



# Pragmatic Skills in Chinese Dyslexic Children: Evidence from a Parental Checklist

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Individuals with deficits in pragmatic skills, the skills of applying and interpreting language appropriately in its occurring context, may lead to reduced communication ability that affects social interactions. The present study aimed at examining whether children with dyslexia had pragmatic deficits and what their specific language profile was as compared with normally-developing children and those with autistic spectrum disorder (ASD). Sixty-eight participants of Grades 3 to 6 were recruited from five mainstream schools in Hong Kong. They were divided into the Dyslexia group (N=22), the ASD group (N=22) and the Control group (N=24) matched on age, IQ, and SES. The Children Communication Checklist-2 (CCC-2, Bishop, 2003), a parental checklist, was used to collect information regarding the language and communication abilities of these children. Results showed that the Chinese dyslexic children had reduced pragmatic skills compared to normally-developing children. These dyslexic children were relatively weak in structural language skills and reduced general communication scores that were comparable to children with ASD, but they were normal in social relationships and interests. These results provided new insights for investigating communication abilities of the dyslexic population and implied a possible need for remediation of this population in the domain of language use.

Keywords: pragmatic skills, dyslexia, Chinese, Children Communication Checklist-2 (CCC-2)

## Pragmatic Skills

Form, content and use are three intertwined domains of language. Pragmatics, also known as the use of language, is one of the important domains that affects the success or failure of our communication. Pragmatic skills are the language abilities to apply and

interpret language appropriately in its occurring context (Bishop, 1997). These skills are involved in comprehension and production of tailored forms and meanings of language to fulfill different goals and intention in varying social demands and situations (Dockrell & McShane, 1993; Landa, 2000). This flexibility enhances the effective use of

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language to communicate with different contents and meanings, through various forms like nonverbal communication, spoken and written language.

In written communication, meaning could always go beyond what is literally written. Inferential meanings consist of a considerable portion in different texts, articles and books. They could not be overlooked or else the communication would not be complete (Caccamise & Snyder, 2005; Westby, 2004). For example, Chinese idioms are commonly used expressions observed in both daily and formal communication. They carry both literal and hidden meanings which come from historical and cultural allusions. Interpretations of these idioms require linguistic, pragmatic and world knowledge. Mastering the literal and figurative meaning of them is an expected age-appropriate language task for primary school children (Tsou, et al., 2006). Individuals with lower pragmatic skills were usually having poorer comprehension and usage of these idioms that contain indirect meanings (Kerbel & Grunwell, 1998). Textual comprehension is another area that also requires one's sophisticated pragmatic skills. It does not only demand readers' linguistic knowledge and world knowledge to decode words, to understand syntactic structures and to identify schemata and scripts. Successful and thorough comprehension also requires one to have sufficient pragmatic knowledge. Pragmatic skills are necessary in scenarios that require readers to detect hidden logical relationships, to make coherent understanding and to identify writers' or characters' illocutionary force from

sentences and passages (Buck, 2001; Garnham, 1989; Tsou et al., 2006). Individuals with better pragmatic skills could obtain more information from contexts in written texts to enhance their inferential reasoning from words and sentences to master the overall meaning while those with pragmatic difficulties may be impaired in these situations (Leu, DeGroff & Simons, 1986).

### **Pragmatic Deficits**

Despite the great importance of pragmatics in one's oral and written language, not every individual possesses age-appropriate skills in this language domain (Griffiths, 2007). The presence of some developmental disorders may hinder the normal development of one's pragmatic skills to a significant extent and this may lead to pragmatic deficits and communication impairments.

For instance, individuals with autism spectrum disorders (ASD) are characterized with pragmatic deficits. ASD is a collective term referring to diagnoses of autism, autistic features, Asperger's syndrome and related pervasive developmental disorders. Individuals with ASD have delayed development in structural language aspects like syntactic, morphological and phonological skills as well as in language use. Difficulties in pragmatics are disproportionately more prominent among different language domains in children with ASD and such difficulties may persist throughout their lifespan (Geurts & Embrechts, 2008).

Besides ASD, developmental disorders like attention deficit hyperactivity disorder

(ADHD) and specific language impairment (SLI) may also be associated with pragmatic difficulties, although impaired use of language was not an essential diagnostic criterion of these disorders. For example, individuals with SLI have delayed or distorted spoken language development that is not explained by other conditions like mental retardation, hearing or physical impairment etc. These individuals have heterogeneous language profiles, which could have comprehension or expression difficulties either on structural language components or pragmatic components, and sometimes they could have difficulties on both domains (Geurts & Embrechts, 2008).

Individuals with pragmatic deficits could have reduced communication ability while facing different social or situational contexts or have distorted and unexpected language performance during specific context (Martin & McDonald, 2003). Reduced pragmatic skills may be manifested as limited communicative functions, unable to comprehend verbal or nonverbal contextual cues, insufficient response to others' communication, interaction and conversation. Distorted pragmatic skills may be manifested as inappropriate initiation or termination of conversation, stereotypic production or over-literal interpretation and production.

### **Developmental Dyslexia**

Developmental dyslexia (DD) is a learning disorder recognized by unexpected discrepancy between their intelligence and literacy attainment. This mismatch is manifested with literacy

impairment, where proficiencies of reading and writing are affected (Snowling, 2000; Vellutino, 1979). Generally speaking, around 2 to 4 percent of school populations may have severe DD, while a further 6 percent may have mild to moderate reading difficulties (e.g., Badian, 1994; Miles & Miles, 1999). Individuals with DD often show impairments in word-recognition, spelling, reading comprehension and writing (Bruck, 1990; Miles, 1993). Phonological deficits (Snowling & Nation, 1997; Van Daal & Van der Leij, 1999), rapid naming deficits, and other cognitive deficits (Badian, 1997; Willows, Corcos & Kershner, 1993; Wolf and Bowers, 1999) have been found to be some cognitive causes for DD. (Ho et al., 2002; Stanovich, & Siegel, 1994; Watson & Willows, 1993; Willows, 1991).

However, pragmatics, as an important aspect of language, remains unexplored in the dyslexic population until recent years. Riddick, Farmer and Sterling (1997) reported in their survey results that dyslexic children showed difficulties such as incoherent and disorganized speech content, inappropriate topic initiation and difficulty of their communication partners to make sense of their utterances. Similarly, Cooke (2001) reported communication difficulties of dyslexics such as failure to understand jokes and idioms, failure to identify minute social cues and reduced processing of communication content. These difficulties could be categorized under pragmatic competence. These communication problems seem to persist in dyslexic adults. Griffiths (2007) investigated pragmatic skills of well-compensated dyslexic adults using self reported

questionnaire and selected subtests from Dyslexia Adult Screening Test (DAST, Fawcett & Nicolson, 1998) and Right Hemisphere Language Battery (RHLB, Bryan, 1995). Results across different measurements suggested that dyslexic adults were showing significantly reduced pragmatic skills compared to those without dyslexia. The results demonstrated that individuals with dyslexia may have possible correlation with impairments in the use of language, namely the domain of pragmatics.

### Measuring Pragmatic Skills

To investigate pragmatic competence of an individual, reliable and valid tools are needed. Structural language abilities such as speech, semantics or syntax have a variety of standardized measurements to evaluate one's performance on these areas. However, tests for pragmatic competence to date are limited, and these tests often lack sensitivity or are limited to superficial aspects only (Glumbić & Brojčin, 2012). This posed difficulties for researchers and clinicians to make accurate judgment on an individual's pragmatic competence. Pragmatic skills are difficult to assess for two reasons (Bishop & Baird, 2001).

First, pragmatic skills are highly context-dependent. Pragmatic skills could only be observed in specific social or situational contexts. The occurrence of targeted behaviors is relatively indefinite compared to other language domains. In the aspects of structural language, researchers or clinicians could create situations to elicit certain skills of the respondents (e.g., divergent naming of different categories of objects to assess

semantic knowledge, reading words containing specific speech sounds to assess phonological skills). Regarding pragmatic skills, this is relatively less feasible. When certain pragmatic skills are elicited in artificial test settings, they may reflect respondents' capability in this specific communicative environment. If complete and accurate measurement of an individual's pragmatic skills is expected, measurement across a wide range of communicative contexts will be needed. This makes the assessment time-consuming or even not practical (Norbury et al., 2004).

Second, atypical or deviated communicative behaviors indicating possible pragmatic deficits are usually infrequent in their occurrences. Comparatively, deficits in structural language aspects (e.g., syntactic structure errors in expressive language impairment, initial-consonant-deletion in speech disorder) are more consistent and frequent. These errors could be observed by researchers or clinicians during assessment or even naturalistic observation. However, pragmatic errors (e.g., over-literal interpretation of others' expression) occur in specific contexts and therefore are relatively rare. Researchers or clinicians' observation may not coincide with these scenarios so the deficit will be overlooked.

Based on the above considerations, Bishop devised a checklist to evaluate children's pragmatic skills in 1998, the Children's Communication Checklist (CCC). The checklist was revised by Bishop in 2003 into a second version (CCC-2). She presented prominent features of strengths and weaknesses in

different communication areas (including structural and pragmatic language) in a systematic format with objective and concrete ways of ratings. The checklist was designed to be used by people that could observe children's communicative behavior across a wide range of social contexts for a prolonged period, such as parents, teachers or significant others of the individual. This was to overcome the previously mentioned limitations of clinical assessment and naturalistic observation made by researchers or clinicians and to provide more representative profiles on children's everyday communication. The checklist was standardized on children in UK to provide reliable and accurate measurement of children's communication skills.

Acceptable validity, reliability and internal consistency of the checklist were reported (Norbury, et al, 2004; Geurts, 2007). The checklist was able to distinguish between individuals with or without pragmatic disorders. The initial study of CCC (Bishop & Baird, 2001) showed different clinical groups scored differently in the pragmatic composite. ASD group received lowest rating, SLI group followed and control group was rated highest. CCC-2 could depict a wide range of language functions and could be used as a more general screening tool for communication impairments. Since their publication, CCC and CCC-2 gained popularity and were used widely across the globe to describe different communication profiles and distinguish communication deficits in children with ASD, SLI and other disorders (Bishop, et al., 2011; Bishop & McDonald, 2009; Ferguson et al., 2011; Whitehouse, Barry

& Bishop, 2008).

### **Aims of the Present Study**

The present study investigated the pragmatic skills of Chinese dyslexic children. There were two research aims. First, it examined whether Chinese dyslexic children have pragmatic deficits with the use of CCC-2. It was hypothesized that this group of children would have impairment in this language domain. Second, it studied the specific language profile of children with dyslexia, comparing their CCC-2 results with normally-developing children and children with ASD. By comparing with normal controls and pragmatically impaired ASD children, the relative pragmatic competence of this population could be understood. It was hypothesized that dyslexic children would have poorer pragmatic skills compared to normally-developing children. Also, the severity of the pragmatic impairment would be lower compared to ASD children. It was hypothesized that dyslexic children would also have structural language difficulties but have normal social relationship and interests.

This study hopes to bring new insights about the communication skills of the dyslexic population. Besides language content and form, which were studied more in-depth by other previous studies, the current study will start to build a more complete picture about the language profile of the dyslexic population.

### **Method**

#### **Participants**

Sixty-eight Chinese children and their

Table 1—Background information of the participants

	Groups				Statistics		
	Dyslexic (n=22)		ASD (n=22)			Control (n=24)	
	Mean	SD	Mean	SD		Mean	SD
Age (Months)	126.1	14.4	130.6	16.4	122.0	14.3	$F(2,65)=1.875, p=.162, \text{partial } \eta^2=.055$
IQ score	93.6	6.7	99.3	12.5	99.0	9.9	$F(2,65)=2.324, p=.106, \text{partial } \eta^2=.067$
Socio-Economic-Status	Percentage (%)	Percentage (%)	Percentage (%)	Percentage (%)	Percentage (%)	Percentage (%)	
Parents' Education Level (1/2/3/4/5) *	0/22.7/54.5/22.7/0	4.5/18.2/54.5/18.2/4.5	4.5/18.2/54.5/18.2/4.5	4.5/18.2/54.5/18.2/4.5	8.3/29.2/25.0/33.3/4.2	8.3/29.2/25.0/33.3/4.2	$X^2(8, n= 68)= 7.562, p=.477$
Parents' Occupation (1/2/3/4/5/6) #	36.4/50.0/4.5/0/4.5/4.5	27.3/31.8/4.5/0/27.3/9.1	27.3/31.8/4.5/0/27.3/9.1	27.3/31.8/4.5/0/27.3/9.1	37.5/25.0/12.5/0/25.0/0	37.5/25.0/12.5/0/25.0/0	$X^2(8, n= 68)= 9.692, p=.287$
Family Monthly Income (1/2/3/4/5) @	0/4.5/36.4/13.6/4.5	0/0/42.9/19.0/38.1	0/0/42.9/19.0/38.1	0/0/42.9/19.0/38.1	12.5/8.3/16.7/12.5/50.0	12.5/8.3/16.7/12.5/50.0	$X^2(8, n= 67)= 10.543, p=.229$

Notes: Parent education level \* 1. Primary or below /2. Junior secondary /3. Senior secondary /4. Post-secondary /5. Master degree or above  
 Parents' Occupation # 1. Managers/ Administrators / Professionals /2. Clerks / Service workers / Shop sales workers  
 3. Craft / Plant and machine operators and assemblers /4. Elementary occupations /5. Unemployed 6. Others  
 Family Monthly Income @ 1. \$6000 or below /2. \$6001 to \$10,000 /3. \$10,001 to \$20,000 /4. \$20,001 to \$30,000 /5. \$30,001 or above

parents were recruited from Grades 3 to 6 in five mainstream primary schools in Hong Kong. They were categorized into three different groups: (1) the Dyslexia group (n=22); (2) the Autistic Spectrum Disorder (ASD) group (n=22) and (3) the Control group (n=24). Children in the dyslexic group had school record of special educational needs (SEN) of dyslexia, diagnosed by professional educational or clinical psychologists. Children in the ASD group had school SEN records of ASD, including diagnoses of autism, autistic features and Asperger's syndrome, diagnosed by pediatricians or psychiatrists. Children in the Control group had no SEN records of any developmental disorders. Children in the three groups were matched on age, IQ, and SES (see Table 1). All the participants were reported to use Cantonese Chinese as their first language or one of the most commonly used languages at home.

## Materials and Procedures

Children's Communication Checklist-2 (CCC-2; Bishop, 2003), Raven's Standard Progressive Matrices (Raven, 1981) and a demographic information questionnaire were used in this study to assess children's communication skills, estimate their general intellectual ability and collect demographic information on these children and their families respectively.

Children's Communication Checklist-2. CCC-2 is a checklist developed to be completed by individuals that were familiar with the children, such as parents, caregivers or teachers. Seventy items were included in the checklist, divided into 10 subscales with 7 items

each. These subscales aimed to investigate the strength and weakness of different areas regarding children's language, communication and social aspects. They are (A) speech; (B) syntax; (C) semantics; (D) coherence; (E) inappropriate initiation; (F) stereotyped language; (G) use of context; (H) nonverbal communication; (I) social relationships; and (J) interests. The first four subscales (A-D) measure competence of structural language aspects of children. They identify deficits on children's phonology and articulation, syntactic ability, vocabulary and discourse skills respectively. The next four subscales (E-H) tap into children's pragmatic skills. Common pragmatic deficits are categorized into these four areas. Inappropriate initiation subscale (E) measures impairments involved in conversational topics such as repetitive initiations, failure to commence topics with mutual interests and talking too much. Stereotyped language subscale (F) describes atypical and unusual expressions such as overuse of bizarre, overly precise or specific learned phrases. Use of context subscale (G) investigates the adequate comprehension and expression related to social rules such as the use and understanding of politeness, humor and irony. Nonverbal communication subscale (H) targets on the appropriate understanding and utilizing of nonverbal communication like facial expressions, bodily movements and gestures. The remaining two subscales (I-J) measure characteristics commonly observed in children with ASD. They look into children's relationship with other individuals and identify any rigid, repetitive or atypical interests (Glumbić &

Brojčin, 2012; Volden & Phillips, 2010).

Each item in the CCC-2 consists of a statement describing certain behavior. Among the seven items in each subscale (A-J), five of them measure weaknesses and two of them measure strengths in those communication areas. They add up to 50 negative items and 20 positive items in total. For example, item 34 "takes in just one or two words in a sentence, and so often misinterprets what has been said", it described a behavior of weakness in the subscale (G), use of context; item 62 "conversation with him/her can be enjoyable and interesting", it described a behavior of strength in the subscale (E), inappropriate initiation. The 50 items regarding weaknesses were randomized in order and presented first. Respondents, which were the participants' parents in this study, were required to rate their children's performance according to their daily observation. The ratings were evaluated in a 4-point scale (0 - less than once a week or never; 1 - at least once a week; 2 - once or twice a week; 3 - more than twice a week or always). The 20 items regarding ability were randomized in order and presented next. Respondents were required to rate children's performance in another 4-point scale (0 - children yet to achieve; 3 - children have been able to achieve). The formats of rating scales were set to be definite and objective. The randomization of item order was expected to minimize response bias. A consistency check was established to ensure the responses to positive and negative items were consistent. This monitored and improved the validity of the checklist.

The ratings obtained from the checklist were then computed into scaled scores of each of the ten subscales with a mean of 10 and standard deviation of 3. The abovementioned scoring procedures were based on the original UK norm provided by the publisher. Besides subscale scores, four composite scores could be calculated from the scaled scores to further analyze some characteristics of the tested children's communication skills. Structural language composite (SLC) estimates their structural language skills. It is calculated by the summation of scaled scores of subscales A to D. Pragmatic language composite (PLC) estimates their pragmatic language skills. It is calculated by the summation of scaled scores of subscales E to H. The general communication composite (GCC) estimates the overall communication skills. It is calculated by the summation of scaled scores of subscale A to H. The social interaction deviance composite (SIDC) estimates the discrepancy between structural language aspects and pragmatic skills. It is calculated by the subtraction of the sum of subscale E-H from the sum of subscale A-D. Positive SIDC indicates structural language outperformed pragmatic language, while negative SIDC indicates pragmatic language outperformed structural language. Scaled scores of the ten subscale and the composite scores help to provide an overview of language profile of the tested children (Geurts & Embrechts, 2008).

A Chinese version of the CCC-2 was used to assess the Chinese children in the present study. It was translated from the original English version with slight cultural adaptations, mainly on the examples



provided. The license to use the Chinese checklist for research purpose was obtained from the publisher.

#### Raven's Standard Progressive Matrices.

It is a standardized test devised by Raven in 1981 to estimate children's nonverbal intelligence. Sixty items were printed in a booklet, divided into 5 sets with 12 items each. Each item consisted of either a single visual matrice or a set of visual matrices, where part of it or one of the set was missing respectively. Participants were required to select the appropriate missing piece from the given list of six to eight choices to complete the matrice. Total raw scores were added up and converted into intelligence quotient (IQ) equivalents, with a mean of 100 and standard deviation of 15. Local norms established by the Hong Kong Education Department (Raven, 1986) were used in the scoring procedures of the current study.

#### Demographic Information Questionnaire.

A questionnaire was designed by the authors to collect demographic information of students and the SES of their families. It was designed to be completed by parents of the participating children. Respondents were required to provide children's gender, date of birth, prior diagnoses and treatment of developmental disorders to the best of their knowledge. This information was cross-checked with schools' records. They were required to state their relationship with the children and the most commonly used language at home. The information was used to confirm the validity of the observation and exclude confounding caused by differences in language background. SES

was measured from the given information about parents' educational level, parents' occupation and family monthly income. This information was used to exclude possible effect of family SES on children's language performance.

## Results

Strengths and weaknesses of children's communicative abilities were measured using the Children's Communication Checklist-2 (CCC-2; Bishop, 2003). Subscale scores provided indication of children's communication ability in specific areas. Composite scores aggregated various subscales to identify deficits in certain language domains.

Scaled scores of the ten subscales and composite scores of CCC-2 of the three groups were summarized in Table 2. The subscale scores were compared among the three groups using univariate ANOVA. Results indicated that all but one (A. Speech) subscale scores had significant group differences (all  $ps < .05$ ). Post-hoc analyses were performed to make multiple pairwise comparisons between subscale scores among the three groups using Tukey test. Results suggested that the Dyslexia group had significantly lower scores than the Control group in subscales E (inappropriate initiation),  $p < .05$ , and subscale G (use of context),  $p < .05$ . All subscale scores of the ASD group were significantly lower than those of the Control group (all  $ps < .05$ ). Compared with the ASD group, the Dyslexia group had significantly higher scores in subscales I (social relationship) ( $p < .05$ ).

Univariate ANOVA was also used to

Table 2—Mean Scores, Standard Deviations, and Group Comparisons of the Children’s Communication Checklist Scores

	Groups				Statistics					
	Dyslexic (D)		ASD (A)		Control (C)		ANOVA		Post-hoc Analysis (p value)	
	Mean	SD	Mean	SD	Mean	SD	F(2,65)	p	partial $\eta^2$	D vs C <sup>a</sup> A vs C <sup>b</sup> D vs A <sup>c</sup>
<b>Subscales Score</b>										
A. Speech	5.8	3.5	4.6	3.1	7.0	3.1	3.092	0.052	0.087	D < C A < C * D > A
B. Syntax	2.8	3.0	2.3	4.1	5.0	3.9	3.684	0.031*	0.102	D < C A < C * D > A
C. Semantic	5.8	2.8	4.8	3.2	7.7	3.5	4.982	0.010*	0.133	D < C A < C** D > A
D. Coherence	4.4	3.4	2.9	2.0	6.4	3.6	7.385	0.001**	0.185	D < C A < C** D > A
E. Inappropriate initiation	6.0	2.6	4.6	1.6	7.8	2.6	10.911	<0.001**	0.251	D < C * A < C** D > A
F. Stereotyped language	4.1	2.8	2.7	2.0	5.8	2.9	8.038	0.001**	0.198	D < C A < C** D > A
G. Use of context	4.4	2.6	2.7	3.0	6.6	3.4	9.369	<0.001**	0.224	D < C * A < C** D > A
H. Nonverbal communication	4.7	3.2	2.7	1.7	6.5	3.7	9.213	<0.001**	0.221	D < C A < C** D > A
I. Social relationship	5.1	3.5	2.7	2.4	5.8	3.7	5.673	0.005**	0.149	D < C A < C * D > A *
J. Interests	6.6	2.4	5.2	2.0	8.0	3.2	6.515	0.003**	0.167	D < C A < C * D > A
<b>Composite Score</b>										
SLC <sup>#</sup>	18.8	10.8	14.6	11.0	26.2	10.8	6.719	0.002**	0.171	D < C A < C** D > A
PLC <sup>†</sup>	19.2	9.4	12.7	6.9	26.6	10.1	14.004	<0.001**	0.301	D < C * A < C** D > A *
GCC <sup>‡</sup>	38.0	19.4	27.3	16.6	52.8	19.1	11.136	<0.001**	0.255	D < C * A < C** D > A
SIDC <sup>§</sup>	-0.4	5.9	1.9	7.9	-0.5	8.4	0.726	0.488	0.022	D > C A > C D < A

Notes: \* p<0.05 \*\*p<0.01 <sup>a</sup>D vs C: Dyslexic vs Control A vs C: ASD vs Control D vs A: Dyslexic vs ASD  
<sup>#</sup>SLC = Structural language composite(A+B+C+D) <sup>†</sup>PLC = pragmatic language composite (E+F+G+H)  
<sup>‡</sup>GCC = general communication composite (A+B+C+D+ E+F+G+H) <sup>§</sup>SIDC =social interaction deviance composite (A+B+C+D- E-F-G-H)

compare composite scores of the three groups. Results indicated that significant group differences were observed in all but one (SIDC) composite scores (all  $ps < .01$ ). Post-hoc analyses using the Tukey test showed that the Dyslexia group had SLC scores not statistically different from the Control group or the ASD group. The Dyslexia group had intermediate PLC scores among the three groups, which was significantly lower than that of the Control group, but significantly higher than that of ASD group (all  $ps < .05$ ). The Dyslexia group had significantly lower GCC score compared to that of the Control group ( $p < .05$ ) but comparable to that of the ASD group. The ASD group had significantly lower SLC, PLC and GCC scores compared to those of the Control group (all  $ps < .01$ ).

## Discussion

### Pragmatic Skills of Dyslexic Children

Children's Communication Checklist-2 (CCC-2) results suggested that Chinese dyslexic children in this study had pragmatic deficits. Pragmatic language composite (PLC) score of the Dyslexia group was significantly lower than that of the Control group. The dyslexic children scored significantly lower in two out of the four pragmatic subscales, namely inappropriate initiation (E) and use of context (G), compared with normally-developing children of similar age, IQ, and SES. It appears that dyslexic children may have some genuine difficulties in developing adequate pragmatic skills.

The present CCC-2 results successfully distinguished between children with autistic spectrum disorder (ASD) and

normally-developing children. The diagnostic label of ASD pointed to structural language impairment, pragmatic language impairment, atypical social relationship and interests. All these deficits were reflected from the comparison of the ten subscales between the ASD group and the Control group. All subscale scores and three composite scores, structural language composite (SLC), pragmatic language composite (PLC) and general communication composite (GCC), of the ASD group were significantly lower than those of the Control group. This result was consistent with those of previous studies (Bishop, 2003; Bishop & Baird 2001; Geurts et al. 2004, Norbury et al., 2004). CCC-2 was able to distinguish between children with and without communication impairments. This suggested that the parent-reported CCC-2 data in the current study were reliable and be able to identify deficits in different areas of communication skills in a Chinese population.

The present finding of children with dyslexia having signs of pragmatic deficits was consistent with those of past studies (Cooke, 2001; Griffiths, 2007; Hales, 1995; Riddick, Farmer & Sterling, 1997). Griffiths (2007) has suggested that pragmatic difficulties may be attributed to working memory deficit, affected speed of processing and reduced skill automatization. Pragmatic skills are more complex than those in other language domains by nature. Besides mastering different levels of semantic and syntactic information, at the same time individuals need to process discourse information and contextual cues before accurately acquiring the complete pragmatic meaning of verbal or written information.

The greater demand on processing may overload one's limited working memory. This reduces the processing speed and skill automatization of dyslexic individuals. Pragmatic deficits may also be a result of difficulties in the structural language skills in dyslexic children. Although the difference of SLC scores between the Dyslexia group and the Control group did not reach statistical significant level, dyslexic children displayed lower scores in structural language domains. This suggests that dyslexic children may have mild structural language difficulties which would affect their pragmatic competence. For instance, reduced ability in semantic and syntactic comprehension may affect the ability to comprehend details of a situation, making the use of contextual information less likely (Norbury et al., 2004). Future studies may examine the association between working memory, processing speed, structural language skills and pragmatic skills in children with dyslexia.

### **Language Profile of Children with Dyslexia vs. those with ASD**

In the present study, CCC-2 is able to discriminate the language profile of children with dyslexia and those with ASD. Children with dyslexia demonstrate mild structural language difficulties, moderate pragmatic language deficits, general communication problems, but normal social relationships and interests. However, children with ASD show general communication problems with more severe pragmatic difficulties and social difficulties.

Past studies often failed to discriminate

the language profiles of groups with different disorders (e.g., ASD, SLI, and ADHD), but dyslexia was not examined in these studies (Geurts & Embrechts, 2008; Norbury, et al., 2004). It appears that there may be more overlapping on the behavioural manifestations of these disorders but relatively less between dyslexia and ASD. In addition, past studies included participants of a wider age range (from 6 to 15 years old) while the present study examined children from 8 to 12 years old. Children of different ages have different demands in their communication. For instance, younger children may focus more on their structural language development while older ones more on social communication. Larger age range of the participants in other studies might have averaged out the effect of specific domains, making the composite scores less able to distinguish between different clinical groups.

Although the three groups had comparable social interaction deviance composite (SIDC), it was observed that the Dyslexia group and the Control group had negative SIDCs while the ASD group had a positive SIDC. This suggested that the dyslexic and normally-developing children in the present study had better pragmatic language skills than structural language skills, while the reverse was true for children with ASD. This is consistent with the explanation given by Geurts and Embrechts (2008). They have suggested that normally-developing children are able to communicate before learning to use language, so typically children have better pragmatic competence than structural language competence. A reversed pattern is often

observed in populations with severe pragmatic and social impairments like children with ASD.

### **Limitations and Suggestions for Future Research**

The present study used information from parent-report to measure children's communication ability. Although strengths of using parent checklist were reported, Bishop and her colleagues suggested that CCC-2 could be used as complementing evidence rather than solely a diagnostic tool (Norbury, et al., 2004). Direct testing of pragmatic and other language skills may provide convergent evidence to the extent of pragmatic difficulties in dyslexic individuals. A longitudinal study also helps to clarify whether such pragmatic difficulties may persist over time.

### **Conclusion**

In the present study, pragmatic skills of Chinese dyslexic children were investigated using a parental checklist, Children's Communication Checklist-2 (CCC-2). The present findings suggested that Chinese dyslexic children were less pragmatically competent when compared with normally-developing peers matched with age, intelligence and socio-economic-status (SES).

The CCC-2 results also show that Chinese dyslexic children have a specific language profile that is different from normally-developing children and children with autistic spectrum disorder (ASD). The present findings suggest that Chinese dyslexic children appear to have mild structural language difficulties, some

pragmatic and general communication problems, but normal social relationships. Intervention to dyslexic children may therefore be focused not only on decoding and comprehension, but also on language use in social context. CCC-2 has also been demonstrated in this study to be a reliable tool to examine the language and communication skills of children with different developmental disorders in a Chinese population.

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