Articulation research 2004:

Summary of Results

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ABSTRACT

Most junior syndicate teachers have concerns about the speech clarity of some of the children in their class. It is difficult for teachers to know whether to refer such students for speech assessments by their speech-language therapist. This article outlines a project which gathered New Zealand normative data for a test of articulation. A summary of the results of the project are presented in a chart which junior school teachers may find useful to help them in this decision.

Research paper
KEYWORDS:
Articulation (speech), assessment tools, data collection, New Zealand, norms (test), speech and hearing measures.

PROJECT BRIEF

The aim of this project was to gather New Zealand norms for children aged five to eight for the New Zealand Articulation Test (NZAT), which assesses speech sounds in single words. This is the first time since the 1980s that such data has been gathered. Across the country, 1,013 children were tested by 56 speech-language therapists at 53 schools. The sample was balanced to proportionally represent the whole country by geographic region, population density, ethnicity, gender and decile. Children were randomly selected. Children who were funded under the Ongoing Reviewable Resourcing Scheme, had a hearing impairment or cleft palate, or were beginning speakers of English as a second language were not included in the normative sample. The New Zealand Council for Educational Research completed the collation of the data, which was gathered and analysed in 2004.

NZAT NORMING RESULTS CHARTS

The results are summarised in the charts in Appendice one and two to show which speech sounds children are still developing in the junior school years. The results are shown as bands of percentages for the number of children saying that sound correctly in the test. Ages where 50 percent, 90 percent and 95 percent of children were achieving the sounds are shown by the shaded sections on the bar graph. The sounds were all assessed in at least two of three positions in words – at the start, middle and/or end of words. These results were averaged to find a total percentage of children who said the sound correctly across positions. A 90 percent criterion is generally used by therapists as a guideline for when children should have developed sounds. Note that any percentage chosen as the cut-off is somewhat arbitrary. To indicate how long it takes for the next five percent of children to acquire the sound, the 95 percent cut-off is also shown. Some sounds, such as 's' and 'r' blends, have a long tail of children who take one to two years longer than the majority to develop these sounds. Other sounds, especially the blends 's' and 'th', did not reach the 100 percent criterion even at eight years, the oldest age tested.

SUMMARY OF RESULTS

The majority of children begin school at the age of five with adult speech sound patterns. A minority of children are still developing some sounds, the 'ch', 'l', 's', 'z', 'r' and 'th' blends, usually referred to as 'later developing sounds'. As expected, there was a clear pattern of older children achieving higher scores on the test than younger children, but significant gender differences were found at ages five to six but not at seven to eight. This indicates that, in general, girls learn to articulate sounds more quickly than boys. Significant differences were also found by decile and ethnicity, with children from lower decile schools and Polynesian children scoring significantly lower in the total test score than other children, particularly at younger ages. This is may be due to a higher incidence of middle ear infections in Polynesian populations (Cook, Kirk, Bidwell, Hider, Weir and Tolan, 1998), which can have a detrimental impact on speech sound development (Chalmers, Stewart, Silva and Mulvena, 1989; Shriberg, Friel-Patti, Flipsen and Brown, 2000). Population density and geographic region had no discernable effect on articulation proficiency.

COMPARISON WITH PREVIOUSLY USED DATA

The results were similar to other studies of articulation which have traditionally been used as norms in New Zealand, the most common one is Sander's 1972 summary of Wellman, Case, Mengert and Bradbury (1931) and Templin's (1957) American studies. However, there were significant differences between the previously used norms and the NZAT results. Many of the ages at which 90 percent of children were achieving the sounds are lower than the previously used norms, in particular 't', 'ng', 'l', 'ch', 'sh', 's', 'z', 'j' and 'v', which reached 90 percent criterion between six months to two years earlier than indicated on Sander's chart.

'Th' sounds were the only ones found to develop later, with 19 percent of New Zealand children still developing 'th' at age 8. Other international normative studies have shown this sound to have developed in 90 percent of children by age eight (Goldman and Fristoe, 2000; Sander, 1972). This is the only sound to be developed more slowly in the NZAT results

than in other articulation development studies, and the discrepancy is wide, at 19 percent, which may indicate a dialectal effect rather than purely developmental processes. The substitution of 'f' for 'th' may be accepted by a wider group of New Zealand society, especially among people of non-European ethnic backgrounds, non-English speaking backgrounds and lower socio-economic classes.

'S' showed an interesting pattern of development for the girls' sample. Girls arrived at school with 96 percent mastery of 's', this dropped to 88 percent at ages five and a half, then increased to 97 percent again at the six year level. The blend 'dr' showed a similar pattern of reversal in the NZAT research, also only in the girl's sample. Other researchers have noted apparent reversal patterns in mastery, particularly for 's', but at different ages (Goldman and Fristoe, 2000; Kenney and Prather 1986; Poole, 1934; Prather, Hedrick and Kern 1975; Sax 1972; Templin, 1957). Various explanations have been put forward for this. Some children, who acquired an acceptable 's' early on, may then adopt an error pattern for a time before reverting back (Smit, Freilinger, Bernthal, Hand and Bird., 1990). A possible causal factor here may be the period of time between the loss of the deciduous teeth and the adult teeth coming through. Kenney and Prather (1986) suggested that reversals affecting 's' may be because examiners unconsciously tolerate greater deviations in the younger children. If this was true, the NZAT examiners must have only had higher standards for the girls at older ages, as the reversal trend was seen in the girls' sample, but not the boys', although each examiner tested both genders in equal proportions. Another possible cause for this reversal is sample error or random fluctuation, while 's' is the most commonly affected phoneme, this trend has also been reported on other sounds (Smit et al, 1990). This is an area for further investigation and highlights the need to consider all percentages for possible sampling error or random fluctuations.

IMPLICATIONS FOR SCHOOLS

Teachers are advised to replace their old data/charts on speech development with these local up to date norms. Teachers should also be aware that research indicates that boys, more so than girls, children from Pasifika nations and children from lower socio-economic backgrounds may develop sounds a little slower. The expectation is that most will have 'caught up' by age eight. When deciding on whether to refer a child for a speech assessment, teachers should take note of the sounds the child is having difficulty with and check when they develop on the chart.

If children are having difficulty making themselves understood and have a high number of sounds which are not developed by the 90-95 percent criterion for their age, referral to Group Special Education (GSE) for an assessment would be appropriate. The speech-language therapist would assess whether the child has a speech disorder and if they would benefit from speech-language therapy services.

The GSE speech-language therapy initiative is funded to provide therapy for the one percent of the population with the highest communication needs. Other avenues of speech help are private speech-language therapists and speech teachers. There are also ways teachers can assist children with their sounds through the curriculum – teachers can contact a speech-language therapist at their local GSE office for ideas.

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AUTHOR PROFILE

Jayne Moyle graduated from the University of Canterbury with a Bachelor of Speech and Language Therapy with first class honours in 1999. She started her career at Invercargill Specialist Education Services working with children with communication disorders in the Early Intervention, Communication and Inclusive Services teams. In 2002, she transferred to Lower Hutt Group Special Education and joined the School Focus team. She currently works in the mainstream setting with children who have severe communication needs.

Jayne Moyle

APPENDIX 1

New Zealand Articulation Test Norms Chart – Females

5	6	7	8
bl cl gl fl pl			
v			
	tr		
	dr		
z			
sl sw	sm sn sc		
	s		
	sq st		
	r		
	br fr gr cr		
	pr		
	spr scr		
	str		
	th (as in "thumb")		
	th (as in "there")		

Sounds reaching 95% criterion before 5 years old: p b t d k g f m n l h w y ng sh ch j

KEY:

	Age range where the average of correct reponses over the word positions tested is less than 50%.
	Age range where the average of correct reponses over the word positions tested is between 50% and 90%.
	Age range where the average of correct reponses over the word positions tested is between 90% and 95%.
	Age range where the average of correct reponses over the word positions tested is greater than 95%.

APPENDIX 2

New Zealand Articulation Test Norms Chart – Males

5	6	7	8
ng			
j			
l			
ch			
cl gl bl fl			
pl			
v			
sh			
	s		
	z		
gr cr br tr dr			
sl sp sc st sq			
	r		
	pr fr		
	str		
	scr spr		
		th (as in "thumb")	
		th (as in "there")	

Sounds reaching 95% criterion before 5 years old: p b t d k g f m n h w y

KEY:

	Age range where the average of correct reponses over the word positions tested is less than 50%.
	Age range where the average of correct reponses over the word positions tested is between 50% and 90%.
	Age range where the average of correct reponses over the word positions tested is between 90% and 95%.
	Age range where the average of correct reponses over the word positions tested is greater than 95%.