordered children are a heterogeneous group. They differ in terms of aetiology, severity, type of surface error patterns and their response to different treatment strategies. Although some researchers continue to argue that all phonologically disordered children should be considered 'delayed' (eg Fletcher, 1990), the need to classify subgroups of phonological disorder is now widely recognised (Shriberg & Kwiatkowski, 1982). What remains controversial is the criteria that should be used for categorisation. One approach is to use the patterns of surface errors. A review of the literature (Dodd, 1992) revealed that three basic categories of error types emerged in the description of what constituted a phonological disorder: delay (eg Fletcher 1990); consistent but unusual (non-developmental) errors (eg Leonard 1985); and inconsistent errors (eg Dodd & Leahy 1989).

If categorisation in terms of type of surface speech errors has any validity, then the three patterns - delayed, unusual rules and inconsistent errors - should also be apparent in the speech of phonologically disordered children learning languages other than English. The purpose of this study is to describe the phonological systems of 17 monolingual Cantonese speaking children who were consecutively referred for assessment of disordered speech. It is hypothesised that four groups of children will be identified: (i) articulation disorder (eg lisp); (ii) delayed phonological development ie all errors can be described by processes or rules used by more than 10% of children acquiring phonology normally; (iii) consistent use of one or more unusual rules (ie rules not used by more than 10% of children acquiring phonology normally); (iv) children who make inconsistent errors ie production of specific words or particular phonological segments (eg the cluster /kw/) in a variety of ways in one speech sample. It is also predicted that tone and vowel errors are likely to be rare since these aspects of Cantonese phonology are learned early (before two years of age), and few errors are made by children acquiring phonology after that time.

Cantonese Phonology

Cantonese is a tone language where a change in tone of a syllable leads to a change of meaning. There are six contrastive tones, 17 initial consonants and two initial consonant clusters, eight final consonants and eight vowel phonemes. The syllable structure of Cantonese is relatively simple: there are two syllabic nasals /m/ and /ŋ/ and all other syllables have the following structure: (C) (G) V (C / G). The number of segments can vary from one to four with a vowel being an obligatory segment.

METHOD

Subjects.

The subjects were 17 monolingual Cantonese-speaking children who were referred to the Phonology Clinic, Department of Speech and Hearing Sciences, University of Hong Kong during one academic term. There were 13 boys and four girls aged between 3;6 to 6;4 years. None had any hearing impairment or cognitive delay. Two had minor oro-motor abnormalities. Language assessment revealed that two children had difficulties Table 1 provides a summary of the subjects' characteristics, including the percent of consonants (sample = 121) and vowels (sample = 67) in error on the Cantonese Segmental Phonology Test (So, 1992) as an indication of severity, plus the classification to which each child was assigned.

Table 1: Subject Information

Subject	Age	Sex	Oral Structure and Function	Any Additional Problems	% Error		Diagnosis
					Vowels	Cons	
N.F.	5:10	M	Tongue Thrust		0	3.3	Articulation
K.Y.H.	5:10	F	Short Velum	Hypernasality	0	16.5	Articulation
S.F.	3:6	M			0	20.7	Delay
K.P.	3:7	M			0	20.7	Delay
C.M.	4:6	M			1	5.8	Delay
K.L.	4:11	M			0	36.4	Delay
C.S.	5:1	M			0	24.0	Delay
K.Y.	5:2	M			0	16.5	Delay
F.W.	5:3	M			0	21.5	Delay
C.W.	5:4	F			0	31.4	Delay
J.M.	4:1	M		Language	11	28.9	Artic & Consistent
Y.Y.	4:6	M			1	19.8	Consistent P.D.
Y.W.	4:8	M			0	17.4	Consistent P.D.
Y.L.	5:11	F			0	18.2	Artic & Consistent
O.L.	5:11	F		Voice	18	34.7	Consistent P.D.
T.C.	4:7	M		Language	0	20.7	Inconsistent P.D.
M.Y.	6:4	M			4	38.0	Inconsistent P.D.

Procedure.

Children were assessed in a soundproof room by a speech pathologist and a final year student clinician. The Cantonese Segmental Phonology Test (So, 1992) was administered. The 31 words included in this picture naming test sample all syllable initial and final Cantonese consonants, vowels and tones. At least one representative of each class of intervocalic sounds was also sampled. In order to sample pronunciation of words in continuous speech, children were asked to retell a story illustrated by five photographs. After completion of this test, the student collected a spontaneous language sample, carried out an oromotor examination and then interviewed the parents to obtain case history information. All sessions were both audio- and video-taped. All sessions were immediately transcribed phonetically.

Analyses.

The phonological data therefore consisted of both single word and spontaneous continuous speech. A phoneme was judged acquired if it was used correctly at least twice, and a rule was considered to be used if there were at least two occurrences of the error in different lexical items and no counter examples of a different error rule. Four audiotapes of the Cantonese Segmental Phonology Test were retranscribed to check for reliability with the initial transcription. Point to point reliability was high (98.5%). The children's patterns of errors were compared with those of 268 two to six year old children whose phonology had been assessed by an extended version of the Cantonese Segmental Phonology Test. Children who consistently distorted a particular phoneme or phonemes irrespective of phonetic environment as well as in isolation were categorised as having an articulation disorder. All the errors made by children who were classified as delayed could be described in terms of phonological processes or rules that were used by more than 10% of subjects in the normative study. At least two of those rules had to be used by an age group at least six months younger than that of the subject, but not by

their age matched peers. To be classified as phonologically disordered (consistent), subjects had to use error patterns that were used by less than 10% of children in the normative study at any age or rules that were not used by any of the children in the normative study. If specific words or particular phonological segments in specific phonetic contexts (eg syllable initial cluster /kw/) were produced in a variety of ways by the child in one speech sample then the child was assigned to the inconsistent category.

RESULTS

The children fell into four basic groups (see Table 1). Two children had articulation difficulties of organic origin ie palatal insufficiency and a tongue thrust. Eight children showed a strictly delayed pattern of acquisition. Five of the children consistently used at least one unusual phonological rule and two of these children also distorted /l/ and/or /s/. There were also two children whose errors were inconsistent. Each case is briefly outlined below.

Articulation:

N.F. This 5;10 year old boy's only difficulty was the distorted production of /s, ts, ts^h/ due to a tongue thrust.

K.Y.H. Oro-motor examination revealed that this 5;10 year old girl had a short velum, resulting in inadequate closure of the soft palate with the oropharyngeal wall. Her articulation was characterised by hypernasality and exaggerated aspiration of aspirated sounds.

Delay

Eight children aged 3;6 -5;4 showed patterns of delayed speech development. With the exception of one child, the vowels, tones and syllable structures were correct. The rules used by these children are listed in Table 2.

Phonological Disorder: Consistent

Five children aged between 4;1 and 5;11 were found to use rules that were atypical of normal development. These nondevelopmental rules used are shown in Table 2.

Phonological Disorder: Inconsistent

T.C. No rules could be derived to describe his errors. Most of his errors affected alveolar consonants /s, t^h, n/ and are summarised below:

/s/ -> [h], [l], or deleted eg /sœj/ was realised on different occasions as [hœj], [tœj] and [œj].

/l/ -> [j] or deleted eg /tin/ was realised as [jin] and [in]

/t^h/ -> [h], or deleted eg /t^hɔŋg/ was realised as [hɔŋg] and [ɔŋg]

/l/ -> [j], deleted or correct eg /tɛj/ was pronounced as [jɛj], [tɛj] but also as [tɛj].

/n/ -> [l] or deleted

There was also inconsistent initial consonant deletions of /k, j/; and also some other odd substitutions eg /j/ -> [m]; /m/ -> [n], f-> [m]

M.Y. This boy's repertoire lacked the following syllable initial consonants: /p^h, t^h, k^h, l, s, ts^h, k^hw/ and syllable final consonants /p^h, t^h, m/. He sometimes marked consonant clusters with either /g/ or /gw/, sounds not occurring in Cantonese phonology. All vowels, tones and syllable structures were represented. The phonological rules F.W. used were:

(i) All syllable initial consonants delete (except labials /p,m,w,f/ and glottal /h/).

(ii) All syllable final consonants, except glides, are velars eg [ak^h] /ap^h/, [mɛk^h] /mɛt^h/, [wɛŋg] /k^hwɛn/, [mɛŋg] /kɛm/

(iii) All consonants are deaspirated.

(iv) Clusters were reduced inconsistently:

/kw/ -> [gw]; /kw/ -> [w]; /k^hw/ -> [f]; /k^hw/ -> [kw]; /k^hw/ deletes. There were also inconsistent vowel errors eg /œl/ -> [u], /œl/ -> [e], /a/ -> [ɛ]; and consonant substitutions eg /p/ -> [f]; /j/ -> [h]; /w/ -> [m], /k/ -> [m].

Table 2: The Processes and Rules Used by Children Classified As Delayed and Disordered (Consistent)

Subjects:	Delayed								Disordered: Consistent				
	SF	KP	CC	KL	CS	KY	FW	CW	JM	YY	YW	YL	OL
<i>Processes</i>													
<i>Assimilation</i>					*	*							
<i>Cluster Reduction</i>				*	*	*		*					
<i>Systemic Simplification Rules:</i>													
Stopping	*	*	*		*	*	*	*					
Fronting				*	*	*		*					*
Deaspiration	*	*	*		*		*	*				*	
Affrication	*					*							
/h/ deletes	*	*				*							
Deaffrication													
F. C. D.*		*		*						*			*
F.G.D.				*					*	*			*
<i>Non-Developmental Rules</i>													
Frication										*			
IC Deletion											*		
Aspiration													
Gliding												*	
Vowel Rule									*				*
Backing									*		*	*	*

DISCUSSION

Classification of Cantonese-speaking speech disordered children in terms of their surface speech errors revealed four groups: articulation disorder, delay, consistent use of unusual (non-developmental) rules and inconsistent errors. These same four subgroups are apparent in the disordered speech of children acquiring English (Dodd, 1992). Articulation disorders, due to organic cause or functional difficulties in the articulation of specific speech sounds, appear to occur in all languages. Two of the Cantonese-speaking children had pure articulation difficulties of organic origin and two who used unusual rules also exhibited difficulty in the articulation of /s/ and /l/. While articulation difficulties and phonological disorder can co-occur (Elbert 1992), it is nevertheless important to distinguish between articulatory and phonological errors since treatment approaches for the two disorders differ markedly (Fey, 1992).

Eight of the Cantonese-speaking children provided examples of delayed development. Some of these cases were very straightforward in that their cluster of processes indicated a phonological system that was typical of a specific younger age group eg CS, a five year old boy, was behaving, phonologically, like a typical three year old. Some other children provided examples of use of rules that were chronologically mismatched (Grunwell, 1985) where rules used early in development co-occur with those typical of older children eg K.L.'s treatment of syllable final consonants. None of the children classified as delayed made a significant number of vowel or tone errors, used syllable structure constraints or were identified as having delayed acquisition of expressive or receptive language. That is, they presented with a pure phonological delay that was restricted to the consonant system.

The finding that some Cantonese-speaking children use unusual processes is similar to the findings of studies on Portuguese-speaking (Yavas and Lamprecht, 1988) and Italian-speaking children (Bortolini and Leonard, 1991). Some of the unusual rules used reflect those reported for English-speaking phonologically disordered children eg backing and deletion of syllable initial consonants other than /h/ (Dodd and Iacono, 1989). The use of such unusual rules seems to be associated with an impaired understanding of the nature of the phonological system being acquired (Duggirala & Dodd, 1991). For example, Leonard *et al* (1989) argue that phonologically disordered children have 'a restricted ability to capitalize on the phonetic regularities of the language' (p 589). That is, children fail to acquire a phonological system that categorises, differentiates and generalises information about the phonetic segments that make up words in a particular language.

Such a deficit, at the cognitive-linguistic or organisational level of the speech processing chain, would be likely to result in the use of some shared unusual rules by phonologically disordered English- and Cantonese-speaking children. However, the influence of the ambient language was also apparent. Some rules not used by more than 10% of two year olds acquiring Cantonese phonology normally eg gliding, would not be cause for concern if used by a child acquiring English ie a normal developmental rule in one language can be an unusual rule in another. Two of the children made a significant number (ie more than 10%) vowel errors. Vowels carry a heavy functional load in Cantonese because so many words consist of CV syllables and vowel errors make a child's speech particularly unintelligible. Although clinicians are becoming more aware of English-speaking children who have difficulty contrasting vowels, there seem to be few children reported in the literature as having a disorder affecting vowels. Finding two in a group of five children with consistent phonological disorder is therefore surprising. It may be that the vowel system is more vulnerable to disorder in Cantonese than English despite Cantonese-speaking children's typical mastery of vowels before two years of age. In contrast, there was only one example of a tone error in the entire data.

The children classified as inconsistent nevertheless exhibited two somewhat different patterns of errors. T.C.'s pattern of inconsistency was primarily, although not entirely, limited to alveolar consonants, and their range of errors was also limited to deletion, or marking by /h, l, j/. While these sounds were not used as allophones, the error pattern might reflect his impaired ability to assemble phonological plans for words that contrast alveolar consonants. M.Y.'s pattern of errors might also be attributed to a similar, though more extensive deficit. His deletion of a wide range of syllable initial consonants and use of /k/ to mark all syllable final consonants except glides might suggest the use of a syllable strategy to overcome an impaired ability to assemble contrastive phonological plans for words (Dodd *et al*, 1989). An alternative account of inconsistent errors (Bradford, 1990) argues that the ability to assemble phonological blueprints for words is intact, but the implementation of those plans is sabotaged by a deficit in the planning of sequences of fine motor movements for speech production. Both accounts of the deficit underlying inconsistent errors seem plausible. Further research is needed to describe the nature of the deficit or deficits that might underly inconsistent speech errors.

In summary, the seventeen cases of Cantonese-speaking speech disordered children reported here could be categorised into four groups: articulation disorder, delayed phonological development, use of unusual (non-developmental) phonological rules and children whose error patterns were inconsistent. These same four groups of children have been identified in the English-speaking speech disordered population (Dodd, 1992). The different patterns of surface speech errors are arguably related to a range of causes eg the language learning environment, deficits at different levels of the speech processing chain. Consequently one of the most important clinical research questions is not whether one remediation approach is better than another for phonologically disordered children in general (Gierut, 1990), but which specific remediation approach is most successful for each subgroup of phonological disorder.

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