Narrative Structure and Child Language Assessments

Karissa Eichelt and Tammie Zielinski

Supervisors: Karen Pollock, Elena Nicoladis, and Jessie Bee Kim Koh

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ABSTRACT

Speech-language pathologists often assess children's expressive language, which sometimes includes narrative abilities, when screening and diagnosing language delays. Typically, narratives are analyzed for grammatical complexity (i.e., mean length utterance or MLU) and lexical complexity (i.e., Type-Token Ratio, or TTR, and Guiraud's Index). In this study, we tested whether measures of narrative structure complement or add information to typical assessment measures. Analyzing narrative structure would allow speech-language pathologists to assess whether children are able to effectively articulate and organize different pieces of information into a meaningful story. Specifically, narrative structure includes orienting (i.e., when, where, who, what), referential (i.e., actions), evaluative (i.e., thoughts and feelings) and coda (i.e., moral insights) information. Seventy-nine typically developing English monolingual children (aged 4-6) were asked to watch a Pink Panther cartoon and recount the story of what they had seen. Their narrations were coded for information that reflects the four narrative structure elements. Each child's MLU, TTR and Guiraud's Index were also calculated. Correlations were run between the narrative structure variables and the traditional narrative measures to determine if they were related and if narrative structure added new information. The results showed that MLU was not significantly correlated with the four narrative structure variables. Interestingly, most of the narrative structure variables showed negative and moderate correlations with TTR, while notably showing positive and moderate correlations with Guiraud's index. These findings suggest that narrative structure is related to children's lexical complexity (as assessed by Guiraud's Index), adds new information to understanding children's narrative abilities, and should be considered for inclusion in child language assessments.

INTRODUCTION

Speech-language pathologists (SLPs) are professionals who assess, diagnose, and treat speech, language, and swallowing difficulties. When screening and diagnosing language delays in children, SLPs need to gather information about the child's receptive and expressive language. Receptive language refers to the child's understanding of language, while expressive language consists of a child's productions in terms of vocabulary, grammar, and sentence structure (Paul & Norbury, 2012). A variety of methods can be used to gather information on a child's expressive language. For instance, an SLP may use a standardized test or collect a language sample (i.e., a collection of the child's utterances) (Paul & Norbury, 2012). One way that a language sample can be obtained is through narrative. Narrative is a genre of discourse that focuses on talking about related series of events, typically in the order that the events occurred (Hayward, Schneider, & Gillam, 2009). There are different types of narratives, including scripts (e.g., talking about the events that happen when you go to the grocery store), personal stories (i.e., talking about something that happened to you), and fictional stories (Paul & Norbury, 2012). Oral narratives, especially fictional stories, are a particularly useful way to collect a language sample because they tend to elicit more advanced language than a play or conversational sample and serve as a bridge between oral language and literate language (Bashir & Scavuzzo, 1992; Westby, 2005). That is, oral narratives contain language that is more representative of written language styles (Hayward, Schneider, & Gillam, 2009).

When people produce narratives, they follow a general structure in their storytelling and this structure develops as language develops (Schneider, n.d.). This allows researchers and SLPs to analyze narratives for particular features because there is commonality between

narratives. There has been a number of features in narratives that SLPs assess as part of children's language development. Yet, there may be other features in narratives that could be further assessed to strengthen the use of narratives as part of children's language assessment.

Narratives as Children's Language Assessment

Narratives have been found to be a valuable means of assessing a child's language production in connected discourse (Heilmann, Miller, Nockerts, & Dunaway, 2010). They have been used by SLPs to help identify those children with language impairments, as children with language impairments have impaired ability to understand and produce narratives (Liles 1985, 1987; Merritt & Liles, 1987, 1989; Schneider, Hayward, & Dube, 2006; Schneider, Williams, & Hickmann, 1997). Narratives have also been found to predict later language and academic achievement (Griffin, Hemphill, Camp, & Wolf, 2004; O'Neill, Pearce, & Pick, 2004). Therefore, they are a valuable assessment tool.

Narratives can be gathered through various means, such as having the child tell a story (generation), having the child tell a story based on pictures (formulation), or having the child recount a story that they previously heard (story retell) (Kamhi & Catts, 2012). Afterwards, the narrative that the child told is analyzed for specific features that are indicators of their language development. These features can include macrostructure elements (e.g., the content included in the story and its organization) and microstructure elements (e.g., sentence patterns, grammar, vocabulary) (Heilmann, Miller, Nockerts, & Dunaway, 2010). Researchers have discovered that the narratives of children with and without language disorders differ in terms of macrostructure, microstructure, and cohesion (Justice et al., 2006; Paul, Hernandez, & Johnson, 1996). Therefore, these are useful features to include in narrative assessments. The Edmonton

Narrative Norms Instrument (ENNI) (Schneider, Dubé, & Hayward, 2005) is one known assessment measure that has a child look at a series of pictures and tell a story about what is happening. Their narration is then analyzed for macrostructure elements in the form of story grammar (i.e., the units typically included in a story such as setting, initiating event, outcome, etc.) and microstructure elements in the forms of first mentions (i.e., the way in which characters/objects are introduced for the first time), and syntactic complexity (e.g., Mean Length of Communication Unit, Total Number of Words, Number of Different Words, and Complexity Index).

Nonetheless, most typically, SLPs have focused on the microstructure elements and analyze narratives for grammatical complexity and lexical complexity. Grammatical complexity takes into account the grammar and sentence structure that the child uses in his or her narrative. This is captured through Mean Length of Utterance (MLU). MLU is a measure of language development where a higher MLU indicates a higher level of grammatical complexity (Brown, 1973). It involves dividing the number of words or parts of words by the number of utterances. Lexical complexity refers to the size and variety of a child's vocabulary. Type-Token Ratio (TTR) is one way SLPs have attempted to capture a child's lexical complexity and is calculated by dividing the number of different words (types) by the total number of words (tokens) (Lindqvist et al., 2013). A high TTR indicates a high degree of lexical diversity, while a low TTR indicates a low degree of lexical diversity.

Specific to the Type-Token Ratio, it is to be noted that its validity has been questioned (Lindqvist et al., 2013). Research has found that a flaw with TTR is that it is sensitive to text length. The longer a text gets (i.e., the greater the number of tokens), the more likely it is that

high-frequency words will be repeated, while low-frequency words are not as likely to be repeated (McCarthy & Jarvis, 2007). This means that longer texts will generally have a lower TTR than shorter texts, and this may not reflect the amount of lexical diversity that each text actually has (Chipere, Malvern, & Richards, 2004). Therefore, TTR loses its value when it is used with longer texts.

A measure called the Guiraud's Index has been proposed as an alternative to TTR. It was introduced as a way to solve the sensitivity to text length problem that TTR has (Lindqvist et al., 2013). Guiraud's Index is a measure of lexical complexity that, like TTR, takes into account the size and variety of a child's vocabulary (Klatter-Folmer, van Hout, Kolen, & Verhoeven, 2006). This measure involves dividing the number of different words by the square root of the total number of words (Lindqvist et al., 2013). This results in a higher lexical richness score for texts that are longer than would have been found with the TTR. Vermeer (2000) has found Guiraud's Index to be an effective measure for early language acquisition. However, some researchers have argued that both measures (TTR and Guiraud's Index) are not effective for measuring lexical richness at later stages of second language acquisition (Daller, Van Hout, & Treffers-Daller, 2003). Due to the limited amount of research and lack of consensus on this measure, one aim of this study was to provide further evidence to determine the efficacy of Guiraud's Index.

Recognizing the range of features in narratives that have been used to assess children's language development and the problems that some of these features present, other features in narratives may be further considered to strengthen the use of narratives in children's language assessment.

Narrative Structure as New Feature for Children's Language Assessment

One set of critical features in narratives that may be considered for inclusion in children's language assessment is the macrostructure elements in the form of narrative structure. Labov and Waletzky (1997) argued that narrative structure comprises of orienting information (i.e., when, where, who, what), referential information (i.e., actions), evaluative information (i.e., thoughts and feelings) and coda information (i.e., moral insights). Minami (2011) applied this theoretical framework to study narrative structure development as part of bilingual children's language development. Koh, Nicoladis, and Marentette (2016; 2017) further developed a coding scheme based on this theoretical framework to examine narrative development in children in different linguistic and cultural contexts. Narrative structure has thus been regarded as an important aspect of children's language development. Indeed, narrative structure can allow SLPs to assess whether children are able to effectively articulate and organize different pieces of vital information (orientation, referential, evaluation, coda) into a meaningful story. While SPLs have assessed macrostructure elements in the form of story grammar (such as using the ENNI), narrative structure represents a different set of macrostructure elements that could be further considered for inclusion as part of children's language development assessment.

The Present Study

Thus, in the present study, we tested whether measures of narrative structure complement and/or add information to the typically used assessment measures of grammatical and lexical complexities. If the measures are positively and highly correlated, it would indicate that there is no need to include the narrative structure information in assessment as it would

not add any new information. On the other end, if they are not correlated at all, it would mean that they each look at different aspects of narratives, and that again it would not be beneficial to include the narrative structure measures. However, if the two measures are positively and moderately correlated, it would indicate that the measures are related while each making a contribution, and that SLPs should consider including the narrative structure measures in their assessment in addition to the typically used measures. We posited that narrative structure would be positively and moderately correlated with grammatical and lexical complexities. In addition, this research attempted to further evaluate the efficacy of using Guiraud's index to measure lexical complexity, by comparing its direction and degree of correlation with the narrative structure measures with TTR's direction and degree of correlation with the narrative structure measures. We expected Guiraud's Index to be positively correlated with the narrative structure measures, but not between TTR and the narrative structure measures.

METHODS

Participants

Seventy-nine monolingual English children participated in the study. The children were recruited through daycares and preschools in Edmonton. All children were typically developing and between the ages of four and six (M = 4.73 years, SD = 0.50 years). Of the seventy-nine participants, there were 41 girls, 36 boys, and two children had missing information on their gender. The children were part of a larger study examining narrative development in different language and cultural contexts. Eight children did not tell the Pink Panther story. Therefore, their data was not included in the results.

Procedure and Measure

Before taking part in the study, informed written consent was obtained from the parents of the participants. The children then gave their verbal assent. The participants watched two short (four minute long) Pink Panther cartoons that contained no dialogue. Immediately after watching the second video, the research assistants (RAs) asked the children to tell what happened in the videos. If the children needed further prompting to justify why they should tell the stories, the RAs followed up with "I haven't seen it." The RAs were instructed to actively listen, to ask for clarification if the stories were confusing, and to only use open-ended questions (e.g., "Was that the end?" or "Did anything else happen after that?"). The children's retellings were videotaped and later transcribed into orthographic words.

Coding

Originally, both narratives were going to be coded; however, the researchers later decided to focus solely on the first story. This particular story was picked over the other one because it was the first story the children narrated, participants in previous studies indicated that they enjoyed the video more, and participants tended to tell longer narratives about the story (Personal communication, Nicoladis, 2016). The children's narratives were coded for narrative structure (including orientation, referential, evaluation, and coda) and the traditional narrative measures (MLU, Guiraud's Index, and Type-Token Ratio). These measures are described in further detail below.

Narrative Structure. Narrative structure is made up of orienting information, referential information, evaluative information, and coda information (Labov & Waletzky, 1997; Minami,

2011). The coding scheme developed by Koh and colleagues (2016; 2017) was used in the present study, as follows.

Orientation is information that sets the context for the narrative. It includes time (e.g., "In the morning"), place (e.g., "He threw the birdie in the water"), character (e.g., "The Pink Panther"), and object (e.g., "He was banging nails in his clock"). Only the first mention of orienting information was coded. For instance, the first time that the Pink Panther was mentioned, it was counted as one character mention. Further mentions of the Pink Panther in the narrative were not counted.

Referential information includes the actions that the characters do (e.g., "He was hammering"), as well as objective descriptions (e.g., "The small bird"). Each instance of referential information throughout the narrative was counted.

Evaluation refers to the emotions (e.g., "He was mad"), thoughts (e.g. "He thought the bird had drowned"), and desires (e.g., "Then he wanted it back") of the characters. Evaluation also includes intensifiers (e.g., "Because it was too noisy"), emphasis (i.e., making someone do something), and dialogue (e.g., "The guy yelled coocoo"). Each instance of evaluation was counted.

Coda is the moral insights or lessons learned (e.g., "And then they were so beautiful"). Each instance of a coda was counted.

Typical Narrative Measures. Mean Length of Utterance (MLU) was calculated for each narrative in order to capture grammatical complexity. MLU was calculated by dividing the total number of words in the narrative by the total number of utterances. An utterance was defined as a sentence. For example, "The pink panther threw the clock into the water and went home"

was counted as one utterance. To capture lexical complexity, Type-Token Ratio (TTR) and Guiraud's Index were calculated. TTR was calculated for each narrative by dividing the total number of different words in each narrative (Types) by the total number of words (Tokens). Guiraud's Index was calculated by dividing the number of different words by the square root of the total number of words (Klatter-Folmer, van Hout, Kolen, & Verhoeven, 2006).

The coding was done by two SLP students at the University of Alberta. The two students independently coded 20% of the transcripts for the purpose of achieving high intercoder reliability. Discrepancies in coding were resolved through discussion between the coders and their research supervisor. A minimum of 80% reliability was achieved on all areas coded. The intercoder reliability *r* was 0.82 for orientations, 0.91 for referentials, 0.99 for evaluations, and 1.00 for codas. The students then divided the remaining transcripts evenly and coded them independently.

RESULTS

After coding the transcripts of the narratives, the researchers conducted statistical analyses using SPSS. Traditional measures commonly used to evaluate and describe children's narratives, including MLU, TTR, and Guiraud's index, were analyzed along with measures of narrative structure. Details including the means, standard deviations, and ranges of these measures can be found in Table 1.

Next, in order to determine the relationship between the narrative structure variables and the traditional measures of grammatical and lexical complexity, a Pearson correlation was run between the narrative structure variables and MLU, TTR, and Guiraud's index. No

significant correlations were found between any of these narrative structure measures and Mean Length of Utterance. Negative and moderate correlations were found between Type-Token Ratio and three of the narrative structure measures. Nonetheless, the results revealed positive and moderate correlations between Guiraud's Index and three measures of narrative structure: Orientation $r = .486$, $p < .001$, Referential $r = .443$, $p < .001$, and Evaluation $r = .561$, $p < .001$. A full breakdown of the correlations can be found in Table 1.

Table 1

Means, standard deviations, ranges and correlations of narrative variables

	MLU	TTR	Guiraud's	Orientation	Referential	Evaluation	Coda
Variable							
Mean	**18.26**	**.59**	**4.42**	**3.761**	**5.972**	**.901**	**.028**
SD	**9.866**	**.178**	**.945**	**2.207**	**5.13**	**1.343**	**.237**
Range	**6 - 75**	**0 – 1**	**2 – 6**	**0 – 11**	**0 – 21**	**0 – 5**	**0 – 2**
MLU		**-.168**	**.372****	**-.123**	**-.055**	**.040**	**-.064**
TTR			**-.261**	**-.539*****	**-.653*****	**-.410****	**-.017**
Guiraud's				**.486*****	**.443*****	**.561*****	**.093**
Orientation					**.734*****	**.498*****	**-.041**
Referential						**.503*****	**-.023**
Evaluation							**.278***
Coda							

***$p < .05$; **$p < .01$; ***$p < .001$.**

DISCUSSION

The results of this study support the use of narrative structure measures to evaluate children's language development. Additionally, the results suggest that Guiraud's Index can be a more effective means for calculating narrative complexity than TTR.

The findings outlined above show positive correlations between three of the narrative structure elements (i.e.,orientation, referential, and evaluation) and Guiraud's index, suggesting that narrative structure may be an important tool for assessing language development, just like lexical complexity. Furthermore, because the correlations are moderate, it indicates that these measures are related but different enough that they are each important in their own right, meaning lexical complexity and narrative structure are separate concepts of equal importance with respect to child language assessments. Due to the low frequency in coda information, it was not surprising that no significant or meaningful finding was found between the fourth element of narrative structure (i.e., coda) and Guiraud's Index. Together, these findings suggest that narrative structure variables could be integrated into a comprehensive assessment of children's language development. Using the ENNI, SLPs have already assessed stories by analyzing macrostructure elements in the form of story grammar as well as the microstructure of first mentions, which overlaps with the feature of orientation in the present study. Yet, narrative structure represents a different set of macrostructure elements that could be used as part of the assessment. These other means, such as referential and evaluative information, may provide a more complete picture of narrative complexity as suggested by the data in this study.

Interestingly, Guiraud's Index was shown to be negatively correlated with TTR. Importantly, Guiraud's Index was found to be positively correlated with the narrative structure variables, but not between TTR and narrative structure variables. These findings may further suggest that TTR is not an effective measure of narrative-lexical complexity (Malvern, Richards, Chipere, & Duran, 2004). Past research has suggested issues with the TTR as reflected in written essays (Chipere, Malvern, Richards, & Duran, 2001). The present study showed that TTR may also need to be used with caution when analyzing oral narratives. Past researchers including Malvern et al. (2004) have also called into question the efficacy of Guiraud's Index. Even so, it may be that Guiraud's Index is the better measure, since the data in the current study showed that Guiraud's is positively correlated with the other measures of narrative structure.

Future Directions

One limitation of the current study identified by the researchers relates to the complexity of the coding scheme. Many speech-language pathologists have a limited amount of time in which to conduct assessments. Since this particular coding scheme could be quite time-consuming, it would be important to refine these analyses for practical usage. Additionally, it would be beneficial to standardize the data collection procedures (i.e., how the narratives are elicited from the participants) in order to ensure validity and reliability. For example, the same video should be shown, and the subjects' recounting of the story should be elicited and collected in the same way across all subjects, with the same rules for anyone who administers the tool (e.g., no leading questions should be asked). This will help ensure an

accurate reflection of narrative structure and complexity is collected (validity), and that the results are consistent across conditions, subjects, and clinicians (reliability).

Further, because this study was conducted with typically developing children, it would be beneficial to repeat the study with different populations who are not typically developing in order to determine whether this narrative analysis would be an effective way to identify those children whose narrative skills are not developing along a typical trajectory.

Oral narrative is an extraordinarily rich means of assessing child language development. By continuing to explore the features and constructs of children's narrative, clinicians and researchers can further understand its importance in assessing and improving children's language development.

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