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INFORMATION FOR AUTHORS

Editorial Policy
The New Zealand Journal of Speech-Language Therapy is a peer-reviewed publication. Manuscripts are critically appraised by two researchers with a history of publication in the area of study. The criteria for acceptance of manuscripts may include: (1) a focus on clinical or research work with particular relevance to clinical applications within the profession, (2) adherence to professional standards of scientific method and (3) clarity of writing. Book reviews are also encouraged.

NZSTA membership is not a factor in selection. No manuscript that has been published or is under consideration elsewhere may be submitted. All submissions considered acceptable for publication may be returned to the author for revisions. Authors are free to make additional minor changes at this stage. Once a paper has been accepted, the author should provide the complete final text of the paper via an email attachment. Upon receipt, the Editor may edit further for style, clarity, and consistency. The manuscript and page proofs should be returned to the author for final proofreading. Only minimal alterations are permissible on page proofs.

Manuscript Style and Requirements
All submissions should be accompanied by a cover letter indicating that the work has not been published previously and is not currently submitted elsewhere. The contact author’s email address, postal address and phone number should be included. Submitted manuscripts are expected to follow the style specified in the Publication Manual of the American Psychological Association (APA) (6th ed) and must be double-spaced throughout. Authors are encouraged to use non-sexist and person-first language in writing their manuscripts. A blind system of peer-review is undertaken in which no names or addresses are available to the invited reviewers.

Tables and Figures
Copies of tables and figures should be attached at the end of each copy of the manuscript. Use Arabic numerals for both tables and figures. Please attempt to simplify complex tables by making two or more separate tables. Table titles and figure captions should be short and clear.

Acknowledgment(s)
Citation of grant or contract support of research should be given in an Acknowledgment(s) section at the end of the manuscript. If any part of the research was support by an institution not listed on the title page, that institution should be recognised in this section. Individuals who assisted in the research or were helpful in the review process may also be acknowledged.

Submissions and Editorial Correspondence
Manuscripts should be submitted electronically via email attachment to the Editor, New Zealand Journal of Speech-Language Therapy at nzsta@speechtherapy.org.nz. Please direct all other correspondence to the Administrator, New Zealand Speech-language Therapists’ Association, PO Box 137256, Parnell, Auckland 1151, New Zealand.

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EDITORIAL

It is a pleasure to bring you the 66th edition of the New Zealand Journal of Speech-language Therapy.

We took over as interim Editors mid-way through the year and we are thrilled to have been able to bring together this issue. It is a credit to the profession in New Zealand that we have such a diverse collection of articles and, for the first time ever, this edition includes two recipients of the Marion Saunders Literary Award (Bohot and Purdy from 2010 and Robinson from 2011).

We are grateful to those people who acted as reviewers in the blind peer-review process for this edition. This is an important way to ensure the robustness and integrity of research presented within the journal.

We begin with an article by Clendon which analyses the written language syntax of 98 typically developing children as they wrote about self-selected topics. The rationale for the study was to provide knowledge about the range and complexity of language structures that typically developing children use when they are faced with one of their greatest cognitive challenges: the translation of thought into abstract symbols.

This is followed by the two Marion Saunders Literary Award winners; Robinson’s review of social validity and how this construct could be applied within speech-language therapy and then Bohot and Purdy’s investigation of the communication behaviour changes in the communication partners of children who use a low-tech communication aid.

In the fourth article Ngan, Hand, May, Antipova and Purdy discuss Experience Sharing (a social pragmatic relationship-based intervention programme for children with autistic spectrum disorders) which is currently operating in a special school.

The final article by Ballard, Wilson, Campbell and Purdy and Yee provides normative data on the phonological development of over 100 New Zealand English-speaking 5-year old children using the phonology subtest of the Diagnostic Evaluation of Articulation and Phonology (DEAP).

We have begun to investigate the sustainability of the Journal in its current format. 2012 is likely to see the introduction of a new format, but before we bring in any changes, we will survey NZSTA members for suggestions on the continued growth of the Journal.

Dr Brigid McNeill and Dr Clare McCann
Editors
Many children with complex communication needs (CCN) experience significant difficulty developing mature syntax and morphology (Binger & Light, 2008). Studies that have examined the structure of the language produced by individuals with CCN have identified a number of characteristics. Many individuals predominantly produce single-symbol utterances (Binger & Light, 2008). When they do produce longer utterances, there is a high occurrence of simple clause structures and limited use of questions, commands, negatives, and auxiliary verbs. Other characteristics include atypical word order patterns and a tendency to omit syntactic and morphological structures such as verbs and articles (Soto, 1997; 1999). This investigation documented and analysed the syntax used by typically developing children when they wrote about self-selected topics. The study was part of a broader investigation (Clendon, 2006) that considered the parallels between learning to write and learning to use an augmentative and alternative communication (AAC) system, and the implications that typical written language development has for children with complex communication needs (CCN). The study analyzed the syntax used by typically developing children in North Carolina and New Zealand when they wrote about self-selected topics. The children’s writing samples were compared across school ages and countries. The school age comparisons highlighted the restricted language abilities of children in the earliest stages of writing development and the country comparisons revealed differences in patterns of use. The study’s findings will provide AAC professionals with knowledge about the range and complexity of language structures that typically developing children use when they are faced with one of their greatest cognitive challenges: the translation of thought into abstract symbols. This will enable AAC professionals to acquire realistic expectations for children with CCN, and will assist them as they make decisions relating to syntax intervention and language representation in children’s AAC systems.
spoken language” (von Tetzchner & Jensen, 1996, p. 1). This may include unaided methods such as gesture or sign language, and/or aided methods such as low-tech communication boards or books, and high-tech computerised devices with voice output (Clendon & Erickson, 2009).

Why Study Written Language?

It is common practice in the AAC field to collect spoken language samples from typically developing children, analyse these samples, and then relate the results of the analyses to children with CCN (e.g., Beukelman, Jones, & Rowan, 1989; Crestani, Clendon, & Hemsley, 2010; Fallon, Light, & Paige, 2001; Trembath, Balandin, & Togher, 2007). The language that typically developing children use when they are first learning to write, however, may also provide useful information that can be used to improve the communication abilities of children with CCN. Learning to write is a complex process that requires the integration of knowledge and skills across a variety of domains (Light & McNaughton, 2009).

Various researchers (e.g., Gombert, 1992; Kroll, 1981; McCutchen, 2000) have discussed the challenges involved in learning to write and many of these challenges are comparable to those experienced by children with CCN when they are learning to use AAC. Both groups of children must learn to translate language into an expressive form, using an instrument that is not second-nature to them (e.g., a pencil or a communication device) (Clendon, 2006; Clendon & Erickson, 2008). As Harpin (1976) indicated, the demands of such a process can have a substantial impact on the quantity and quality of the language produced:

When children begin the process of learning to write there is a big gap between their general language competence and their performance. The effort involved in learning a new skill is considerable and attention is, naturally enough, on the mechanics of the process. What is drawn on from those oral language resources is sharply restricted. As the act of writing becomes habitual, so more opportunity is available to bring oral competence and written performance into harmony. (p. 52)

Only a few theoretical models have been generated that have attempted to describe writing development in young children. Unfortunately, these models have questionable validity since they have not yet been adequately tested through research. Despite this, the models do offer some useful insight into the manner in which the acquisition of written language appears to unfold (Singer, 1995). Kroll (1981) presented a model that examines how the relationships between speaking and writing change over time and how these changes indicate different stages in development. The first two stages in Kroll’s model are particularly relevant to beginning writers and children with CCN.

In the first stage, the preparation stage, speaking and writing are relatively separate processes. Children are usually at this stage when they start school. Their spoken language skills are well developed. In contrast, their written language abilities are extremely limited. Their cognitive resources are concentrated on acquiring the technical or mechanical skills involved in generating written text such as handwriting and spelling. In the second stage, the consolidation of spoken and written language skills. Children begin to draw on their spoken language abilities to support their written language development. During this stage, children’s spoken and written language skills become increasingly integrated. In fact, the writing that children generate during this stage is often described as resembling spoken language written down (Kroll, 1981).

The theoretical model proposed by Kroll (1980) reveals parallels between beginning writing development and beginning AAC communication. The model suggests that when typically developing children are first learning to write, their greatest challenge is figuring out how to translate the words they wish to communicate into written symbols. This process is comparable to that observed in children with CCN when they are first learning to use an AAC system. Beginning writers and beginning AAC communicators are both learning to transform language that is inside their heads into abstract symbol systems. Obviously, the symbol systems vary since children with CCN are often trying to translate language into picture symbols and not into letters or written text. However, the cognitive, memory, and physical constraints involved in the learning process and the impact that these constraints have on the language generated are likely to be very similar (Clendon, 2006; Clendon & Erickson, 2008).

Why Study the Syntax of Typically Developing Children?

Three theoretical models have been presented in the literature that suggest possible explanations for the differences observed in the syntax produced by individuals with CCN. The first of these models is the deficit hypothesis. This hypothesis purports that individuals with CCN have differences in their underlying knowledge of syntax and morphology that can be attributed to the limited opportunities that they have to actively manipulate and construct language (Blockberger & Johnston, 2003; Sutton, Soto, & Blockberger, 2002). Many children with CCN do not receive AAC systems until the period of primary language development is already well underway (Sutton & Gallagher, 1993). Furthermore, even when these children do receive AAC systems, they tend to assume passive roles within communicative interactions. They rarely initiate and only respond when they are clearly obligated to do so (Light, Collier, & Barnes, 1985). The amount of time that these children spend experimenting with language is therefore extremely limited. Support for the deficit model was highly prevalent in the AAC field until Kroll (1985) questioned it in an influential paper that synthesized the interaction research at the time. Kroll suggested that the differences in the language produced by individuals with CCN did not reflect underlying language deficits. Instead she proposed that the differences reflected strategies and competencies necessary for successful AAC communication. Following Kroll’s paper, two alternative theoretical models were proposed and explored: the compensation hypothesis and the modality-specific hypothesis.

The compensation hypothesis suggests that the atypical patterns observed in the language structures produced by individuals with CCN occur due to the cognitive, physical, and linguistic constraints involved in communicating using an AAC system (Sutton et al., 2002). These constraints include reduced access to the full range of syntactic and morphological structures, reduced rate of communication, and the need for co-construction and negotiation of message meaning (Sutton, Gallagher, Morford, & Shahnaz, 2000). For instance, the compensation hypothesis suggests that individuals with CCN may intentionally omit inflectional morphemes because they are trying to conserve their physical resources and/or save time (Blockberger & Johnston, 2003). The inflectional morphemes in English are often predictable from context and they tend to carry a minimal share of the informational load (Blockberger & Johnston, 2003). For these reasons, individuals with CCN may purposefully omit inflectional morphemes because doing so allows them to generate messages at a faster rate without seriously compromising their message clarity.

The modality-specific hypothesis attributes the structural features of the language produced by individuals with CCN to the process of generating language in the visual graphic modality (Sutton et al., 2002). The exact nature of the relationship between spoken language and the construction of utterances using graphic symbols is still relatively unknown. It is not until recently that studies have attempted to investigate how individuals with CCN construct their utterances by generating their messages using subvocal speech, and then translating their messages from spoken language into graphic symbols, or whether they formulate their utterances by adhering to linguistic patterns that are unique to the visual graphic modality (Sutton et al., 2000).

The modality-specific hypothesis suggests that the language structures produced by individuals with CCN are at least partially influenced by factors unique to the modality. Examples of these factors include the possibility to select more than one symbol at a time (Sutton et al., 2000) and the possibility to use one symbol to represent more than a single concept or word (e.g., the picture communication symbol sit could be used to represent the word sit, but it could also be used to represent the phrase girl sit chair) (Smith, 1996).

Advocates of the compensation hypothesis and/or the modality-specific hypothesis may argue that the syntax of typically developing children has limited relevance to children with CCN. However, there are at least two reasons why this is not the case. Firstly, the findings of the studies conducted to date that have addressed issues relating to
the syntactic abilities of individuals with CCN suggest that there is no simple explanation for the differences observed in the language produced by individuals with CCN (Sutton & Gallagher, 1993). It seems possible that underlying language deficits, compensatory strategies, and modality influences may all impact on language production. In fact, it seems likely that a fourth theoretical model that reflects the interaction of the constructs in the existing three hypotheses may be required to capture the complexity of language produced using AAC.

Secondly, children with CCN need to develop the ability to communicate both efficiently and precisely. They must be able to transmit the meaning and communicative intent of a message as quickly as possible, and be able to construct a message that is grammatically correct and complete. Both are important for effective AAC communication. Efficient communication strategies decrease the number of targets that individuals with CCN need to hit which speeds up their rate of communication and enables them to participate in conversations in a timely manner (Harris, Doyle, & Haaf, 1996). In contrast, the lack of efficient communication is necessary for the prevention of communication breakdowns, for the communication of complex ideas, and for written language development (Lund & Light, 2003; Sutton et al., 2002). The findings of the current study are highly relevant for informing the development of students’ precise communication. They may be less relevant, however, for informing the development of efficient communication as research suggests that efficient AAC communication may not adhere to the rules of conventional English syntax (Sutton et al., 2000).

The Syntax of Beginning Writers

A number of studies have been conducted that have explored the syntax that typically developing children use when they write. Some of these studies have compared the written language produced by typically developing children with that produced by children with language disorders, learning disabilities, and/or intellectual disabilities (e.g., Gillam & Johnston, 1992; McFadden & Gillam, 1996; Scott & Windsor, 2000). Other studies have examined differences across genres (e.g., Beers & Nagy, 2011) or compared the spoken and written language modalities (e.g., Gillam & Johnston, 1992; Hidi & Hildyard, 1983; McFadden & Gillam, 1996; Scott & Windsor, 2000). Usually, these studies have employed tests of significant differences on various summary measures (e.g., total number of words, total number of t-units, t-unit length, clause length, total number of dependent clauses). Very few descriptive analyses have been employed that provide details regarding the actual content and form of children’s writing samples. Most of these studies have been conducted with children above the third-grade level.

A review of the literature identified four large-scale studies (Bear, 1939; Hunt, 1964; Loban, 1976; O’Donnell, Griffin, & Norris, 1967) that have included more comprehensive analyses of the syntax and morphology used by typically developing children in their writing. These studies were all published prior to 1976. One of the major objectives of these studies was to find quantitative indices of grammatical development that would be useful for informing educational decision-making (Scott, 1988). The Bear, Hunt, and O’Donnell et al., studies were cross-sectional. In contrast, the Loban study was longitudinal, carried out over a 13-year period. The Bear and Hunt studies focused only on written language, whereas the Loban and O’Donnell et al. studies compared language produced in the spoken and written language modalities.

The writing samples reflected a variety of different discourse contexts. The children in Bear (1939) were asked to write a story about “an interesting experience during the summer vacation” (p. 312). In contrast, the children in O’Donnell et al. (1967) were asked to write a story in response to a short film that was shown to them with the sound turned off. Loban (1976) and Hunt (1964) collected writing samples that were described as being typical of those that the children produced in school.

The studies employed various units of analysis including t-unit length (Hunt, 1965; O’Donnell et al., 1967), c-unit length (Loban, 1976), clause length (Hunt, 1964), degree of subordination (Hunt, 1964; Loban, 1976), degree of elaboration (Loban, 1976), frequency of particular sentence types (e.g., simple, compound, complex) (Bear, 1939), and frequency of particular clause structures (e.g., subject-verb, subject-verb-object) (O’Donnell et al., 1967). All of the studies documented slow and steady syntactic growth across the age-span (Scott, 1988).

Only one study (Bear, 1939) examined the written language skills of children below the third-grade level. The findings of this study indicated that children used fewer simple sentence structures, and more compound and complex sentence structures as they advanced through the grade levels. For instance, in 1st-grade, the percentage of children who used one or more compound sentence structures was 7.1%. In 2nd-grade, this percentage increased to 15.5%, and in 3rd-grade, it increased to 26.9%. Similarly, in 1st-grade, the percentage of children who used one or more compound sentence structures was 6.2%. This percentage increased to 20.7% in 2nd-grade and 48.3% in 3rd-grade.

The two studies (Loban, 1976; O’Donnell et al., 1967) that compared the language produced in the spoken and written language modalities generated support for Kroll’s (1981) theory of writing development. In the earlier grades, children’s written compositions were syntactically less complex than their spoken compositions. In the later grades, however, this trend reversed and children’s written compositions became more advanced than their spoken compositions.

It is evident from examining the literature that additional studies that examine age-related differences in beginning writers are required. Many studies conducted to date were carried out more than 30 years ago. Since this time, writing instructional practices and the expectations that educators and parents have for children have undoubtedly changed. Another limitation of the existing research is that only one study (Bear, 1939) has included children below the 3rd-grade level. In at least one of the studies, the reason for this was a concern that children in or below 3rd-grade “may jabber away with ease, fluency and exuberance”, but most will “write only under considerable duress” (Hunt, 1964, p. 4). However, it is the written language used by children in the earlier grades that may be most relevant to children with CCN. Other gaps in the existing research are that very few studies have examined patterns of syntax below the clause level, very few studies have collected writing samples about self-selected topics, and no studies have compared the written language generated by children in different countries. All of these limitations were taken into consideration and addressed in the current study.

The current study was part of a broader investigation that examined the vocabulary, semantics, and syntax of beginning writers. The specific research question addressed in this study was: Are there school age and country-related differences in the syntax used by typically developing beginning writers who reside in North Carolina and New Zealand when they compose about self-selected topics, and if so what are these differences?

Methods

The Children

The children in New Zealand (n = 113) were recruited from Year 1-4 classrooms in three schools. The children in North Carolina (n = 125) were recruited from kindergarten, first-, second-, and third-grade classrooms in four schools. The average consent form return rates were 50% in New Zealand and 42% in North Carolina. The inclusion criteria required the children to be fluent in English and to have no evidence of poor speech, language, and/or hearing problems (as evidenced by school records).

The children represented a variety of ethnic backgrounds. In New Zealand, 70% of the children were New Zealand European, 12% were New Zealand Maori, and 18% were classified as Other. In North Carolina, 72% of the children were United States European, 11% were African American, 3% were Hispanic, 7% were Asian, and 6% were classified as Other. In both countries, the Other classification encompassed children from European countries and children who represented more than one ethnic background.

The children were classified into four groups according to their school age, which was defined as the length of time that the children had been at school. Children who had been at school for less than one year were assigned a school age of ’1’, children who had been at school for between 1 and 2 years were assigned a school age of ’2’, and so forth. The creation of this variable was necessary in order for valid cross-country comparisons to be made. Children in the United States typically start school at the beginning of the school year within...
which they will turn five. In contrast, most children in New Zealand start school on their fifth birthday. Ascertaining the grade level in the United States that is equivalent to the year level in New Zealand is a difficult task. The school age variable was created because it circumvented this issue. In New Zealand, there were 32 children in School Age 1, 49 in School Age 2, 58 in School Age 3, and 19 in School Age 4.

The Teachers

The school principals at the participating schools were asked to identify teachers who provided regular (at least three times per week) self-selected writing opportunities. These teachers were approached and invited to participate in the study. There were 13 teachers in New Zealand and 17 teachers in North Carolina who took part. In New Zealand, two of the teachers co-taught within the same class. The teachers in New Zealand had between 6 and 30 years of experience (M = 15 years). The teachers in North Carolina had between 2 and 24 years of experience (M = 8 years).

The Schools

The three schools in New Zealand are all public primary schools located in suburbs of two small North Island cities. Schools E and G are situated in one city and School F is situated in the other city. School E is a Catholic school. The writing samples were collected in 2005 and according to the 2001 Census in New Zealand, the median household income for the areas surrounding the three New Zealand schools ranged from NZ$35,195 to NZ$66,789. The median household income for the city that Schools E and G are located within was NZ$45,667 and for the city that School F is located within was NZ$44,320. The median household income for New Zealand was NZ$39,588 (Statistics New Zealand, 2001).

The four North Carolina schools are all public elementary schools that are located in the central piedmont region. School A is located in a university town. Schools B, C, and D are located within 13 miles of the university town. According to the 2000 Census in the United States, the median household income for the census tracts surrounding the four North Carolina schools ranked from US$40,424 to US$54,897; all exceeding the state average of US$39,184. The median household income for the United States was US$41,994 (United States Census Bureau, 2000).

Data Collection

All of the writing samples generated during self-selected writing sessions over a six-week period were collected and photocopied for analysis. The teachers were asked to translate any handwriting or spelling attempts that were unclear or unconventional, i.e., any words that could not easily be read by an unfamiliar conventionally literate person. They were also asked to complete bi-weekly classroom context logs. The logs elicited descriptions of classroom, school, community, national, and international events that may have influenced children’s writing topics, vocabulary, etc.

A total of 2721 writing samples were collected. Each of the participating children produced between 1 and 33 writing samples. All of the children in New Zealand and the children in School Ages 1 and 4 in North Carolina produced a different writing sample each day. However, the children in School Ages 2 and 3 in North Carolina often worked on the same writing sample over multiple days.

The syntax analyses were completed on 98 writing samples. These writing samples were selected by randomly choosing 49 children from North Carolina and 49 children from New Zealand. Within each country, the sampling was stratified based on school and school age in an effort to achieve balanced representation. In both groups of 49 children, there were 14 children in School Age 1, 14 in School Age 2, and 14 in School Age 3. There were, however, only 7 children in School Age 4. This was because there were only 7 New Zealand children in School Age 4 who participated in the study. One writing sample was randomly selected for each child.

Language Analysis

The Language Assessment, Remediation, and Screening Procedure (LARSP, Crystal, Fletcher, & Garman, 1989) program in the Computerized Profiling (Long, Fey, & Channell, 2004) software program was used to examine the children’s syntax. The LARSP analysis is recognized as one of the most comprehensive approaches to grammatical assessment (Klee & Paul, 1981; Lund & Duchan, 1983). The analysis is based on a structural linguistic model of syntax. It examines the use of various clause, phrase, and word level elements across a series of developmental stages. The LARSP analysis is generally used to examine the spoken language skills of children between the ages of 9 months and 4 years 6 months. Its use in this study, however, was deemed appropriate given that the writing samples were collected from beginning writers. The written language skills of beginning writers are typically inferior to their spoken language abilities (Kroll, 1981).

The first stage in LARSP consists of single word sentences that are classified as being either major or minor. Major sentences consist of elements (e.g., verb, noun) that “are able to combine with other elements according to the language’s rules to produce an indefinitely large set of sentences” (Crystal, 1982, p. 17). In contrast, minor sentences (e.g., vocatives, interjections, greetings) “do not permit the application of these rules, and do not readily allow an analysis into structural types” (Crystal, 1982, p. 17).

The first three clausal stages in LARSP, Stages II, III, and IV, are defined quantitatively with the stage number corresponding to the number of elements found within the clause (i.e., Stage II clauses are comprised of three elements and so forth). The next clausal stage, Stage V, is focused on clausal coordination and subordination (Blake, Quartaro, & Onorati, 1993). The two most advanced clausal stages (VI and VII) were not analyzed in this study for two reasons. Firstly, stages VI and VII are not well defined (Blake et al., 1993), and secondly these stages include clausal elements (e.g., passive verb tense) that are considerably more advanced than those typically observed in the population of children with CCN. For similar reasons, only the first three phrasal stages (II, III and IV) were included in the analysis. These stages consist of some phrase types that are defined quantitatively and some that are defined qualitatively (e.g., auxiliary verb, copula) (Blake et al., 1993).

The frequency of all clause, phrase, and word level elements was calculated for each writing sample. Following the procedure outlined in Blake et al. (1993), the children’s scores were then converted into relative frequencies for the across-school age and across-country comparisons. This helped to control for the writing samples’ differing lengths. In addition, a number of summary measures were produced: mean number of t-units per writing sample, mean length of t-unit, relative frequency of Stage I, relative frequency of each clausal stage, relative frequency of each phrasal stage, mean clausal complexity, and mean phrasal complexity.

Statistical Analysis

Descriptive statistics and graphs were generated to compare school ages and countries. Differences on two of the summary measures (mean clausal complexity and mean phrasal complexity) were analyzed using a multivariate analysis of variance (MANOVA), followed by repeated contrasts. Originally, it was intended to include mean length of t-unit in this analysis as well; however, this variable failed to meet the assumptions of normality (positively skewed), homogeneity of variance, and multicollinearity and singularity. Various solutions to these problems were considered including transforming the variable to a different scale (e.g., logarithmic, square root). However, the multicollinearity and singularity diagnostics indicated that the variable was significantly correlated with mean clausal complexity for children in New Zealand in School Age 1 (r = .731) and for children in North Carolina in School Age 2 (r = .920). It was decided to omit the variable because including redundant variables in the same analysis is not recommended as it increases the size of the error terms and weakens the analysis (Tabachnick & Fidell, 2001). Tabachnick & Fidell (2001) cautioned researchers to “think carefully before including two variables with a bivariate correlation of more than .70” (p. 84).

Reliability

The computerized version of LARSP (Crystal et al., 1989) found in CP (Long et al., 2004) does necessitate some human decision-making. It is reasonably accurate at coding word (94% accuracy), phrase (91% accuracy), and clause (84%) level elements, but has substantial difficulty with more complex syntactic structures such as subordinate clauses (14% accuracy) (Long & Channell, 2001).
Since CP has difficulty analyzing more complex syntactic structures, each sample selected for analysis with LARSP was hand checked for accuracy of coding by the researcher. Then, an associate professor in linguistics who has expertise in LARSP analyzed a random selection of 10% of the writing samples. Both the researcher and the professor analyzed the writing samples using CP and then verified the accuracy of the analysis by reviewing each structural element. Percent agreement scores were 91% for clause level elements, 94% for phrase level elements, and 95% for word level elements.

Following this, the linguistics professor examined the discrepant analyses to determine whether the researcher’s alternate analyses were appropriate or inappropriate. A number of the discrepant analyses were deemed appropriate. The percent agreement scores for clause, phrase, and word level elements were adjusted accordingly. The adjusted scores were 96% for clause level elements, 98% for phrase level elements, and 97% for word level elements.

RESULTS

Mean Number of T-Units per Writing Sample and Mean Length of T-Unit

The mean number of t-units per writing sample and the mean length of t-unit were calculated for the countries with the school ages combined, and for the school ages and countries separated out. When the school ages from the two countries were examined collectively, the mean number of t-units per writing sample increased as a function of school age. On average, the children in School Age 1 generated 2.86 t-units per writing sample. This increased to 4.46 at School Age 2, 7.89 at School Age 3, and 12.14 at School Age 4. The mean length of t-unit increased from School Ages 1-3 with an average of 5.26 words in School Age 1, 7.28 in School Age 2, and 7.69 in School Age 3. Interestingly, it then decreased to 6.44 words in School Age 4.

Similar patterns of increasing writing sample length were evident when the school ages from the two countries were examined separately. For the children in North Carolina, the mean number of t-units per writing sample increased as follows: 3.82 t-units in School Age 1, 6.83 in School Age 2, 10.43 in School Age 3, and 13.71 in School Age 4. The children in School Ages 1-4 in New Zealand tended to generate writing samples that included fewer t-units than the children in North Carolina. In fact, the writing samples generated by children in School Ages 3 and 4 in New Zealand were similar in mean number of t-units to those generated by children in School Ages 2 and 3 in North Carolina. The New Zealand children in School Ages 1-4 wrote an average of 1.91, 2.43, 5.36, and 10.57 t-units respectively.

The pattern of t-unit length when the countries were examined separately was also similar to the pattern observed when the countries were examined collectively with increases from School Ages 1-3 and then a decrease in School Age 4. For the children in North Carolina, the mean length of t-unit was 4.63 words in School Age 1, 5.79 in School Age 2, 6.37 in School Age 3, and 6.02 in School Age 4. The children in New Zealand tended to write longer t-units. The mean length of t-unit for the children in New Zealand was 5.89 words in School Age 1, 8.56 in School Age 2, 9.00 in School Age 3, and 6.87 in School Age 4.

Stage I Analyses

The complexity and types of Stage I (single word) structures that were used were examined for the countries combined and for the countries separated. When the countries were combined, the mean percentage of t-units including a Stage I structure was 0 in School Age 1. This increased to 5.69 in School Age 2, 6.89 in School Age 3, and 11.63 in School Age 4. When the countries were separated, the same pattern of increasing use was evident for the children in New Zealand. The mean percentages of t-units including a Stage I structure in School Ages 1-4 in New Zealand were 0, 0.857, and 9.41 respectively. In North Carolina, the pattern was different. The mean percentage increased from 0 in School Age 1 to 11.37 in School Age 2. It then decreased to 5.22 in School Age 3 before increasing again to 13.85 in School Age 4.

The different types of Stage I structures used were also examined. When the countries were examined collectively, the Stage I structures used included one of the school age groups were Minor Vocative, Minor Other, V (Command), V (Statement) and Other. Three structures, Minor Response, Q, and N, were not used at all. Minor Other was the structure used most frequently by children in School Ages 2 to 4. The children in School Age 1 did not use any Stage I structures.

When the countries were examined separately, three Stage I structures were used in at least one of the school age groups in both countries. These structures were Minor Vocative, Minor Other, and V (Command). The V (Statement) structure was used in one of the school age groups in New Zealand and the Other structure was used in three of the school age groups in North Carolina. Minor Other was the most frequently used Stage I structure in School Ages 2, 3, and 4 in North Carolina and School Ages 3 and 4 in New Zealand. The children in School Age 1 in North Carolina and School Ages 1 and 2 in New Zealand did not use any Stage I structures.

Stage II Analyses

The clause structures that were used were examined, and the calculation of the summary measure, mean clausal complexity. The analyses were conducted for the school ages with the countries combined, and also for the school ages and countries separated out.

Stage stages – Countries combined

When the countries were combined, some general trends in clause-level complexity were apparent. Clause structures from all the four clause stages were used across the school age groups. The clause structures that tended to be used most frequently were from Stage III. On average, 65% of the clause structures used in School Age 1 were from Stage III. This decreased to 48% in School Age 2 and 38% in School Age 3, before increasing to 45% in School Age 4. Stage II clause structures had fluctuating patterns of use. The mean percentage for Stage IV clause structures doubled from School Age 1 to School Age 2 but then decreased in School Ages 3 and 4. The mean percentage for Stage V clause structures increased from School Ages 1 to 3, but then decreased slightly in School Age 4.

Interestingly, clause structures from the two most advanced stages, Stages IV and V, were typically not used with the highest frequency by children in School Age 4. Stage IV clause structures had the highest mean percentage of use in School Age 2, and Stage V clause structures had the highest percentage of use in School Age 3.

Stage stages – Countries separated

When the children in North Carolina and New Zealand were examined separately, some similarities and differences were evident. In North Carolina, all of the school age groups used Stage II to V clause structures. The pattern was the same for School Ages 3 and 4 in New Zealand, however School Age 1 in New Zealand used Stage II to IV clause structures and School Age 2 used Stage III to V clause structures. On average, Stage III clause structures were used most frequently by children in all of the school ages in North Carolina and School Ages 1, 3, and 4 in New Zealand. However, in School Age 2 in New Zealand, the children tended to use stage IV clause structures most frequently.

The patterns of use of the two most advanced stages also highlighted some similarities and differences between the two countries. Stage IV clause structures had the highest mean percentage of use in School Age 2 in New Zealand and School Age 3 in North Carolina. Stage V clause structures had the highest mean percentage of use in School Age 3 in New Zealand and School Age 4 in North Carolina.

Clause types – Countries combined

The different clause types used within each LARSP stage were also examined. When the countries were combined, only 2 of the 10 Stage II clause types were not used: SO and Other. In School Ages 1 to 3, the most frequently used clause type was SV. In School Age 4, two clause types were used most frequently: SV and VO. The Stage III clause types that were used most frequently varied significantly across the school ages. In School Age 1, the most frequently used clause type was SVO. In School Age 3, it was SVA and in School Age 4, it was SVC. In School Age 2, two clause types were used most frequently: SVC and SVO. The only stage III clause types that were not used were Do XY and Neg XY.

In Stage IV, the only clause types that were not used were VS(X)+ and Tag. SVOA was used most frequently by children in School Ages 1, 2, and 4, and Other was used most frequently by children in School Age 3. Of the 14 Stage V clause types, 7 clause types were used and 7 were not used. The most frequently used clause type in School Ages 1 and 2 was Sub A I. In School Ages 3 and 4, the most

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frequently used clause type was PM Cl I.

Clause types – Countries separated

When the children in North Carolina were examined separately from the children in New Zealand, similar trends in the types of clause structures were apparent. Across the school age groups in both countries, the most frequently used Stage II clause type was SV. The most frequently used Stage III clause type differed depending on the country and school age. There were three clause types that were used most frequently: SVO (North Carolina School Age 4, New Zealand School Age 2), SVO (North Carolina School Ages 1 and 2, New Zealand School Ages 1, 3, and 4), and SVA (North Carolina School Age 3, New Zealand School Age 1).

Apart from the frequent usage of the Stage V clause type Sub O, the usage patterns for Stage IV and V clause types were almost identical to those observed when the countries were examined collectively. SVOA (North Carolina School Ages 2 and 4, New Zealand School Ages 1, 2, and 3) and Other (North Carolina School Age 3, New Zealand School Age 4) were the most frequently used Stage IV clause types, and Sub A 1 (North Carolina School Ages 1, 3, and 4, New Zealand School Ages 2 and 4), Sub O (North Carolina School Age 2), and PM Cl I (North Carolina School Age 3, New Zealand School Age 4) were the most frequently used Stage V clause types8.

Clausal complexity

The mean clausal complexity scores for the two countries combined revealed that clausal complexity increased from School Age 1 (M = 3.18) to School Age 2 (M = 3.50) to School Age 3 (M = 3.55), but that it then decreased in School Age 4 (M = 3.50). The greatest growth occurred between School Ages 1 and 2. The mean scores for all of the school age groups were between 3.18 and 3.55 providing further evidence of the high prevalence of Stage III clause structures.

Growth trajectories for the children in North Carolina mirrored those for the school ages when the two countries were combined. The mean clausal complexity for the children in School Ages 1-4 in North Carolina were 3.16, 3.28, 3.48 and 3.41 respectively. The children in New Zealand exhibited a different growth trajectory when examined separately. Their mean clausal complexity scores increased from 3.19 in School Age 1, 3.69 in School Age 2, but then decreased to 3.61 in School Age 3, and 3.59 in School Age 4. The mean clausal complexity scores for the children in New Zealand were slightly higher than those in North Carolina across all of the school ages. The New Zealand scores in School Ages 2, 3, and 4 fell above 3.5 indicating a higher usage of Stage IV and V clause structures.

Phrase Level Analyses

The phrases that the children generated were analyzed according to their complexity and type. The summary measure, mean phrasal complexity, was also calculated. Again, the analyses were conducted for the four school ages within and across countries.

Phrase stages

The patterns of complexity across the school ages were remarkably similar when the analyses were conducted with the two countries combined. Across all of the school age groups, Stage III phrase types tended to be used most frequently, followed by Stage II, and finally Stage IV. All of the stages had mild fluctuations, but no mean percentage of use. There were no clear school age related differences.

The analyses conducted with the two countries separated revealed very similar patterns of complexity. In both countries, the order of mean percentage of use from most to least for all of the school age groups was Stage III, Stage II, and then Stage IV. Again, all of the stages fluctuated mildly in their mean percentage of use. The only obvious school age-related difference was a decrease in the use of Stage III phrases in New Zealand. Interestingly, the pattern of use at School Age 1 was almost identical for the two countries. The only difference was that the children in New Zealand did not use any Stage IV phrases, whereas some of the North Carolina children used a few.

Phrase types

The phrase types used within each LARSP stage were also examined. When the countries were combined, all of the Stage II phrase types were used by children in all of the school age groups, all of the Stage III phrase types were used by children in at least one of the school age groups, and all but one (cX) of the Stage IV phrase types were used by children in at least one of the school age groups. Across all of the school age groups, the most frequently used Stage II and Stage III phrase types were DN and Pron-P respectively. For Stage IV, the most frequently used phrase types were XcX for School Ages 1, 2, and 3, and NPP/NP for School Age 4.

When the countries were separated, the patterns for Stage II were similar with the most frequently used phrase type being DN across all groups except for North Carolina School Age 3. The children in North Carolina School Age 3 used the PiN phrase type most frequently instead. All of the groups did not use every phrase type. Adj/N, NN, VPart, and IntX were used by some groups and not by others. As was observed in the combined findings, all of the phrase types in Stages III and IV were used by children in at least one of the groups except for cX in Stage IV. The most frequently used Stage III phrase type was Pron-P for all of the groups. For Stage IV, the most frequently use phrase type differed depending on the country and school age. It was XcX for School Age 1 in North Carolina and School Ages 2 and 3 in New Zealand, NPP/NP for School Age 4 in New Zealand, and Other for School Ages 2, 3, and 4 in North Carolina9.

Phrasal complexity

The mean phrasal complexity scores for the two countries combined indicated that phrasal complexity increased from School Age 1 (M = 2.69) to School Age 2 (M = 2.83), but then it dropped slightly in School Age 3 (M = 2.79), before increasing again in School Age 4 (M = 2.82). The greatest growth occurred between School Ages 1 and 2. The mean scores for all of the school age groups were between 2.69 and 2.83. This confirms the finding that there was a high prevalence of Stage III phrase structures, and that there were a greater number of Stage II phrase structures than there were Stage IV.

When the two countries were examined separately, it was apparent that the growth trajectories of the children in North Carolina and the children in New Zealand were different. In North Carolina, phrasal complexity increased across the school ages from 2.70 in School Age 1 to 2.80 in School Age 2, 2.81 in School Age 3, and 2.88 in School Age 4. In New Zealand, phrasal complexity increased from 2.69 in School Age 1 to 2.85 in School Age 2. It then decreased, however, to 2.78 in School Age 3 and to 2.76 in School Age 4. The mean phrasal complexity scores for the children in New Zealand and North Carolina were equivalent in School Age 1. In School Age 2 the scores for the children in New Zealand were slightly higher than those in North Carolina, and in School Ages 3 and 4, the scores for the children in North Carolina were slightly higher than those in New Zealand. In both countries, all of the scores fell above 2.5 indicating a high usage of Stage III phrase structures.

Word level

The usage patterns for the 14 bound morphemes analyzed at the word level were examined for the countries combined, and also for the countries separated out.

Countries combined

The results of the combined analyses revealed that the use of bound morphemes increased as a function of school age. In School Age 1, 10% of the total words used contained a bound morpheme. This increased to 14% in School Age 2, 20% in School Age 3, and 22% in School Age 4. The children in School Age 3 were the only group that used all 14 types of bound morpheme. The children in School Age 1 used only five (-ing, pl, -edreg, -ed (irreg), and 3s (irreg)). The children in School Age 2 used all except three (-est, -er, -ly) and the children in School Age 4 used all except one (-est).

The most frequently used bound morphemes differed across the school ages. In School Ages 1, 2, and 4, the most frequently used bound morpheme was the irregular simple past tense form (-ed (irreg)). In School Age 4, however, it was the irregular third-person singular present tense form (3s (irreg)). Other frequently used morphemes included the present progressive form (-ing, 22% in School Age 1), the plural form (pl, 24% in School Age 1, 17% in School Age 2, 19% in School Age 3, and 24% in School Age 4), and the regular simple past tense form (-ed (reg), 14% in School Age 4).

Countries separated

The usage patterns for the children in the two countries were markedly different. In North Carolina, the pattern was similar to that observed
In the combined analysis with the children in each of the advancing school ages using a greater percentage of bound morphemes. For these children, the percentage of total words containing a bound morpheme was 5% in School Age 1, 15% in School Age 2, 20% in School Age 3, and 21% in School Age 4. In New Zealand, the percentage of total words containing a bound morpheme was 20% in School Age 1. This was much higher than the 5% observed in North Carolina. Interestingly, the percentage of bound morphemes used in New Zealand then dropped to 13% in School Age 2, before increasing again to 18% in School Ages 3 and 24% in School Age 4.

In School Age 1, the North Carolina children used 4 different types of bound morpheme and the New Zealand children used 5. The simple past tense verb form (-ed (reg)) was used by the children in New Zealand, but was not used by the children in North Carolina. The type used most frequently by children in School Age 1 in New Zealand was the irregular past tense form (-ed (irreg)). In contrast, the type used most frequently by children in the same school age group in North Carolina was the irregular third-person singular present tense form (3s (irreg)).

The children in School Age 2 in North Carolina used 10 different types of bound morpheme. They used 3 types that were not used at all by the children in New Zealand (-en, n’t, and ’cop). The children in New Zealand used 8 different types, one of which (-aux) was not used by the children in North Carolina. In both countries, the type used most frequently by children in School Age 2 was the irregular simple past tense form (-ed (irreg)).

In School Age 3, the children in North Carolina used all 14 types of bound morpheme. The children in New Zealand used 11 types. They did not use the contracted auxiliary (‘aux), the comparative form (-er), or the adverb form (-ly). The bound morpheme that was used with the highest frequency was the plural form (pl).

The children in School Age 4 in North Carolina used 11 different types of bound morpheme and the children in New Zealand used 13 different types. The children in North Carolina did not use the past participle form (-en) or the comparative form (-er). The type used most frequently by children in School Age 4 in both countries was the irregular simple past tense form (-ed (irreg)).

**Multivariate Analysis of Variance**

The MANOVA procedure was conducted to examine school-age and country related differences in two of the syntactic measures: mean clausal complexity and mean phrasal complexity. Before conducting the analysis, the data were screened to check for violations of the MANOVA assumptions (e.g., normality, homogeneity of variance, multicolinearity, and singularity). The mean clausal complexity variable exhibited problems with normality (negatively skewed). The Shapiro-Wilk test was significant (p < .001) for the children in School Age 1 in New Zealand. Efforts to transform the data did not result in a normal distribution. As a result, the MANOVA was run for children in School Ages 1-4 in North Carolina, but only for children in School Ages 2-4 in New Zealand.

Using Pillai’s Trace criterion, the main effects for school age, F(4,450) = 1.936, p = .220, and for country, F(2,74) = 2.710, p = .073 were not significant. Furthermore, there was no significant interaction between the two factors, F(4,450) = .966, p = .428. Even though the main effects were not significant, the repeated contrasts for the school age variable were still examined since they were planned a priori and when “the analyst has planned specific comparisons across the categories of an independent variable, the outcome of the omnibus test is typically of no interest or consequence in itself” (Spicer, 2005, p. 157).

Repeated contrasts for the school age variable identified a significant difference in mean phrasal complexity between School Ages 1 and 2 (p = .025). There were no significant differences, however, between School Ages 2 and 3 (p = .551) and between School Ages 3 and 4 (p = .662). There were no significant differences in mean clausal complexity between School Ages 1 and 2 (p = .191), School Ages 2 and 3 (p = .572), and School Ages 3 and 4 (p = .724).

In summary, the results of the MANOVA indicated that there were no country related differences in mean clausal complexity or mean phrasal complexity. There were school-age related differences, however, in mean phrasal complexity. On average, the children in School Age 2 used more complex phrase structures than the children in School Age 1. There were no significant differences in mean phrasal complexity between the children in School Ages 2 and 3, and the children in School Ages 3 and 4. In addition, there were no significant differences between School Ages 2 and 3, and the children in School Age 4 used more complex phrase structures than the children in School Age 1.

**Discussion**

If AAC teams wish to be effective at facilitating the syntax development of children with CCN, then they must take into consideration the demands involved in learning a new expressive communication form, and the impact that this may have on the rate and complexity of the language structures produced. This study examined the language of beginning writers in the hope that this would provide AAC professionals with a window into a similar learning situation. The findings of this study provide support for Kroll’s (1981) description of beginning writers as having very restricted written language abilities.

The children in School Age 1 used fewer t-units and fewer words per t-unit than the children in the other school age groups. The children’s mean clausal complexity and mean phrasal complexity scores were also the lowest observed. The performance of children across the school ages on these two measures, however, was surprising. The degree of difference between the four school ages was not as large as was expected at the outset of the investigation. The only statistically significant difference was in mean phrasal complexity between School Ages 1 and 2. The data were examined in more detail to try and figure out why there was such limited variability.

One reason for this might be that the LARSP stages of development become less valid as children develop more advanced language skills. As mentioned earlier, the LARSP is generally used to assess the spoken language skills of preschool children. It was used in this study because the focus was on examining the language of beginning writers; a population who have written language abilities that are typically inferior to their spoken language abilities and perhaps commensurate with the spoken language abilities of preschool children. It was difficult to determine beforehand whether LARSP would be appropriate for all of the school ages in this study because so few studies have examined the written language abilities of children below the third-grade level.

One of the problems inherent in the LARSP analysis is that some clausal structures are tallied more than once (see discussion in French, 1988). For instance, in the t-unit: I like my t-shirt because it is colorful, the subordinate clause because it is colorful is tallied at Stage V as Sub A 1, and at Stage III as SVC. The effects of this problem were evident when the mean percentage scores from School Age 2 were compared to those from School Ages 3 and 4. This comparison revealed that the children in School Age 2 used a greater proportion of Stage III and IV clause structures, but that the children in School Age 3 used a greater proportion of Stage I, II, and V clause structures. Possible reasons for the increasing proportion of Stage I and II clause structures in School Ages 3 and 4 were examined. It was found that when children in School Age 2 used Stage II structures, the structures usually comprised an entire t-unit. In contrast, when children in School Ages 3 and 4 used Stage II structures, the structures were frequently subordinate clauses that were embedded within more advanced clause structures. It seems possible that if the analyses had tallied only the most advanced clause structure within each t-unit, then the differences between the school age groups may have been more substantial.

A second problem inherent in the LARSP analysis is that some stages may be more valid than others. Blake et al. (1993) conducted a study in which they used the LARSP analysis to test the validity of the mean length of utterance (MLU) measure. They found that the LARSP stage frequencies were significantly correlated with MLU, but that the correlations were only moderate for Causal Stage III and Phrasal Stages III and IV. They also examined the correlations between LARSP stage frequencies and chronological age. The stage frequencies were...
significantly correlated with age, however again, the correlations were only moderate for some stages, namely Clausal Stages III and IV and Phrasal Stage III. The researchers stated that:

It should be noted that the weaker relationships between both age and the overall language measures and clause 3, clause 4, and phrase 4 constructions make the validity of these LARSP measures somewhat questionable. Thus, although we have used LARSP to determine the grammatical validity of MLU… some of the LARSP measures, namely the middle clausal stages and the highest phrasal stage may be, themselves, less valid than others (p. 150). Problems like these are not specific to the LARSP analysis. Kroll (1980) acknowledged when presenting his theoretical model of written language development that there are a number of weaknesses inherent in models that attempt to delineate developmental stages. Kroll stated that these models can oversimplify development by making it appear “unidimensional and strictly linear” (p. 40).

Despite these problems, stage models of development, including the LARSP analysis can be extremely valuable. Although the LARSP analysis may not have revealed substantial quantitative differences between the written language abilities of children in School Ages 1–4, it did reveal some striking qualitative differences. The findings of some follow-up analyses suggest that one characteristic that set the beginning writers in School Age 1 apart from the children in the other school age groups was a lack of variation in the types of clauses used. The children in School Age 1 used 9 different clause types. In contrast, the children in School Age 2 used 17, and the children in School Ages 3 and 4 used 27.

Another difference between School Age 1 and the other school age groups was the number of children that used advanced clause types. As mentioned in the results, clause types from Stages IV and V were used across all of the school age groups. However, frequently a smaller percentage of children in School Age 1 used these structures than in the other school age groups. For instance, the clause type AAX was used by 1 (4%) of the 28 children in School Age 1, by 5 (18%) of the 28 children in School Age 2, by 14 (50%) of the 28 children in School Age 3, and by 6 (43%) of the 14 children in School Age 4. Similarly, the clause type SVOA was used by 8 (6%) of the 28 children in School Age 1, by 17 (61%) of the 28 children in School Age 2, by 18 (64%) of the 28 children in School Age 3, and by 9 (64%) of the 14 children in School Age 4.

When the clause types from the two countries were examined separately, some differences were evident. The children in School Age 1 in North Carolina predominantly used only one clause type (SVO) and the children in School Age 1 in New Zealand predominantly used two (SVO and SVA). The children in New Zealand used a greater variety of clause structures than the children in North Carolina. They also used a greater number of advanced (Stage IV) clause structures. In addition to the clause type differences already described, the children in School Age 1 also used a narrow range of phrase structures. They used 16 different types whereas the children in School Age 2 used 22 and the children in School Ages 3 and 4 used 23. Again the children in School Age 1 in North Carolina tended to favour one structure (Pron-P). Approximately 75% of the phrase structures used by the children in North Carolina were either Pron-P or DN. In contrast, in New Zealand 75% of the phrase structures were comprised of PronP, DN, PnDN, PrN, or Aux-O. There was only one Stage IV phrase structure used, XcX. It was used by one child in North Carolina.

Additional credence for the observation that beginning writers have written language abilities that are inferior to their spoken language abilities can be obtained by comparing the findings of this study to the findings of another study which also employed LARSP. French (1988) used LARSP to examine the spoken language skills of five 5-year-old children in the United Kingdom. French provides a list of the phrase structures that the children used in order from highest frequency to lowest frequency. When this list is compared to the findings for School Age 1 in this study, some interesting findings are evident. The top 3 phrase types were the same in both studies: Pron-P, DN, and Cop. There were 6 phrase types that were used by the children in French’s study that were not used by the children in this study: Pron-O, Neg V, cx, NPPyNP, Neg X, and 2 Aux. One of these phrase types was from Stage III (Pron-O). The remaining phrase types were from Stage IV.

In French’s (1988) study, the proportions of Stage II, Stage III, and Stage IV phrase structures were fairly evenly distributed across the stages: 35%, 35%, and 30% respectively. In this study, however, there were significantly more Stage II (50%) and Stage III (44%) structures, than there were Stage IV (6%) structures. Obviously these two studies were not carried out under identical conditions and therefore any comparisons made between the two need to be interpreted cautiously. Nevertheless, the collective findings of these two studies suggest a substantial discrepancy between the spoken language skills and written language skills of young children.

The finding that many children in School Age 1 used a restricted set of clause and phrase types has important implications for speech-language therapists and other AAC professionals who work with children with CCN. Some professionals may have unrealistic expectations about the kinds of sentence structures that children with CCN should be able to produce. The findings of this study suggest, that even typically developing children who are beginning writers in North Carolina in their paths to learning, experience substantial difficulty taking language that is inside their heads and translating it into a novel language form. The findings also suggest that there may be differences in the types and complexity of clause and phrase structures used by children in North Carolina and children in New Zealand. AAC teams in the two countries may need to adjust their expectations accordingly.

Supporting Complexity through Augmentative and Alternative Communication

The findings of the syntax analyses provide information that can assist AAC teams as they make decisions about how best to represent language on a child’s AAC system. Picture symbols in light-tech communication boards/books and dynamic display systems are typically arranged using one of four approaches to language organization: taxonomic grid displays, schematic grid displays, semantic-syntactic grid displays, or visual scene displays. The findings of this study do not assist AAC teams with figuring out which of these approaches or combination of approaches are best for the children they work with. The findings do, however, help AAC teams to think more critically about how language is arranged within one of these language organization approaches: the semantic-syntactic grid display in which language is displayed according to the parts of speech.

One of the most commonly used semantic-syntactic formats is the Fitzgerald key (Fitzgerald, 1954). In this format, the parts of speech are arranged from left to right in a manner that corresponds to typical sentence order. For example, in Bruno’s (n.d.) version of the Fitzgerald key, people words (nouns and pronouns) are presented on the left of the display followed left-to-right by action words (verbs), little words (e.g., articles, prepositions, conjunctions), descriptive words (e.g., adjectives, adverbs), object words, and place words.

In all but one of the groups in this study (New Zealand School Age 2), Stage III syntactic structures were used most frequently. The types of Stage III structures used most frequently differed across the school ages within the two countries. However, the clauses that were used most frequently were always one of three clause types: SVC, SVO, or SVA. These clause structures can be generated in the Fitzgerald key described above, but the arrangement doesn’t directly support their generation in any way.

The findings of the current study suggest an alternative format may be superior to the Fitzgerald key arrangement as a support for clause construction. In this format, symbols representing the subject in a sentence would be positioned in a column down the left of the display. On the right of those symbols would be a column of symbols representing the verb. Arranged in the column next to the verb symbols would be three rows of symbols representing the complement, the object, and the adverbial. When the children selected one of these symbols the display would change and they would be presented with symbols reflecting the high frequency phrase structures that occur within those clause elements.

The format would provide children with the capacity to also generate frequently occurring Stage II and IV clause structures such as SV and SVOA. The format may be particularly useful for children who appear to have become stagnant in their syntactic development. It may help support these children...
to start combining more clausal elements and to expand the types of clause and phrase structures that they produce.

Limitations

Several contextual influences were identified in the current study, which reduce the generalisability of the study’s findings. For example, there was a high prevalence of SVA sentence structures in School Age 3 in North Carolina because the children in this group wrote a large number of alphabet stories. The classroom context logs revealed that two of the teachers had read alphabet stories to the children in their classrooms as part of the language arts curriculum. The teachers reported that the children had enjoyed the stories and had subsequently chosen to write their own.

Asking children to write about self-selected topics obviously increases the likelihood that context will have an influence on a study’s findings. The need to minimize contextual influences has likely resulted in previous researchers asking children to write on controlled topics. However, the purpose of the current study was to elicit a broad range of communication abilities of children with CCN, and it will prompt them to carefully consider a child’s school age and country when setting targets for intervention and when making decisions about language representation within children’s AAC systems.

Such a large sample of children’s writing lends itself to a number of further analyses. The children’s syntax should be analyzed further with a particular focus on the children in the lowest quartile of syntactic ability. The children’s errors should also be examined to see whether they share any characteristics with the errors made by children who are learning to use AAC.

CONCLUSIONS AND FUTURE DIRECTIONS

The findings of this study identified various school age and cross-cultural differences in the syntax used by typically developing children when they compose about self-selected topics. In particular, the study highlighted the restricted language abilities of children in the earliest stages of writing development and discussed the implications that this has for children with CCN. The study is distinctive in terms of the wealth of descriptive information that has been produced. This information will assist AAC professionals to have realistic expectations for children with CCN, and it will prompt them to carefully consider a child’s school age and country when setting targets for intervention and when making decisions about language representation within children’s AAC systems.

Such a large sample of children’s writing lends itself to a number of further analyses. The children’s syntax should be analyzed further with a particular focus on the children in the lowest quartile of syntactic ability. The children’s errors should also be examined to see whether they share any characteristics with the errors made by children who are learning to use AAC.

REFERENCES


Hunt, K. (1964). Differences in grammatical structures written at three grade levels, the structures to be analyzed by transformational methods. Tallahassee: Florida State University.


Footnotes

1 Definitions and examples of the different clause, phrase, and word types are available by contacting the author via email: sally@clendon.net

2 The calculations for mean number of t-units per writing sample and mean length of t-unit (measured in words) were based on complete and intelligible t-units. T-units that were abandoned or that contained unintelligible segments were excluded from the calculations.

3 The relative frequency of Stage I constructions was calculated by dividing the total number of Stage I constructions by the total number of t-units.

4 The relative frequency of each phrasal stage was calculated by dividing the total number of phrases at each stage by the total number of phrases across all of the stages.

5 Stage I frequencies were excluded from these calculations. The mean clausal complexity scores were weighted by multiplying the number of clauses at the four clausal stages (II, III, IV, and V) by the stage number, and then dividing by the total number of clauses across all of the stages.

6 The mean phrasal complexity scores were weighted by multiplying the number of phrases at the three phrasal stages (II, III, and IV) by the stage number, and then dividing by the total number of phrases across all of the stages.

7 Tables documenting the frequencies of the different clause, phrase, and word types are available by contacting the author via email: sally@clendon.net. The frequency data is presented for the children in North Carolina, the children in New Zealand, and the children in North Carolina and New Zealand combined.

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References

Light, J.C., & McNaughton, D. (2009). Addressing the literacy demands of the curriculum for more conventional and more advanced readers and writers who require AAC. In C. Zangari & G. Soto (Eds.), Practically speaking: Language, literacy, and academic development for students with AAC needs (pp. 217-245). Baltimore: Brookes.


Social validity: A review of the literature

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The following article reviewed the literature regarding ‘social validity’ and explored its potential application within speech-language therapy. Social validity has been most commonly explored in the evaluation of behaviour modification techniques, and refers to the extent to which the technique is acceptable and has real-life relevance to clients and the significant people in their lives. Subjective evaluation, social comparison, and template matching are discussed as specific techniques of establishing the social validity of an intervention.

Within the profession of speech-language therapy (SLT), ‘social validity’ is not a term in current use, but it could be a useful factor in making assessment and therapy decisions. The concept of social validity aligns with the holistic approach promoted within the SLT discipline (i.e., considering the whole person, their social environment, and daily communication demands). The following article presents a literature review of social validity and explores its application within the processes of assessment, goal setting and establishing intervention effectiveness.

What is Social Validity?

Social validity is defined as the degree to which therapeutic changes are socially important to a client or the clinical meaningfulness of behavioural changes (Kazdin, 1977; Sheridan, Hungelmann, and Maughan 1999). Similarly, McLean, Wolery and Bailey (2004) emphasised that socially valid interventions should be seen to be important in real life and include therapy methods that are analogous to real life situations. Thus, assessment of social validity should include measures that use the client’s own criteria to determine the acceptability of an intervention. McLean et al. (2004) noted that if the client does not know what the therapy goals are, the therapy will not be socially valid. In contrast, the authors advocated assessment within natural settings, particularly for young children, so their behaviour was not affected by unfamiliar aspects of the assessment situation.

Myers and McBride (1996) provided a direct comparison of naturally based and norm referenced assessment methods by evaluating the acceptability of transdisciplinary play-based assessment versus standardised assessments for 40 children aged under 3 years. Parents and professionals completed questionnaires after the assessments had been completed to rate the social validity of the two approaches. Transdisciplinary play-based assessment was rated slightly higher than the standardised method, with both approaches scoring high ratings. The authors speculated that family members may rate an assessment technique highly because they like the therapist, rather than giving a more objective opinion of the technique alone.

There is consensus in the literature that the inclusion of assessment data collected in natural settings does not negate the use of standardised assessment tools. Rather, it points to the importance of collecting assessment data from a variety of sources, including formal testing, observations, and discussion with family members. For example, “Guidelines for developmentally appropriate practices (DAP) suggest that assessment tools and procedures be naturalistic, multidimensional, and do not rely exclusively on standardised and norm-referenced measures (Copple & Bredekamp, 2009; Neisworth & Bagnato, 2005)” (Bagnato & Macy, 2010, p. 44).

Selecting socially valid goals

The second step in implementing socially valid practice is to select socially valid goals following completion of the initial assessment process. Methods for selecting socially valid goals have centred around those focused on a) subjective evaluation and b) social comparison (Hawkins, 1991; Campbell and Dollaghan, 1992). Subjective evaluation includes measures that use the client’s own criteria to determine the acceptability of an intervention. Social comparison involves examining the performance of someone who is highly proficient in the area under focus, particularly when identifying behaviours and sub-skills that lead to success and that can be used as therapy targets. For example, social skills goals can be derived from what a person with good social skills actually does when they meet someone they do not know (Hawkins, 1991). Template matching is a social comparison technique that can be used to identify skills that are valued in a particular social situation by surveying peers and adults. For example, respondents can be asked to think of someone they think performs particularly well in a given situation and then describe the behaviours of that person which mark them as particularly proficient (Sheridan et al., 1999).

The use of subjective evaluation and/or social comparison has been reported in the literature in a number of intervention settings applicable to speech-language therapy, including language sample evaluation for children with brain injury and the development of social skills (Christensen, Young, and Marchant, 2007; Sheridan, Hungelmann, and Maughan, 1999).

Socially valid interventions

The third step in implementing socially valid practice is to ensure clients and their families are engaged in the selection of intervention approaches and monitoring intervention effectiveness. A number of studies have evaluated the social validity of a given intervention following completion of the intervention alone (i.e., without building social validity into assessment and goal setting processes). Olive and Liu (2005) assessed the social validity of their behaviour interventions on 14 young children following completion of the intervention. They found a strong positive relationship between observed improvement in behaviour and parent and teacher ratings of treatment acceptability and effectiveness. Teachers gave lower ratings than parents, even when there were similar outcomes. Dunlap, Ester, Langhans and Fox (2006) implemented a behaviour modification programme with two young children with challenging behaviours. The authors measured the social validity of their programme by asking the children’s mothers to complete ‘goodness-of-fit’ questionnaires during the implementation phases of the programme. Parent ratings showed that the mothers felt the programme was feasible and compatible with their family life.

Social validity ratings appear to be influenced by the success of the intervention. Chuk, Alberto and Fredrick (2007) implemented behaviour modification plans for four teenagers with learning difficulties. Social validity was assessed using the Intervention Rating Profile (IRP; Martens, Witt, Elliot, & Darveau, 1985, cited in Chuk et al., 2007). The teachers completed the questionnaire before and after they were aware of the positive outcome of the intervention. Social validity was rated much higher on the questionnaires completed after being told the results. These findings support the notion that an intervention will be more acceptable the more successful it is, and that reservations about a technique can be overcome when it is seen to be successful.

Treatment success, however, is not the only factor in determining the acceptability of a given therapy strategy. Rhue, McMahon and Vando (2009) assessed the social validity of four behaviour assessment activities for 43 mother and child pairs. Children were aged 3 to 6 years. Thirty mothers identified themselves as European-American and 13 mothers identified themselves as African-American.

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Participants completed structured parent-child interactions and then the mothers completed social validity questionnaires that probed the acceptability of the activities and how representative they were of typical interactions. Results showed high levels of acceptability and representativeness for all tasks. “Additionally, social validity ratings were significantly associated with parenting self-esteem, maternal ethnicity, child gender, and child age, but not child behaviour problems (meaning the children’s compliance during the experiment)” (Rhule et al., 2009, p. 393). This is pertinent because it suggests that a technique can be rated as socially valid even if it is not highly successful with all clients.

The prominent method of ascertaining the level of social validity of a particular intervention used in the literature is via questionnaires and interviews. Finn and Sladecezek (2001) provided an overview of rating scales designed to measure treatment acceptability. The authors highlighted concerns over the lack of breadth of measures to establish treatment acceptability and suggest more sophisticated methods be developed.

The utilisation of indirect methods for establishing the social validity of interventions may be a potential further option for establishing treatment acceptability and effectiveness. Indirect methods make inferences from factors such as the compliance of participants in the therapy process, rather than explicitly assessing social validity. Fye et al. (2007) collected and analysed videos of children with Rett syndrome. The authors argued that the method was acceptable, and thus socially valid to parents because 97 families agreed to make the videos for the study (out of 169 families in the study).

Trent-Stainbrook, Kaiser and Frey (2007) trained older siblings of children with Down Syndrome (DS) to interact in particular ways to increase intentional communicative behaviours from the children with DS. They assessed social validity by asking independent observers to rate video clips of the dyads. They were asked to judge whether the older sibling was using the techniques, whether the child with DS was communicating with the older sibling, and whether the siblings were enjoying spending time together and were interacting positively. The use and enjoyment of the intervention techniques were used as markers of the social validity of the intervention approach. More research is required to establish the optimal method of ensuring socially valid intervention choices.

**Discussion**

Social validity ratings are likely to be influenced by a number of factors including the success of the intervention, the relationship between the clinician and the client, and the involvement of the client throughout the entire process from assessment choice to establishing intervention effectiveness. Social validity should not be relegated to an evaluation at the end of an intervention, although that can be part of the appraisal. The professional should start with social validity as a high priority and use it to guide decisions around assessment, goal selection and intervention strategy. The inclusion of significant people in the decision making stage is a valuable opportunity to recruit their assistance and compliance in the intervention phase of therapy. Professionals can also use their experience of similar cases right from the early planning phase when thinking about possible approaches. The professional will need an implementable and documentable model of what social validity is, however, to be successful in this endeavour.

**Summary and conclusion**

Social validity is a term used by psychologists in behaviour modification research. It could also be a useful concept in speech-language therapy when planning and evaluating assessments and therapy techniques. Important features include consulting informants on the choice of methods at the beginning of the process, in contrast to polling them afterwards, when they are likely to be influenced by the effectiveness of the intervention and their personal feelings about the professionals involved. The person whose needs are the focus of the therapy may be an appropriate informant, and significant people who will be involved in implementing the therapy can also provide important information to increase social validity of the undertaking. Significant people are likely to include family members and also people who have key roles in the person’s life at the time, such as a school child’s teacher and their special education needs coordinator. The informants can be asked to suggest therapy goals, or to provide data on the characteristics of a person who is skilled in the area under discussion. They may also be able to report on changes in the client’s behaviour. The professional judgement of the therapist is still important in selecting the most appropriate goals at the time, and proposing a course of action (or giving several options that the team can choose from).

Social validity, then, is a valuable consideration when choosing a programme of assessment and therapy. Its use promotes the involvement of clients and their significant people in the therapy process. If social validity is built into every step in the process, evidence will probably be seen in the evaluation at the end with high customer satisfaction as well.
Two Case Studies of Self-efficacy and Communication Behaviour Change in Communication Partners of Individuals who use a Low-tech Communication Aid

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This study aimed to explore the relationship between parents’ self-efficacy ratings and their communication behaviour. Parents’ self-perceptions and videoed communication interactions were compared pre- and post-instruction for two parent-child dyads using a within subject, case study design. Parent participants received 4-5 sessions of communication partner instruction using a strategy instruction approach that targeted four evidence-based supportive communication strategies: (a) use of yes/no questions, (b) modelling of the AAC system, (c) responsiveness to communication attempts and (d) expectant delay. The investigation used two dependent variables: (i) a purpose designed questionnaire and (ii) transcribed video recordings of parent-child interactions.

Effective communication partner training is critical to successful implementation of augmentative and alternative communication (AAC) (Light, Daffilo, English, Gutierrez & Hartz, 1992; Kent-Walsh & Light, 2003). ASHA (2004) advises communication partner instruction for family members and significant others is best practice in the service delivery of AAC, yet recent reports suggest communication partners lack knowledge and fail to use and maintain skills following instruction (Beukelman & Mirenda, 2005; Kent-Walsh & McNaughton, 2005; Bailey, Parette, Stoner, Angell & Carroll, 2006; Johnson, Inglebret, Jones & Ray, 2006). One possible reason for communication partner instruction failing to reach its potential is the absence of specific protocols to guide speech-language therapists (SLTs) who deliver instruction. When communication partners lack knowledge and skills, AAC systems can fail to function as effective modalities of communication, and in some situations systems may be abandoned altogether, despite their potential to aid the individual (Johnson, et al., 2006).

Approximately 38,600 New Zealanders (Statistics New Zealand, 1998) have complex communication impairments that restrict their participation in everyday communication activities. The American Speech-language Hearing Association (2004, p.4) defines AAC as a means to “temporarily or permanently compensate for the impairments, activity limitations, and participation restrictions...
of individuals with severe disorders of speech-language production and/or comprehension”. In the absence of natural speech, AAC systems can enable individuals to express their communication needs and enhance communicative participation with communication partners (Light, et al., 1992). There is no formal, comprehensive record of AAC use in New Zealand. In 2005, Sutherland et al. surveyed 214 New Zealand SLTs regarding AAC use and service provision and found that most individuals who use AAC in New Zealand use low-tech systems. Despite the popularity of low-tech over high-tech systems, the majority of AAC literature focuses on high-tech systems.

Success versus Abandonment

The communication and social benefits of AAC have been widely reported in the literature (Light, 1989; Schepis & Reid, 1995; Calculator, 1999; Beukelman & Mirenda, 2005). AAC systems can speed up exchanges, make the exchange more understandable, and reduce the need for the communication partner to act as an interpreter, thus increasing the likelihood that a partner will initiate and maintain interactions with an individual who uses AAC (Johnston, Reiche & Evans, 2004).

In the last ten years, several authors have introduced the term ‘system abandonment’ (Soto, 1997; Sutherland, Gillon & Yodder, 2005; Johnson, et al., 2006). The use of the term ‘abandonment’ indicates increased acknowledgement and concern for the failures of AAC. This literature highlights the attitude and role of the communication partner and the instruction and support they receive as contributing to the success of AAC system use. Teachers’ perceptions of students’ abilities to communicate and their perceptions of their own skills and responsibilities are amongst the strongest indicators of system abandonment for families of children who use AAC. Although this was a small study, Bailey et al.’s data indicates that families may benefit from improved AAC instruction and support services.

Role of the Communication Partner

Communication is a dynamic two-way process, and the success of communicative interactions depends on the skills and contributions of both participants. AAC is a poor substitute for natural communication (Kraat, 1987), and as a result, interactions using AAC differ from natural spoken communication (Wilkinson & Hennig, 2007). Interactions using AAC are typically asymmetric, as the AAC user relies heavily on partners’ skills to facilitate effective communication (Kent-Walsh & McNaughton, 2005). Wilkinson and Hennig (2007) noted that communication partners might need to anticipate and interpret the actions of the individual who uses AAC to allow communication to occur. By predicting the individual’s needs and wants, the communication partner reduces the number of opportunities for communication, and as a result, dominates the interaction (Halle, Brauer & Spradlin, 1981; Light, Collier & Parnes, 1985; Kraat, 1987; Wilkinson & Hennig, 2007).

Light, Collier & Parnes (1985) studied eight 4-6 year old children who were non-verbal. Unstructured interactions with a parent/carer were compared to structured interactions with an experienced AAC clinician. Parent/carers dominated communicative interactions, asked predominately yes/no questions, had the majority of conversational turns, interrupted utterances and focused on the AAC system rather than the message. These observations provide information about parent-child interactions when an AAC system is present. These findings are based on a small sample size, however, and there were differences in data collection conditions for parents versus clinicians. It is also likely that individual variations exist in the interaction styles of communication partners of individuals who use AAC (Kraat, 1987; Light, et al., 1992).

Communication Partner Training

Since interactions with AAC systems are different from natural communication (Wilkinson & Hennig, 2007), it is not surprising that most communication partners require instruction to develop knowledge and skills to support individuals who use AAC (Light, 1997). The purpose of instruction is to teach communication partners how to provide communication opportunities for individuals who use AAC (Light, 1997). A study by Light et al. (1992) demonstrated that a short period of direct training can successfully teach supportive communication skills. Using a single-subject multiple baseline design, Light et al. (1992) provided three adult communication partners of individuals with complex communication needs with four hours of instruction. Following instruction, the participants incorporated the new strategies into their interactions. Participants maintained their use of strategies for 2-4 weeks following instruction, but it is not known whether the participants’ communication behaviours remained changed following this period. Several studies have replicated this finding (Sigafos, 1999; Kent-Walsh & Light, 2003).

Despite the positive effect of instruction reported in the literature, there is little information regarding specific protocols for communication partner instruction (Kent-Walsh & McNaughton, 2005). Based on a systematic review of 22 articles focused on communication partner instruction, Kent-Walsh and Light (2003) determined evidence-based interaction strategies that instruction packages should include. Kent-Walsh and Light (2003) concluded that positive change occurred in all of the studies reviewed, but concluded that the use of case studies and exploration of multiple interventions limited conclusions regarding causal relationships. Based on their review, Kent-Walsh and Light (2003) summarised four interaction strategies repeatedly targeted in the literature: use of extended conversation pause time or expectant delay, responsiveness to communication attempts, use of open-ended questions and modelling of the AAC system. Kent-Walsh and Light (2003) concluded that instruction for communication partners should provide multiple opportunities for practice and feedback, be highly focused, and include instruction in how to generalise the new skills, but they did not identify a specific protocol for communication partner instruction.

Kent-Walsh and McNaughton (2005) advocated the use of an eight-step strategy instruction model for communication partner instruction. Developed in the field of education, the ideas of constructivist theorists such as Devey, Piaget, and Kohlberg form the basis for strategy instruction (Harris & Pressley, 1991). The underlying principle of this model is that understanding and learning occur when the learner actively participates in the learning process (Harris & Pressley, 1991). The eight-step strategy, based on Ellis et al.’s (1991) instructional model of teaching, involves providing the learner with a description of strategies to be learnt and the benefits of using them, demonstration of the strategies by the instructor, a breakdown of each strategy into small steps, and multiple opportunities for practice and feedback.

Strategy instruction has the potential to become a useful communication partner instruction tool as it provides a systemic protocol for teaching multi-step procedures (Kent-Walsh & McNaughton, 2005), and is a proven teaching tool for other complex skills. In a randomised control trial, Jitendra, Hoppes and Xin (2000) applied strategy instruction to reading comprehension in a group of children with learning difficulties. The experimental group of 20 children received instruction to identify and perform each step of a strategy using a strategy instruction procedure. The experimental group statistically outperformed those in the control group who did not receive instruction. Maccini and Hughes (2000) also reported positive outcomes for six children with learning difficulties who were taught mathematical problem solving skills using a strategy instruction procedure. One must view these results with caution, however, due to the small sample sizes, and the failure to compare the strategy instruction procedure to other instructional methods.

While strategy instruction may successfully teach specific skills, it does not provide information about an individual’s readiness to engage in instruction, or commitment to implement new communication behaviours. Investigations that consider the likelihood of communication partner behaviour change could lead to improved service delivery and greater likelihood of AAC success.

Communication Partner Behaviour Change

Since the 1970s, researchers have used the measures of ‘self-efficacy’ to ascertain ability and readiness to learn and implement new skills. Self-efficacy has been defined as “confidence in one’s
Communications partners who fail to change their communication behaviour may have low self-efficacy, whilst those with high self-efficacy may be more ready to change their communication behaviour. If self-efficacy ratings are a positive indicator of ability to change communication behaviour, they could provide clinicians with an indication of the level of support and instruction required, thus guiding service delivery models and increasing the effectiveness and efficiency of communication partner instruction. The aim of the current study was to conduct a pilot exploration of the relationship between parents’ self-efficacy ratings and their behaviour as communication partners when interacting with their children who used low-tech communication aids, pre- and post-a short period of instruction.

**Methodology**

**Design**

The investigation consisted of two case studies. Within a subject design was used whereby comparisons were made for each subject before and after communication partner instruction. Two communication dyads participated. Individuals who use low-tech communication aids were chosen for a number of reasons. Firstly, low-tech systems are employed across the SLT profession. They are a viable option for individuals with complex communication needs as they are inexpensive to develop, simple to operate, and can be adapted to match individual level of symbolic understanding more readily than their high-tech, technology based counterparts (Wilkinson & Hennig, 2007). Examples of low-tech systems include touching, finger pointing, eye pointing to photographs, objects and/or written words.

**Measures**

Two dependent variables were investigated: parent/carer self-ratings obtained from a purpose designed questionnaire and communication performance measures obtained from transcribed video recordings. The principal investigator devised a 46-item parent/carer communication aid questionnaire (PACCA) to obtain qualitative and quantitative data associated with self-efficacy. The questionnaire sought to investigate parent/carers’ attitudes towards communication aids and their perceptions of their interactions with their child. The questionnaire comprised five sections relating to background information, general attitudes towards communication aids, effectiveness of child’s communication aid, self-perceptions of communication partner behaviour, commitment to communication behaviour change and self-efficacy. Statements accompanied by a 10-point rating scale that ranged from very strongly agree to very strongly disagree accounted for 31 items in the questionnaire. Six questions required parents/carers to provide qualitative responses. Three experienced speech-language therapists reviewed the questionnaire and refined them prior to its use in the study.

A Samsung Minikit digital video recorder was used to record parent-child interactions in the home environment. The recordings totalled approximately 15 minutes for participant 1 and approximately 30 minutes for participant 2, pre-and post-intervention. The recorder was set up to allow the investigator to follow the child and parent. Recordings were obtained in the period following the child’s return from school. Communication partner instruction had been completed and parents were encouraged to use a mnemonic to help them implement the four strategies. During the final visit, following completion of intervention, parents completed the PACCA questionnaire, after which a 15-25 minute video recording of the parent-child dyad using the low-tech communication aid was obtained.

**Data Analysis**

Questionnaire responses were compared pre- and post-intervention. Questionnaire items with rating scales were grouped according to whether one would expect agreement or disagreement with the statement. Statements were rated by five student SLTs according to what they would expect if an AAC system was effectively in use. Inter-rater agreement was 88.3%. Questionnaire responses were coded from very strongly disagree (1) to very strongly agree (10). Means, medians, modes and ranges were calculated for questionnaire scores. A section of video approximately 5 minutes long for participant 1 pre- and post-intervention and 3 minutes long for participant 2 pre- and post-intervention was chosen as representative of the parent-child interactions. These interaction timings accounted for 20% of the video data obtained for each participant. Timings were approximate as the investigator ensured that complete interactions were obtained. For participant 1, the video recording was analysed to identify frequency and type of questions used by parents, frequency of AAC system modelling, frequency of communicative reinforcement and missed reinforcement opportunities, and frequency and duration of pauses. A second SLT transcribed 40% of the data; inter-rater agreement was 87%.

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Table 1. Strategy Instruction Model adapted from Kent-Walsh and McNaughton (2005)

<table>
<thead>
<tr>
<th>Session</th>
<th>Step 1</th>
<th>Description</th>
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<tr>
<td>1</td>
<td>1</td>
<td>Pre-test and commitment to communication partner instruction</td>
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<td></td>
<td>2</td>
<td>Strategy description, advantages of applying strategy and disadvantages</td>
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<td></td>
<td>3</td>
<td>Review strategies</td>
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<td>4</td>
<td>Verbal practice</td>
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<td>2</td>
<td>5</td>
<td>Controlled practice and feedback</td>
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<td></td>
<td>6</td>
<td>Advanced practice and feedback</td>
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<tr>
<td>3</td>
<td>7</td>
<td>Post-test and commitment to long-term strategy use</td>
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<td></td>
<td>8</td>
<td>Generalisation of targeted strategy use</td>
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Participants

Participants were recruited from a convenience sample of young people aged 8-16 years, who did not use speech as a primary mode of communication, and who used a low-tech communication aid. Recruitment was via a whanau/family co-ordinator working for a community support organisation for individuals with intellectual disabilities and a SLT based at a special school.

The first pair of participants was a 13-year-old male with cerebral palsy, who attended full time special school, and his 45-year-old mother, who was educated to tertiary level. The parent and child were of New Zealand European descent, and were monolingual speakers of English. The parent described the child as using a combination of cries, eye pointing, body movements, switches, and pictures to communicate. A low-tech communication aid developed and selected by the school’s SLT, which used principles of the Picture Exchange Communication System (PECS), had been in place at school for approximately 1-2 months. The parent was currently introducing the system at home at weekends.

The second pair of participants was an 8-year-old male with autism spectrum disorder, who attended full time special school, and his 49-year-old mother, who was educated to tertiary level. The parent and child were of New Zealand European and Maori descent, and were monolingual speakers of English. The parent described the child as using a combination of objects, gestures, pointing and a small number of Makaton signs to communicate. The Picture Exchange Communication System (PECS) had been in use approximately 1 year at home and at school, until abandoned by the child. The child currently used Makaton to request, reject, and greet others in the school environment, but less so at home. The parent introduced PECS and Makaton independently after having sought training for herself.

RESULTS

Parent Participant 1

Attitudes to Communication Aids

Pre-intervention, parent participant 1 very strongly agreed with statements regarding the communicative potential of communication aids (mean 10.00, median 10.00, mode 10.00, range 0). Post-intervention, parent participant 1 strongly agreed with the same statements (mean rating 9.33, median 9.00, mode 9.00, range 1.00), which suggests her ideas about communication aids were unchanged following instruction. The statements were “Communication aids can help children with communicate difficulties to communicate more effectively”, “Children who do not talk can learn to use communication aids” and “All children, regardless of their disability, can be helped to communicate.”

Communication Aid Effectiveness

Parent participant 1 initially disagreed with statements regarding the effectiveness of their child’s communication aid (mean 3.00, median 3.00, mode 3.00, range 4.00). Following training there was an increase in parent participant 1’s level of agreement with six of the seven statements (85.71%) regarding the effectiveness of their child’s communication aid (mean rating 5.86, median 7.00, mode 7.00, range 5.00). An average rating increase of 3.33 points (median 3.5, mode 4) was evident across the six of the items concerned with perceived effectiveness of the child’s communication aid following instruction (Figure 1).
Commitment to and Self-Efficacy for Communication Behaviour Change

Prior to intervention, parent participant 1’s questionnaire responses narrowly ranged from strongly agree (8) to very strongly agree (10), (mean 8.40, median 9.00, mode 9.00, range 2.00). Post-intervention, parent participant 1 continued to agree with commitment to behaviour change and self-efficacy statements (mean 8.40, median 9.00, mode 9.00, range 2.00). There was a rating decrease for two statements (mean 2, median 2), a rating increase for two statements (mean 1, median 1), and no change in one statement (Figure 2). Overall, these responses indicate generally high self-efficacy and commitment to behaviour change, and little change in perceptions after the intervention.

Self-perceptions of Communication Behaviour

Prior to intervention, parent participant 1 was in agreement (mean 7.00, median 7.00, mode 7.00) with four of the six statements regarding her communication behaviour (66.66%). There was a broad range in parent participant 1’s pre-intervention self-ratings of her communication behaviour from disagree to very strongly agree (range 7.00). Post-intervention there was a rating decrease for three of the six statements (mean 1.66, median 2, mode 2), a rating increase for two statements (mean 4, median 4) and no change in one statement regarding self-perceptions of communication behaviour. Overall, there was a slight increase in parent participant 1’s agreement ratings post-intervention (mean 7.50, median 8.00, mode 5.00) and a reduction in range of responses (5.00) (Figure 3).

Comparison of Parent’s Self-perceptions with Video Analysis

The video analysis provided information on turn-taking, use of questions, responsiveness, modelling and expectant delay (see Table 2). The three minute pre-intervention interaction sample consisted of 78 conversational turns. The parent took 54 (69.23%) turns, and the child 24 (30.76%). The parent asked 26 questions, accounting for 48.14% of conversational turns. Post-intervention the three minute interaction sample consisted of fewer conversational turns (36). The parent took 27 turns (75%), and the child 9 (25%).

The initial sample consisted of 19 yes/no questions (66.66%) and 7 (33.33%) other questions types, including open and forced choice. Post-intervention, there were 8 yes/no questions (61.53%) and 5 (38.46%) examples of other question types.

In the initial sample, parent participant 1 responded to 6 of the child’s communicative attempts (46.15%) compared to 5 (83.33%) post-intervention.

Parent participant 1 modelled the communication aid on 11 occasions pre-intervention, which accounted for 20.3% of her conversational turns. Post-intervention there were 3 examples of modelling, which accounted for 11.11% of her conversational turns.

There were 23 examples of expectant delay in the pre-intervention sample. Expectant delay lasted up to 1 second on 19 occasions (82.90%), and more than 1 second on 4 occasions (17.39), with a mean pause time of 1.21 secs (median 1, mode 1, range 2). Post-intervention there were 10 examples of expectant delay, 8 of which lasted up to 1 sec (80.00%) and 2 for more than 1 sec (20.00%), with a mean pause time of 1.5 secs (median 1, mode 1, range 2).
Overall the questionnaire data indicated little change in attitude towards communication aids and commitment to communication behaviour change for parent participant 1 following instruction. In two areas, rating increases were noted. An increase in the perceived effectiveness of her child’s communication aid was notable by a mean 3.33 point rating increase for 85.71% of items, in addition to a rating increase for 50% of parent participant 1’s ratings of her communication behaviour following instruction.

The video analysis of communicative performance indicated improved use of two of the four strategies targeted during intervention: responsiveness to communication attempts and expectant delay. The use of yes/no questions and modelling were relatively stable pre-and post-intervention. A comparison of questionnaire and communicative performance data indicated discrepancies between questionnaire ratings and communicative performance for two out of four of the strategies targeted during intervention. Agreement was evident between perceived and actual use of questions and expectant delay, but not for responsiveness and modelling.

Parent Participant 2

Prior to intervention, parent participant 1 strongly agreed with statements regarding the communicative potential of communication aids (mean 8.67, median 9.00, mode 9.00, range 1.00). There was no change in parent participant 2’s ratings post-instruction (mean 8.67, median 9.00, mode 9.00, range 0.00) (Figure 4).

Commitment to and Self-efficacy for Communication Behaviour Change

Prior to intervention, parent participant 2’s responses ranged from agree to strongly agree (mean 7.80, median 8.00, mode 8.00, range 4.00). Post-intervention, parent participant 2 produced a narrower range of responses (mean 8.00, median 8.00, mode 8.00, range 0.00) (Figure 5). Following instruction there was a two point rating decrease for one statement, a rating increase for two statements (mean 1.00, median 1.00, mode 1.00) and no change in the rating of two statements. Overall, these responses indicate that Parent Participant 2 has lower self-efficacy than Participant 1, and a slight improvement in self-efficacy after the intervention.

Self-perceptions of Communication Behaviour

Prior to intervention parent participant 2’s responses to statements about her communication behaviour narrowly ranged from agree to strongly agree (mean 8.50, median 8.50, mode 9.00, range 3.00). Post-intervention there was a rating decrease for three of the six statements (mean 3.33, median 4.00), and no change in three of the statements regarding self-perceptions of communication behaviour. Overall, there was a decrease in parent participant 2’s agreement ratings post-intervention (mean 6.83, median 8.00, mode 9.00) and an increase in range of responses (6.00) (Figure 6).
Comparison of Parent’s Self-perceptions with Video Analysis

The video analysis provided information on turn-taking, use of questions, responsiveness, modelling and expectant delay. The five-minute pre-intervention sample consisted of 94 conversational turns. The parent took 53 (56.38%) turns, and the child 41 (43.61%). The parent’s performance indicated a mean 3.00 point rating decrease compared to 9 (60.00%) post-intervention. The parent took 29 turns (55.76%), and the child 23 (44.23%). The parent asked 13 questions, accounting for 44.82% of conversational turns. Post-intervention, there were 14 examples of conversational turns, with a mean pause time of 1.35 secs (median 1.00, mode 1.00, range 1.00). Post-intervention there were 14 examples of expectant delay, which accounted for 44.82% of conversational turns, with a mean pause time of 1.35 secs (median 1.00, mode 1.00, range 1.00).

Overall the questionnaire data indicated little change in attitude towards communication aids and commitment to communication behaviour change for parent participant 2 following instruction. In two areas, rating decreases were noted. A decrease in perceived effectiveness of her child’s communication aid was notable by a mean 3.00 point rating decrease (median 2, mode 3.00, range 7.00). Post-intervention there were 14 examples of conversational turns, with a mean 3.00 point rating decrease (median 2, mode 3.00, range 7.00).

The initial sample consisted of 4 yes/no questions (30.76%) and 9 (69.23%) open questions. Post-intervention, there were 5 yes/no questions (38.46%) and 8 (61.53%) examples of other question types.

In the initial sample, participant 2 responded to 8 of the child’s communicative attempts (66.66%) compared to 9 (60.00%) post-intervention.

Participant 2 modelled communication aid use on 9 occasion’s pre-intervention, which accounted for 16.98% of her conversational turns. Post-intervention there were 4 examples of modelling, which accounted for 13.79% of her conversational turns.

There were 14 examples of conversational pause accompanied by eye contact and expectant facial expression in the pre-intervention sample. Use of expectant delay lasted up to 1 second on 10 occasions (71.42%), and more than 1 second on 4 occasions (28.57%), with a mean pause time of 1.35 secs (median 1.00, mode 1.00, range 1.00).

Post-intervention there were 14 examples of expectant delay, which accounted for 44.82% of conversational turns, with a mean 3.00 point rating decrease (median 2, mode 3.00, range 7.00). Overall the questionnaire data indicated little change in attitude towards communication aids and commitment to communication behaviour change for parent participant 2 following instruction. In two areas, rating decreases were noted. A decrease in perceived effectiveness of her child’s communication aid was notable by a mean 3.00 point rating decrease (median 2, mode 3.00, range 7.00). Post-intervention there were 14 examples of conversational turns, with a mean 3.00 point rating decrease (median 2, mode 3.00, range 7.00).

The small changes in questionnaire responses following instruction may indicate a limitation of the PACCA questionnaire. Feedback from parent participants was that the questionnaire was too long, and was difficult to complete as some statements were positive whilst others were negative. The length and difficulty of the questionnaire may have reduced its sensitivity. It would be beneficial to assess the inter-item and test-retest reliability in a

**Table 3.** Parent participant 2’s self-ratings on the PACCA questionnaire for items 33, 36, 37, 39, 40 & 41 and performance measures based on analysis of video recordings for use of questions, AAC modelling, expectant delay and responsiveness pre- and post-intervention.

<table>
<thead>
<tr>
<th>Communication Strategy</th>
<th>Pre-rating</th>
<th>Post-rating</th>
<th>Pre-Performance</th>
<th>Post-Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Use of Questions</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of yes/no questions</td>
<td>9</td>
<td>4</td>
<td>30.76%</td>
<td>33.46%</td>
</tr>
<tr>
<td>Use lots of questions</td>
<td>8</td>
<td>8</td>
<td>24.52%</td>
<td>44.82%</td>
</tr>
<tr>
<td><strong>AAC Modelling</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>8</td>
<td>16.98%</td>
<td>13.79%</td>
</tr>
<tr>
<td><strong>Expectant Delay</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time to express (mean)</td>
<td>10</td>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>3</td>
<td>1.35 sec (mean)</td>
<td>2.85 sec</td>
</tr>
<tr>
<td><strong>Responsiveness</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>9</td>
<td>66.66%</td>
<td>60%</td>
</tr>
</tbody>
</table>

**DISCUSSION**

The aim of this study was to explore the relationship between parents’ perceptions of their communication, including self-efficacy ratings, and their behaviour as communication partners of individuals who use low-tech communication aids. The PACCA questionnaire indicated little change in attitude towards communication aids, commitment to behaviour change and self-efficacy for either parent participant following instruction. There were, however, differences in responses to questions regarding effectiveness of their child’s communication aid and self-perceptions of communication behaviour for both parent participants following instruction. Parent participant 1 showed positive changes in 50% of communication behaviour ratings. In contrast, parent participant 2 showed negative changes in 50% of communication behaviour ratings. A similar pattern was evident in perceived effectiveness of the child’s communication aid. Parent participant 1 indicated a mean 3.33 point increase in perceived effectiveness of their child’s communication aid, whilst parent participant 2 indicated a mean 3.00 point decrease in the perceived effectiveness of their child’s communication aid. The responses suggest an increase in parent participant 1’s confidence and a decrease in parent participant 2’s confidence following instruction.

The small changes in questionnaire responses following instruction may indicate a limitation of the PACCA questionnaire. Feedback from parent participants was that the questionnaire was too long, and was difficult to complete as some statements were positive whilst others were negative. The length and difficulty of the questionnaire may have reduced its sensitivity. It would be beneficial to assess the inter-item and test-retest reliability in a
larger sample of parents prior to using the tool in further AAC investigations.

The video analysis indicated differences in communication behaviour change for the two participants. Parent participant 1 demonstrated improved use of 50% of the intervention strategies, whilst parent participant 2 demonstrated improved use of 25% of the intervention strategies. Parent participant 1 exhibited changes in responsiveness to communication attempts and in the use of expectant delay, whilst parent participant 2 exhibited changes only in the use of expectant delay. There were no negative behaviour changes, suggesting strategy instruction did not have a detrimental impact on communication behaviour. It is possible a more longitudinal study design could have achieved greater communication change, however, both families commented that a longer period of instruction would have been difficult to accommodate due to work and family commitments.

Strategy instruction was more effective in changing responsiveness and expectant delay behaviours in this investigation than question and modelling behaviours, despite the strategies receiving equal instruction. One reason for this might be that responsiveness and expectant delay are naturalistic features of conversational turn taking (Binger & Kent-Walsh, 2005), whereas use of yes/no questions and modelling are not naturalistic conversation behaviours.

Results from these two case studies suggest application of strategy instruction was not as effective as proposed by Kent-Walsh and McNaughton (2005). One reason for this could be that participants had inadequate knowledge of communication and AAC systems to engage in communication partner interaction. Prior to the intervention both families perceived they required more knowledge and support to implement AAC. It is possible participants would have benefited from an additional step in the instruction model that provided information about communication processes, their child’s communication and AAC systems. Communication partners might also benefit from more knowledge and support to implement AAC.

It appears that the strategy instruction procedure failed to increase awareness of communication skills for the participants in this study. Both participants perceived changes in their use of questioning and responsiveness following instruction. Parent participant 1 also perceived a change in her use of modelling. Perceived changes in questioning and responsiveness may indicate greater levels of awareness of these strategies over the modelling and expectant delay strategies targeted in intervention (Williams, 1999). One reason for this is that questioning, responsiveness, and modelling have linguistic elements, and could therefore be more salient than expectant delay which is a non-verbal strategy.

One should view the results of this pilot investigation with caution. Firstly, there are a number of design limitations. The small sample, limited number of data points, and lack of follow up due to time constraints limits confidence in these findings. Future investigations would benefit from a larger sample and longitudinal within-subject design, which allows multiple data collection points at baseline and follow-up.

Secondly, there are limitations in the measurements used. The test-retest and inter-item reliability of the PACCA questionnaire should be determined in a large sample of AAC users. Because interaction data was obtained during free interactions, pre-intervention and post-intervention collection conditions differed somewhat. Future investigations should obtain interaction data during semi-structured or structured interactions.

Thirdly, there are potential limitations with the strategy instruction model. A short period of strategy instruction may be inadequate to provide the instruction and support parents require to interact effectively with their children who use low-tech communication aids. Future research should therefore consider the benefits of other models such as ‘stages of change’ in addition to the strategy instruction procedure.

Fourthly, the investigation failed to consider external factors, such as cultural beliefs, known to affect behaviour change (Grol, 1997). Bunton et al. (2000) suggested behaviour change considered in isolation of external factors such as attitudes in the family and the community is oversimplified.

Both families expressed concerns that family and friends had different views than their own regarding how to communicate with their child who uses a low-tech communication aid. Future exploration of effective instruction should consider the broader social context of the family, by providing group instruction that includes family and friends.

CONCLUSIONS

Change in self-efficacy and communication performance following a short period of strategy instruction for the participants in this investigation was limited. Following instruction, parent participants continued to experience difficulties supporting their children who used AAC. Parent participants continued to dominate interactions, asked predominately yes/no questions, and infrequently modelled the AAC system for their child. These behaviours limit communication opportunities for children who use AAC. This pilot investigation highlights the need for further exploration of instructional procedures that promote self-efficacy and behaviour change in communication partners supporting individuals who use low-tech communication aids.

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Social communication intervention for children with Autism Spectrum Disorders: Background and Teacher strategies in an Experience Sharing programme

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This paper discusses a social pragmatic relationship-based communication intervention termed the Experience Sharing programme for children with autism which is currently operating in a NZ special school setting. The background and theoretical basis of the programme is discussed in relation to developments in intervention with children with autism. In order to begin to establish an evidence base for the effectiveness of the Experience Sharing programme, an investigation was conducted into the ways that teachers trained in this programme interact with children, to find what interaction strategies they used to promote experience sharing. Some comparisons were then made between teachers specifically trained in the Experience Sharing programme and another teacher who was trained in intensive interaction only. Many interaction strategies common to both were found, which appeared to reflect some shared similarities across interaction styles of individual teachers and possible influences of differences between the children. However, overall there were more similarities than differences. Implications of these findings are discussed.

Social interaction difficulties help define Autism Spectrum Disorders (ASD) (DSM-IV, APA 1994). There have been a number of behavioural approaches to working with social problems with people with ASD, such as the Picture Exchange Communication System (PECS) (Bondy & Frost, 2001), which have demonstrated success with the social interaction behaviours they target. However, there has been a developing debate about what these deficits in social interaction mean, and how to intervene with them (Gutstein, 2000). These social interaction difficulties in children with autism are often presented as a list of deficits, such as a lack of nonverbal communication, delay or lack of verbal language, and a lack of spontaneous showing and sharing of interests (Charman & Baird, 2002; Landa, 2007). This ‘listing’ relates also to how normal development of social interaction is often presented, with another list or set of milestones which do not relate together very strongly, such as that by six months of age, typically developing children master joint attention, and then develop communicative intent as they establish joint reference (Landa, 2007). The targets in behaviourally based interventions for social interaction similarly tend to take one behaviour at a time and establish this behaviour before moving on to the next. However, a more holistic perspective looks at social interaction as an integration of more complex internal and contextual factors and sequences, requiring a child (or adult) to constantly adapt to changing situations and continually evaluate information about emotions – their own and others’.

This emphasis on emotions is not generally found in discussions on the development of communication. However, this more holistic approach sees emotions as central to the process. At birth, typically developing children are oriented to the human face and begin to learn to relate emotionally to caregivers. Typically developing children experience emotional secure relationships with caregivers who are sources of meaning and indicate what is interesting and safe, therefore reducing ambiguity and confusion for the child (Landa, 2007). They experience enjoyment from these early interactions which motivates them to communicate with others. This is a dynamic process.

Research into children with ASD paints a very different picture of their early learning about relationships and communicating, with long-term consequences. Trevarthen and Daniel (2005) found that one year old children with ASD did not relate to their caregiver’s affect and expressed either delayed or no babbling. Charman (2003) and Delgado et al. (2003) associated the absence of joint attention, i.e., attending to the interests of another, with decreased language and social development in children with ASD. Charman et al. (2005) identified that children with ASD of average intelligence and who had developed competent formal language skills still struggled to engage meaningfully with others and tended to have one-sided conversations and play. Stichter, Randolph, Gage and Schmidt (2007) found that as children with ASD grew older, they failed to develop self-regulation and the higher social competence which would enable them to interact with others independently.

Therefore, rather than seeing the social interaction problem in terms of a list of deficit behaviours needing remediation, holistic therapists have begun to see the problem as being about this core emotional deficit, which would therefore become the target for intervention, rather than the individual behaviours which might be a consequence of such a deficit. The problem is seen to be about relationships with people, and the child’s understanding of the ways to emotionally connect with others (Gutstein, 2000). This changing perspective led to a rise through the 1990s and 2000s of intervention models categorised as “social” or “pragmatic” interventions. From these ideas, approaches such as SCERTS (Social Communication, Emotional Regulation and Transactional Support (Prizant et al, 2006), Intensive Interaction (Firth, 2009), DIR/Floortime (Greenspan & Wieder, 2006) and Relationship Development Intervention (Gutstein 2000) have emerged.

Social-pragmatic interventions
Prizant and Wetherby (1998) suggested that educationally based programmes could be categorised as fitting within a continuum of approaches, with behavioural interventions such as discrete trial training at one end and developmental (social pragmatic) approaches at the other. Developmental social-pragmatic interventions began to place importance on the functions of communication (e.g. requesting, commenting) and to recognise that exists in many forms including eye gaze, vocalisation and recognisable language (Ingersoll et al., 2005). These interventions assumed that children with ASD have the potential to enjoy interaction and aimed to trigger the innate social motivation they are presumed to have so they would want to interact with others. The programmes attempt in many cases to have the adult join in the child’s emotional world, and make pleasure and interaction the core of the programme, rather than attempting to change specific behaviours of the child.

Social-pragmatic programmes are newer than the behaviourally based programmes and have less evidence for their effectiveness. However, a joint guideline from the NZ Ministries of Health and Education in 2008 on best practices in working with people with autism (NZ Autism Spectrum Guideline) concluded that there is growing evidence that early intervention using such approaches can result in positive outcomes for individuals with ASD. Other researchers
have indicated effectiveness, for example, of the SCERTS programme (Prizant, Wetherby, Rubin, Laurent & Rydell, 2006; Woods & Wetherby, 2003; Landy, 2007).

### Intensive Interaction

This approach was built on the concept of ‘Augmented Mothering’ developed by psychologist Gary Einfeld (1982), who argued for the use of naturalistic interactions with clients with learning disabilities based on ‘infant-caregiver’ interactional techniques. Hewett and Nind (1998), who developed the programme, stated ‘Intensive Interaction is characterised by regular, frequent interactions … in which there is no task or outcome focus, but in which the primary concern is the quality of the interaction itself’ (p.2). The techniques of Intensive Interaction include the use of non-task associated physical proximity, responsive eye contact and facial signalling, physical contact, vocal echoing and behavioural mirroring (Firth, 2006). It facilitates communication development through intuitive processes as the child explores and develops typical early communicative behaviours (e.g. joint attention, joint reference and turn-taking) (Nind, 1999). In this approach, the caregiver is non-directive and responsive to any aspects of the child’s behaviour (however idiosyncratic) to ensure successful, enjoyable interaction through play (Barber, 2008). Evidence from several studies using this approach with a limited number of participants has shown a reduction in challenging behaviours and increased signs of positive affect and overall involvement in social communication (Barber, 2008; Elgie & Maguire, 2001) and increased levels of joint attention, active participation and turn-taking (Firth, 2006). Firth (2006) in his review indicated however that “the body of research is not large” and that the educational setting and varying methodologies were a feature with studies being small scale or single case without experimental controls, and sometimes with a limited timescale. He also indicated that the results were not robust enough to rule out “general maturation rather than any specific intervention” (p. 57) as accounting for the changes reported.

**DIR/Floortime (The Developmental, Individual Difference, Relationship-based /Floortime) Model**

DIR/Floortime is another approach which focuses on developing emotional and intellectual capacities which include creative and abstract thinking throughout interaction with a caregiver. The model looks at individual and biological challenges of the child and ways to overcome those challenges within the interaction. The programme describes communication or interaction as circular and reciprocal, and interaction aims to gradually increase the number of circles between the child and caregiver (Greenspan & Wieder, 1998; Greenspan & Wieder, 2006). Cartwright and Beskina in 2007 described DIR/Floortime as a well-known and widely used approach that has much appeal, but “lacks robust objective evidence to validate its effectiveness” (p 1498).

### Relationship development intervention

Of all these programmes, it could be argued that the one most centred in the emotional and relationship realms is Relationship Development Intervention (RDI) (Gutstein, 2000). Gutstein proposed that an emotional deficit leads children with ASD to lack understanding and internal social motivation to emotionally connect and relate meaningfully with others, and this results in a lack of interactional behaviours. He argues that children with ASD’s limited understanding of social interaction results in stress and confusion, leading to social isolation and withdrawal from society. The complex nature of interaction makes no sense to a child who does not understand or appreciate spending time with others.

RDI is a developmental intervention which sets out to assist children with ASD to understand, appreciate and enjoy social interaction in constantly changing situations. It highlights the child’s responsibility to maintain interactions and aims to assist children to become adaptable and flexible so they can repair communication when it breaks down. According to Gutstein, children are taught “experience sharing abilities” by enjoying social interaction without any external prompts or rewards. The children learn to observe and use the adult’s emotions (facial expressions and intonation) as social references to interpret safety and approval in social interaction.

The type of adult interaction in RDI changes as the child advances through the multiple levels of “experience sharing”. The caregiver/adult’s role shifts from being a director to a spectator role as the child increasingly engages with peers. Children first become attuned to the adult’s emotional indicators, and then learn to develop predictable and then more improvised play routines. Children learn self-regulation skills (e.g. following the adult’s lead), how to increase the variety of activities they engage in, to develop and enjoy thoughts and ideas, and learn to socially relate to peers. According to RDI, a child with ASD should develop social competence and be motivated to interact actively and independently in increasingly challenging situations (Gutstein, 2000).

The theory and construct of RDI has a great deal of intuitive appeal, especially to those dissatisfied with behavioural approaches, and those feeling that even socio-pragmatic approaches do not go far enough into the core of the problem for children with ASD. However, only one research study into the effectiveness of RDI has been published. The results of this first study were deemed promising (Gutstein, Burgess & Montfort, 2007). The study’s children involved a previous diagnosis of autism, Asperger’s syndrome or pervasive developmental disorder, and were aged between three and seven years at the onset of treatment. The children were considered to be “high-functioning” as their IQ scores ranged from 70 to 118. Following the intervention, the children were perceived to be more socially related, engaging in more reciprocal communication, functioning more independently at school, and significantly more flexible and adaptive. Effects were maintained for over three years on average. The study suggested that intervention is effective in older children, however there are limitations in the study design that preclude strong conclusions. Numbers were small, and there was little reporting of control over treatment fidelity. There is also no study which compares RDI to other intervention methods in terms of outcome, and clearly more evidence is needed.

While RDI appears to attempt to address the emotional deficit of ASD, evaluating the effectiveness of these treatments with randomised experimental designs is unlikely to capture the wide range of interactions which occur during social interaction, as the need to control variables in such research designs will rule out responding to the dynamic nature of these interactions. Researchers need to be aware of all the relevant communicative actions that could be involved, and then further investigate those which could be associated with social motivation and competence in children. For example, tapping a child on the leg to gain their attention, responding to eye gaze by throwing an object, or responding to throwing an object by throwing another. The set of actions and their relationship to motivation, pleasure and involvement of children are of particular interest to researchers working in this field as they may relate to the core deficits of children with ASD.

### The Experience Sharing approach

Most current social pragmatic approaches focus on the caregiver-child-relationships. In the NZ education system there is limited opportunity for educators to access training and professional development in social pragmatic approaches and apply them within a school setting. One school, seeing a need for an approach which was centred around the teacher-student relationship in a special school setting, developed the “Experience Sharing” approach, which looks at the way interactive strategies can be integrated into the classroom. A core philosophy of the Experience Sharing approach is that changing the adult’s interaction style will result in changes in children (Winnig & Hobson, 2007). Another assumption of the programme is Fogel’s view of the dynamic nature of children’s emotional development (Fogel, Nwokah, Dedo, Messinger, Dickson, Matusov & Holt, 1992). Children with ASD tend to strongly prefer static or unchanged situations, and Experience Sharing aims to guide them into increasingly dynamic situations. The teaching strategies and techniques used are based on typical social and communication development and parent based developmental programmes.

Experience Sharing (ES) is a relationship-based approach that has been developed over six years through collaboration between specialised ASD teachers, a music therapist and speech language therapists (SLTs). The children at the school are moderately to severely affected by autism and by developmental delay, and are non-verbal at
school age. The group was searching for ways to develop fundamental capacities in the fields of social communication, relationships and flexible thinking in students, particularly those with ASD. Educational approaches for children with ASD already used within the school included TEACCH (Treatment and Education of Autistic and related Communication handicapped Children) (Mesibov, Shea, & Schopler, 2005), Intensive Interaction (Hewett, & Nind, 1993), and SCERTS (Prizant et al., 2006).

The Experience Sharing approach was initially trialled for two years in one classroom of six children with ASD aged 6-8 years (Davidson, Stuart & Timmins, 2002; Stuart & Timmins, 2008). The children had frequent opportunities throughout the school day to be engaged in 1:1 interactions with an adult. The adult was focused on developing a trusting relationship with the child through spending time in mutually enjoyable experiences. The teacher engaged the child in simple, repetitive, and enjoyable games. Within these games the adult used a catchphrase to 'label' the game in order to create a positive memory of being together. The child was always given an active role in the game, and variations and problem solving opportunities were added to keep the interaction dynamic. These strategies aimed to increase the child’s active involvement, flexibility and communication. During the interaction the adult constantly observed and responded to the child to ensure that they were competent in taking part in the game and scaffolded their attempts to take independent actions and solve problems. For example, in an Experience Sharing session, if the child likes spinning, the adult may set up a game around this. The child’s part in the game would be to come to the adult when they put their hands out, then they then could spin around together, this would be repeated and the adult could include slight changes into the game, e.g. spinning at different speeds and directions, the adult changing their position in relation to the child. This game may be repeated with different people and different situations. In the session the child is learning to be actively involved in the interaction, to notice and respond appropriately to the small changes that the adult includes in the game and to remember positive social experiences.

The staff members were trained by an Experience Sharing team in using specific interactive strategies. This involved regular team meetings, reviewing video of interactions and modelling their use in classrooms. Reports on the experiences of those involved were made 6 months after beginning the programme, and parents reported that they felt more connected with their children when interacting or playing that they could play for longer. This led to providing Experience Sharing for more children in the school. Later, Experience Sharing targets were incorporated into individual educational plans (IEPs) for each child. Specific objectives for all children who took part in Experience Sharing were written and progress was monitored. Anecdotal reports from staff and parents were positive in terms of adults being able to more easily form relationships with children with autism, and in adults spending more time interacting with children because they had strategies which made these interactions more successful. Children appeared more motivated to interact with adults throughout the day, with increased length of interactions, and children appeared more trusting of adults to guide them through new and varied activities and situations.

Although these reactions and monitoring within the school and with parents have been positive, there has been no formal evaluation of the effectiveness of this programme. As indicated above, the nature of this programme, based as it is on interaction and dynamic relationships, means it is not easy to conduct research into its effectiveness. Capturing the dynamic and interactive character while still producing robust research requires first of all knowing what the interactions consist of, and what the teachers are who are trained in the programme are doing that is different to those from other programmes. A small study was undertaken to try to answer these preliminary questions.

THE STUDY

The current study investigated the interactions of the teachers with children. It set out to outline the interactional strategies teachers were using, and also to compare occurrence of these strategies between two teachers who were specifically trained in the ES method and one who was not. To the best of our knowledge there is no existing instrument for analysing interactions that did not run the risk of failing to count behaviours which were unique and perhaps sensitive indicators of the programme. Therefore the researchers made the decision to examine the interactions as they were, and generate the strategies that seemed to be significant from within this data. This allowed the possibility of developing an instrument specific for this purpose which could be applied both as an assessment and a training tool for the ES programme. Literature on what constituted typical relating and communicative interactions between children and adults at the pre-verbal or early verbal stages was consulted, and during phases of the coding, there was consideration of any interactions described in this literature that might have been missed.

METHOD

Participants

The teachers were employed at a special school in a large urban centre in New Zealand. Table 1 shows that all three teachers were highly experienced and committed to working in special education and all had formal qualifications beyond the standard teacher level.

The school concerned had gone through a process of developing and trialling their experience-sharing approach based on relationship development principles. Two of the teachers in this

| Table 1. Characteristics of teacher training, experience and self perception rating |
|--------------------------------------|--------------------------------------|--------------------------------------|
| Teaching experience in:             | Ms Jenkins* (nES) | Ms Bell (ES 1) | Mr Nates (ES 2) |
| a) general education                | a) 4 years       | a) 0 years    | a) 4 years       |
| b) special education                | b) 16 years      | b) 11 years; plus 1 year as teacher aide | b) 15 years |
| Relevant qualifications             | BA, Dip Tchng, AdvDip Tching, Dip Tch VI (visual impairment) | BEd, Dip Tchng | BEd (Hons) |
| Additional training                 | Intensive Interaction | SCERTS, TEAACH, Makaton signing, PECS | TEAACH (1994), PECS, Intensive Interaction, Early Bird |
| Location of training                | New Zealand | New Zealand | UK., U.S.A., New Zealand |
| Self rating of experience and knowledge in ASD: (1-very low, 7-very high) | 3.5 | 6 | 7 |

(nES = non-Experience-Sharing trained, ES = Experience-Sharing trained)

* All names are pseudonyms
Table 2. Pairings of children and teachers in the videotaped interactions.

<table>
<thead>
<tr>
<th>Child*</th>
<th>Teachers*</th>
<th>Child</th>
<th>Teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘Jared’ – 1</td>
<td>Ms Jenkins (nES)</td>
<td>‘Isaac’ – 1</td>
<td>Ms Jenkins (ES)</td>
</tr>
<tr>
<td></td>
<td>Ms Bell (nES)</td>
<td></td>
<td>Ms Jenkins (nES)</td>
</tr>
<tr>
<td>‘Liam’ – 1</td>
<td>Ms Jenkins (nES)</td>
<td>‘Will’ – 1</td>
<td>Ms Jenkins (nES)</td>
</tr>
<tr>
<td></td>
<td>Ms Bell (ES)</td>
<td></td>
<td>Ms Jenkins (nES)</td>
</tr>
</tbody>
</table>

(nES = non-Experience-Sharing trained, ES = Experience-Sharing trained)  
* All names are pseudonyms

Table 3. Resources and duration of each section within a session

<table>
<thead>
<tr>
<th>Activity</th>
<th>Duration (min)</th>
<th>Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free play</td>
<td>5</td>
<td>Bean bags, foam tubes, doctor’s set, balls, flying discs</td>
</tr>
<tr>
<td>No teacher initiation</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Block play</td>
<td>5</td>
<td>Box of blocks</td>
</tr>
<tr>
<td>Drum play</td>
<td>5</td>
<td>2 sets of drums with 4 beater sticks</td>
</tr>
<tr>
<td>Bean bag play</td>
<td>5</td>
<td>2 large bean bags</td>
</tr>
</tbody>
</table>

The semi-structured sessions focussed on a) allowing the teacher and child to become comfortable with each other’s company, b) encouraging the child to have fun and engage with the teacher and various toys (blocks, drums and bean bags) and c) giving the child an opportunity to initiate interaction with the teacher. Each session had four 5-minute sections, each built around a different activity (Table 3). In section two of the session teachers withdrew initiation by sitting away from the child and not looking at them, and not saying or doing anything unless the child did so. This was intended to give the children a chance to initiate or re-start the interaction.

The first author was blinded as to the training status of the teachers, and was not aware of the details of the Experience Sharing method prior to the analysis. She viewed the videos of each session, and made multiple passes through each one to produce a list of interactions and to categorise and refine the categories and subcategories until all actions identified could be accounted for within them. The literature was then consulted again to check if any actions or strategies were identified there which had not been included, and the video recordings re-viewed to see if any potential interactions had been missed and if so, these were added, and the recordings systematically reanalysed. The analyses and categories were checked for reliability. The status of the teachers was then disclosed, and the data compared between the teachers to look for any differences that might relate to this training status. Differences that may have been individual styles, and might relate to variability of interpretation of Experience Sharing were also examined.

Reliability
A colleague with no association with the research project coded a random selection of 12.5% of the videos (one session) to ensure adequate levels of reliability were achieved. There was 93% inter-rater reliability for the total number and types of interactions coded within the session.

RESULTS
The interactions used in the sessions
The process of coding described above resulted in a very long ‘list’ of codes (see Appendix A), but these fell into a small number of categories, as it became clear that the teachers’ actions were achieving three main things; gaining the child’s attention, extending the child’s interactions, and responding to the child’s actions (whether the child ‘intended’ to be interactive or not). A fourth type of indicator that was significantly represented was about expressing emotions. These categories all had a variety of strategies within them, and there could be more than one expressed in overlapping actions. It was also possible for a teacher to interact with a child in a way which was not responsive to them, or not child-centred, so the category of “non-responsive” was added.
Table 4. Five main categories of interaction

<table>
<thead>
<tr>
<th>Definition</th>
<th>Attention</th>
<th>Extending Interaction</th>
<th>Response</th>
<th>Affect</th>
<th>Non-responsive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher attempt to gain child’s attention when child not attending to same object/activity as teacher</td>
<td>Teacher attempt to elicit response from child when child is attending to the same object/activity as teacher</td>
<td>Teacher reaction to child’s (potentially) interactive behaviour</td>
<td>Teacher’s expression of emotion</td>
<td>Teacher non-child-centred interactions</td>
<td></td>
</tr>
</tbody>
</table>

Subtypes

<table>
<thead>
<tr>
<th>Attention</th>
<th>Extending Interaction</th>
<th>Response</th>
<th>Affect</th>
<th>Non-responsive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verbal</td>
<td>Verbal</td>
<td>Positive</td>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>Nonverbal</td>
<td>Nonverbal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>Other</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Examples

<table>
<thead>
<tr>
<th>Attention</th>
<th>Extending Interaction</th>
<th>Response</th>
<th>Affect</th>
<th>Non-responsive</th>
</tr>
</thead>
<tbody>
<tr>
<td>T says “time for blocks” to redirect child’s attention to blocks (verbal). T pokes child’s leg to redirect attention (nonverbal).</td>
<td>T says “I’m gonna build a tower” (verbal). Noise and use of blocks (nonverbal)</td>
<td>T laughs (positive). T says “careful, fingers” with disapproving tone of voice (negative).</td>
<td>T talks to C while standing, and C sits on floor</td>
<td></td>
</tr>
</tbody>
</table>

These five categories and their subtypes can be seen in Table 4. For example, within the category of Extending Interactions there are 3 subtypes (verbal, nonverbal, other). Verbal initiation could be expressed through asking a question, making a comment, giving a directive or imitating the child. The category labelled Response included child-centred strategies such as initiation, extending sequences, verbally or nonverbally responding to object holding student’s attention and responding to a communicative act. Appendix A shows the full list of all the categories and examples of each that were found in the video recordings.

Figure 1 shows the total numbers of each interaction category used across the eight sessions by the teachers. In figure 1, the teachers have the greatest number of examples in the category of extending interactions, and nonverbal strategies appeared in greater numbers than verbal ones in both attention and extending interactions. This may well show a good match to the largely nonverbal levels of the children. It is also a very high concentration of strategies; the largest category, extending interactions, had a mean of 457 per teacher per session, with a high of 114 instances in one 10 minute segments of the session (Free Play) alone.

This indicates the close attention these teachers were paying to the child, and the extent to which they were taking every opportunity to extend the child’s actions into interactions with them. A common pattern was ‘nonverbal’ extending interactions followed by ‘verbal’ extending interactions (e.g., holding out their hand to indicate the student should take their hand, and saying “it’s a ball”).

Responses as expected occurred in small numbers, as these were dependent on child initiations of interaction which were infrequent. Positive affect, while not high in relative terms, still averaged 33.2 events per session, which is very high compared to what might happen in many teaching sessions. Negative affect (e.g., warning the student of danger by saying “careful” with warning intonation) did not occur at all in 6 of the 8 sessions, and occurred only once in each of the other two. ‘Other’ extending interactions (such as not responding to a student who ran from them) and ‘verbal’ attempts to gain attention (such as calling the student’s name) were used relatively infrequently.

No codes were given to any interactions occurring in Section 2 (No initiation) of the session, as in this section teachers withdrew interaction from the child, and this study only coded teacher behaviours. However in the other parts of the session, types of interactions remained largely the same across the activities, with Free Play and Bean Bag play showing the greatest similarity. Drum Play had the fewest verbal interactions, perhaps due to the noise involved.

The impressions on viewing the videos was that the teachers were remarkably consistent and skilled in interacting with children who were not easy to interact with. The results obtained in Figure 1 and 2 (below) confirmed this impression, by showing that not only were the totals high, but that all three individual teachers had a very high frequency of
Extending Initiations with the children. Given the length of the sessions involved, the numbers of these are very high, indicating the teachers were constantly using strategies to engage the children. This applied to all three teachers, which would be predicted by the fact that all three had training in developmental social pragmatic programmes.

Differences between individual teachers
Although the teachers all presented as skilled interactants, there was some degree of individual variation. Figure 2 shows a degree of variability across the teachers for the categories ‘nonverbal’ attention (such as making the noise “bing” while stretching and releasing a squishy ball when the child is not engaged) and ‘positive’ affect (such as using exaggerated intonation and volume to convey positive emotion). Ms Jenkins used ‘other’ extending interactions and ‘verbal’ attention slightly more frequently than the other two teachers, while Mr Nates used ‘responses’ more often (see also Appendix B).

These differences may be a matter of personal style of teachers, as they are not related to whether the teachers had Experience Sharing training. However the interactions are by definition dynamic, so variations between the children may be a factor. For example less attentive children could lead teachers to use nonverbal strategies (e.g. using touch - such as tapping a child’s legs with sponge tubes - or additional noises) to get their attention.

Figure 3 below shows the teachers’ use of individual interaction types within the verbal extending interaction category. All teachers used comments most frequently across all sections, and used imitation very rarely across all sections. All teachers asked comparatively more questions in bean bag play than any other section. Drum play seemed to allow the fewest opportunities for verbal initiations. Few directives appeared for any teacher which is consistent with an Experience-Sharing approach, but also with other pragmatic or relationship-based programmes.

In 3 of the 4 activities, Mr Nate used a higher frequency of comments than other types of interactions, but the other 2 teachers appeared to find it easier to make comments in particular activities but not in others – in Free Play for Ms Bell and in Bean Bag Play for Ms Jenkins. There seems a degree of inconsistency here, which is not accounted for by Experience Sharing training.

Differences between teachers
This is a single-case example, hence no statistical comparison between the teachers is possible. However Figure 1 suggests that the teachers trained in Experience Sharing used ‘nonverbal’ extending interactions more than the other teacher. They also used response interactions (e.g. interpreting a child’s foot movement as meaningful, and then holding a toy drum out to the student to encourage repeated kicking) slightly more than the untrained teacher. It is possible the Experience Sharing trained teachers paid more attention to small changes in the student’s movements and actions, and were more likely to interpret their responses as potentially meaningful, but there is not enough evidence to be certain of this conclusion from this data. It could also suggest that Experience Sharing trained teachers were less concerned with the student using objects/toys in a conventional way, and more interested in any possible response from the child (for instance in the example above, the child’s foot contacting the drum was interpreted as meaningful and it was not important that the child did not use their hand). Certainly the philosophy of experience-sharing is that the main purpose of play is mutual involvement and emotional connection between the adult and the child.

Figure 3 shows the frequency of teacher interactions observed during each session for all eight sessions. The graph indicates that across three of the four children (Jared, Liam and Isaac), Experience Sharing trained teachers (Mr Nates and Ms Bell) exhibited more interactions than the other teacher (Ms Jenkins). In sessions with Will, the other teacher exhibited more interactions than the Experience Sharing trained teacher. In informal discussion with the parents prior to the study, Will’s parents characterised him as “withdrawn”, a term which was not used by any of the other parents to describe their child, so the nature of Will may possibly have been a factor.
DISCUSSION

The paper has introduced some of the history of changing programmes in working with children with autism from behaviourally based programmes to those which incorporate social-pragmatic principles. The evidence for behaviour change from behaviourally based programmes is undoubtedly strong (e.g., Lovaas, 1987) and Roberts and Prior (2006) point out that behavioural interventions vary considerably, from discrete trials to social story programmes. However they have in common “the underlying assumption that the symptoms associated with autism can be reduced by manipulation of the observable interaction between the individual and his/her environment, and in particular through the objective measurement of change in observable behaviour” (Roberts & Prior, p 50). It is this emphasis on ‘behaviour’ rather than on emotion and relating to people that has made a number of researchers and others involved with those with autism feel that behavioural approaches have missed the point. The great benefit of social-pragmatic approaches to many working in the field is that it is attempting to get to the ‘heart’ of autism, seen to be the difficulties people with autism have in making emotional connections and understanding how to relate to people as a positive and deeply human experience. There is also much to be said for programmes adapted for local conditions, and this paper discusses such a development in NZ.

Justification for a focus on interaction in development of communication in children is not hard to find, including for children with autism. Changes in an adult’s interaction style will influence how children with ASD interact with others (Wimpory & Hobson, 2007), and research into mothers and their children with ASD has suggested that nonverbal object use and closer physical proximity increases child responsiveness (Dousnard-Roosevelt, Joe, Bashenova, & Porges, 2003). Similarly, when adults follow a child’s lead and imitate their actions, children are more responsive (demonstrated by increased eye contact, gestures and body contact) (Escalona, Field, Nadel & Lundy, 2002; Field, Field, Sanders & Nadel, 2001). This kind of evidence provides part of the basis for social-pragmatic programmes with children with autism, and also for the Evidence Sharing approach.

Experience Sharing teaching strategies include using declarative, non-directive communication (e.g., commenting vs questioning), exaggerating non-verbal communication (facial expressions and body language) as well as general teaching strategies (e.g., modelling, scaffolding). The data reported in this study showed that the teachers represented in these data were using these teaching strategies with the children. The teachers consistently used nonverbal interactions, close physical proximity, and followed the child’s lead. This research has found a consistent use by these teachers of pragmatic developmental approaches to working with children with ASD, which recognise the value of the adult involving themselves in the child’s world and interpreting the child’s interactions as meaningful.

This study has shown that teacher interactions in structured sessions designed to develop communicative interactions in the children were highly responsive to the child’s objects of interest and their actions. The teachers employed a range of actions which fell into five categories, principally those of gaining (the child’s) attention and extending interactions which were about extending what the child was already paying attention to. This meant the interactions were mostly created by the teachers, in which they all showed a high frequency of a diverse range of involving behaviours, and interpreted all interactions from the child as meaningful. The children showed little spontaneous interactional behaviour themselves, which is consistent with the disability, its severity and the age of the children. Where responses to child interactions were possible, the teachers also showed no negative emotions except some few ‘warnings’, and had a significant use of positive emotional display. These teachers were all involving themselves in the child’s world and making the child’s experiences as interactive as possible, with a positive tone. The activities and the behaviours of the teachers were consistent with the programme’s theories.

However, there was a degree of variation across teachers and sessions. Some variations appeared to relate to the Experience-Sharing programme, in that those teachers trained in ES were different to the teacher who was not so trained. These differences were most notably in having more nonverbal extending interactions (attempts to gain a child’s response by, for example, throwing a ball at them), and more response interactions (e.g. responding to a child who throws a block across the room by also picking up a block and throwing it). This may indicate a greater skill in finding ways to make interactions possible where few apparent opportunities exist. There was also a difference that occurred relative to the nature of the children. More interactions were consistently found with the ES trained teachers for 3 of the 4 children, but the non-ES trained teacher showed greater interactions with the one child characterised by his parent as “withdrawn”. This suggests the possibility that Experience-Sharing training has allowed the teachers to interact more with children who might be characterised as “disruptive”, or whose behaviours are more assertive. It may also be that ‘teacher-led’ interactions, which might be more traditional, might be easier with less active or more withdrawn children. However this can only be a very tentative suggestion, and needs to be supported with further research.

This distinction might also account for differences across the activity types. The current study results suggested the nature of the activity influenced the amount of teacher interaction that occurs. It is possible that ES trained teachers were better able to coordinate elements of interaction such as adult imitation or creating social routines into a more enjoyable experience during “unrestricted” activities (free and block play), than the other teacher. Another possibility is that the ES trained teachers may have found it easier to engage the children when exposed to a wide range of objects. Conversely, the other teacher may have found it easier to interact with the children during “restricted” activities (e.g. bean bag play) because possible interaction sequences may have been more predictable (e.g. run across the room to the bean bags and fall on them). However these activities typically involve fewer objects and are of a more repetitive nature (e.g. running and jumping on the bean bags many times) which may limit the degree to which the complexity of the communication exchange can be extended. This is possibly related to the aims of ES in that teachers using ES are trying to promote flexible thinking and variation when interacting with children so the ES trained teachers use strategies to keep the interaction dynamic. None of these possibilities can be decided on the basis of the data from this study. However it suggests that future studies could profitably further investigate what type of interaction style (repetitive compared to dynamic) promotes which responses from which children.

It is also possible that these differences are due to individual variation between people and styles, and have less to do with training. The teachers had much more in common in their interactions than...
they had differences, and it must be remembered that the teacher not trained in Experience Sharing did have training in the intensive interaction programme, which has many points in common with other relationship development programmes. A number of variations occurred between teachers that did not fall into the ES versus non-ES trained sets. Particularly the greater use of comments by one teacher, the greater use of positive emotion display by another, and variations for individual children which may show that some teachers respond better to some children than others. Previous knowledge and skill variations across the teachers cannot be ruled out, and perhaps personality differences can also impact on these interactions.

Future investigations into the effect of ES teacher training could involve new teachers without any previous experience in any of the developmental–pragmatic approaches, which may help ensure that any differences found were attributable to the training. This would not enable ES to be separated from other relationship-development programmes however. Given the similarities between them, comparing ES with, for example) intensive interaction approaches would require larger samples, a finer-grained examination of the nature of the trainings and the interactions that are expected to result, and measurements of the teachers’ personalities (e.g. temperament and extrovert tendencies) and teaching styles to see whether any variations could be attributable to the specific training approach.

Variations in the children might also be expected to be a source of difference. Indeed, it is hoped that they would be, as any system which is meant to be dynamic, responsive and adaptable should vary as participants vary. For instance, a teacher would have limited opportunities to follow a child’s lead (e.g. with a comment or imitation) if the child exhibited very few responses, as in a high frequency of withdrawing behaviours. Similarly, a teacher exhibiting high frequencies of attention interactions may decrease the available opportunities for children to initiate interaction with them. Future studies should include a larger number of children as well as teachers.

There were occasional instances where it was unclear as to how the teachers were applying strategies to foster flexibility and adaptability in the students, as Experience Sharing intends to do. For instance, there was a drum play sequence where a trained teacher turned away from a child after they sat down next to her. The teacher then repeatedly tapped the drum while vocalising “boom” for over a minute. During this time, the child did not appear to be engaged with the teacher as they were constantly moving around the room. Intentions of the teachers were ambiguous to the researcher in these situations. Future research would benefit from teachers reviewing the video material and commenting on their own intentions in such situations.

This paper provides data for only a preliminary investigation of the Experience Sharing approach. However it was able to indicate that teachers showed a wide range of skills and followed the intentions of the programme to a high degree. Experience Sharing trained teachers differed from the untrained teacher in several positive ways (e.g., using more nonverbal initiations and response interactions). There is much value in attempting innovative approaches to working with communication development in challenging populations, and in adapting these to local conditions. There is equal value to then examining these approaches to begin to evaluate their nature and their effectiveness. We hope to see more of this research published in NZ.

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Speech Science, Department of Psychology,
The University of Auckland
lhand@auckland.ac.nz

**REFERENCES**


APPENDICES

Appendix A. Codes for all categories of interactions and elements

<table>
<thead>
<tr>
<th>Interaction</th>
<th>Mode</th>
<th>Code</th>
<th>Definition / Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attention: Teacher attempts to gain child's attention – when adult and child are not attending to same object/activity</td>
<td>Verbal</td>
<td>GA-V</td>
<td>Attempt to gain attention verbally (e.g. &quot;look,&quot; &quot;here’s the bean bag&quot;)</td>
</tr>
<tr>
<td></td>
<td>Nonverbal</td>
<td>GA-N</td>
<td>Attempt to gain attention by noisemaking (e.g. sounds such as “bing”, nonsense words, banging blocks)</td>
</tr>
<tr>
<td></td>
<td>Nonverbal</td>
<td>GA-M</td>
<td>Attempt to gain attention by manipulating object (e.g. Squishing bean bag pouch, poking toy child is holding)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GA-FV</td>
<td>Attempt to gain attention by placing face in child's visual field</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GA-OV</td>
<td>Attempt to gain attention by placing object in child's visual field</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GA-T</td>
<td>Attempt to gain attention through touch (e.g. touching child’s arm, tickling)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GA-Ge</td>
<td>Attempt to gain attention through gesture</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GA-Mo</td>
<td>Attempt to gain attention through movement</td>
</tr>
</tbody>
</table>

Extending interactions: Teacher initiations/attempts to elicit a response from child

<table>
<thead>
<tr>
<th>Interaction</th>
<th>Mode</th>
<th>Code</th>
<th>Definition / Example</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Verbal</td>
<td>GR-Q</td>
<td>Attempt to gain response by asking question</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GR-C</td>
<td>Attempt to gain response by making comment (e.g. one, two, three, four, five)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GR-D</td>
<td>Attempt to gain response with a directive (e.g. look!)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GR-Ive:</td>
<td>Attempt to gain response by imitating (child’s) real word</td>
</tr>
<tr>
<td></td>
<td>Nonverbal</td>
<td>GR-Mo</td>
<td>Attempt to gain response by using movement (e.g. picking up child and dropping him onto bean bag, pulling child across floor)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GR-T</td>
<td>Attempt to gain response through touch (e.g. touching child’s arm, tickling)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GR-Ivo</td>
<td>Attempt to gain response by imitating (child’s) vocalisation</td>
</tr>
</tbody>
</table>
### Responses: Teacher responses to child’s interaction

<table>
<thead>
<tr>
<th>FC-C</th>
<th>Comments on object holding child's attention or exhibits action</th>
</tr>
</thead>
<tbody>
<tr>
<td>FC-I</td>
<td>Imitates child’s utterance or vocalisation/action</td>
</tr>
<tr>
<td>FC-R</td>
<td>Responds to child's communicative act (e.g. teacher takes object when child holds a ball out toward teacher; teacher asks a question in response to child picking up a toy)</td>
</tr>
<tr>
<td>FC-L</td>
<td>Looks toward/touches/picks up object holding child’s attention</td>
</tr>
<tr>
<td>FC-E</td>
<td>Extends child’s interaction</td>
</tr>
<tr>
<td>EB</td>
<td>Attempts to extend a sequence (pattern of one or more behaviours) beyond one turn (e.g. Adult tickles child more than once), i.e., maintaining the interaction</td>
</tr>
</tbody>
</table>

### No response:  

<table>
<thead>
<tr>
<th>No response:</th>
<th>NCL</th>
<th>NRT</th>
<th>NAL</th>
<th>NEC-I</th>
<th>NEC-R</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not physically at child's level</td>
<td>Not responding in timely manner</td>
<td>Not using the appropriate language level for the child</td>
<td>Adult does not initiate interaction by looking at child's face more than once</td>
<td>Adult does not respond (look back at child) when child is looking at them</td>
</tr>
</tbody>
</table>

### Appendix B. Mean frequency of teacher interactions across categories with children

<table>
<thead>
<tr>
<th></th>
<th>Initiations</th>
<th>Attention</th>
<th>Affect</th>
<th>Responses</th>
<th>No response</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Verbal</td>
<td>Non-verbal</td>
<td>Other</td>
<td>Verbal</td>
<td>Non-verbal</td>
</tr>
<tr>
<td>Ms Jenkins</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(N=4)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>107.75</td>
<td>202.5</td>
<td>17</td>
<td>22.5</td>
<td>62.25</td>
</tr>
<tr>
<td>Ms Bell</td>
<td></td>
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<td></td>
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<tr>
<td>(N=2)</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>100.5</td>
<td>233.5</td>
<td>12</td>
<td>19</td>
<td>27</td>
</tr>
<tr>
<td>Mr Nates</td>
<td></td>
<td></td>
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<tr>
<td>(N=2)</td>
<td></td>
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<tr>
<td></td>
<td>138.5</td>
<td>279</td>
<td>8.5</td>
<td>14.5</td>
<td>54</td>
</tr>
</tbody>
</table>
Phonological development: Establishing norms for New Zealand English-speaking children aged 5;0 to 5;11 years

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The present study provides normative data on the phonological development of New Zealand English-speaking children aged 5;0-5;11. 106 children from schools around Auckland were assessed using the phonology subtest of the Diagnostic Evaluation of Articulation and Phonology (DEAP). Their data were analysed in regard to phonological accuracy and errors (differences between adult and child target forms). The variables of age, sex, socio-economic status and multilingualism were considered in relation to phonological accuracy. Results show that New Zealand children are, on the whole, intelligible and produce a range of errors. Of these, gliding is the only one considered to be age appropriate. Variables such as age band (5.0-5.5 compared with 5.6-5.11), socio-economic status and multilingualism were found to have no significant impact on production accuracy, while sex did. These results were further compared to data from equivalent age children from the UK and Australia. The mean scores for all measures of production accuracy were significantly lower for the New Zealand children compared to overseas data. This seems to suggest that these children do not achieve phonological accuracy as quickly as their peers in other English speaking populations. A range of factors that may impact on the differences between populations are discussed.

When children are unintelligible or misarticulate speech sounds they may be referred to a speech-language therapist for assessment. However, not all of these children will require intervention as children often mispronounce words in their normal development and their speech is not error free. For the purpose of accurately differentiating development from disorder therapists require normative data on typical speech sound development. Such data enable clinicians to record specific characteristics, allowing effective management decisions on the basis of objective descriptions of the impairments (Broomfield & Dodd, 2004).

Normative information for clinical use generally focuses on speech sound development or error patterns (also known as phonological processes). The focus of research on speech sound acquisition (Templin, 1957; Smit, Hand, Freiling, Berthal & Bird, 1990) is on production accuracy and defining age of acquisition. There is little consensus on how age of acquisition is determined because researchers vary considerably in methodology (see Sander, 1972; Smit, 1986; Dodd, Holm, Hua, & Crosbie, 2003 for discussion and summary). Studies differ on the minimum percentage of children required to determine acquisition of a speech sound, varying between 75% and 100% accuracy. Even amongst studies that use similar criteria differences can be found with the number of word positions assessed (initial, medial, final), elicitation techniques (single words or spontaneous speech) and scoring (averaging performance over all tokens of a speech sound or by considering each token).

The focus of research into error patterns is on incorrect productions in the child’s phonological system in relation to the adult target forms. Typically these developmental errors are simplifications or approximations of as yet unachievable adult speech sounds to a target which is easier for the child to produce (Dodd et al., 2003; Paul, 2001). Much of the information on these errors in children’s speech comes from longitudinal studies of limited numbers of children (Smith, 1973), or from studies based on data from very small groups of children (Stool-Gammon & Dunn, 1985). Although this type of research is well documented (Hodson & Paden, 1981; Stool-Gammon & Dunn, 1985), studies often do not give precise details on the range of each error nor do they indicate the number of children using them (James, 2001).

A recent study that addresses the methodological issues raised in defining age of acquisition and error patterns is that of Dodd et al. (2003). This cross-sectional study defines age of acquisition as 90% of children in an age group producing a sound correctly in all positions. Errors are categorised as patterns if there are five examples of a particular error type. Patterns are further identified as typical for an age band if at least 10% of the children for that band have demonstrated their use during administration of an assessment. The rationale for defining acquisition and errors in this way is based on the premise that estimates of the proportion of children with speech disorders in the normal population fall between 3-10% (Enderby & Phillipp, 1986).

While normative data from large-scale studies have clinical applicability it is appropriate only for children from the population on which it has been standardised. This point is of particular significance in an English-speaking but small population such as New Zealand, where the majority of formal assessments available are sourced from overseas and are therefore normed on non-New Zealand populations. Furthermore, New Zealand’s unique cultural and ethnic diversity makes it even more difficult to draw comparisons with other populations. In the last census, 59% of respondents identified themselves as New Zealand European and 14% as Māori. Twenty-three percent of respondents identified themselves as belonging to other ethnic groups, with a diverse range of ethnicities represented under the major groupings of European (including American and Canadian), Pacific Peoples, Asian, Middle Eastern, Latin American and African. Twenty-seven percent of the population identified themselves as having been born somewhere other than New Zealand, and 23% as being able to speak more than one language. These data indicate the diversity of the population, and hint at the problematic nature of trying to define a ‘normal’ population, or of trying to align one population with another for valid comparisons (Statistics New Zealand, 2007).

Normative data on speech sound acquisition in New Zealand children are available in Moyle (2005). Data from a sample of 1,013 children aged 5;0-8;11 from across New Zealand were gathered for this study. Although comprehensive in scope, this research is limited in its acquisition and focuses on consonant accuracy, rather than examining the nature of error patterns. Furthermore data were gathered from a single instance of production for each sound in individual words.

The primary purpose of the current research is to complement Moyle (2005). First normative data on phonological accuracy for the phonemes of English are established based on children’s production of phonemes in multiple instances. More information on the type and number of errors in the speech of New Zealand children are then provided by classifying their range and frequency. As this research is an ongoing process, the findings presented here are limited to those for children aged 5;0-5;11.

These findings are also considered in light of age, sex and socio-economic status (SES), three demographic variables discussed in Moyle (2005). Multilingualism is added as a fourth variable given the changes in New Zealand linguistically and culturally. As children become more accurate and make fewer misarticulations over time, it is hypothesised that age will have an impact on their phonological accuracy. Unlike larger cross sectional studies (Dodd et al., 2003; Moyle, 2005), the concern here is to test whether this
still holds for an age difference as small as six months. It is hypothesised further that sex, SES and multilingualism will impact on phonological accuracy since sex and SES were found to have a significant effect in Moyle’s (2005) study and the impact of multilingualism has been noted in recent research on the phonological acquisition of English by bilingual children (see Gildersleeve-Neumann, Kester, Davis & Peña, 2008; Bunta, Fabiano-Smith, Goldstein & Ingram, 2009, Fabiano-Smith & Goldstein, 2010, Fabiano-Smith & Barlow, 2010, Gildersleeve-Neumann & Wright, 2010). There is no consensus in the literature as to how large an impact these variables actually have on speech development and whether their effect may or may not be in tandem with other variables (Hyde Law 1992).

As a final point it is hypothesised that the norms for the New Zealand population will differ from those of other English speaking populations given the cultural and linguistic differences. To test this, findings are compared to those of other English speaking populations (Dodd et al., 2002) was used to assess children’s speech-language therapy battery. Each word was transcribed phonemically into the International Phonetic Alphabet (IPA). To determine inter-rater reliability, an independent experienced transcriber randomly selected recordings of 10% of the final sample for retranscription. All assessors and transcribers were native speakers of NZ English. Inter-rater reliability was 94%.

**METHOD**

**Participants**

Schools were selected at random from the Auckland area, and principals were first contacted by telephone to discuss potential involvement in the project. Those that indicated interest were sent further information about the study for consideration. Thirteen schools then agreed to participate in the study, from which a total of 106 children aged 5;0 to 5;11 were assessed. The sample was representative of the populations as an almost equal distribution in terms of sex was attained. Schools were also selected to represent the full spectrum of decile rankings, a grading system created by the Ministry of Education to represent SES. The Ministry of Education calculates a school’s decile ranking from five weighted demographic variables (income, occupation, household crowding, education, income support) captured in census data (Ministry of Education, 2009). Deciles 1-3 equate to low SES ranking, deciles 4-7 to middle SES ranking, while deciles 8-10 are equivalent to high SES ranking. These rankings comprised 30%, 32% and 38% of the sample respectively.

Parents of the participants completed a consent form, which included questions about languages spoken in the home and concerns about their child’s speech, language and hearing.

Although children were excluded from the study if they did not use English as their primary language, children with a variety of other home languages were included. Twenty nine children (27%) had exposure to at least one other language in addition to English. Other children who were excluded from the study included those with pre-existing vision or hearing difficulties as identified by in-school testing and those who had received or were receiving speech-language therapy.

Details regarding the sex, age, decile and language background of the participants are given below in Table 1 below.

<table>
<thead>
<tr>
<th>Decile</th>
<th>Sex</th>
<th>Languages</th>
<th>5-5.5</th>
<th>5.6-5.11</th>
<th>Whole group</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-3: Low</td>
<td>boys</td>
<td>1</td>
<td>3</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>girls</td>
<td>1</td>
<td>4</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>4-7: Mid</td>
<td>boys</td>
<td>1</td>
<td>5</td>
<td>8</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>girls</td>
<td>1</td>
<td>4</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>8-10: High</td>
<td>boys</td>
<td>1</td>
<td>7</td>
<td>10</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>girls</td>
<td>1</td>
<td>5</td>
<td>0</td>
<td>5</td>
</tr>
</tbody>
</table>

**Table 1. Characteristics of the participants (n=106)**

<table>
<thead>
<tr>
<th>Languages</th>
<th>Number of speakers in study</th>
<th>Individual PPC scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Māori</td>
<td>7</td>
<td>97.72, 97.22, 94.98, 94.98, 94.52, 91.78, 91.32</td>
</tr>
<tr>
<td>Samoan</td>
<td>5*</td>
<td>97.26, 95.89, 94.98, 93.15, 92.69</td>
</tr>
<tr>
<td>Tongan</td>
<td>3</td>
<td>95.89, 95.43, 92.69</td>
</tr>
<tr>
<td>Gujarati</td>
<td>3</td>
<td>93.15, 93.15, 91.78</td>
</tr>
<tr>
<td>Hindi</td>
<td>2*</td>
<td>97.26, 93.61</td>
</tr>
<tr>
<td>Mandarin</td>
<td>2</td>
<td>97.72, 84.47</td>
</tr>
<tr>
<td>Arabic</td>
<td>2**</td>
<td>97.72, 86.76</td>
</tr>
<tr>
<td>German</td>
<td>2</td>
<td>98.17, 92.69</td>
</tr>
<tr>
<td>Croatian</td>
<td>1</td>
<td>96.35</td>
</tr>
<tr>
<td>Cantonese</td>
<td>1</td>
<td>97.72</td>
</tr>
<tr>
<td>Cook Island Māori</td>
<td>1</td>
<td>95.89</td>
</tr>
<tr>
<td>Niuean</td>
<td>1</td>
<td>95.43</td>
</tr>
<tr>
<td>Tagalog</td>
<td>1**</td>
<td>97.72</td>
</tr>
</tbody>
</table>

**Table 2. Additional languages spoken by multilingual participants (n=29; two children spoke two additional languages). PPC values for the individual children speaking each language are listed. * and ** includes one trilingual child.**
The means and standard deviations for PCC, PVC and PPC were also calculated by age, sex, SES and multilingualism. To test the effect of these variables, separate one-way analyses of variance (ANOVA) were conducted for PCC, PVC and PPC, using R analysis software (Ihaka & Gentleman, 1996). One-way ANOVAs may be sensitive to violations of the assumption that the standard deviations for each group are equal, therefore the results were checked using the Levene test (Levene, 1960) and no problems were found. Large-sample two-sample t-tests were used to compare the phonological accuracy means for the New Zealand data with those from age equivalent children in Australian and British populations. The Australian and British data were taken from the DEAP manual (Dodd et al., 2002). For the t-test calculation, the numerator was the difference in the means of the two countries. The denominator was the standard error of the difference of the means. Since all countries had sample sizes which are large enough for the central limit theorem to operate reasonably, the test statistic had an approximate standard normal distribution under the null hypothesis that there is no difference between the countries. P values less than 0.05 were regarded as statistically significant.

**Errors**

Using standard New Zealand English adult target forms as a measure qualitative mismatches between child and adult realisations of a target speech sound were classified as errors. As little is known about the range and frequency of errors produced by New Zealand children all misarticulations were catalogued according to their frequency for individual participants as well as their overall frequency in the sample. Errors were then divided into those found typically in the speech of children during their development (see Dodd et al., 2003) and other differences. Typical developmental errors included those produced by typically developing children in their speech development (e.g., stopping, cluster reduction and fronting). Following Dodd et al. (2003) these were subsequently classified as patterns if they occurred on five or more instances within an individual’s speech and identified as age appropriate when used by a minimum of 10% of the children tested. Other differences included all other misarticulations that are generally not considered to be part of typical development. These included errors classified as unusual in Dodd et al. (2003) (e.g., backing, initial consonantal deletion) and all remaining misarticulations (e.g., tongue protrusion, lateralisation, dental fricative substitution). Unusual errors are categorised as such in Dodd et al. (2003) because they occur in under 10% of monolingual populations and are generally observed in clinical populations. The remaining misarticulations are not found in Dodd et al. (2003) but are also observed in clinical populations (Hodson, 2004).

**RESULTS**

**Phonological accuracy measures**

Table 3 provides the mean scores and standard deviations for the participants on the three measures (PCC, PVC, PPC).

Initial statistical testing using one-way ANOVA to compare the phonological accuracy measures for the children in separate age bands 5:0-5:5 and 5:6-5:11 indicated that the two age bands performed similarly in respect to all measures and there were no statistically significant differences between them. These two groups were therefore combined when testing for relationships between phonological accuracy and the variables of sex, SES and multilingualism. The ANOVAs showed no significant statistical interactions between these variables even though background information on the participants (see Table 1) is somewhat suggestive given that there are relatively more multilingual children in the lowest compared to the highest deciles.

One-way ANOVA results indicate that sex had a significant effect on PCC [F(1,104)=7.17, p=0.009] and PPC [F(1,103)=6.50, p=0.012] accuracy. Girls were more phonologically accurate than boys on all measures as illustrated in Table 4.

However, children from high deciles were not necessarily more phonologically accurate than children from lower deciles (see Table 5) nor were multilingual children less accurate than monolinguals (Table 2 gives their mean PPC scores). One-way ANOVAs indicate that neither SES nor multilingualism had a significant effect on children’s phonological accuracy measures.

### Table 3. Mean correct percentage (SD) by age (band) on phonological accuracy measures

<table>
<thead>
<tr>
<th></th>
<th>Whole group</th>
<th>5:0-5:5 (n=50)</th>
<th>5:6-5:11 (n=56)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCC</td>
<td>92.56 (5.06)</td>
<td>92.37 (5.24)</td>
<td>92.73 (4.94)</td>
</tr>
<tr>
<td>PVC</td>
<td>98.17 (2.61)</td>
<td>98.03 (3.23)</td>
<td>98.31 (1.91)</td>
</tr>
<tr>
<td>PPC</td>
<td>94.56 (3.56)</td>
<td>94.38 (3.88)</td>
<td>94.72 (3.28)</td>
</tr>
</tbody>
</table>

### Table 4. Mean correct percentage (SD) by sex on phonological accuracy measures

<table>
<thead>
<tr>
<th></th>
<th>Boys (n=52)</th>
<th>Girls (n=54)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCC</td>
<td>91.21 (5.6)</td>
<td>93.89 (4.45)</td>
</tr>
<tr>
<td>PVC</td>
<td>97.6 (2.5)</td>
<td>98.29 (2.82)</td>
</tr>
<tr>
<td>PPC</td>
<td>93.68 (3.94)</td>
<td>95.41 (2.95)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Boys (n=52)</th>
<th>Girls (n=54)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCC</td>
<td>92.28 (4.63)</td>
<td>92.84 (6.07)</td>
</tr>
<tr>
<td>PVC</td>
<td>97.6 (2.5)</td>
<td>98.53 (1.79)</td>
</tr>
<tr>
<td>PPC</td>
<td>94.18 (3.19)</td>
<td>94.87 (4.19)</td>
</tr>
</tbody>
</table>

### Table 5. Mean correct percentage (SD) by SES (decile) on phonological accuracy measures

<table>
<thead>
<tr>
<th></th>
<th>Low :1-3 (n=32)</th>
<th>Mid:4-7 (n=34)</th>
<th>High:8-10 (n=40)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCC</td>
<td>92.77 (4.58)</td>
<td>98.52 (2.70)</td>
<td>96.75 (3.68)</td>
</tr>
<tr>
<td>PVC</td>
<td>98.22 (2.58)</td>
<td>99.86 (0.63)</td>
<td>99.35 (1.22)</td>
</tr>
<tr>
<td>PPC</td>
<td>94.71 (3.21)</td>
<td>98.97 (1.92)</td>
<td>97.68 (2.45)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>NZ sample mean</th>
<th>Australian sample mean</th>
<th>UK sample mean</th>
<th>NZ vs. Australia p value</th>
<th>NZ vs. UK p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCC</td>
<td>92.77 (4.58)</td>
<td>98.52 (2.70)</td>
<td>96.75 (3.68)</td>
<td>&lt;0.0001</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>PVC</td>
<td>98.22 (2.58)</td>
<td>99.86 (0.63)</td>
<td>99.35 (1.22)</td>
<td>&lt;0.0001</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>PPC</td>
<td>94.71 (3.21)</td>
<td>98.97 (1.92)</td>
<td>97.68 (2.45)</td>
<td>&lt;0.0001</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>
There is in fact a statistically significant difference phonologically accurate as the other populations. British counterparts in being more accurate with children were similar to their Australian and assessment. As shown in Table 6, New Zealand Australian and British children using the same study with data available for age equivalent comparisons between mean results of the present Comparison with Australian and British data

Table 7 lists the typical errors and their frequency. Of these, only gliding (with both /r/ and /l/) can be categorised as an age appropriate pattern according to the classification outlined in Dodd et al. (2003). No other errors meet the criteria for a pattern although a range of children (6.6-46.2%) produced nine other typical errors. Of those errors, fronting and deaffrication were produced by a small number of children on five or more occasions (ca. 2%).

Other differences

Table 8 lists nine further mismatches. Unusual errors such as backing (18.9%), medial consonant deletion (20.7%), initial consonant deletion (6.6%) and affrication (4.9%) were exhibited by some of the children tested. Of these errors backing alone (0.9 %) was exhibited five or more times.

The remaining errors found with the children include tongue protrusion, dental fricative substitution, vowel errors, glottal stop substitution and lateralisation. Of these, tongue protrusion and substitution of dental fricatives were the most frequent. Tongue protrusions (also known as frontal lisping) were exhibited by 21 children in total, of whom ten used it five times or more (9.4%). This type of substitution can persist until seven years of age but is not considered a marker of impairment or delay (Hodson & Paden, 1981; Porter & Hodson, 2001).

The replacement of dental fricatives with labiodentals was exhibited by a high number (83) of children but was only used by nine children on five or more instances (8.5%). This type of substitution generally does not persist in children’s speech but it is classed as an error in some studies (James, 2001; Hodson & Paden, 1981) and was treated as such by the assessors in this study. There is some debate as to whether this difference should be treated as an error for New Zealand children. Moyle (2005) noted that this substitution could well be a dialectal variant as it is becoming more accepted by a wider group of New Zealand society. This view is supported by other research where this type of substitution (referred to as th-fronting) is identified as a speech pattern characteristic of casual dialect (Gordon, Campbell, Hay, Maclagan, Sudbury & Trudgill, 2004) and Māori and Pasifika varieties of English (Maclagan, King & Gillon, 2008). However, there are reasons as to why a more conservative scoring was adopted in this study. Of particular importance was the fact that the assessors found it very difficult to state conclusively whether this substitution was used as a dialectal variant by the participants. Only a small percentage of children used it consistently. The possibility that some participants were speakers of Māori and Pasifika English could also not be established as information on ethnicity was not gathered for the study. Information on language background was collected but this could not be used to clarify the status of the substitution as

<table>
<thead>
<tr>
<th>Errors</th>
<th>Exhibited at least once</th>
<th>Exhibited five times or more by individual participant</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>% of sample</td>
<td>n</td>
</tr>
<tr>
<td>Cluster Reduction</td>
<td>37</td>
<td>34.9</td>
</tr>
<tr>
<td>Deaffrication</td>
<td>13</td>
<td>12.7</td>
</tr>
<tr>
<td>Epenthesis</td>
<td>14</td>
<td>13.2</td>
</tr>
<tr>
<td>Final consonant deletion</td>
<td>36</td>
<td>34.2</td>
</tr>
<tr>
<td>Fronting</td>
<td>26</td>
<td>24.5</td>
</tr>
<tr>
<td>Gliding/r/ /l/</td>
<td>63</td>
<td>59.4</td>
</tr>
<tr>
<td>Harmony/assimilation</td>
<td>22</td>
<td>20.7</td>
</tr>
<tr>
<td>Stopping</td>
<td>49</td>
<td>46.2</td>
</tr>
<tr>
<td>Voicing/devoicing</td>
<td>15</td>
<td>14.1</td>
</tr>
<tr>
<td>Weak syllable deletion</td>
<td>7</td>
<td>6.6</td>
</tr>
</tbody>
</table>

4Or, in the case of weak syllable deletion, two times or more.

Comparison with Australian and British data

Two-tailed t-tests were conducted to make comparisons between mean results of the present study with data available for age equivalent Australian and British children using the same assessment. As shown in Table 6, New Zealand children were similar to their Australian and British counterparts in being more accurate with their production of vowels than consonants. New Zealanders are however not as phonologically accurate as the other populations. There is in fact a statistically significant difference between New Zealand children and the other populations on all measures (p<.0001).

Table 8. Other errors observed for New Zealand children aged 5;0-5;11 (n=106).

<table>
<thead>
<tr>
<th>Errors</th>
<th>Exhibited at least once</th>
<th>Exhibited five times or more by individual participant</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>% of sample</td>
<td>n</td>
</tr>
<tr>
<td>Affrication</td>
<td>5</td>
<td>4.9</td>
</tr>
<tr>
<td>Backing</td>
<td>20</td>
<td>18.9</td>
</tr>
<tr>
<td>Glottal stop replacement</td>
<td>8</td>
<td>7.8</td>
</tr>
<tr>
<td>Initial consonant deletion</td>
<td>7</td>
<td>6.6</td>
</tr>
<tr>
<td>Lateralisation</td>
<td>7</td>
<td>6.6</td>
</tr>
<tr>
<td>Medial consonant deletion</td>
<td>22</td>
<td>20.7</td>
</tr>
<tr>
<td>Substitution of /θ, Ω/</td>
<td>83</td>
<td>78.5</td>
</tr>
<tr>
<td>Tongue protrusion</td>
<td>21</td>
<td>19.8</td>
</tr>
<tr>
<td>Vowel changes</td>
<td>60</td>
<td>56.6</td>
</tr>
</tbody>
</table>

Typical developmental errors

Table 7 lists the typical errors and their frequency. Of these, only gliding (with both /r/ and /l/) can be categorised as an age appropriate pattern according to the classification outlined in Dodd et al. (2003). No other errors meet the criteria for a pattern although a range of children (6.6-46.2%) produced nine other typical errors. Of those errors, fronting and deaffrication were produced by a small number of children on five or more occasions (ca. 2%).

Other differences

Table 8 lists nine further mismatches. Unusual errors such as backing (18.9%), medial consonant deletion (20.7%), initial consonant deletion (6.6%) and affrication (4.9%) were exhibited by some of the children tested. Of these errors backing alone (0.9 %) was exhibited five or more times.
none of the Māori or a Pasifika language speakers replaced dental fricatives with labiodentals in a consistent manner.

Of the remaining mismatches vowel errors were prevalent with 60 children (56%) producing these on at least one occasion. This is an interesting result given that it is assumed that typically developing children do not have issues with vowels at this age and this type of error is most frequently found with hearing impaired children (Hodson, 2004). Within this group, six (5.7%) produced vowel mismatches in five or more instances. For these children cases of multiple vowel mismatches occurred with different vowels and there were no consistent error patterns associated with any of the vowels. Vowel errors were produced by both monolingual and multilingual children but some errors were found predominantly with multilingual children. These included substitutions for the vowel /a/ (Tongan, Samoan, Arabic and Gujarati speaking children) and the vowel /æ/ (Mandarin and Gujarati speaking children).

Lateralisation (lateral lisp) and glottal stop replacement also occurred in this sample. Neither was of particularly high prevalence as only 6.7% of children produced these errors during testing. However two children (1.9%) did lateralise on five or more occasions.

**DISCUSSION**

This study sought to obtain normative data on phonological acquisition of New Zealand children aged 5:0-5:11. In doing so, the study has focused on a quantitative measure of production accuracy and a categorisation of speech errors. Results indicate that children in this age range are for the most part intelligible and exhibit a high degree of phonological accuracy. Their speech is however not free of errors.

**Demographic variables**

Based on the findings from previous research (Smit et al., 1990; Dodd et al., 2003; Moyle, 2005; Gildersleeve-Neumann et al., 2008; Bunta et al., 2009; Fabiano-Smith & Goldstein, 2010; Fabiano-Smith & Barlow, 2010; Gildersleeve-Neumann & Wright, 2010). However, this finding could reflect a lack of statistical power due to the relatively small number of multilingual children and the heterogenous nature of their type of multilingualism. When comparing the mean PPC scores of the bilingual children with that for all children (see tables 2 and 3) it is observed that 16 (55%) children performed at the same level or above the mean while 13 (45%) performed below it. Unlike overseas research where language background and degree of bilingualism are controlled for, this study represented a much broader range of language backgrounds and lacked information on the participants’ degree of bilingualism.

Findings indicate that sex alone was found to have a statistically significant effect on phonological accuracy measures for the children assessed in this study. The finding that girls are phonologically more accurate than boys is consistent with studies on other populations (Smit et al., 1990; Dodd et al., 2003). The finding that small age band differences have no impact on phonological accuracy is also in line with results in larger cross sectional studies (Dodd et al., 2003; Moyle, 2005). The finding that socio-economic background has no impact on phonological accuracy is also in line with the fact that focused on articulation as opposed to phonology. As a final point the criteria for measuring decile band performance according to standard New Zealand English adult model. In that regard the distinctive vowel qualities of NZ English and vocalisation of postvocalic /l/ were assessed as correct but dental fricative substitution was not. Given that the replacement of the dental fricatives with the palatal fricatives for some New Zealanders (Maclagan et al., 2008), a scorings of this substitution as correct would most likely produce higher phonological accuracy scores for some children. This could then possibly reduce the differences in accuracy between New Zealand and other English speaking populations.

Another possible factor is that of multilingualism. Although speaking an additional language was not found to have a statistically significant effect on phonological accuracy measures in the current study, there is the possibility that the inclusion of some conventional multilingual children may have contributed to differences between the NZ, Australian and UK data. Twenty nine (27%) multilingual children participated in this study because they used English as their primary language. The number of children with multilingual backgrounds in the Australian data is unknown (Dodd et al., 2002), while the British sample was restricted to monolingual speakers (Dodd et al., 2002). British bilingual data from children who speak Punjabi as a first language are available but these were analysed separately and presented as supplementary data in the appendices of the DEAP manual (Dodd et al., 2002). The mean scores on all measures for these children (PCC: 91.3% for 5;0-5;5, 91.1% for 5;6-5;11; PVC: 98.3% and 98.8% for the respective groups; PPC: 93.4% and 93.8% respectively) were lower than those of their monolingual peers. It is worth noting that these scores would have had an impact on the overall accuracy scores of the UK sample if they had been combined with the monolingual data.

Another possible contributing factor is the prevalence of early otitis media. Although the long-term effects of otitis media in early development are a subject of debate in the literature, there are indications that transient hearing loss associated with this condition can negatively impact the rate at which children acquire speech sounds (Miccio, Gallagher, Grossman, Yont, & Vernon-Fegans, 2001; Sonnenschein & Cascella, 2004). Otitis media is common among New Zealand children and particularly in Pasifika children whose audiometry failure rates at 5 years of age are over 2.5 times that of European children and higher than both Māori and Asian children (Craig Jackson, Han, NZ YTES Steering Committee, 2007). However, otitis media as a possible explanation cannot be verified for this particular group of children as detailed information regarding the number of ear infections and the use of grommets was not included in the background information provided by caregivers.

A final possible factor that may impact phonological accuracy is the speaking rate of the people who demonstrate their phonological models. Adults who speak New Zealand English speak at a faster rate than those who speak British and Australian English (Robb & Gillon, 2007), and this could make it more difficult for children to imitate and acquire their phonology with accuracy.

**Speech errors**

Ten different typical errors occurred in the normative sample. Of these, gliding is the only one considered age appropriate for typically developing 5:0-5:11 year-old New Zealand children. This finding is in line with other research that suggests that gliding is not resolved for this age group (Dodd et al., 2003; Porter & Hodson, 2001). Other typical errors occurred less frequently and in some cases were of very low prevalence. Although it...
is assumed in some of the literature that many of these are age appropriate for children younger than five years of age (Porter & Hodson, 2001; Dodd et al., 2002) and are resolved by this age (Dodd et al., 2003; Stoel-Gammon & Dunn, 1985), the findings are in line with other research suggesting that typically developing five year old children can still produce such errors and present a wide variability in the type of errors they employ (James, 2001).

Errors that are observed in clinical populations were also found with the children tested. However, this is not unexpected for a typical population. As noted in the literature (Dodd et al., 2003; James, 2001) such errors do occur in this population but are of low prevalence with less than 10% of children producing them as patterns.

As a final point, the classification of error raises the issue of how best to classify mismatches between child and adult speech sounds. Some studies restrict the discussion of such mismatches to the typically developmental ones (Stoel-Gammon & Dunn, 1985; Dodd et al., 2003). Other studies include a wider variety of differences in order to capture the most detailed description of those mismatches (Hodson & Paden, 1981; James, 2001; Hodson, 2004). In this paper the second approach has been taken because there is to date no information on the type of misarticulations that New Zealand children produce in their speech. In doing so, findings show that ‘non Typical’ errors (e.g., backing, tongue protrusion) can occur across a range of children as well as frequently in the speech of individual children. This finding now leads us to consider how persistent and/or prevalent such patterns are within the New Zealand population. At present this is not known but further research may be able to provide answers on this.

Clinical implications and limitations of the study

The normative data reported here were based on a representative sample (106) from one geographic region in New Zealand (Auckland area). Following Dodd et al. (2003) the data included all children to reflect the diversity of the population and avoid over-identification of speech difficulties. These findings provide clinicians working with New Zealand English speaking children with detailed information regarding the phonological accuracy and the type of errors to be found in these children’s speech. It also draws the clinician’s attention to factors that may impact on phonological development.

Currently the findings are limited to one age range (five year olds) and to one geographical region. In this age range children are over 90% accurate in their speech production. As such it is difficult to state whether the small variation found between the New Zealand population and other English speaking populations is of clinical significance. Future studies that investigate children from a wider range of ages and from different regions of New Zealand are needed as the small differences found with this group may take on a greater significance when detailed information on the phonological accuracy of younger children becomes available. With further studies a developmental trajectory for phonological accuracy can be drawn and a better understanding of the range/frequency of error patterns produced by New Zealand children can be established.

At this stage it is not known to what extent a multilingual background or predisposition to ear infections may have on phonological accuracy and/or on the type of errors produced by typically developing children. With the collection of detailed data on language and health background in future studies answers to these questions may well be provided. Information on ethnicity also needs to be included. This information was not collected for this study but its importance has been raised in regard to factors impacting phonological accuracy and the scoring of errors.

A final point worth considering concerns clinical practice. In this study the assessors scored children’s performance using standard New Zealand English as the target. Features of other variants of New Zealand English such as dental fricative substitution were therefore assessed as errors. This does raise the issue of how best to evaluate children’s performance when the variety of English spoken by the clinician differs in respect to that of the child. Given this it is important that clinicians review their own scoring practices from time to time and take it upon themselves to become familiar with up to date research. The onus for researchers is then to undertake this type of research and disseminate it to the clinical community.

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REFERENCES


