



The impact of oral language skills on the production of written text

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Background. While oral language seems crucial to written language development there has been relatively little research on explicit links between the two.

Aims. This paper reviews and explores the links between oral language skills and the development of writing with particular reference to children with specific language impairment (SLI).

Arguments. Children with SLI are poor at writing and we review evidence from our own and others work showing how oral language and oral vocabulary skills, in particular, are closely associated with written language production in this population. We detail a set of longitudinal analyses showing close relationships between oral language, writing, and other literacy related skills.

Conclusions. We conclude that oral language skill does constrain the development of writing. Children with SLI are very poor at writing. Whether this is due to their general language level or a problem in a specific area such as vocabulary, grammar, or spelling remains to be seen.

We discuss the implications for educational provision of this set of research findings.

The impact of oral language skills on the production of written text

It is well established that oral language competence underpins the development of literacy (Bishop & Snowling, 2004; Catts, Fey, & Tomblin, 1997) and later educational achievements. Children whose oral language skills are compromised often struggle with learning to read and their overall academic achievement is reduced in comparison with their peers. Surprisingly, few studies have attempted to elucidate the ways in which components of the oral language system can enhance or limit the production of written text. This chapter explores the barriers that language learning difficulties in children pose for developing competence in producing written texts and proceeds to explore

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whether language difficulties result in delayed or different profiles of text production. The implications of the reported studies for research and practice are explored.

Learning to write successfully is dependent on a number of basic perceptual, cognitive, and language processes (Kellogg, 1994) and, not surprisingly, poor performance in writing tasks can therefore be the behavioural manifestation of a wide range of developmental difficulties (Dockrell, in press). Although text generation shares many components with oral language production, including lexical retrieval and syntactical formulation, writing places additional demands on the developing cognitive system. For example, children find producing a written narrative significantly more difficult than producing an oral narrative (Gillam & Johnston, 1992) and the written mode takes up more cognitive resource (Bourdin & Fayol, 2000). To understand the nature of the relationship between oral and written language, it is necessary to consider both the subcomponents of the oral language system and the ways in which these components may directly or indirectly impact on the processing of written text (Bishop & Snowling, 2004). It is also necessary to investigate how oral language may be mediated by other skills which are prerequisites for the production of written text.

Oral and written language

The four language systems (speaking, listening, writing, and reading) develop in synchrony (Shanahan, 2006); however, models of writing development do not specifically identify oral language as central to the writing process. Careful consideration of the subcomponents of the language system; phonology, the lexicon, grammar, and pragmatics (Hirsh-Pasek, Kochanoff, Newcombe, & de Villiers, 2005), leads to the clear prediction that these components will all impact on the production of written texts and could do so at different developmental phases. Increased oral language facility is associated with increased written language proficiency (McCutchen, 1986), although to date no thresholds of oral language competence to support writing have been identified (Shanahan, 2006). While oral language competencies and verbal reasoning contribute to composition in the intermediate grades the relationships between these skills are difficult to specify because of high covariance between reading and oral language (Abbott & Berninger, 1993). There is some evidence that children's compositional quality is influenced by oral language skills at several levels including subword, word, sentence, and text levels (Abbott & Berninger, 1993; Berninger, Mizokawa, Bragg, Cartwright, & Yates, 1994). For example, at the single word level, phonological processes impact directly on children's spelling development, the mastery of which is a prerequisite to extended text generation (Graham, Berninger, Abbott, Abbott, & Whitaker, 1997). In the early school years, there are parallels between oral and written modalities in writing (Hidi & Hidyad, 1984). At this point in development, oral language can be viewed as leading the production of written text (Shanahan, 2006). Over time these processes diverge. The focus of oral language is on elaboration whereas the focus in writing is the development of cohesion (Gillam & Johnston, 1992; McCutchen, 1986) and knowledge transformation. Despite the differentiation of the two processes, as children become more skilled in writing and speaking, there are continual links between them. Over time as writing develops it too influences the other language systems.

By corollary, poor oral language skills are associated with difficulties in fluently producing words and clauses in text and are more generally associated with reduced compositional quality (Berninger & Fuller, 1992; Berninger *et al.*, 1992). Limitations

with oral vocabulary (Bishop & Clarkson, 2003; Dockrell, Lindsay, Connelly, & Mackie, 2007) and oral narrative performance (Cragg & Nation, 2006) are related to poor written text production. A recent comparative study of dyslexic, language impaired, and typically developing matched children demonstrated the ways in which different profiles of skills can impact on writing performance (Puranik *et al.*, 2007). Language-impaired participants, but not dyslexic participants, produced fewer words and numbers of ideas than typically developing matched peers. In contrast, both dyslexic pupils and language-impaired pupils produced more spelling and grammar errors than typically developing matched peers. These authors argued that the differences between the language-impaired group and dyslexic group rested in the non-phonological dimensions of text production that were impaired in the children with oral language difficulties. Even when early language problems are overcome, written language continues to suffer in children (Naucler & Magnusson, 2002). Difficulties appear to be particularly marked in the production of expository texts (Scott & Windsor, 2000) where production may be constrained by the additional cognitive demands in developing these texts. Studying both typical and atypical development in the same tasks, and with the same methodology, can be both mutually informative, and can help reveal underlying mechanisms of developmental change.

Children with specific language difficulties

Writing poses a number of challenges for children with language learning difficulties. Practitioners, policy makers, and researchers use a range of different terms to describe this population (see Lindsay, Dockrell, Mackie, & Letchford, 2002). Moreover, a range of terms is used in Europe (dysphagia) and North America (USA: specific language impairment (SLI), or in parts of Canada: dysphagia) and more recently primary language disorder (Tomblin *et al.*, 2003). The specific characteristic of the children's development are difficulties with the acquisition and processing of oral language skills. The most commonly used core criterion to identify children is that their language problems cannot be explained in terms of other cognitive, neurological, or perceptual deficits (Bishop, 1997; Leonard, 1998). These children typically have non-verbal skills within the average range and language problems are evident by a protracted rate of language development as well as difficulties with subcomponents of the language system (Leonard, 1998). Therefore, the high cognitive demands placed on the individual when learning to write may overload a language system that is reduced in processing capacity (Ellis Weismer, Evans, & Hesketh, 1999; Montgomery, 2000; Windsor & Hwang, 1999) and lead to problems with text production. Such difficulties lead to reduced length of texts and higher levels of errors than children of a similar age, and possibly language level.

There are also reasons to predict particular patterns of errors in the written text of these children at both the word and sentence level. For example, the reduced lexical knowledge experienced by some children with language difficulties may impact directly on the children's written outputs. More advanced writing is associated with a greater number of different words (Beard, 2000), increases in the number of adjectives (Wells & Chang, 1986), and an increased number of adverbs and adverbial phrases (Perera, 1984). Thus, limits in vocabulary are likely to influence both the length and content of the written texts of children. In contrast, the grammatical complexity of the written outputs produced by the children may be influenced by their morphological (Leonard, Eyer, Bedore, & Grela, 1997) and syntactic skills (van der Lely & Christian, 2000; van der Lely

& Ullman, 2001). The writing profile of children with difficulties with morphology and syntax will arguably lead to quite different patterns of problem than the difficulties experienced by children with phonological difficulties.

Morphology and syntactic difficulties may manifest themselves in writing through the construction of simple rather than complex sentences and the omission of prepositions, articles, and verbs. Many children with SLIs have particular difficulties in acquiring inflectional morphemes which represent tense and agreement in the underlying syntactic structure of sentences (Leonard, McGregor, & Allen, 1992; Rice & Oetting, 1993). Together, these difficulties would predict problems in producing coherent written texts. The texts are, therefore, expected to contain high levels of grammatical errors and reflect immature sentence constructions. These grammatical limitations will reduce the children's ability to express semantic content.

A significant proportion of children with SLI also experience phonological difficulties (Bishop, North, & Donlan, 1996; Briscoe, Bishop, & Norbury, 2001; Gathercole & Baddeley, 1990) and thus have spelling difficulties (xxx) which will influence written text both directly and indirectly. Problems with phonology may impact on writing through increased numbers of spelling errors (Clarke-Klein, 1994; Lewis & Freebairn, 1992; Treiman, 1993). In fact, children with SLI do indeed produce a high number of spelling errors (Bishop & Clarkson, 2003; Lewis & Freebairn, 1992; Treiman, 1993) particularly phonological errors (Clarke-Klein, 1994; Mackie & Dockrell, 2004) and there are suggestions that error patterns can deviate from both chronological and language matched peers (Mackie & Dockrell, 2004).

Given the range of problems related to the oral language system it is not surprising that the children also experience problems with reading in general (Bishop, 1997; Gallagher, Frith, & Snowling, 2000; McArthur, Hogben, Edwards, Heath, & Mengler, 2000) and so this is another potential barrier to producing fluent and coherent written texts. Early experience and developmental competence in reading increases children's ability to produce coherent written texts. Reading can assist in the development of vocabulary meaning and meaning gained through connected text (Anglin, 1993). Reading also provides knowledge of letter shapes and an introduction to morphological awareness (Fitzgerald & Shanahan, 2000). Early literacy experience increases awareness of sentence structures and text organization. Thus, it is important to consider to what extent the writing problems experienced by children with SLI are mediated by their difficulties in reading (Bishop, 1997; Gallagher *et al.*, 2000; McArthur *et al.*, 2000).

Recent research on the writing of children with SLI

Despite the substantial indirect evidence that children with SLI will have difficulties with written language, there have been limited attempts to specify the nature and extent of the children's problems beyond the single word level and we now know that there is a substantial variation in written narrative skill of children with SLI that is not captured by single word spelling alone (Bishop & Clarkson, 2003). In general, studies have supported the view that children's difficulties in producing written text reflect a particular vulnerability in linguistic form, as evidenced by their grammatical errors (Gillam & Johnston, 1992; Mackie & Dockrell, 2004; Scott & Windsor, 2000; Windsor, Scott, & Street, 2000). These errors include both the percentage of written utterances containing grammatical errors (Gillam & Johnston, 1992; Mackie & Dockrell, 2004; Scott & Windsor, 2000) and the total number of verb composite errors (Windsor *et al.*, 2000).

Errors are not simply restricted to verbs but include the omission of whole words, the omission of plural inflections, as well as the overuse of the conjunction 'and' (Mackie & Dockrell, 2004). Bishop and Clarkson (2003) confirmed the vulnerability of children with language difficulties in producing written text but found that the commonest problems were not grammatical difficulties but problems with spelling and punctuation, and poorer semantic skills. They argued that it was the children's phonological processing deficits that were central in causing the children's written language problems and that this was demonstrated by the close link with the children's difficulties in repeating non-words. Morphological errors are more prevalent in children with SLI but these errors cannot always be explained by phonology alone (Mackie & Dockrell, 2004). Morphological development, both inflectional and derivational, plays a key role in the development of typical children's written language (Green, McCutchen, Schwiebert, Quinlan, Eva-Wood, & Juellis, 2003) and it is important to consider the extent to which these dimensions relate to the written language of children with SLI.

Cross-sectional studies limit our ability to model the relationships between language and literacy difficulties and text production. Children's profiles of linguistic deficits change over time (Bishop & Adams, 1990; Conti-Ramsden & Botting, 1999) and, since written language skills are built on competencies in other tasks, examination of both longitudinal and concurrent competencies is an important component in understanding the nature and extent of the children's written language deficits. Moreover, if early predictors of later writing performance can be identified in longitudinal studies, this provides a basis for identifying appropriate comparison groups to explore delayed or different patterns of text production in cross-sectional studies. This approach will also help highlight the textural features which should be the focus of detailed analyses and provide a infrastructure to devise appropriate interventions for children with language learning disabilities.

An initial attempt to examine the longitudinal effects of oral language on writing was reported by Dockrell *et al.* (2007). This study examined the writing skills of a cohort of children from age 8 to 11 who had been identified with a specific language problem earlier in their development. Writing performance was examined in relation to both earlier and concurrent oral language skills and literacy levels. As a cohort, these children experienced significant problems in producing written text throughout the study period. Both concurrent and predictor measures of receptive vocabulary and reading showed similar patterns of strong relationships with the outcome written language measure.

However, in contrast to previous research, neither working memory nor oral grammatical competence was statistically significantly associated with writing at this point in time. This was surprising given previous research (Mackie & Dockrell, 2004; Scott & Windsor, 2000; Windsor *et al.*, 2000) but was consistent with the data from Bishop and Clarkson (2003). Importantly, a factor analysis of the subscales of the writing measure captured two different dimensions of the writing process: semantics and rules. The semantic factor was significantly related to the amount of written text produced. In contrast, the scores on the rule-based factor were negatively correlated with text production. This relationship highlights the fact, that for children with written language difficulties, the more text that is produced the greater the scope for errors of grammar and punctuation. The importance of semantic skills in underpinning the writing skills of the children was further substantiated by the significant independent contribution of the vocabulary measure in the regression analyses.

Previous studies had provided indicative evidence that vocabulary knowledge may be a relevant dimension in the writing of children with SLI. Lexical diversity was shown

to be a factor in the performance of the children studied by Scott and Windsor (2000), and semantic content was associated with writing in the Bishop and Clarkson (2003) study but in both cases the researchers minimized the role of semantics as a support for writing for the participants' production of written texts. In contrast, the Dockrell *et al.* (2007) study reported that vocabulary was the only language factor to contribute significantly in regressions with the quality of written text composition. As with oral language, vocabulary appears to provide a building block for written language (see also Green *et al.*, 2003). A range of lexical items allows the child to build a text and provide the basic infrastructure of text meaning. This is consistent with work published by Berninger, Hart, Abbott, and Karovsky *et al.* (1992), where text generation skills in typically developing 5- to 9-year-olds were constrained by verbal IQ, including vocabulary development. They also noted that basic oral language skills such as word finding influenced the development of transcription skills in children's writing. The extent and nature of children's semantic representations was a central dimension in the texts produced.

The Dockrell *et al.* (2007) study also indicated that the production of written text was indeed mediated by the children's reading levels. Thus, studies of children with SLI need to address this factor prior to drawing any conclusions about the role of oral language skills. The influence of reading skills has an impact at a number of levels of writing development from a lack of familiarity with books constraining knowledge of narrative structure (Juel, 1988) to limited knowledge of spellings constraining the development of low level writing skills such as transcription and text generation (Berninger *et al.*, 1992).

At age 11, for the pupils in the Dockrell *et al.* (2007) study, their writing resembled that of much younger children. However, it is not clear to what extent their pattern of performance differs from children of a similar language age. Nor does the data speak to potential continuities in the factors that support the pupils' performance on writing texts. We now turn to these questions. In the first instance, we consider the continuity of writing performance and predictors of writing performance.

The continuity of writing performance in children with language impairments

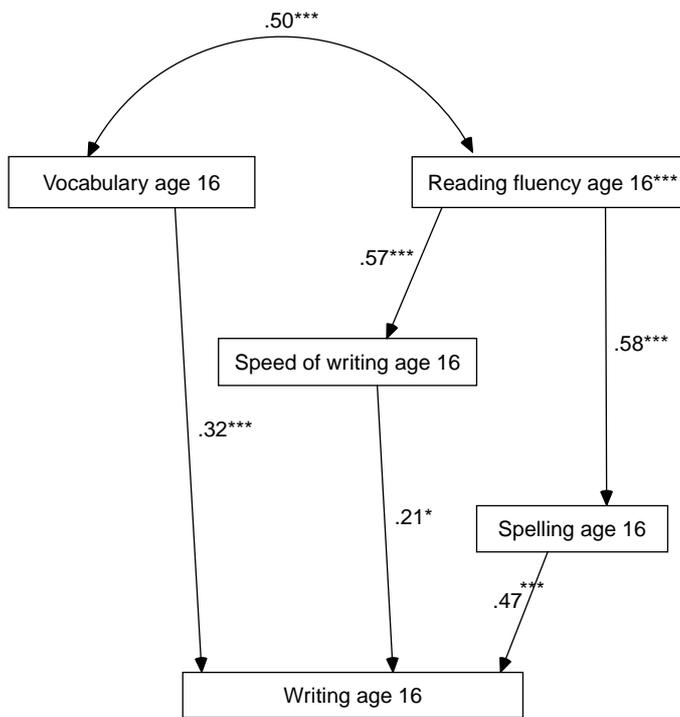
To examine the trajectories in the pupils writing performance, we further examined the same group's language, literacy, and writing skills at the age of 16 (Dockrell, Lindsay, & Connelly, in press). At this point in development, measures of language and literacy, assessed both longitudinally and concurrently, were examined to establish their relative contribution to written text production. The pupils continued to experience specific difficulties with language and literacy and the data indicated that by the age of 16 literacy skills were a particular area of weakness. The production of written text continued to be an area of marked vulnerability for these pupils, with writing scores often being the lowest standardized score of all the language and literacy measures. Moreover, during their teenage years the pupils' writing skills decreased relative to standardized norms. Thus, this current data contrast with data in the elementary years where a relative improvement in the production of written story composition has been noted (Fey *et al.*, 2004). These differences are important to address. The decreases in pupils' performance on written measures may reflect their specific language difficulties. For typically developing children their increasing language competence supports later development;

for those with continued language difficulties these resources are not available. In conjunction, it is important to consider the specific support provided to children when developing their competencies in the written mode, an issue we return to later. This decrease in writing skills occurred at the time when, in the UK, it is expected that by the age of 11 pupils will have mastered the basic skills in reading and writing, moved towards the analysis of genres, writing with technical accuracy, and organizing text into planned and coherent sequences (Department for Children, Schools and Families, 2007, www.standards.dfes.gov.uk/keystage3/) - a major challenge for the pupils in this study.

By the age of 16, the pupils' written productions could be captured by a single dimension. This differs from the patterns at age 11 (Dockrell *et al.*, 2007) and age 14 (Dockrell & Connelly, 2007). Despite the apparent co-ordination of the two dimensions of rules and semantics identified in Dockrell *et al.* (2007), difficulties in relation to form (spelling and handwriting) and content generation was a specific area of weakness. By the age of 16, the significant concurrent predictors of text production were spelling and vocabulary. The current data add further weight to the view that vocabulary continues to provide a building block for written language for these young people.

The poor spelling skills of the participants were evident both in their written text productions and in the assessment of their single word spellings. At 11, the participants' writing levels were mediated by their reading levels. The point of fracture had moved, and on the surface appears similar to difficulties exhibited by young adults with dyslexia (Connelly, Campbell, MacLean, & Barnes, 2006) where writing was constrained by their transcription skills in the form of poor spelling and slow handwriting. This difficulty had a direct impact on the amount of words produced by the young adults with dyslexia when writing and the overall quality of composition produced by this population. However, our participants differed to those of Connelly *et al.* (2006) where participants could produce compositions that were age appropriate in terms of the ideas and development, sentence structure and organization, and unity and coherence on a standardized writing measure. The children with SLI were not producing age appropriate scores in any of these areas. Thus they had problems with spelling and transcription combined with a wider problem in language that was leading to very poor performance in all aspects of the writing process.

We examined concurrent and longitudinal predictors with path analysis. As shown in Figures 1 and 2, the best fit model for the concurrent path analysis included direct effects of vocabulary, spelling, and writing fluency, with reading fluency (a timed measure of reading decoding) having an indirect effect through spelling and writing fluency. The concurrent model confirmed both the effects of semantic factors, as measured by vocabulary, and phonological factors, as measured by spelling, and indicated that an independent contribution of writing fluency featured in the adolescents' writing. In our second model, we explored the longitudinal predictors for the pupils' writing performance at 16. This model identified direct effects of reading, spelling, and writing 2 years previously on writing at 16. These data demonstrated the ways in which literacy measures come to the fore in the writing performance of older pupils with a history of language difficulties. These measures reflected both phonological and morphological features of oral language. Non-phonological factors were also evident, and unlike the literacy measures, their impact was traced back to the age of 8. Vocabulary appears to form a semantic basis which supports both continued vocabulary growth and written text production at age 11 and oral sentence construction at age 14. Over time the impact of oral language was mediated by both the pupils' reading skills and their writing skills.



***<.001, **.01, * .05

Figure 1. Path analysis examining concurrent contributions of literacy and language to writing at age 16.

As the figures demonstrate, at both time points in this longitudinal study, vocabulary played a key role in these pupil’s written text productions. We now examine the extent to which this reliance on vocabulary is a compensatory mechanism for reduced performance in other areas.

Patterns of written text production in children with specific language difficulties: delayed or different?

Comparisons of the writing of children with specific language difficulties with other groups of writers are limited. Of those comparisons, there have been mixed results in specifying how the writing of children with specific language difficulties differs from that of typically developing children. Partly, this inconsistency may due to the nature of the language comparisons identified. Of particular concern is the use of language age matches (Dockrell, 2001; McCauley & Swisher, 1984; Plante *et al.*, 1993). Age-equivalent scores are often made by extrapolation from a child’s score that lies midway between two age scores on the particular test. There is, however, no reason to assume that a score mid-way equates with age-equivalent midpoint score. Moreover, age-equivalent scores do not necessarily mean that a child is performing in an equivalent fashion to a peer of a younger age. A range of factors affect performance and additional language and social experience will be one such factor (McCauley & Swisher, 1984). Finally, such scores are made up by a child’s results on a number of subtests and there is no, a priori, reason to

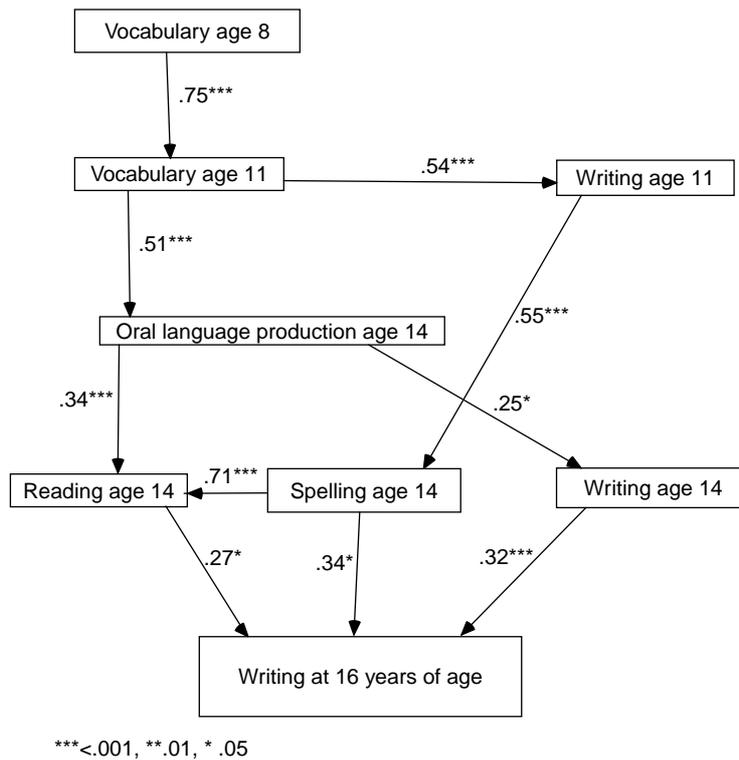


Figure 2. Path analysis examining predictions of literacy and language to writing at age 16.

assume that the pattern of results will be the same across children of different chronological ages but with the same total score. One way to minimize these difficulties is to match language-impaired children with typically developing children on a key variable thought to underpin performance in the task (see Thomas *et al.*, in press for a discussion of alternative approaches). If children are matched on the skills that predict later writing in a language-impaired population then differences in their writing profiles from their relevant matches will allow an examination of specific areas of impairment. Moreover, profiles of weaknesses in text production over time should guide the focus of the data collected about the children's performance beyond simple standardized measures.

The writing skills of 10-year-old children with language difficulties were compared with chronological, language age, and reading age matches by Gillam and colleagues (Gillam & Johnston, 1992; McFadden & Gillam, 1996) The language-impaired children's scores on the Detroit Test of Learning Aptitude-2 was converted to an age equivalent and typically developing children within that age range were identified as language age matches. As such children were not matched on absolute performance on a language measure - either syntactic or semantic. Their results indicated that children with specific language difficulties had holistic level scores in writing texts that were at the same level as the language age match children but less than the chronologically matched peers. This would point to a general delay in writing development. However, the children with language difficulties and their reading age matches produced more complex oral narratives than written narratives, while the other children, including the

language age matches, produced more complex written narratives. Writing for the children with language difficulty was also more demanding as the grammatical error rates in writing per complex utterance were higher (78%) compared to an average of 46% grammatical error rates in oral narratives. This early study suggests that it is not simply the children's oral language levels which are constraining text production but reading levels and processing demands must also be considered.

A similar result was found by Scott and Windsor (2000) who reported on comparisons on general language performance measures between groups of children of 11-year-old children and their age match and language age match comparison groups. Language matches were identified from language age equivalents on the Test of Language Development (TOLD) spoken language quotient, a measure of both expressive and receptive language (Hammill & Newcomer, 1988). They assessed children's writing on 10 general language performance measures. On nine of these measures there was no difference between the children with specific language difficulties and their language age match comparison group. There was though a difference between the language age match and the children with specific language difficulties on the number of grammatical errors produced in T-units. T-units are the shortest grammatically allowable sentences into which writing can be segmented (Hunt, 1965). T-units, which are longer and have more subordinate clauses are more complex. The children with specific language difficulties produced more of these errors in both narrative and expository writing and also across narrative and expository spoken summaries, although the effects of discourse and genre were consistent across the groups studied.

T-unit errors encompassed a wide range of errors and included 'any error that rendered a T-unit ungrammatical' (Scott & Windsor, 2000, p. 330). As such it is not possible to distinguish, for example, failures in spelling to mark tenses from difficulties with subordinate clause relationships. Therefore, while they made the claim that children with specific language difficulties had difficulties with grammar, it was uncertain if this was a general deficit or could have been due to a particular weakness in one area such as grammatical rules applied to spelling.

Windsor *et al.* (2000) carried out a further analysis on the same group of children and reported that the children with language difficulties made more verb and noun composite errors on both the spoken and written narratives than either their chronological or language age matched peers. Verb composite errors included errors with the regular past tense, third person singular, and copula and auxiliary forms of be while noun composite errors included the regular plural, articles, and the possessive. The rate of errors on the written narratives was very much higher than that found in the spoken narratives for the children with language difficulties but not for the language and chronological age matches. They also made three times as many verb as noun errors in the written narratives while there was no difference between rate of errors in the spoken narratives. Further analysis found that most of this difference was accounted for by verb composite errors on the past tense '-ed' ending in verbs and article errors in noun composites but there was substantial variability in the children's performance. Zero marking of '-ed' in writing was claimed by Windsor *et al.* (2000) as a clinical marker of the writing of children with language impairment since typical children do not show difficulties with '-ed' beyond the age of 8 or 9 years (Carlisle, 1996, Nunes, Bryant, & Bindman, 1997). However, while omitting '-ed' may be a failure of grammatical awareness, it may also be a failure to spell orthographically. When children are slow in processing language they may experience difficulties in processing sounds with rapid acoustic transitions and/or perceiving phonemes with low phonetic salience

(for example, t/d and s/z). These difficulties can affect both the regular past tense (ed) and tense agreement (plurals, for example, 'plays'; Montgomery & Leonard, 1998). Despite an attempt to account for this complication in their ratings of spellings of words that should have contained '-ed' Windsor *et al.* were not able to draw a clear conclusion on the basis of the children's errors. No spelling skill level was reported for the children in the study and it is therefore difficult to disentangle spelling levels and language levels. Therefore, it may be that children with language impairments in this study, while matched on language levels with a comparison group may have been poorer spellers.

We could find very few studies that had a matched spelling group with children with language impairment and that also compared writing performance. No significant differences in spelling between the children with language impairment and language aged controls were found by Mackie and Dockrell (2004). However, when word length and linguistic structures are considered in greater detail, children with language difficulties are more impaired than their spelling matched peers (Silliman, Bahr, & Peters, 2006). Particular difficulties were evident with more complex phonological structures in words and more inflected and derived morphological markers were omitted compared to spelling matched peers (Silliman *et al.*, 2006). Both studies are small-scale (Mackie & Dockrell, 2004, $N = 11$; Silliman *et al.*, 2006, $N = 8$). Nonetheless, these studies in conjunction with our longitudinal data indicate that children with language impairments may differ in how they deal with the orthographic and grammatical aspects of spelling during writing.

Vocabulary and spellings as indicators of writing problems for children with language impairment

Based on the evidence of our longitudinal study, and the inconsistent results in the literature about the nature of the writing difficulties experienced by children with language difficulties, we examined the differences in written text between children in the longitudinal sample at age 10 (Dockrell *et al.*, 2007) and typically developing children matched for vocabulary skills and spelling level. Language age and chronological age matches were identified for 23 of the original language-impaired population. The language age match group was aged 7.11. All children also completed a standardized spelling measure. This showed that the language age match group was no different to the children with language impairment in overall spelling ability. All the children completed a standardized writing assessment, the Wechsler objective language dimensions (WOLD; Rust, 1996), that was scored across six dimensions.

Our first step was to examine whether the two-factor solution that explained the performance of the language-impaired sample (Dockrell *et al.*, 2007; Connelly & Dockrell, 2009) was also evident in the writing of the comparison groups. We had interpreted the two-factor solution for the language-impaired sample as a failure to coordinate two components of writing – text generation and transcription. Specifically, we interpreted the first factor as relating to semantic or meaning dimensions of written language including ideas and vocabulary, while the second factor was interpreted as relating to rule-based factors including grammatical morphology and punctuation. We confirmed this two-factor solution both for the smaller subset of language-impaired children and for the language matched comparison group. Importantly, in both cases the factors accounted for similar percentages of variance (language impairment 45 and 22%; language matched 56 and 19%). However, only a one-factor solution was found for the

older chronological age matched children that accounted for 60% of the variance. These results suggest that by age 11 typically developing children are coordinating idea generation while these dimensions have independent influences for younger typically developing children. Moreover, these data suggest that the difficulty in coordinating the two dimensions by the language-impaired group reflects their language level rather than specific cognitive impairments.

To further examine the produced by the three cohorts, we used a systematic analysis of language transcripts to compare key linguistic features. As with previous studies, the majority of these measures showed no difference with their language age controls while underperforming relative to their chronological age match comparison group. This analysis included areas such as word count and number, types of word use frequency of error such as bound morpheme errors, verb tense errors, pronoun errors, preposition errors, article errors, or subject errors. Nor did the total percentage of grammatical errors produced by the children with language difficulties differ from their language age controls. In contrast, the children with language difficulties did differ from their language age controls in the average number of different word roots used. The restriction in number of different word roots again appears to highlight the importance of a flexible use of vocabulary for this group of children.

We also examined the spelling errors within the written narratives. We found that, again, in general terms, the children with language difficulties were producing the same amount of spelling errors as their language aged peers. However, a more detailed classification revealed a more subtle pattern of errors. Three error types were identified, errors relating to a misapplication of phonology, errors relating to a misapplication of orthography, and non-word errors where the errors aetiology was more difficult to classify. Language age matched children produced more errors that were misapplications of orthography than the children with language impairments. The children with language impairments tended to produce more non-words but the effect was not statistically significant to differentiate between the groups. This then mirrors the results from other studies that show that despite being matched generally for spelling there are subtle differences in the spelling errors displayed by children with language impairments (Mackie & Dockrell, 2004; Silliman *et al.*, 2006).

We also found differences between the SLI cohort and the children matched for language ability in their use of punctuation (see also Bishop & Clarkson, 2003). Punctuation marking throughout a text signifies that the child has grasped some of the key differences in parsing between spoken and written language. Full stops and capital letters are indicative of children who have grasped this knowledge. Correct use of these sentence boundary markers is established quite early on in writing by typical children at about age 9. However, we found that the children with language impairment produced more errors relating to full stops and capital letters than their language age peers.

Implications for educational provision

Children and young people with a history of language learning difficulties will need additional support and instruction to master the production of written text. A systematic and sensitive approach to intervention is required if both writing difficulties and motivational factors are to be addressed. There is evidence overall that teachers' adaptations for children struggling to learn to write are limited (Graham, Harris, & Fink-Chorzempa, 2002). Even teachers who are well prepared to meet the needs of

children with writing difficulties transfer of their knowledge and attitudes into classroom practice can be limited (Moni *et al.*, 2007).

Overall, there is a paucity of studies investigating writing in the classroom (Hooper *et al.*, 1994) and we know of no studies that have focused on children with language learning needs. Nor is it known what the contribution of teaching is to the long-term writing strategies of developing writers, although there is some evidence that the differences in strategy use found in older writers may have arisen from how they were initially taught writing (Torrance *et al.*, 1999; Whitaker *et al.*, 1994). The importance of the curricular/instructional explanation for the differences in the writing skills of children with learning difficulties, both within and across genres, has gathered a vocal and growing number of proponents (Scott, 1999).

For children with language learning difficulties even the best classroom support may not be enough; more intensive and explicit instruction will be required (Troia, 2006). This review has identified the key instructional components that should be evaluated and can subsequently be supported through targeted intervention. As long as translating continues to place heavy demands on writing the management of planning will be impaired. Approaches to supporting translation skills are therefore a basic prerequisite to any intervention program. An analysis of spelling errors can provide reliable cues for spelling instruction (see Berninger & Amtmann, 2003). Handwriting (or word processing) and spelling need to be, at least, partly automated to open the way up for pupils to develop text production. Once some automaticity is established pupils can move from word and sentence level to the development of text structures and planning and revision. As we see/have seen in other chapters in this volume, a number of effective strategies have been identified. The appropriate mix for children with language learning needs yet to be established.

Summary and conclusions

This review points to some general conclusions about the writing ability of children with language impairments. Their writing level is generally commensurate with that of their language age controls when such controls are used on most general measures of writing ability. Vocabulary level is a good indicator of writing level and is highly associated with skill at writing in children of all ages.

Controversy still remains over whether there are markers of difference in the writing of children with language impairments over and above the general low level of their writing. The writing of children in our sample of 11-year-olds with language impairments showed children who had not yet been able to blend aspects of the writing system, transcription and text generation. This would seem to indicate an immaturity with the construction of written language. However, it also appears to be related to language level and does not necessarily show children with language impairment develop writing differently, albeit more slowly, than their peers.

There is some evidence that the incidence of grammatical errors in children with language impairments is higher than would be expected for their language age. However, the precise natures of these difficulties have been difficult to establish and is complicated by spelling skills. Those studies that have matched for spelling as well as writing have generally found less difference than others in terms of grammatical markers (but see Silliman *et al.*, 2006, for a study that focuses solely on spelling and not writing per se). However, spelling does appear to be a clearly difficult area for children with

language impairment. More investigation of this area would allow us to see if spelling development is disproportionately affected by SLI.

There is evidence that children with language impairment also struggle more with the rules of writing such as punctuation. Again, this seems to indicate more clearly an immaturity with written language than any clear marker of difference in this population.

Kroll (1981) described how oral and written language interacts in a complex manner by proposing four stages of spoken/written form relationships. In the early stages of writing, texts are less complex and not as sophisticated as oral language (the preparation stage). In the consolidation phase, writing begins to be as complex as oral language. During the differentiation phase, a distinct written style of grammar develops using structures only found in written language. Elements of oral language grammar may still be used inter-changeably in texts. In the final, integration phase, children can differentiate between oral and written forms and grammars and can consciously use them interchangeably. Scott (1999) concludes that children with language impairment may be stuck at the Kroll (1981) preparation or consolidation phase in their writing. Some of our more recent evidence on the 11-year-old children with language impairments may well fit this description. What is needed though is a more specific understanding of why they are not progressing forward to the differentiation stage.

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