Manolitsi, M. & Botting, N. (2011). Language abilities in children with autism and language impairment: using narrative as a additional source of clinical information. Child Language Teaching and Therapy, 27(1), pp. 39-55. doi: 10.1177/0265659010369991

Language abilities in children with autism and language impairment: using narrative as a additional source of clinical information

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Abstract

Autistic Spectrum Disorder (ASD) and Specific Language Impairment (SLI) are disorders of communication that are sometimes thought to show similar structural language difficulties. Recent research has even suggested that they might be aetiologically related. However, it may be that standardised language tasks are not sensitive enough to detect similarities and differences accurately. This study involved 26 Greek children with either ASD or SLI and compared them on standardised measures of structural and pragmatic language as well as using a structured narrative task. Children with ASD were more impaired on receptive but not expressive scores from standardised language tests. In contrast, narrative measures showed significantly poorer ASD performance in expressive skills involving wider story-telling skill and in some sentence-level skills, in particular referencing, compared to peers with SLI. ASD and SLI groups also showed different relationships between structural language and other measures. The data suggests that narrative is a useful tool for revealing qualitative differences in language between overlapping communication disorders both at the clinical and theoretical level, since it provides information that is lost in more formalised testing. This may be particularly true where norms are not available or testing is difficult.

Key words

Autism; Language Impairment; Narrative; Assessment; Children

Word Count (main text)

5875

Introduction

A growing body of research throughout the years has focused on the language abilities of children with communication difficulties and how these affect their understanding and use of language (pragmatics). Children with autistic spectrum disorder (ASD) and with specific language impairment (SLI) make up two main groups in this population. Children diagnosed with communication difficulties represent around 10% of the population when specific language impairment and autism are combined (Tomblin et al, 1997; Charman, 2002). Children with language impairment (with or without autism) are expected to show delays and deficits in the acquisition of language, which according to Tager-Flusberg (2000) could range from very poor levels of functional communication to adequate acquisition and use of linguistic knowledge, but with persisting impairments in conversation and discourse contexts.

There is also a current debate about the nature of language impairments in autism and SLI, in particular whether they have the same or different aetiological sources (see Williams, Botting & Boucher, 2008, for a review). Recent research has reported overlap between the two disorders (e.g., Conti-Ramsden, Simkin and Botting, 2006) and a number of different potential underlying mechanisms from memory to theory of mind have been suggested that may moderate the expression of a related communication difficulty (e.g., Walenski, Tager-Flusberg & Ullman 2007). However, despite this, relatively few studies have examined communication skills across groups with different communication impairments and these studies have tended to focus only on English-speaking participants and have used standardised language measures. This study aimed to look both at standardised tests of language and at narrative skills in children with ASD and SLI. The different disorders will be considered in more detail first, before exploring the concept of narrative as a clinical measure.

Language and Communication in ASD

According to the Diagnostic and Statistical Manual, 4th Edition, (DSM-IV-TR,) a diagnosis of autism is made on the basis of a 'triad' of qualitative impairments: social and communicative impairment and impairment in creativity, flexibility of thinking and generalization (American Psychiatric Association, 2000). Research has suggested that 20-50% of the autistic population does not develop speech and one reason for this could be the range of IQ in autistic populations (Lord, Risi and Pickles, 2004; Tager-Flusberg, Paul and Lord, 2005). These non-verbal children will not be considered further here as the present study addresses the language of those verbal and relatively High Functioning children with autism (HFA). In these children, pragmatic language ability is the most uniformly affected aspect of language. Even children with Asperger's syndrome show the characteristic over-literal language and poor conversational skill seen in others with ASD (Vogindroukas, 2007). Nevertheless, attempts to describe the difficulties in pragmatic skills such as inference have proved difficult experimentally. For example, Botting and Adams (2005) found few differences between SLI and pragmatic language impaired (PLI) groups on an inferencing task. Norbury and Bishop (2002) also found minimal difference between ASD, SLI and PLI groups when story comprehension was assessed. However, a narrative task was also used allowing for a more qualitative analysis which did reveal associations between pragmatic skill and inferencing ability.

Structural language ability seems to show a more heterogeneous picture across the ASD population. The group of high functioning individuals with language impairment and autism has sometimes been referred to in the literature as ASD-LI (see Williams, Botting and Boucher, 2008). Nevertheless, even in this group, delayed articulation and sometimes syntax do not appear to cause the continuing difficulties experienced by those with specific language impairments. Furthermore, comprehension impairments are often thought to be a key feature in ASD, whilst both expressive and receptive skills are affected in those with language impairment

(Tager-Flusberg, Paul and Lord, 2005) and for some with SLI, only expressive language is impaired (although most of these children experience some receptive difficulties at some point during development; Conti-Ramsden and Botting, 1999). In actuality, large research studies directly comparing the two groups are few and far between. One exception is Rapin and Dunn's (2003) study which showed a distribution of impairments that reflected more receptive difficulties (and no children with solely expressive impairment) compared to a language impaired group (a third of whom had no receptive difficulties). However others such as Kjelgaard and Tager-Flusberg (2001) found no difference between expressive and receptive skills, and reported that the ASD profile was similar to those with language impairment but no autism. Testing the language of children with ASD-LI can prove challenging – for example, although some children with ASD do relatively well at the British Picture Vocabulary Scale (Dunn et al, 1998) they may exhibit semantic errors in naturalistic language (Volden & Lord, 1991). Similar differences are found when assessing syntactic ability and Tager-Flusberg and colleagues emphasise the difficulties experienced in everyday life compared with performance on clinical assessments. Indeed, Eigsti, Bennetto & Dadlani (2007) found that compared to young typically developing children and a learning disabled comparison group, children with ASD used less complex morpho-syntactic structures in a spontaneous play paradigm. Despite the fact that pragmatic skill is a key feature of children with autism, the relationship between structural language and pragmatic skill in those with ASD-LI is not yet clearly documented (see Williams, Botting and Boucher, 2008).

Language and communication in Specific Language Impairment (SLI)

The term Specific Language Impairment (SLI) is used to describe children with unexplained difficulties in the acquisition of spoken language despite their normal nonverbal ability (Leonard, 1998). Research has shown that SLI is not a homogeneous disorder but within it subgroups can be identified (e.g., Conti-Ramsden and Botting, 1999; Van der Lely, 1999). Children with

SLI present impairments in acquiring different aspects of language and in particular grammatical morphology (Leonard, 1989), phonology (Bird and Bishop, 1992) and syntax (Leonard, 1998; van der Lely, 1996). For example, Conti-Ramsden and Windfuhr (2002) found that verb inflections were more difficult than noun inflections for all children, and that children with SLI had proportionately more difficulty than their typical peers. Certain semantic classes of verbs might also prove particularly difficult for children with SLI, namely those involving placement (Hansson and Bruce, 2002). Whilst some children with communication difficulties can be described as having Pragmatic Language Impairment (PLI; Bishop, 2003) without other autistic features (e.g., Botting and Conti-Ramsden, 2003), not all children with SLI have pragmatic language difficulties. Recent estimates place the overlap at around 15-20% (Conti-Ramsden and Botting, 1999; Conti-Ramsden, Botting, Simkin and Knox, 2001). The debate about whether children with PLI are best described as having a specific language impairment or as having a broader subtype of ASD is ongoing (see Bishop, 2003), and whilst this group are of much interest in the debate about overlap between disorders, they are not the direct focus of the present study and this wide-ranging discussion will not be furthered here.

As noted earlier, the majority of children with SLI who are still receiving intensive therapeutic and educational intervention by mid-childhood tend to have impairments in both comprehension and production (Conti-Ramsden, Crutchley and Botting, 1997) and may change their comprehension profile over time (see Conti-Ramsden and Botting, 1999).

Using narrative in a clinical setting

Narrative assessments may be a useful way forward for testing children with ASD and SLI. This is because highly structured testing paradigms may inadvertently support some individuals and conversely may be unfairly stressful for others. Narrative may also be particularly helpful where good normative data is not available, or where children are difficult to assess using more test-

like measures. Furthermore, standardised tests are often not sensitive at detecting small levels of change over time. Finally, there is a wealth of normative information about how typical children perform on story-telling tasks. Narrative shows a predictable developmental pattern reaching an adult-like form at around 10 years and improving narrative skill in typical children has been found to relate to improved comprehension, literacy and peer relations (see Johnston, 2008 for a review). In the interests of space, the large typical literature base will not be reviewed here, but interested readers are referred to Bamberg and Damrad-Frye (1991) and Berman and Slobin (1994) among others.

There have been a number of studies exploring narrative skills in those with communication disorders and research has shown that verbal comprehension and the ability to produce a narrative are associated (Norbury & Bishop, 2002). Thus although producing a narrative is thought of as an expressive skill, it might sometimes provide an insight into communication as a whole. Narrative has several advantages over other assessments as a 'clinical tool' (Botting, 2002). It is ecologically valid and highly accessible by children from atypical groups. Although standardized tests of language are available in the UK, these may be limited or non-ideal in many countries and may not represent accurate language skill in certain groups (such as largely bilingual populations). Assessments other than standardised tests of specific linguistic skills are also needed for 'hard to test' populations such as those excluded from school, young offenders, children with additional languages, those who are at risk of being 'over tested' on regular measures, or those who are beyond the primary age range for whom the content and style of many tests is not appropriate.

Narrative can be analysed at two levels: the macro-structure which assesses the ability to sequence a story coherently, i.e., the story grammar or story structure; and the micro-structure which assesses the sentence-level structural language ability evident in the narrative. Whilst

children with ASD (Loveland and Tunali, 1993) and those with SLI (Norbury and Bishop, 2003) have both been shown to have difficulties with narrative, the precise differences have not always been obvious. Nevertheless, for those with ASD fairly typical performance at the micro level (structural language) has been reported (Tager-Flusberg and Sullivan, 1995; Loveland et al, 1990) when compared to children with similar intellectual impairment, whereas young people with SLI show continuing difficulty with structural language forms when compared to peers, and this is true even into adolescence (Wetherell, Botting and Conti-Ramsden, 2007a). Analyses involving macro structure have produced more mixed results, however. Whilst Loveland and Tunali (1993) reported difficulties for children with ASD at this level, Norbury and Bishop (2003) and Liles et al (1995) showed that global organisation factors did not distinguish children with ASD or SLI from typically developing controls.

Narrative as a tool to compare different groups with communication disorders

If ASD and SLI share similar structural language difficulties, one might expect that similar results would be found on standardised tests of communication. Whilst this has been the case in some studies (Kjelgaard and Tager-Flusberg, 2001), in others, profiles of impairment and pathways of linguistic development, have proven to be different (Lloyd, Paintin, & Botting, 2006; Mawhood et al, 2000). However even then, a number of factors need to be considered. One of these is developmental age. Conti-Ramsden and Botting (1999) showed that even within SLI, children's structural language profile changed from year to year. Another is the sensitivity of standardised tasks and the lack of qualitative information they afford. It is wholly plausible, for instance, that similar test results are gained on some measures even when different problems and strategies underlie the language performance.

Narrative measures may be useful in this context to tease apart qualitatively different diagnostic features of disorders with similar communication profiles. Indeed narrative has been shown to

be poorer in those with a history of SLI who now have low cognitive scores compared to those with a more typical SLI pattern with normal IQ scores, even when standardised tasks were not sensitive enough to detect this difference (Wetherell et al, 2007b). Important differences in narrative between those with autism and developmental disorders other than SLI have also been identified (Reilly et al, 2004). Moreover, the ways in which narrative relates to well-used standardized tests of language, and to pragmatic language skill have been investigated less fully, particularly in non-UK /US samples. Whilst Norbury and Bishop (2003) did examine the relationship between these three factors, they combined their ASD and SLI groups so any differences in these relationship patterns may have been masked.

A note about SLI and ASD in Greece

The present study was conducted with Greek monolingual children living in Athens. Modern Greek language differs from the English language in many respects. The main differences between the two language systems can be found in phonology, morphology (inflectional) and intonation. In addition, the Greek language is a language rich in metaphors and thus words often have double meanings depending on the way the speaker uses them. It may also be worth noting that different regions across Greece have their own metaphors and in order to decode them a higher level of linguistic skill is needed.

Although there is limited cross-linguistic research into communication disorders in Greece, some studies have shown that Greek children with SLI and ASD may show numerous linguistic and language-use errors. In line with the general consensus on language difficulties, these include verb tense errors i.e. difficulties with irregular past tense, with possessive grammatical structure, comparatives, adjectives, prepositions (SLI: Clahsen and Dalalakis, 1999), syntactic errors (word ordering) in children with SLI and ASD (Stavrakaki, 2001) and difficulties with initiation and engagement in conversation for those with ASD (Vogindroukas, 2007). Typically

in Greece, standardised tests are not widely available. Where they are used, many are used in a qualitative or descriptive fashion since normative data in Greek is not available. For example, The Clinical Evaluation of Language Fundamentals (CELF, Semel et al, 1997) used in this study, is available in a Greek version, but has not been normed for Greek speaking children. It is also unclear whether such 'adapted' versions provide the most useful information clinically when looking to inform therapy or map progress over time.

Aims of the Study

The aim of this study was to explore the narrative abilities of two groups of children: those who were diagnosed with Specific Language impairment (SLI) and those having a diagnosis of Autistic Spectrum Disorder (ASD). A range of linguistic, pragmatic and narrative measures were examined.

The following issues were explored:

1) Whether any differences were identifiable between the groups regarding test-based (raw) language scores, pragmatic skills and narrative ability;

2) Whether the comparison of group profiles using the CELF looks similarly close or disparate when using narrative measures;

3) The nature of the relationships between language test performance, pragmatic language skills, nonverbal cognitive ability and narrative performance.

Method

Participants

All participants were monolingual native speakers of the Greek Language. Participants with a clinical diagnosis of moderate learning difficulty or emotional disorder and those with Greek as an additional language were excluded from the study. Children were selected from the same private language clinic so that the participants were all residents of the North Suburbs of Athens, Greece.

Children with Autistic Spectrum Disorder (ASD)

The ASD group consisted of 13 participants. All had been diagnosed with ASD by a Child Psychiatrist following DSM IV criteria and were attending a specialist clinic for children with language impairments. ASD participants ranged in age from 4 years and 2 months to 13 years and 0 months of age (see Table 1). They had a mean age of 7 years 2 months (85.92 months ;SD=28.04). Non-verbal IQ was measured using Raven's Matrices (n=7) or WISC (n=3) (see measures below). Three children had no cognitive data available. The ASD group had a mean non-verbal IQ of 84.3 (SD=9.4). Of 13 participants only 1 was female. Children in this group were on the caseload of a speech and language therapist for clinically observed difficulties with language and might therefore be considered as ASD-LI.

Children with Specific Language Impairment (SLI)

The SLI group also consisted of 13 participants. All had been diagnosed with SLI by a Speech and Language Therapist and a Child Psychiatrist. The children in the SLI group all presented with mixed receptive and expressive language difficulties and showed no autistic traits. Participants ranged in age from 5 years and 0 months to 13 years and 0 months of age (see Table 1). They had a mean age of 7 years 4 months (88.15 months; SD=28.13). Again non-

verbal IQ data was available for 8 children using Raven's matrices (n=6) or WISC (n=2) assessments. Five children had no cognitive data available. The SLI group had a mean non-verbal IQ of 87.4 (SD=3.4). From the sample only 2 out of 13 participants were girls.

There was no difference between groups on gender (fisher's exact p=1.0), age (F (1, 24)=0.04, p=0.84) or non-verbal IQ (F(1,16)=0.77, p=0.4).

[Table 1 about here]

Measures

Narrative Production Assessment

Peter and the Cat (Leitao & Allan, 2003): In this story re-telling task, the examiner orally produced the story first. The narration was accompanied by the presentation of an 11 page coloured book. Immediately, after the examiner had finished the narration the child was asked to retell the story using the same book. Participants' narratives were audio-recorded and then written on a transcription sheet.

Analysis of Narrative skills: Coding was broadly divided in macro and micro skills following the assessment guidelines. All scoring items were scored from 0-3 with 3 representing a more favourable score.

Macro skills: Two aspects of macro-skill were coded: the *story structure* (sometimes referred to as the 'story grammar') and the *story content*. For both, scoring was completed following the Peter and the Cat manual (Leitao & Allan, 2003) which scores for the presence of structure / content in the following sections.

Story Structure: One score ranging from 0-3 given for the level of structure. Descriptions of scoring levels were as follows (taken directly from the Peter and the Cat Manual, Leitao &Allen, 2003).

0. Labels or describes characters, objects or other picture features with no inter-relationship among the elements.

1. Chain of actions / events that have a temporal sequence; explicit cause and effect linking of events is not evident.

2. Clear event structure (i.e., Introduction including initiating event, problem, response and consequence).

3. Story is comprehensive (i.e., Introduction including initiating event, problem, plans, resolution and closing event).

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Story content:

Participants were again scored from 0 to 3 for appropriate content as follows. Again scoring descriptions are taken directly from the manual.

0. Content may consist of extremely reduced utterances in response to continuous prompting; or be tangential and not constrained by prompting.
1. Basic content is related to action sequence depicted in story pictures; content is specific enough to allow a listener unfamiliar with the story to gain a reasonable grasp of story plot.
2. Characters, goals and actions demonstrate cause-effect reasoning, however focus is still largely external with limited reflection on characters' internal responses and planning.
3. Planning and intentions of characters are integrated with story plot.

Micro skills: At this level linguistic devices (i.e. semantics and syntax) were examined. In line with the Peter and the Cat scoring instructions, these comprised scores for competence of use from 0-3 for each of the following:

- Vocabulary including adjectives (tall, high, long), mental/cognitive verbs (love, know) and modals (will, couldn't)
- Connectors e.g. and, that, while, because
- Adverbials of time, place and manner
- Referencing (using pronouns correctly when introducing characters and elements)
- Story register (use of appropriate narrative mode, character speech)

Inter-rater reliability

Inter-rater reliability on narrative scores was established using an independent speech and language therapist. Because data is ordinal with a limited scale, reliability was assessed using both correlational and kappa analyses. The correlations between first author and the SLT for each score above ranged from 0.63 to 0.89 (Macro-story structure: 0.72; macro-story content: 0.85; micro-vocabulary: 0.74; micro-connectors: 0.63; micro-adverbials: 0.70; micro-referencing 0.79 and micro-story register: 0.89; all $p<0.001$). Kappa statistics for agreement ranged from 0.43 to 0.78 (Macro-story structure: 0.65; macro-story content: 0.78; micro-vocabulary: 0.65; micro-connectors: 0.43; micro-adverbials: 0.36; micro-referencing 0.67 and micro-story register: 0.70; all $p<0.001$) representing 'fair' (>0.21), 'moderate' (>0.41) and 'substantial' (>.61) agreement according to Landis and Koch (1977).

Standardised Language Assessment

Because the ages of the participants varied, two versions of the CELF were used according to age and functioning of the child:

Clinical Evaluations of Language Fundamentals – Revised (CELF-R; Semel, et al, 1987) ages 5-17.

Clinical Evaluations of Language Fundamentals – Preschool (CELF-Preschool; Wiig et al, 1992) ages 3-7.

Thirteen children (5 with SLI and 8 with ASD) completed the CELF-P (3 who were aged <5years and 10 who were <7 but had lower language functioning). The remaining 13 children completed the CELF-R. Both tests are designed to assess children on: word meaning (semantics), word and sentence structure (morphology and syntax) and recall and retrieval (memory). However, it should be noted that certain subtests differ across the versions. For ease of analysis with a small sample, subtests with a clear test aim were conflated: namely word structure / morphology both of which assess morphology; and oral directions and basic concepts both of which assess comprehension of conceptual level language.

Pragmatic Language Assessment

Test of Pragmatic Language (TOPL; Phelps-Terasaki and Phelps-Gunn, 1992): The Test of Pragmatic Language (*TOPL)* is an individually administered test to assess a child's ability to effectively use pragmatic language. *TOPL* test items provide information within six core subcomponents of pragmatic language: physical setting, audience, topic, purpose (speech acts,) visual-gestural cues, and abstraction. The test includes 44 items, each of which establishes a social context. After a verbal stimulus prompt from the examiner, who also displays a picture, the student responds to the item. For example, the child looks at a picture where one child is ready to draw and the other child is putting the markers away. The examiner says: 'Sally saw Mike making a beautiful picture with his new markers. She wanted to make a picture with his new markers too. How did she ask him to borrow the markers?' It is expected that the request will be a polite question. The child is given 1 point if he/she says 'May I use your marker?/ May I borrow your markers? /May I please borrow your markers?' and 0 points if he/she says 'I want to use those/ Give me your markers/ I'm using your markers'.

Non-verbal cognition

Raven's Coloured Matrices (Raven, 1997): This non-verbal cognition test presents the child with a series of patterns from which a 'piece' is 'missing'. The child is instructed to look very hard at the pattern and select (from six alternative 'pieces' printed below the pattern) the one and only piece that can complete the pattern. The test is split into three sets of twelve patterns each.

Wechsler Intelligence Scale for Children –III (WISC-III): Another well used test of cognitive ability. Subtests making up the non-verbal or 'performance' composite are Block Design (in which children have to make up a pattern from individual coloured blocks); Object Assembly (where children are asked to complete a jigsaw-type task); Picture Completion (where children must identify a missing element from a picture); Picture Arrangement (for which children are asked to order a series of pictures to tell a story); and Coding (children are asked to decode a pattern given a key to do so).

Procedure

The assessments were conducted in Greece, at a private child development centre in quiet rooms. The first author conducted all assessments, which were spread out across two Speech and Language Therapy sessions, one Psychiatric Assessment session and one Psychological Assessment session in order to successfully complete testing and avoid fatigue of the participants. Ethical approval was gained from the Senate Ethics Committee, City University, London, UK. Parents of the participating children were personally invited to participate by the Child Psychiatrist and Speech and Language Therapist, and given an information sheet after which written consent was gained.

Results

Comparison of groups on CELF scores

Receptive but not expressive language appeared different across clinical groups. Thus, ANOVA analyses showed a significant difference between groups in CELF total composite ($F(1,24)=4.5$, $p=0.04$), and receptive language scores ($F(1,24)=6.1$, $p=0.02$), the children with SLI scoring better than their ASD peers. However no difference was found for expressive scores on the CELF ($F(1,24)=2.0$, $p=0.17$). Table 2 presents details on total scores and on subtest scores for the CELF.

[Table 2 about here]

As can be seen from this table, the groups showed very similar linguistic profiles using the raw scores of the CELF, their pattern of performance being highly similar. The only subtests that differed significantly across groups were Linguistic Concepts ($F(1,24) = 5.2$, $p<0.05$), and Sentence Structure ($F(1,24)=8.0$, $p< 0.05$) in which the SLI group scored more favourably. In contrast, no statistical significance was found for Oral Directions/Basic Concepts ($F(1,24)=1.1$, $p>0.05$), Word Structure/Morphology ($F(1,24)=0.013$, $p>0.05$), Recalling Sentences ($F(1,24)=0.60$, $p>0.05$), and Formulated Sentences/Formulated Labels ($F(1,24)=4.5$, $p>0.05$).

Comparison of groups on TOPL

Performance of the groups on the TOPL test (Test of Pragmatic Language) is shown in Table 3. As expected, results showed that the SLI group scored better than the children with ASD who scored much lower ($F (1, 24) = 30.24$, $p<0.001$). This result remained highly significant when CELF total scores were used as a covariate ($F (1, 23) = 20.8$, $p<0.001$).

[Table 3 about here]

Comparison of groups on narrative

Individual aspects of narrative were analysed as categorical variables using chi-square. Children with SLI performed significantly better than children with ASD on 3/7 measures: macro-story content; micro-referencing and micro-story register. See table 4 for details.

[Table 4 about here]

Micro- and Macro- scores were each then summed to create 2 scales and these were analysed as continuous variables. For macro scores this created a possible score range of 0 to 6 (two items) and for micro scores the potential score range was 0 to 15 (five items). There was an overall difference in macro-level ability between the groups (ASD mean=2.5 (sd=1.2); SLI mean=3.6 (sd=0.8); $F(1,24)=7.4$, $p=0.01$). The groups did not differ on combined micro-level narrative skills (ASD mean=5.9 (sd=1.9); SLI mean=7.2 (sd=2.0); $F(1,24)=2.9$, $p=0.10$) despite there being some differences when individual variables were analysed.

The *pattern* of the groups' performance on the narrative task was then examined. Fig 2 illustrates the *patterns* of performance across groups in the narrative task. Unlike the CELF score profiles which were notably similar across groups, narrative performance suggests a more divergent pattern of strengths and weaknesses in the two groups. These findings may indicate that narrative adds something more qualitative to the assessment and diagnosis of SLI and ASD groups.

[Figure 1 about here]

Relationship between narrative and other measures

In order to find out which measures of narrative relate to receptive, expressive and pragmatic skills, Pearson correlations were carried out with each group separately. Different patterns of association emerged. The ASD group showed high associations between narrative and receptive language, as well as between micro-narrative score and pragmatic language. The SLI group, on the other hand, showed no such relationships. This finding suggests that different skills set clusters might characterise the different diagnostic groups even when test scores appear similar. See Table 5 for details.

Furthermore, when micro and macro group comparisons were repeated using TOPL scores as the covariate, the difference in macro score was no longer evident (micro: $F(1,23)=0.6$, $p=0.8$; macro: $F(1,23)=0.7$, $p=0.4$) , suggesting (not surprisingly perhaps) that pragmatic language skill is a key factor in producing good overall narrative structure and content at least for those with ASD.

[Table 5 about here]

Discussion

This study supports other research in highlighting narrative as a useful clinical tool that is able to provide additional diagnostic and therapeutic information over and above that gained from traditional tests of language. The CELF results showed an advantage for the SLI group on receptive language. Children with ASD are well documented as having particularly poor receptive ability. However no differences were found between groups on the expressive scale of the CELF – an aspect on which we might expect children with ASD to perform more strongly than peers with SLI. Furthermore, the narrative assessment revealed that the SLI group were at an advantage on some measures compared to the ASD group. This is not so surprising for 'macro-level' or story structure results where children with SLI have been reported as performing like peers (Liles et al, 1995), but sentence level skills might have been expected to be poorer in those with SLI. It is worth noting that another study comparing CELF scores between SLI and ASD groups (Lloyd et al, 2006) found the reverse pattern with significant differences on expressive but not receptive language scores. The finding also contradicts the results from the Norbury and Bishop (2003). They found no significant differences among groups with communication impairments and groups of normally developing peers. This mismatch in findings could be attributed to the nature, structure, syntax and morphology of Greek language, which may produce different results from those gathered from English speaking children; to the children taking part, particularly in the ASD group, who were receiving intervention at a specialist clinic for communication impairments and therefore may have had especially complex communication needs. It may also be that the wide age ranges included here have masked some more subtle developmental differences between the groups and we acknowledge that future studies should attempt to invite children in a narrower age range.

Nevertheless, the linguistic profiles of the children with ASD also looked different to those with SLI when we moved away from the CELF, with significantly poorer performance in some narrative measures but not others, and qualitative differences also noted by the researcher. Children with

SLI were also reliably better than those with ASD, at producing story content. Here children with SLI were better able to report main character's goals and actions. However, focus was still largely external with limited reflection on character's internal responses and planning. The current research found that all children had difficulties with referents. This result finds support from the Norbury and Bishop (2003) study where ambiguities were found in both the clinical groups and also with those of Liles et al (1995) who found measures of cohesion distinguished impaired and unimpaired children (although note that van der Lely (1997) reported a subset of children with SLI who seemed to be unimpaired on referencing measures).

Even within areas of narrative assessment that showed similar group scores, qualitative differences were observed. For example, although groups had a similar performance regarding vocabulary use, those with SLI appeared to make more phonological errors and circumlocutions, although these were not formally measured as part of the study. In contrast, children with ASD appeared to use neologisms or words with no clear semantic meaning. This finding is in line with the results from another Greek study by Vogindroukas, Grigoriadou, Papageorgiou and Tsamourtzi (1997). They tested children with ASD, Language Impairment (LI), Hearing Impairment (HI) and Mild Learning Disabilities (MLD). It was found that children with ASD had the most semantic paraphrasias and most wrong answers in naming pictures. They also found that children with SLI made more phonemic errors and that children with ASD used a wider range of mechanisms of naming (i.e. description, use of it, place) in order to succeed. Botting (2002) also reported children with pragmatic language impairments were blind-rated as having more 'unusual' semantic errors than peers with SLI. Another informal observation was that children with ASD included information from their personal experiences and lives in their narrative making thus the story hard to understand. This finding is supported again by Vogindroukas (2007) who reported that children with ASD began their retell with inappropriate questions and comments.

The debate surrounding language impairment in SLI and ASD has gained interest recently. Some research has seemed to suggest that ASD may in fact be 'SLI plus additional mindreading difficulties', hypothesising that both groups will show similar language profiles (Kjelgaard and Tager-Flusberg, 2001; Walenski, Tager-Flusberg and Ullman, 2007). Even accounting for mindreading as a moderating factor, the evidence for anything more than superficial similarity is far from conclusive (see Williams, Botting and Boucher, 2008, for a review). The present study provides some mixed evidence for the SLI-plus or co-morbidity arguments from less structured language measures. In the present data, important patterns of difference occurred at the macro-level of analysis and on measures such as direct speech (included here in 'story register;') which would require mindreading ability. Furthermore, the relationship between narrative skill and pragmatic language ability is strong for those with ASD, but not evident for those with SLI, and the difference between groups no longer exists after accounting for pragmatic skill. On the other hand, no direct assessments of social cognition were made and whilst pragmatic skill may be associated with this ability, it may not be wise to assume that pragmatic skill is acting as a proxy for 'mindreading' here. It could equally be argued, for instance, that a bias for operating at a local rather than a global level reported in autism (Frith, 2003) has led both to difficulties in pragmatic language and to the poorer performance on macro-level narrative. In the same way, the significantly greater receptive difficulties in the autism group may have impacted on both pragmatic skill and narrative performance without necessarily implying a causal link between the two.

It may also be relevant that no direct memory tasks were included here. Bishop & Donlan (2005) discuss the idea that children with SLI might find their story-recalling ability limited by memory and conceptual understanding as well as by impaired structural language skills. It is interesting that no noteworthy associations were seen in the SLI group between narrative and the other skills assessed. This might imply that other factors not measured here (such as memory) are playing a key role in expressive narrative for this group and lends further support to the notion that CELF tasks are not tapping into the same skills as narrative (see Wetherell et al, 2007b), even when a 're-

telling' paradigm is used. Working memory may also be an explanatory factor in the difference seen between groups at the macro-level: whereas grammar may be fairly 'proceduralised' by children with ASD, the creation of a story-line and appropriate referencing might tap into executive working memory, especially generativity, known to be poor in autism (e.g., Bishop and Norbury, 2005).

Conclusions and clinical implications

It is suggested here that narrative may reveal qualitative information for children with different communication impairments that some tests are not sensitive enough to detect, and that this may be especially true in languages other than English (in this case Greek). The lack of sensitivity on certain standardised measures may be particularly evident for children with the most severe linguistic difficulties because of the way in which standardised tests are designed based on a normal distribution. Even raw scores of standardised measures may not be able to inform the therapist about small amounts or qualitative levels of progress. Therefore, narrative may not only be useful in assessing a child's baseline skill, but also in differentiating change over time. In countries where first-language versions of norm-based tests are not available (or with children whose first language is not English), the use of picture narrative avoids the complex issues around translation and interpretation which often lead to less than optimal testing materials. Clinicians may also benefit from using the more descriptive factors that less structured tasks such as narrative provide. We acknowledge that larger sample sizes and improved inter-rater reliability are needed in future studies to reassure professionals about the use of narrative and to guide them in which factors are most useful. Furthermore, although a good deal is known about the narratives of typically developing (TD) children, future studies should include a TD control group for direct comparison.

Narrative may prove particularly useful communities where traditional non-narrative standardised testing is not wholly appropriate and may also inform research into the aetiological and behavioural similarities of different developmental disorders. This study has added evidence to recent research

suggesting that whilst there is overlap between autistic spectrum disorders and language impairment, it is possible that different clinical groups are completing some (formal) tasks using different underlying mechanisms.

Finally, this narrative dataset suggests that whilst some of the goals that need to be set for children with ASD and SLI are linguistic ones, wider aspects of communication (such as temporal sequence, perspective taking and memory strategies) might also be useful tools in the therapeutic inventory. It is hoped that the present study will encourage further research into the specific linguistic patterns shown by those with ASD and SLI using a range of language measures, and that narrative can be used to enhance therapeutic practice within non-English speaking communities.

Acknowledgements

Our thanks go to the children and families who took part and to Dr. Francis, Child Psychiatrist, for his help and collaboration. This study formed part of an MSc from City University awarded to the first author.

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Table 1. Means and Standard deviations for each group for age in months and nonverbal IQ scores.

	Group	N	Min	Max	Mean	Std. Deviation
Age	ASD	13	56	156	88.6	28mths
	SLI	13	64	127	84.0	24mths
NVIQ	ASD	10	70	102	84.3	9.4
	SLI	8	81	92	87.4	3.4

Table 2. Means and standard deviations for CELF standardized total, receptive and expressive scores and each subtest raw score.

Group		CELF	CELF R	CELF E	LC	SS	OD	WS	RS	FS
ASD n=13	Mean	91.69	31.92	61.00	8.38	13.15	10.31	19.08	36.46	5.69
	SD	24.16	8.78	19.64	3.50	4.65	4.82	7.61	14.15	6.98
SLI n=13	Mean	113.54	41.08	72.15	12.31	17.38	12.31	17.85	40.46	14.62
	SD	28.11	10.07	20.17	5.14	2.76	5.09	9.22	12.10	13.46

LC = Linguistic concepts

SS = Sentence structure

OD = Oral directions / basic concepts

WS = Word structure / morphology

RS = Recalling sentences

FS = Formulated sentences

Table 3: Means and standard deviations on TOPL

Group	Mean	Std. Deviation
ASD N=13	13.62	6.886
SLI N=13	26.15	4.488

Table 4: Numbers achieving each score level narrative task elements.

Group		Macro-story structure	Macro-story content	Micro-connectors	Micro-vocabulary	Micro-adverbials	Micro-referencing	Micro-story register
ASD n=13	**0**	1	1	0	6	0	2	2
	1	8	7	10	7	11	10	9
	2	4	5	3	0	2	1	2
SLI N=13	**0**	0	0	1	7	1	0	0
	1	3	2	8	5	10	9	5
	2	10	11	4	1	2	4	8
		$\chi^2(2)=5.8$ p=0.054	$\chi^2(2)=6.0$ p=0.049	$\chi^2(2)=1.4$ p=0.50	$\chi^2(2)=1.4$ p=0.49	$\chi^2(2)=1.1$ p=0.59	$\chi^2(2)=11.0$ p=0.004	$\chi^2(2)=6.7$ p=0.034

Fig.1: Narrative profiles across groups

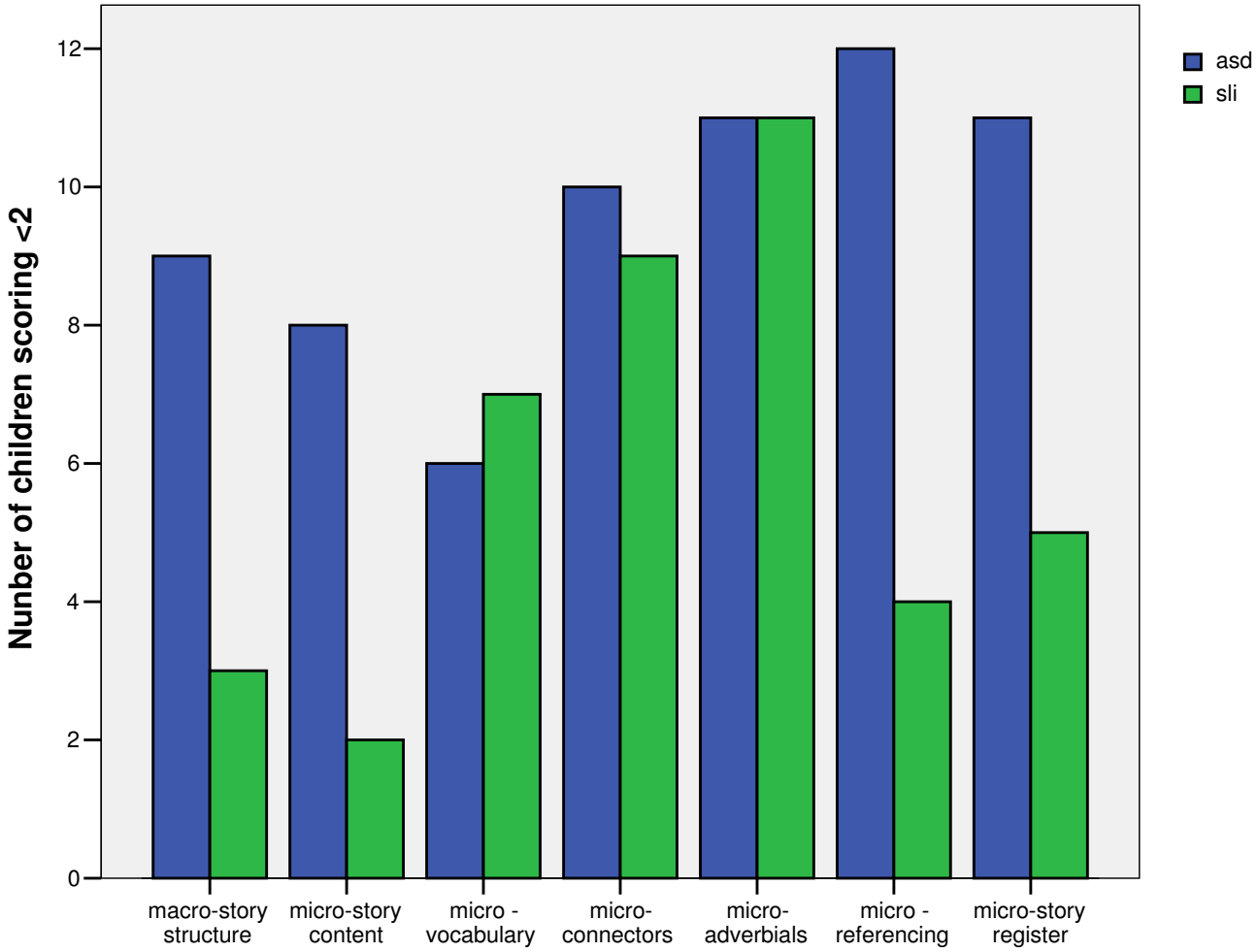

Table 5a: Correlations between narrative and other skills: ASD group

	Micro	Macro
CELF Total	.46	.49
CELF Receptive	.70**	.65*
CELF Expressive	.29	.33
NVIQ	.33	.28
TOPL	.65*	.48

Table 5b: Correlations between narrative and other skills: SLI group

	Micro	Macro
CELF Total	.20	.23
CELF Receptive	.04	.26
CELF Expressive	.26	.19
NVIQ	.32	-.23
TOPL	-.003	-.25

** Correlation is significant at the 0.01 level (2-tailed)
* Correlation is significant at the 0.05 level (2-tailed)