Language-Specific Effects of Task Demands on the Manifestation of Specific Language Impairment: A Comparison of English and Icelandic

Elin Thordardottir
McGill University, Montreal, Quebec, and ReykjavíkurAkademían, Reykjavik, Iceland

Purpose: Previous research has indicated that the manifestation of specific language impairment (SLI) varies according to factors such as language, age, and task. This study examined the effect of task demands on language production in children with SLI cross-linguistically.
Method: Icelandic- and English-speaking school-age children with SLI and normal language (NL) peers ($n = 42$) were administered measures of verbal working memory. Spontaneous language samples were collected in contexts that vary in task demands: conversation, narration, and expository discourse. The effect of the context-related task demands on the accuracy of grammatical inflections was examined.
Results: Children with SLI in both language groups scored significantly lower than their NL peers in verbal working memory. Nonword repetition scores correlated with morphological accuracy. In both languages, mean length of utterance (MLU) varied systematically across sampling contexts. Context exerted a significant effect on the accuracy of grammatical inflection in English only. Error rates were higher overall in English than in Icelandic, but whether the difference was significant depended on the sampling context. Errors in Icelandic involved verb and noun phrase inflection to a similar extent.
Conclusions: The production of grammatical morphology appears to be more taxing for children with SLI who speak English than for those who speak Icelandic. Thus, whereas children with SLI in both language groups evidence deficits in language processing, cross-linguistic differences are seen in which linguistic structures are vulnerable when processing load is increased. Future research should carefully consider the effect of context on children's language performance.

KEY WORDS: specific language impairment, cross-cultural issues, Icelandic

Specific language impairment (SLI) is diagnosed in children who present with a significant language deficit in the absence of other clinically identifiable cognitive, perceptual, or neurological deficits (cf. Leonard, 1998). As a condition presumed to affect language selectively, SLI is seen as providing a unique opportunity to examine the boundaries of the linguistic system. However, as research findings accumulate, it proves increasingly difficult to provide a consistent description of the characteristics of SLI. Important differences in the typical manifestation of SLI have been documented across languages as well as across age groups of children speaking the same language. In addition, the performance of children with SLI has been observed to vary across tasks. Thus, it emerges that one of the characteristics of SLI appears to be its changing

manifestation as a function of factors such as language, age, and task. Another major issue that has arisen concerns how selective the impairment really is, as cognitive deficits are uncovered in children with SLI that are not detected by a clinical test of nonverbal cognition but may be sufficiently significant to impact the acquisition and use of language (e.g., Hoffman & Gillam, 2005; Johnston & Smith, 1989; Kail, 1994).

As many researchers have pointed out, the diagnostic criteria for the identification of SLI are largely exclusionary in nature, consisting of ruling out other developmental deficits. Although the principal criterion, that of a significant language impairment, is certainly inclusionary, this criterion is unspecific in terms of which area or areas of language must be affected for the diagnosis to be made. Many authors have noted that the population fitting the diagnostic criteria of SLI is a heterogeneous one. Proposals have been made as to potential subgroups of SLI (e.g., Rapin, Dunn, & Allen, 2003). However, membership in such subgroups has been reported to be unstable over time. In a longitudinal study, Conti-Ramsden and Botting (1999) used cluster analysis to identify a set of subgroups among children with SLI. On follow-up testing a year later, the same subgroups emerged, but close to half of the children now belonged to a different subgroup than they did at the initial test time. This observation fits well with clinical observations of changing symptoms of language impairment over time in individual children, such that the symptoms of school-age children differ from those of preschoolers, often rendering the impairment less visible and leading to the assignment of different diagnostic labels from ones focusing on language to ones focusing on school-related difficulty such as reading or learning disability (Paul, 2001). For English-speaking children, a prominent deficit in grammatical morphology is a well-documented characteristic of children with SLI in the preschool period (Leonard, Eyer, Bedore, & Grela, 1997; Rice, Wexler, & Cleave, 1995). However, even this well-known hallmark characteristic of SLI has been shown to change with time. In a longitudinal study, Rice, Tomblin, Hoffman, Richman, and Marquis (2004) demonstrated that children with specific and nonspecific language impairment improved their production of verb inflection in an elicitation task from kindergarten to 4th grade, with the oldest children performing close to ceiling levels.

An increasing number of cross-linguistic studies of SLI similarly indicate that the manifestation of SLI is not uniform across languages. Low accuracy rates in the production of grammatical morphology have been documented repeatedly as a major characteristic of SLI in English-speaking preschoolers. A number of reports have indicated a tendency for grammatical morphology to be less severely affected in highly inflected languages, including German, Italian, Hebrew, French, and Icelandic (Elin Thordardottir, 2001; Elin Thordardottir & Namazi, 2007; Lindner & Johnston, 1992; Leonard, Sabbadini, Leonard, & Volterra, 1987; Rom & Leonard, 1990). Additionally, studies of other languages have pointed to problem areas in SLI which are not problematic in English. For example, Hansson, Nettelbladt, and Leonard (2000) reported a prominence of word-order errors in children with SLI who speak Swedish.

Within a given language, the performance of children with SLI has been shown to be influenced by a number of task-related factors. In several studies, linguistic complexity and/or sentence length have been manipulated. For example, Grela and Leonard (2000) showed that the performance of English-speaking children with SLI in the use of auxiliary verbs was influenced by the argument structure complexity of the sentences they were producing. Deevy and Leonard (2004) demonstrated that the length of *wh*–questions of comparable syntactic complexity affected the ability of children with SLI to understand these questions. A similar finding on sentence comprehension was reported by Montgomery (2000). The results of these studies were interpreted as suggesting that the greater difficulty of children with SLI with the more complex and/or longer materials was related to their limited processing ability. Discrepant findings on the performance of children with SLI across studies in many cases seem to be related at least partly to the particular tasks in which the structures are examined. For example, whereas studies of SLI in French that use elicitation tasks have reported significant morphological difficulty (e.g., Jakubowicz, Nash, Rigaut, & Gérard, 1998), Elin Thordardottir and Namazi (2007) found little evidence of such errors in the spontaneous speech of French-speaking preschoolers (however, see Paradis & Crago, 2001). Similarly, a number of studies are available which have demonstrated that individual children's performance varies significantly across tasks, such as spontaneous language versus imitation or elicitation (Masterson, 1997; Masterson & Kamhi, 1992), as well as across different sampling contexts of spontaneous language (Hadley, 1998; Leadholm & Miller, 1992; MacLachlan & Chapman, 1988; Marinellie, 2004; Masterson & Kamhi, 1991; Nippold, Hesketh, Duthie, & Mansfield, 2005; Scott & Windsor, 2000).

Task-related effects are often not considered extensively in the interpretation of research findings on normal and disordered language. However, it is clear that communicative contexts can differ sharply. It has been proposed that contextual variation should be included routinely in the clinical evaluation of children to obtain a fuller and more representative picture of the children's language production abilities than can be obtained from observation in a single context. Hadley (1998) suggested that language assessment include the use of short samples collected in conversation, narration, and expository

discourse and demonstrated that these contexts provide complementary information on the children's language production abilities. These three sampling contexts differ in several aspects of complexity, including the dimensions of amount of planning at the utterance and text level, the level of decontextualization resulting in differences in the nature of the information conveyed, the level and kind of detail included, and the typical length and complexity of utterances and speaking turns (see review in Hadley). Conversation is typically relatively unstructured and unplanned beyond single utterances, whereas narrative and expository contexts require larger planning units, including both longer and more complex utterances and multiple utterances per speaking turn, use of cohesive ties, distinction between central and peripheral objects and events, provision of background information, and proper temporal or causal relationships. Leadholm and Miller (1992) point out that conversation appears first in development, with narratives developing considerably later. They rank conversation as the least demanding discourse context and expository discourse as among the most complex discourse types required of children, with narratives in between. In the Leadholm and Miller normative database spanning ages 3–13 years, narratives (which are elicited in a similar manner as in this study) consistently produced significantly longer mean lengths of utterance (MLUs) than conversation. Both narratives and expository discourse typically elicit more complex syntax than conversation and are thus considered the method of choice over conversation when the goal is to examine the limits of children's syntactic abilities (e.g., Elin Thordardottir, Chapman, & Wagner, 2002). However, it is less clear how these two contexts compare in length and complexity of utterances. Studies focusing on expository discourse have employed T-units rather than MLU (Nippold et al., 2005; Scott & Windsor, 2000); thus, direct comparisons of MLU levels are not readily available. In spite of the wide use clinically and in research of these various language-sampling contexts, individual studies most often use samples from a single context, and little attention has been paid to whether variations across contexts are similar in groups of children with NL and children with SLI. The use of more than one context provides a way to examine children's performance under conditions of different task demands.

In sum, the available research on SLI shows variations in its manifestation across age groups, tasks, and languages. Cross-linguistic studies have tended to focus on a search for cross-linguistic similarities in areas of difficulty presumed to reflect breakdown in linguistic rules common to the languages being studied. However, systematic study of cross-linguistic differences as well as task-dependent variability may be equally informative, revealing ways in which a common factor can underlie different manifestations of the disorder known as SLI. Notably, if it is observed that children's ability to produce particular forms breaks down only or more noticeably under certain task-related conditions, then this suggests that the source of the difficulty is not adequately explained as incorrect representation of a linguistic rule but, rather, that additional factors must contribute to the resulting language behavior.

A considerable body of research has indicated that processing limitations are a contributing factor in SLI. Children with SLI have been shown to evidence significantly poor performance on a number of processing-dependent measures, including nonword repetition as well as other tasks involving the processing and/or storage and manipulation of verbal information (Dollaghan & Campbell, 1998; Ellis Weismer et al., 2000; Ellis Weismer, Evans, & Hesketh, 1999). Nonword repetition has been proposed as a phenotypic marker of inherited language impairment (Bishop et al., 1999) and has been shown to have high performance characteristics as a diagnostic test of SLI, with a higher rate of correct identification than standardized tests of language knowledge (Dollaghan & Campbell, 1998; Ellis Weismer et al., 2000). In language production, it has been argued that trade-off effects between language domains observed in children with SLI—where increased complexity in one domain results in decreased performance in another area of language—reflect the effect of a limited processing capacity on language formulation and production (Elin Thordardottir & Ellis Weismer, 2002; Grela, 2003; Namazi & Johnston, 1996). If processing limitations are a factor, then variability in the manifestation of SLI is not surprising but, rather, expected. Indeed, given the differences between languages in their structure and patterns of use, it is reasonable to expect languages to vary in terms of which structures are most difficult at particular points in development and thus most vulnerable to breakdown in the face of insufficient resources.

The goal of the present study was to examine the effect of varying task demands on the manifestation of SLI in children speaking Icelandic and English, respectively, two languages that are related but that differ markedly in the extent to which they are inflected. The study focuses on school-age children, a relatively understudied age range, examining the children's verbal working memory abilities as well as their language production in spontaneous contexts that vary in task demands. Given the prominent focus on grammatical morphology in the study of SLI and the fact that the languages differ importantly in this respect—with Icelandic possessing a far more complex system of both verb- and noun-phrase morphology—analyses of spontaneous language focused on the accuracy rate of production of inflectional morphology across elicitation contexts. It was anticipated that the increased processing load of the more demanding

contexts would lead to trade-off effects involving breakdown in the accuracy of inflectional morphology, with the extent of the trade-offs observed reflecting the degree to which this aspect of language is vulnerable to task demand effects in each language.

Method

Participants

Participants included 42 school-age children: 20 English-speaking children (M = 9;9 [years;months]) and 22 speakers of Icelandic (M = 9;2). The English-speaking children included 9 children with specific language impairment (E-SLI) and 11 children with normal language development (E-NL). The Icelandic-speaking children included 13 children with specific language impairment (I-SLI) and 9 with normal language development (I-NL). English-speaking children were recruited and tested in Quebec and Ontario, Canada; Icelandic-speaking children were recruited and tested in Reykjavik, Iceland. Testing was conducted by trained research assistants who were native speakers of English and Icelandic, respectively. The diagnostic status of the children was verified as part of this study by certified speech-language pathologists. Background characteristics of the children are reported in Table 1, including age, scores on tests of language and nonverbal cognition, and maternal education. The same diagnostic criteria were used for both language groups: Diagnosis of SLI required a positive history of serious concerns related to language development and a score of –1 *SD* or lower on the Test of Language Development–Intermediate (TOLD-I), a test available with norms for both of the languages of the study (Hamill & Newcomer, 1997, Ingibjörg Símonardóttir & Einar Guðmundsson, 1996). In addition, children with SLI were required to obtain a standard score of 70 or above on a test of nonverbal cognition, the Leiter International Performance Scale–Revised (Leiter-R; Roid & Miller, 1997), and to pass a hearing screening at 10 dB HL at octave frequencies from 500 to 4000 Hz. Administration of the Leiter-R, including test items and instructions given to the child, is entirely nonverbal. Although a nonverbal IQ criterion of a standard score of 85 is used widely in research on SLI, several researchers have discussed the arbitrary nature of this criterion, noting that the purpose of the nonverbal IQ criterion in the identification of SLI is to exclude children with mental retardation. A criterion of 85 is unnecessarily restrictive for that purpose, resulting in a focus on a subsample of the population of children with primary language impairment and limiting the generalizability of the findings (Bishop, 2004; Plante, 1998; Tager-Flusberg & Cooper, 1999). Support for the use of a lower IQ score comes, for example, from studies of the heritability of language impairment and IQ (Bishop, 2004; Bishop et al., 1999) as well as evidence that the phenotype of language impairment is similar in children with IQs above and below 85 (Tomblin & Zhang, 1999). The criterion of a standard score of 70 ensures that no children are included who have mental retardation. Among the children in this study, the nonverbal IQ of children with SLI ranged from 71 to 115 for English-speaking children and from 74 to 121 for Icelandic-speaking children. One of the English-speaking children and 2 of the Icelandic-speaking children with SLI had IQ scores below 79. Nonverbal IQ scores of the English-speaking NL children ranged from 82 to 133, and those of the Icelandic-speaking children ranged from 71 to 139. Hearing screening was conducted using portable audiometers in a quiet but not soundproof room. As a result of ambient noise, a threshold of 10 dB HL could not be verified in all cases at 500 Hz. The Peabody Picture Vocabulary Test (PPVT; Dunn & Dunn, 1997), a test of comprehension of vocabulary, was administered as well. This test is available in an Icelandic adaptation that has not been validated or normed but has been used extensively by clinicians in Iceland. Scores on the PPVT are reported for both language groups. For the Icelandic

Table 1. Participant characteristics.

Group	I-SLI	I-NL	E-SLI	E-NL
Age (months)*	111.2 (8.9)	108.7 (5.9)	117.0 (16.5)	118.0 (11.9)
TOLD-I Standard score	68.1 (10.2)	106.8 (12.8)	70.1 (8.1)	99.9 (11.1)
PPVT Standard score	—	—	86.7 (14.0)	108.4 (6.9)
PPVT Raw score	83.2 (25)	116.9 (20.8)	—	—
Leiter-R Brief IQ	91.9 (16.1)	109.1 (21.8)	89.3 (14.9)	99.1 (15.0)
Maternal educ. (years)	13.6 (4.3)	16.1 (3.8)	13.0 (2.5)	15.2 (3.2)

Note. For each language group, the SLI and NL groups did not differ from each other in age, nonverbal cognition (Leiter International Performance Scale–Revised [Leiter-R]), or maternal education, but they differed significantly on the Test of Language Development–Intermediate [TOLD-I]) and Peabody Picture Vocabulary Test (PPVT).

*The age difference between English-speaking and Icelandic-speaking children is statistically significant.

children, as no applicable norms are available, raw scores are reported. These are offered for information purposes with the previously mentioned caveat that this test has not been validated for Icelandic. Given that children with SLI have been reported to vary in their performance in language comprehension, PPVT scores below the normal range were not required for inclusion in the study.

The Icelandic children with SLI were recruited through clinical settings and through speech-language pathologists in schools. English-speaking children with SLI were recruited through speech-language pathologists in schools. Children with NL were required to have no previous history of language impairment and to score within normal limits (above –1 *SD*) on the TOLD-I and the PPVT. Children with an ambiguous profile, involving a mismatch between current scores and history information, were not included in the study in either SLI or NL groups. Although this study did not aim to investigate bilingualism, it did include children who possess some level of bilingual proficiency, and in this sense, these children represent the norm in their respective populations. In Canada, it is commonplace for children from English-speaking homes to attend French-immersion programs in school. Therefore, it is unrealistic to recruit school-age children who have had no significant exposure to a second language. For inclusion in this study, it was required that children be from homes where both parents spoke English and English was identified as the child's first and preferred language. Similarly, for the Icelandic children, foreign-language instruction in the schools starts early, with English being the first foreign language to be introduced, followed by Danish. In addition to this school exposure, the prevalence of English in popular culture is sufficient that even fairly young school-age children may develop some proficiency in spoken English. Icelandic-speaking children were, however, not included if they had had regular exposure to a language other than Icelandic in their homes or if they had lived in other countries.

Procedures

Children were tested individually in two sessions during which the diagnostic tests detailed previously as well as measures of verbal working memory were administered and spontaneous language samples were collected, in addition to other measures administered as part of a larger study. The measures of working memory included tests of nonword repetition and listening span. Language samples were collected in three different contexts: conversation, narration, and expository discourse, as is described in subsequent paragraphs.

Nonword Repetition

For the English-speaking children, the nonword repetition test used was that constructed by Dollaghan and Campbell (1998), which includes 16 words ranging in length from 1 to 4 syllables. The constituting syllables of the nonwords do not correspond to real English words, and no unstressed syllables are included, resulting in the multisyllabic words lacking familiar English stress patterns. This pattern contributes to low predictability and lack of resemblance to English words. The test was administered from a recording obtained from the test's authors and was scored as directed. The Icelandic nonword repetition test was constructed for this study following Gathercole, Willis, Baddeley, and Emslie (1994) and Gathercole (1995), including a list of word-like items, and a list of nonword-like items. Each list consisted of 25 words with 5 at each length from 1 to 5 syllables. The word-like nonwords had familiar Icelandic word endings and stress patterns such that they could easily be assimilated into the Icelandic inflectional system, and multisyllabic words were constructed such that they resembled Icelandic compound words, with nonsense syllables joined together with appropriate inflectional endings (genitive ending on the first word and nominative ending on the second), resulting in a characteristically Icelandic word structure and stress pattern. Nonword-like words were constructed by stringing together syllables without Icelandic inflectional endings. In addition, many of the nonwords had uncharacteristic stress patterns with a string of equally stressed syllables or a rising intonation rather than the characteristic pattern of alternating stressed and unstressed syllables. Initially, a total of 136 words were constructed and their degree of word-likeness was judged on a 6-point scale by 10 adult native speakers of Icelandic, with 6 denoting the highest degree of word-likeness. Words selected for the nonword-like list obtained an average score of 1.5 or lower, and words selected as word-like received average scores of 4 or higher. In each case, all words selected for the final list had a high degree of agreement among raters. The resulting word lists are displayed in the Appendix. The Icelandic nonword lists were administered from a tape recording on which they were spoken by a female speaker who had previously practiced speaking the words at an even rate and intonation pattern. The words were scored according to the same rules as the English nonwords (Dollaghan & Campbell, 1998).

Competing Language Processing Task

The competing language processing task (CLPT), developed by Gaulin and Campbell (1994), is an adaptation for children of the listening-span task constructed by Daneman and Carpenter (1980). This test involves a dual task in which children give "yes" or "no" responses to simple questions while at the same time being required to memorize the last word of each question. A total of 42 questions are presented in increasingly long sets, ranging in length from 1 to 6 questions/words to be

recalled. The test is scored in two ways: as the number of questions answered correctly and as the percentage of words correctly recalled. Gaulin and Campbell documented developmental increases in performance on word recall from age 6 to 10 among children with normal language development. At the same time, response accuracy on the yes/no questions remained stable at high levels in all age groups. The main purpose of the yes/no questions is to ensure that children are processing the questions rather than focusing solely on memorizing the last word. Ellis Weismer and Elin Thordardottir (1998) and Ellis Weismer et al. (1999) showed that school-age children with SLI performed significantly more poorly than NL peers on the word-recall aspect of this test. The Icelandic version of this test was constructed as part of this study initially as essentially a translation of the English test, using simple vocabulary familiar to children and sentences involving the same construction as those used in the English test (subject–verb–object, subject–verb–modifier, subject–auxiliary–verb). Although this resulted in three-word questions in most cases, as in the English version, 8 of the 42 questions have an additional fourth word, such as the infinitive particle *að* or a preposition, to comply with typical wording in Icelandic. In addition, Icelandic does not allow the use of monosyllabic words to the extent that English does, partly because of the requirement for inflectional endings. Thus, the Icelandic questions are overall longer in terms of number of syllables than the English models. Therefore, the Icelandic adaptation of the CLPT is not viewed as a direct equivalent of the English test. Similar issues were encountered in the adaptation of this test to Spanish (Gutierrez-Clellen, Calderon, & Ellis Weismer, 2004). The test was piloted on 2 children and 2 adults to verify the appropriateness of the wording of the questions—that is, that they constitute simple questions that are answered correctly without hesitation or ambiguity of interpretation with subsequent minor modifications.

Spontaneous Language Samples

In order to sample language production under conditions of varying task demands, spontaneous language samples were collected in three different contexts, following the procedure proposed by Hadley (1998), with minor modifications. A language sample of a total length of 15 min was divided into three parts with 5 min each of conversation, narration, and expository discourse (samples of longer duration were conducted with children who were reluctant to talk and were perceived by the examiner to produce little talk-per-unit time relative to other participants in the study). Hadley, using 4 min per context, reported sample lengths of some 30 utterances per context and recommended the use of samples of this length in different contexts over a 100-utterance sample in a single context. A recent study by Miller et al. (2006) indicates that samples of an average length of 40 utterances are reliable and a useful source of information when collected under consistent conditions. The average length of samples obtained in this study was, for SLI and NL groups, respectively: for Icelandic, 61 and 60 utterances for conversation, 55 and 43 for narration, and 57 and 48 for expository discourse; for English-speaking children, 73 and 112 utterances for conversation, 95 and 68 for narration, and 60 and 59 for expository discourse. Analysis in this study was based on entire samples to maximize use of the available data.

In the conversational sample, the interchange generally focused on the child's family, summer vacations, friends, and so forth. In the narrative segment, children were asked to retell the plot of a book (or books) that they had recently read or a movie or television program they had recently watched. In the expository discourse segment, children were asked to explain the rules of a game they play (e.g., the rules of soccer or hockey, the rules of a favorite computer game, the rules in effect at school) or explain in detail the procedure of how a particular task is done (e.g., opening and playing a favorite computer game). In order to elicit these different kinds of language samples, the interview procedure proposed by Hadley (1998) was followed, whereby the examiner models the target behavior by providing short accounts of personal experiences falling into each of the three categories. Language samples were transcribed orthographically and coded for correct and incorrect use of grammatical morphology using the Systematic Analysis of Language Transcripts (SALT) computer program (Miller & Chapman, 1984–2002). SALT conventions were followed for the segmentation of utterances and coding of mazes in both languages. Coding of grammatical morphology in each language followed SALT conventions, using the original English conventions and their Icelandic adaptation (Elin Thordardottir & Ellis Weismer, 1998; Elin Thordardottir, 2003). The aim was to use, in each language, an established coding system targeting the development and accuracy of grammatical morphology. SALT coding in English targets Brown's morphemes (for verbs: contracted copula forms, third person *–s,* regular past tense *–ed,* progressive *–ing*; for nouns: plural *–s* and possessive *–s*). It should be noted that following English SALT conventions, the irregular forms (irregular past tense, irregular plural) were not coded as grammatical morphemes but as different words. Accordingly, errors involving irregular forms, notably the irregular past tense, were not included in the error count in English. This is consistent with the coding used in a large number of studies of SLI in English. Verb errors in both languages do include instances of omission of the contracted and the freestanding copula.

The Icelandic adaptation of SALT conventions was designed to use similar principles as English SALT coding while at the same time capturing the complexity of the Icelandic inflectional system. Verbs are coded for

person, tense (if other than the present), and mood (if other than the indicative). Noun-phrase coding targets nouns, which can be marked for number (plural only) and case (if other than the nominative), and adjectives and pronouns, which can be marked for gender, number (plural only), and case (if other than the nominative; see further details in Elin Thordardottir & Ellis Weismer, 1998). Given that noun-phrase morphology is far more complex in Icelandic than in English, with nouns, pronouns, and adjectives being marked for case, and pronouns and adjectives being marked for gender as well, the accuracy of verb- and noun-phrase morphology was tallied separately. Beyond this, analysis of error types was beyond the scope of this study.

Reliability. Reliability procedures for the English samples followed the procedure recommended by Heilmann, Miller, Nockerts, and Andriacchi (2004), involving a relisten and recheck of the entire set of samples rather than a recoding from scratch of a subset of samples. One sample from each child was relistened to by a second independent scorer who verified both the transcription and the coding, making changes as needed and with disagreements settled by consensus by the recoder and original coder. This resulted in an interrater agreement of 98.5% for transcription and 94% for coding. Given the near-perfect agreement for transcription, further reliability checks focused on coding only. An independent scorer reread all remaining samples and verified coding. Again, disagreements were reviewed by the original coder and settled by consensus. The interrater agreement for this procedure was 95%.

Reliability of coding the Icelandic samples was verified by the traditional method, whereby a subset of the samples was scored independently by a second scorer trained in the procedure. Reliability of transcription was verified periodically during the transcription process with interrater agreement exceeding 95%. To verify the reliability of coding, 10% of the total samples were selected randomly for rescoring with the restriction that they represent children from both groups. This procedure resulted in interrater agreement of 89.6%. The majority of disagreements did not involve morphemes coded as incorrect but rather involved oversights in the coding of the correct use of grammatical morphemes where one of the coders missed the presence of morphemes—for example, coding the case marking on a pronoun but failing to also code the gender marking. Given the sheer volume of grammatical morphemes in Icelandic, the coding task does require a high level of sustained attention on the part of the coder.

Results

Processing Measures

The CLPT scores of the Icelandic-speaking children were as follows: accuracy of yes/no responses was 93.3 % (4.3) for the I-SLI group and 97.8% (2.9) for the I-NL group. Word recall scores were 40.8% (SD = 14.5) for the I-SLI group and 57.4% (SD = 6.1) for the I-NL group. The groups differed significantly on both measures: yes/no, $t(20) = -2.753$, $p = .012$; word recall, $t(20) = -3.217$, $p = .004$. For the English-speaking children, accuracy of CLPT yes/no responses was 93.9% (8.2) for the E-SLI group and 99.1% (1.7) for the E-NL group, a nonsignificant difference ($p = .095$). Word recall scores for the English-speaking children were 57.4% (SD = 8.9) for the E-SLI group and 74.0% (SD = 8.5) for the E-NL group. This difference was statistically significant, $t(18) = 4.241$, $p = .000$.

As for nonword repetition, group means on the Icelandic word-like lists were 91.4% (7.5) for the I-SLI group and 97% (2.9) for the I-NL group. Group means on the nonword-like lists were 85.4% (SD = 9.5) for the I-SLI group and 95.1% (SD = 2.7) for the I-NL group. The group difference is larger on the nonword-like list. However, a significant group difference was found for both lists: word-like, $t(18) = -2.248$, $p = .042$; nonword-like, $t(17) = -3.09$, $p = .011$. The nonword repetition scores for the English-speaking children were 85.2% (SD = 11.4) for the E-SLI children and 93.5% (SD = 3.3) for the E-NL children, a difference that failed to reach statistical significance ($p = .064$). Contributing to this nonsignificance is the large standard deviation in the E-SLI group.

Language Sample Analysis

The main interest of the language sample analysis was in the effect of context on the overall accuracy rate of grammatical morphology within each of the two languages. Results were analyzed separately for English and Icelandic, examining the effect of context and group by means of mixed-model analyses of variance (ANOVAs), with group SLI-NL as the between-subjects factor and context (conversation–expository–narration) as the within-subjects factor, treated as repeated measures. Post hoc comparisons used Fisher's least significant difference (LSD) procedure. It was also of interest to compare the accuracy rates across contexts cross-linguistically for children with SLI. In the cross-linguistic comparisons, age was entered as a covariate, in light of the fact that the English-speaking children were some 6 months older than the Icelandic-speaking children. The dependent variables tested were MLU in morphemes and words, percent correct accuracy of verb morphology, and percent correct accuracy of noun-phrase morphology.

MLU

MLU results are shown in Table 2. As expected, the different contexts used produced systematic differences in MLU in both SLI and NL groups and in both languages, such that the conversational MLU was lowest and narrative MLU the highest. For English-speaking

Table 2. Mean length of utterance in morphemes (MLU) and in words (MLUw) across contexts.

	English		Icelandic	
	SLI	NL	SLI	NL
CONV				
MLU	5.34 (1.6)	6.67 (1.5)	6.31 (1.7)	7.96 (2.0)
MLUw	4.83 (1.5)	5.34 (1.6)	4.48 (1.1)	5.34 (1.3)
EXPO				
MLU	6.67 (2.4)	9.11 (1.3)	8.85 (2.8)	10.12 (4.7)
MLUw	6.09 (2.1)	8.22 (1.18)	6.27 (1.9)	7.01 (3.0)
NARR				
MLU	6.69 (2.1)	9.35 (1.3)	9.19 (3.1)	11.66 (4.24)
MLUw	6.01 (1.9)	8.40 (1.7)	6.23 (1.9)	7.85 (2.8)

Note. CONV = conversation; EXPO = expository discourse; NARR = narration. Values in parentheses represent standard deviations.

children, MLU in morphemes produced a significant main effect of group, $F(1, 18) = 9.78$, $p = .006$, $\eta^2 = .54$, and of context, $F(2, 36) = 27.42$, $p = .000$, $\eta^2 = .56$. The interaction was nonsignificant. The group effect reflects a significantly lower MLU in the SLI group. Post hoc tests on the context effect revealed that MLU is significantly lower in conversation than in each of the other contexts. No significant difference was found in MLU between expository discourse and narration. MLU in words (MLUw) produced the same pattern of effects: group, $F(1, 18) = 9.53$, $p = .006$, $\eta^2 = .34$, and context, $F(2, 36) = 28.18$, $p = .000$, $\eta^2 = .57$.

For the Icelandic children, MLU in morphemes yielded a significant main effect of context only, $F(2, 40) = 18.20$, $p = .000$, $\eta^2 = .46$. Post hoc tests revealed the same pattern as seen for the English-speaking children, with conversation producing a lower MLU than each of the other contexts, which did not differ from each other. Although the SLI group did exhibit a lower mean MLU than the NL group in each context, the group effect was not significant ($p = .152$). The same pattern was observed for MLUw, with a significant effect of context, $F(2, 40) = 19.16$, $p = .000$, $\eta^2 = .47$.

Cross-linguistic comparison of the E-SLI and I-SLI groups revealed a significant effect of group, $F(1, 19) = 6.33$, $p = .021$, $\eta^2 = .25$, with the I-SLI group consistently producing a higher MLU than the E-SLI group. No other effects were significant. Cross-linguistic comparison of MLUw for the children with SLI produced no significant effect.

Accuracy of Verb Morphemes

Table 3 reports the accuracy of production of both verb morphology and noun phrase morphology. For the English-speaking children, a significant effect of group

Table 3. Accuracy of production of noun phrase and verb morphology across contexts for English- and Icelandic-speaking children, showing group means.

	English	
	Noun inflection	Verb inflection
	% Correct	% Correct
CONV		
E-SLI	97.7 (.04)	91.2 (.15)
E-NL	98.4 (.03)	97.3 (.04)
EXPO		
E-SLI	94.0 (.10)	84.0 (.16)
E-NL	98.3 (.03)	94.0 (.04)
NARR		
E-SLI	90.7 (.14)	84.3 (.16)
E-NL	97.5 (.03)	95.2 (.03)
	Icelandic	
	Noun inflection	Verb inflection
	% Correct	% Correct
CONV		
I-SLI	93.1 (.04)	93.0 (.08)
I-NL	97.7 (.02)	98.4 (.02)
EXPO		
I-SLI	95.6 (.02)	93.6 (.05)
I-NL	98.4 (.02)	99.0 (.02)
NARR		
I-SLI	94.6 (.04)	96.0 (.06)
I-NL	98.3 (.02)	98.5 (.03)

Note. Values enclosed in parentheses represent standard deviations.

was found for verb morphology, $F(1, 18) = 4.76$, $p = .043$, $\eta^2 = .20$, as well as a significant context effect, $F(2, 36) = 3.58$, $p = .038$, $\eta^2 = .16$. The interaction was not significant. The group effect reflects lower accuracy rates achieved by the children with SLI. Post hoc tests on the effect of context revealed that the accuracy of verb morphemes was significantly lower in both the expository and narrative contexts than in conversation. However, the expository and narrative contexts did not differ in terms of verb morpheme accuracy. For Icelandic-speaking children, no significant effect was found. However, the group effect approached significance ($p = .054$).

Comparison of the E-SLI and I-SLI groups on verb morphemes revealed a significant Context × Language Group interaction, $F(1, 38) = 3.66$, $p = .035$, $\eta^2 = .15$. Post hoc tests revealed the source of this interaction to be that the language groups differed significantly in accuracy of verb morphemes in the narrative context only. No other effects were significant.

Accuracy of Noun Phrase Morphemes

Noun phrase morpheme accuracy rates are reported in Table 3. The English-speaking children evidenced no statistically significant effect. Thus, noun morphology was not found to be sensitive to group or to context. For Icelandic-speaking children, in contrast, a significant effect of group emerged, $F(1, 20) = 16.54$, $p = .001$, $\eta^2 = .15$, revealing that Icelandic-speaking children with SLI were less accurate in their noun phrase morphology than were their NL counterparts. No other effect was significant. Cross-linguistic comparison of noun morpheme accuracy in the I-SLI and E-SLI groups revealed a significant Context × Language Group interaction, $F(2, 38) = 3.42$, $p = .043$, $\eta^2 = .18$, with no other effects significant. Post hoc tests indicated that the interaction stems from a significant difference between the I-SLI and E-SLI groups in the conversational context only, where the I-SLI group achieved a lower accuracy rate than the E-SLI group. The groups did not differ in accuracy in the other contexts.

Correlations Between Processing Measures and Morphological Accuracy

Correlational analyses were conducted to investigate the association of verbal processing ability and the use of grammatical morphology. To limit the number of correlations, this analysis was limited to the accuracy scores for verb and noun phrase morphology, respectively, in the narrative samples. Bivariate Pearson correlations for the entire group of Icelandic children (SLI and NL combined) revealed a significant correlation between nonword repetition and accuracy of noun phrase morphology ($r = .484$, $p = .036$) and accuracy of verb morphology ($r = .582$, $p = .009$). The CLPT was more strongly associated with noun phrase morphology than verb morphology ($r = .302$ vs. $.039$), but neither association was statistically significant. For English-speaking children as a whole, nonword repetition scores correlated significantly with accuracy of verb morphology ($r = .504$, $p = .024$) but not with noun phrase morphology ($r = .121$, $p = .611$). The association of the CLPT and morphology was not significant (nouns: $r = .304$, $p = .193$; verbs: $r = .293$, $p = .210$). Children with SLI and NL were then analyzed separately. For Icelandic children with SLI, the association between the CLPT and morphology was negligible ($r = .099$ for verbs; $r = .074$ for nouns). In contrast, stronger correlations were found for nonword repetition, with a significant correlation for verbs ($r = .637$, $p = .048$) and a nonsignificant finding for nouns ($r = .301$, $p = .398$). For the Icelandic children with NL, the only significant correlation was a near-perfect association between the CLPT and verb morphology ($r = .905$, $p = .001$). More modest nonsignificant associations were found between the CLPT and noun phrase morphology ($r = .317$, $p = .406$) and nonword repetition and verb morphology ($r = .480$, $p = .191$). For English-speaking children with SLI, the strongest association was that between nonword repetition and verb morphology ($r = .365$, $p = .335$), with all other associations being much weaker. For English-speaking NL children, the strongest associations were between the CLPT and noun morphology ($r = .470$, $p = .144$) and nonword repetition and verb morphology ($r = .512$, $p = .108$).

Discussion

The central question of this study concerned whether the accuracy of production of grammatical morphology by children with SLI is affected by the demands of the communicative context and whether a similar effect in this respect is seen in English and in Icelandic. The study also examined the children's language processing abilities and investigated the relationship between scores on the processing measures and the accuracy of production of grammatical morphology. The main findings of this study are summarized as follows: In both language groups, children with SLI evidenced significantly lower performance on two measures of verbal working memory than the children with NL. This extends cross-linguistically the finding that children with SLI are characterized by limitations in verbal working memory. Nonword repetition was correlated with inflectional accuracy in both languages, suggesting an association between morphological accuracy and processing ability. In language samples collected under conditions of varying task demands, the accuracy of production of grammatical morphology varied significantly across contexts for the English-speaking children such that the error rate was higher in the more demanding contexts. This is consistent with a trade-off effect involving breakdown in the area of morphology as task demands exceed the available resources. This confirms that grammatical morphology is a vulnerable area of language for English-speaking children with SLI. No such trade-off was observed in Icelandic, suggesting that, in contrast to English, grammatical morphology is less vulnerable in Icelandic. Overall morphological accuracy was higher in Icelandic than in English. However, whether this cross-linguistic difference was significant depended on the sampling context. Morphological errors in English overwhelmingly involved verbs, whereas in Icelandic, both verbs and noun phrase morphology were involved to a similar extent, but both were unaffected by context.

Children with SLI speaking English and Icelandic were found to be similar in that they each scored significantly lower on measures of verbal working memory than their NL counterparts. The results for English-speaking children on nonword repetition and on the CLPT replicate previous findings, showing children with SLI to perform

more poorly than their NL counterparts. This study extends this finding to Icelandic, suggesting that processing measures such as the ones developed in this study are a useful addition to the available diagnostic measures in that language as well. The English-speaking children with SLI differed from their NL counterparts in particular on the CLPT, involving the processing of meaningful linguistic material in a dual task (Ellis Weismer et al., 1999, 2000). Although the SLI group obtained a lower group mean than the NL group, the group difference for the English nonword repetition task failed to reach statistical significance. This may be due, in part, to relatively large variability in the SLI group. Alternatively, it may be that a list containing nonwords longer than four syllables is required to sufficiently tax children in this age range. Previous studies have supported the diagnostic utility of the nonword repetition test as an adjunct to other measures rather than as a primary diagnostic measure (Ellis Weismer et al., 2000). Of the two nonword repetition tests developed in Icelandic, the set of nonword-like nonwords produced a larger group difference, indicating that the set of words that more highly resembled real Icelandic words did not prove as taxing to children with SLI. However, the group difference was significant for both lists. The Icelandic version of the CLPT was essentially a translation with some modifications of the original CLPT in English. Although both the English and the Icelandic versions resulted in significant group differences between children with SLI and NL, the scores of the Icelandic children were somewhat lower than those of the English-speaking children, suggesting that the Icelandic version of this test may be more difficult overall. This may be related to the fact that the questions used in the Icelandic version are a bit longer due to the characteristics of the language that adds to the processing load, thus making it harder for children to memorize the words to be recalled.

The claim that limited processing skills have a detrimental effect on language development has been around for some time. One possibility is that limited processing skills hinder the efficient learning of language, resulting in incomplete or incorrect representations. This might mean that processing limitations would affect children the most early on in development during a period of rapid learning of grammar. Another possibility is that limited processing ability hinders the efficient use of language, such that children might have correct representations but might not be able to analyze the grammatical requirements of their language production in real time, and, thus, they would not be successful in implementing the rules that they have learned, especially when task demands are high and competition for the available resources is increased (Lahey, Edwards, & Munson, 2001). These two possibilities are not mutually exclusive. It may be that processing limitations affect both learning and subsequent use of language. In this study, the potential effect of processing ability on the correct use of grammatical morphology was investigated in two ways: by examining the effect of increasing task demands on the accuracy of production of grammatical morphology and by correlational analysis.

Previous studies have used different ways to manipulate processing demands in order to examine their effect on language comprehension and production. In comprehension studies, stimuli presented to children have varied in presentation rate, linguistic complexity, and length (Deevy & Leonard, 2004; Montgomery, 1995, 2000, 2003). In production tasks, sentences of different complexity and length have been elicited, for example, by the use of a story-completion task that involved strategies to encourage children to include or not include certain information in order to vary the complexity and length of the sentences produced (Grela & Leonard, 2000). In this study, the method used to manipulate the processing demands associated with the children's language production was to have them produce language under different spontaneous conditions that have been shown previously to produce marked differences in sentence complexity, average sentence length, and the number of sentences produced per speaking turn. Using this method, language varying in these respects is elicited in a naturalistic manner that mimics the children's everyday use of language and maintains a high level of true communicative intent as opposed to a contrived elicitation context. At the same time, although these contexts are spontaneous, the particular communicative context introduced by the examiner imposes certain task requirements that vary across contexts. The contexts produced a consistent effect on MLU in both languages across children with SLI and children with NL, with conversation producing a significantly lower MLU than the other contexts. This confirms that the language-sampling procedure used was successful in eliciting communicative contexts varying in task demands. Indeed, narratives and expository discourse are known to produce a longer MLU than conversation (Leadholm & Miller, 1992).

The first important finding here was that of a significant effect of context on the accuracy of grammatical morphology in English, where the accuracy of verb morphology was considerably and significantly lower in the expository and narrative contexts than in conversation. Thus, the hypothesis that the accuracy of grammatical morphology is compromised when task demands increase is borne out. This finding is consistent with previous reports of trade-off effects between linguistic domains in English involving morphology and linguistic complexity (e.g., Namazi & Johnston, 1996) as well as of findings showing aspects of grammatical morphology in English to be affected by increases in the complexity and/or length of the sentence (Grela & Leonard, 2000).

The observation of this trade-off effect is particularly interesting in light of the fact that the children in this study are past the age at which verb morphology is most problematic for English-speaking children with SLI. Indeed, children of this age have been reported to perform close to NL levels in morphology (Rice et al., 2004). Such high performance under certain conditions suggests that the relevant grammatical rules are now correctly represented, including the understanding that their use is obligatory. However, the observation of a context-dependent drop in performance indicates that this skill is still fragile in these children when demands in other aspects of language compete for the available resources.

A second major finding relative to these context effects is that in contrast to English, context exerted no significant effect on morphological accuracy in Icelandic. No statistically significant effects were found, and inspection of the data does not suggest a trend in that direction either. Another cross-linguistic difference that emerged is that in Icelandic, morphological errors were not found to be restricted to verbs as they are in English for the most part, but instead they affected verbs and noun phrases to a similar extent. This is not surprising given the great complexity of both the verb and noun systems, but it does differ from previous observations that the morphological difficulty of children with SLI is particularly tied to the rules of verb inflection and thus warrants future study. The statistical tests indicate that Icelandic-speaking children with SLI differed significantly from their NL counterparts in noun phrase morphology but not in verb morphology. However, inspection of Table 3 in fact suggests that the difference in accuracy rates of noun phrase and verb morphology are very small, and both were unaffected by variations in context.

Compared with the English-speaking children, the Icelandic children evidenced higher accuracy rates overall. These findings are consistent with a number of previous studies that have found grammatical morphology to be more robust in SLI in languages that are highly inflected as compared with English (e.g., Elin Thordardottir & Namazi, 2007; Lindner & Johnston, 1992; Rom & Leonard, 1990). Several explanations have been advanced for this somewhat perplexing finding (Leonard, 1998). Grammatical morphology plays an important role in conveying meaning in highly inflected languages. It has been argued that this leads learners to concentrate their efforts on this aspect of the language in order to maximize their communicative efficiency. According to a morphology richness account, children learning a language such as English in which morphology is sparse focus their resources mainly on other aspects such as word order. Thus, when demands compete for and exceed the available resources, morphology does not receive priority (Fletcher, Leonard, Stokes, & Wong, 2005). This could affect both the learning of morphology over time and the subsequent use of morphology when task demands are high. It may be that the higher accuracy rates of the Icelandic-speaking children stem from a relatively strong focus on morphology in acquisition, which may be related to the important meaning component of morphology in Icelandic. Alternatively, it is not hard to imagine that this morphology advantage seen in Icelandic may result, in part, from the sheer number of grammatical morphemes in the language. The very high frequency of grammatical morphemes in the input that children receive as well as in their own production does allow for much more practice than is available to children who speak English and may contribute to making these morphemes more salient. Thus, although it may seem intuitively that the high frequency of grammatical morphemes in Icelandic should make the acquisition of morphology difficult, it may, in fact, also be what makes it possible. This study offers additional insight by the examination of accuracy across contexts. The fact that the production of morphology by the Icelandic children is unaffected by the increased demands related to context appears to indicate that their production of morphology may be less deliberate and more automatic than it is for English-speaking children and thus less demanding of processing resources.

Nevertheless, the findings indicate that grammatical morphology is a vulnerable aspect of language for English-speaking children with SLI, even for school-age children who appear to have reached full mastery of this aspect of language in relatively simple tasks. However, grammatical morphology does not appear to be an area of particular vulnerability for children with SLI who speak Icelandic. It is worth recalling here that children in both language groups were diagnosed using comparable methods and diagnostic criteria and that both groups evidenced similar deficits in verbal working memory. At the same time, differences are evident in the manifestation of SLI in these two languages, which may have to do with differences in which aspects of these languages are most demanding of processing resources.

Correlational analysis was conducted to further investigate the association between processing ability and accuracy of production of grammatical morphology. This revealed a significant association between nonword repetition scores and accuracy of use of grammatical morphemes when the SLI and NL groups were combined. For English-speaking children, the correlation was only significant for verb morphology, whereas it was significant for both verb and noun phrase morphology for Icelandic children. This finding essentially mirrors the findings of the group comparisons. If children with SLI and NL are viewed as belonging to a continuum of low to high language ability (Leonard, 1998), then it could be concluded that language ability on this continuum is

correlated with a continuum of processing ability of the type tapped by nonword repetition. However, correlations conducted separately for the SLI and NL groups are not consistent across the groups or across languages. For SLI groups in both languages, the strongest association with morphological accuracy is still with nonword repetition, and the correlation is significant for verbs for the Icelandic children. No association is seen with the CLPT. The SLI groups thus display a similar pattern as the analyses involving the combined groups. The NL groups, in contrast, show a different and inconsistent pattern. This pattern, including the puzzling finding of a near-perfect relationship between the CLPT and verb morphology use in Icelandic NL children, may be most appropriately viewed as a spurious finding, resulting from the small number of participants and the low variability in scores. In the case of the CLPT and verb morphology, the verb morphology accuracy scores are uniformly high, with 5 children scoring 100%, and the CLPT scores are around 60% for most of the children. The correlational analyses must be interpreted in light of these considerations, in particular for the NL groups, given their low variability of scores, but also for the SLI groups.

Previous studies have shown both nonword repetition and CLPT scores to correlate significantly with scores on language tests in English (Dollaghan & Campbell, 1998; Ellis Weismer et al., 1999). Similar to our findings, Ellis Weismer and colleagues (1999) found a correlation between the CLPT and language scores when NL and SLI groups were combined, but when the groups were analyzed separately, the correlation was significant only for the NL group. Ellis Weismer and colleagues hypothesized that the lack of relationship in the SLI group might represent an abnormal dissociation in children with SLI or, alternatively, might reflect limitations in the measures—either the processing measures or the language tests. In our findings, nonword repetition is consistently found to be associated with morphological accuracy, although the association does not reach significance in all groups. This finding extends previous findings of an association between nonword repetition and scores on standardized language tests to grammatical morphology in spontaneous language. This finding suggests that phonological encoding and/or storage abilities are important components of the development and use of grammatical morphology in the two languages examined here. The role of skills tapped by the CLPT is much less clear from our data. As compared with nonword repetition, the CLPT does involve the processing of meaningful linguistic material, but it is also a dual task and thus may rely significantly on executive control.

Several limitations of this study must be considered as well as alternative interpretations of the findings. The study is limited by the small number of participants, which inevitably limits the statistical power. Also, it could be argued that the tasks used here, with naturalistic manipulation of processing load, may not have created a sufficiently taxing context to bring out vulnerability in the Icelandic children's production of grammatical morphology. In terms of power, it should be noted, however, that the Icelandic children outnumbered the English-speaking children; still, significant context effects emerged only for the latter. Also, although it may be that with a more taxing context, breakdowns in grammatical morphology may be produced in Icelandic children, it remains of interest that the naturalistic context used here was sufficiently taxing to produce a context effect in English but not in Icelandic. Another issue to consider is that the participants in this study are of school age and thus are past the age range during which verb-inflection errors are most prominent in English. Younger children might thus be argued to have been more ideal candidates for this study. However, this is not necessarily the case. It is noteworthy that at the age of 9 years, when English-speaking children with SLI tend to be approaching their NL counterparts in the accuracy of verb morphology, their accuracy is still shown to be vulnerable when the task demands are increased. This indicates that their now relatively well-developed ability to use grammatical morphemes correctly does not result simply from a more correct representation of the underlying linguistic rule or of its application being obligatory, but it also requires the allocation of processing resources to be adequately implemented. It may be speculated that had the participants in this study been in the 4- to 6-year age range, no context effect might have been seen because such an effect might have been overshadowed by an overall low accuracy of use of verb morphology resulting from incomplete learning. The presence of context effects may thus be more visible at a developmental stage where high performance has been reached in some contexts rather than being uniformly low.

Just as the presence of a context effect in English points to morphology as an area of particular vulnerability, the absence of such an effect in Icelandic, together with the overall high accuracy rate, suggests that this is not the case for Icelandic. The logical next question to ask is whether, if grammatical morphology is not a vulnerable aspect in Icelandic, there is another aspect of language that is. Further study focusing on more aspects of language may uncover additional areas that may be especially difficult in Icelandic and that would, therefore, be sensitive to increases in processing demands. One indication that emerged in this study is noun phrase morphology. To the extent that morphological errors were made by Icelandic children, they did involve noun phrase morphology to a similar extent as they did verb morphology. However, noun phrase morphology was unchanged across contexts. Word order may be another possible

candidate given previous findings on Swedish, a closely related language (Hansson et al., 2000). Alternatively, the idea that SLI necessarily involves particular areas of difficulty may be misguided and may be colored by the finding of a particular problem with verb morphology in English, giving rise to the expectation that SLI must be characterized by particular circumscribed problem areas. It may be, instead, that SLI in certain languages and/or age ranges involves a more even profile of generalized difficulty, as has been argued to be the case for French in the preschool period (Elin Thordardottir & Namazi, 2007). Much further study of SLI in Icelandic is in order, focusing on areas beyond grammatical morphology.

Yet another possible confound suggested by an anonymous reviewer is that the contextual variation between conversation and narration may not have produced equivalent changes in processing load in the two languages, given reports of exceptionally high levels of literacy in Iceland, which may be associated with a cultural difference in narrative tradition. There are at least two reasons to believe that the context effect was, in fact, similar in both languages. First, MLU varied systematically with context in both languages, and in a similar way. Second, children of both language groups came from similar backgrounds with respect to maternal education. However, the point is well taken and underscores the need to examine language development and use not only with respect to the grammatical structure of the language but also within the broader context of the cultural traditions in which children learn to use that language. Finally, the analysis of grammatical morphology employed established coding systems in each language: English SALT analysis and its Icelandic adaptation. Although these are designed to be parallel coding systems, they are not identical due to the fact that they apply to languages that vary considerably in their structure. This fact is not seen as a weakness in this study. The purpose was to examine overall accuracy rates of grammatical morphology, knowing at the outset that the frequency and complexity of these rates varies across the languages. Therefore, the goal is not that the coding systems be identical but rather that they each capture the morphological structure of their respective language. One difference in the systems, however, is that the English SALT coding system does not include errors involving irregular verbs. The effect of this difference is in the direction of underestimating the error rate in English. Therefore, given the fact that in those contexts where cross-linguistic differences in error rates were found, the error rates were higher in English than in Icelandic; counting the irregular errors would not have changed this effect.

The results of this study have revealed important cross-linguistic differences in the manifestation of SLI in English and Icelandic and have suggested that whereas children with SLI who speak both languages have limitations in linguistic processing that are related to their language skills, the languages differ in the areas that are most vulnerable when processing demands exceed the supply. The findings indicate that continued cross-linguistic study of the use of processing-based measures is warranted and that such measures hold promise for the assessment of children with SLI across languages. This is supported as well by findings in several languages, including Spanish (Girbau & Schwartz, 2007), Swedish (Sahlén, Reuterskjöld-Wagner, Nettelbladt, & Radeborg, 1999), and French (Elin Thordardottir, Kehayia, Lessard, Sutton, & Trudeau, 2007)—see, however, the study on Cantonese by Stokes, Wong, Fletcher, and Leonard (2006), whose findings differ but also suggest that further cross-linguistic study of processing tasks can contribute to a more refined understanding of the skills tapped by these tasks. Finally, the findings provide a reminder that task effects should be considered carefully in the interpretation of children's performance and in comparing results across studies.

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Contact author: Elin Thordardottir, School of Communication Sciences and Disorders, McGill University, 1266 Pine Avenue West, Montreal, Quebec H3G 1A8 Canada. E-mail: elin.thordardottir@mcgill.ca.

Appendix. Icelandic nonword lists.

Word-Like	Nonword-Like
1 syllable	
lan	ba
kós	li
jind	no
fe	he
nel	to
2 syllables	
lóngi	rím**as**
voppur	vú**kat**
storra	jol**la**
ampar	vop**gem**
setta	po**tem**
3 syllables	
hokkari	ína**san**
muppanar	be**le**gem
vólminur	kolde**sít**
laranur	on**ne**gam
gokkanól	mor**ía**
4 syllables	
tílasakkur	fessa**dí**pa
sókamali	mútívú**li**
bottageifa	pa**na**lúke
keinargolli	mone**la**fí
vapanakki	vúne**la**re
5 syllables	
hálustumpingur	sí**ke**mo**fa**na
gengísartefur	ennepú**te**na
seikulankarar	kob**bel**vaníka
dímupaskína	fíapo**le**ta
felmunarvattur	bíkalení**va**