Determination of the Inter-rater Reliability of the Edmonton Narrative Norms Instrument

By

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Assessment of language is a complicated process best served by information from a variety of different sources. Traditionally, standardized tests designed to capture information about a child's language performance at the word or sentence level at one point in time were used to assess a child's language abilities. There is considerable potential for measurement error with this method (Bracken, 1988) because a child's performance can vary. In recent years, there has been a growing body of evidence that in order to get a clearer picture about a child's functional use of language, collection of a language sample has great value. One form of language sample is a narrative. The value of narratives as a tool to reveal a more accurate representation of a child's language ability creates the potential for narratives to be used as standardized tools of assessment.

Narratives are intermediate between oral and written language and are considered a form of literate language (Westby, 1999). They generally are longer in mean length of utterance (MLU) (MacLachlan & Chapman, 1988), are more syntactically complex (Westerveld et al., 2004) and have more phrasal elaboration (Wagner, 2000) than other forms of oral language. Narratives are part of everyday life and are necessary skills for the school age child. They have been shown to be indicative of current language functioning (Schneider et al., 2006) and predictive of later academic

performance for typically developing children (Griffin et al, 2004) as well as for children at risk for language impairment (Fazio et al., 1996). There is evidence that children with specific language impairment have difficulty with elements of narrative production such as cohesion, content and story grammar (Boudreau & Hedberg, 1999; Greenhalgh & Strong, 1991; Kaderavek, 2000, Merritt & Liles, 1987). For this reason, narratives have potential as a useful tool for discriminating between typically developing children and those with language impairment.

Thus, stories have come to be used frequently in language assessments. However, it is important to note that the way in which stories are elicited from children will affect the quality of their stories. Narratives can be elicited using a number of different techniques such as oral retell, story stem sentence, single picture task and wordless picture books. The technique that is selected has an impact on the nature and quality of the narrative that is generated by the child. Pearce et al. (2003) compared wordless picture books (WPB) with single scene pictures (SSP) as elicitation tools for children (5;0-6;2) who were typically developing, diagnosed with SLI or who had low non-verbal ability. All groups told longer stories using WPB as the elicitation method than when SSP was used. Pearce (2003) also looked at the impact of stimulus type on the complexity of typically developing children's (5;0-5;11) narratives. In this case, the elicitation stimuli were either a complex WPB or SSP. The children were allowed to preview the

WPB, but not the SSP. Communication (C) units, total number of words, number of different words and mean length of communication unit (MLCU) were analysed. As in their previous study, all children told longer stories with the WPB than for the SSP and the stories elicited with the WPB were more complex.

Schneider (1996) examined the effects of story presentation on story grammar in narratives generated by typically developing children. Story grammar refers to the elements of the story that are necessary for a story to be judged a "good story" by a listener. These include initiating event, internal response, internal plan, attempt, outcome, and reaction. The stories were prepared in an oral and pictorial version and were balanced for story grammar units. They represented a single episode with two characters and were presented orally only, orally with pictures, or through pictures alone. There was a significant effect of story presentation on the story grammar units in the narratives elicited from the children. The stories in which the children heard an oral version only elicited more story grammar units than with the picture stimulus alone. In a study with 44 typically developing children in Kindergarten and Grade 2, Schneider and Dubé (2005) demonstrated again that oral retellings generated more story grammar units than pictures alone. There was a developmental effect on the quality of the stories as well so that older children produced more story grammar units than their younger peers. As a result of the impact of story presentation on

the nature of the narratives produced, it is important to have a normative sample to compare to. This way, the results generated by a particular method can be compared to the normative sample in order to determine if the narrative that is generated is typical or indicative of a language impairment.

These studies provided the background to the development of the Edmonton Narrative Norms Instrument (ENNI). Schneider et al. (2006) created the ENNI, an instrument intended to be used as an assessment tool for identifying children with language impairments. The ENNI was designed to elicit narratives and provide a local normative sample to compare children's narratives against. There were two sets of three stories of increasing complexity as well as one training story. The children were administered the training story first. The stories consisted of pictures in a binder that were presented to the child in such a way that the child could not assume that the examiner was able to see the pictures. There is evidence that children provide more information to a naïve listener (Liles, 1987) so this was established to elicit the best representative narrative from the child. The child was allowed to preview the pictures prior to generating their stories. The narratives were transcribed for later analysis.

There were four key research questions posed in this study: Are developmental trends evident in the data for amount of story grammar information; Are there differences between the groups in the amount of story grammar; Do story grammar scores discriminate between children with and

without language impairments; Do story grammar units correlate with a standardized test of language? In this study, 377 children (4:0-9:11) were recruited through local schools, preschools and daycares. Of this group, 77 children were previously identified as having specific language impairment (SLI). This ensured that norms generated for the instrument could be used for children with language impairment. In the typically developing group, the ratio of males to females was approximately 1:1, but in the population of children with SLI, there were more boys than girls, reflecting the gender balance in the population of children with SLI. The story grammar model was used to analyse the stories. Scoring protocols for story grammar and first mentions were developed for this purpose for stories A1 and A3. The CELF-P (3-6 years) and CELF-3 (6-21 years) language tests were administered to the appropriately aged children prior to presentation of the stories. This was done in order to answer the fourth research question about the correlation between story grammar score and another language test. This addressed the issue of concurrent validity, a measure that is necessary for an assessment tool of quality. Construct validity for the ENNI was determined by observing if there was a developmental effect on story grammar and if there was a significant difference in the story grammar scores between the typically developing and language impaired children. A developmental trend was observed up to age 7 for the simple story and up to age 8 for the more complex story. Also, the typically developing children had

higher story grammar scores than the children with SLI with the exception of age 9. This was confirmation of construct validity. The results for the children in this sample were then used to create norms for story grammar so that the instrument could be used for assessment. These are local norms and as such can currently be used only for children in the Edmonton area. Interrater reliability between two scorers who were involved in the creation of the ENNI was determined to 0.92 for both stories A1 and A3. In order to ensure that their experience with the ENNI did not influence the inter-rater reliability, the current study was designed to determine the inter-rater reliability of participants who were not involved in the development of the ENNI.

Inter-rater reliability is one of the measures of reliability that is commonly used in the evaluation of assessment tools. It is a measure of similarity between raters given the same scoring protocol and the same information for scoring. The kind of inter-rater reliability that is appropriate for evaluation of the ENNI is Intraclass Correlation (ICC), which is used for evaluating inter-rater reliability for two or more raters (Shrout & Fleiss, 1979). McCauley and Swisher (1984) described what psychometric measures should be included for an instrument to be psychometrically sound. One of the forms of reliability they recommended was inter-rater reliability. The correlation between scorers should be 0.8 or better if there is good inter-rater reliability. This would support the notion that the scoring protocol is easy to

understand and replicate. In order for the ENNI to be a useful instrument, this is essential information.

Research Question of this Study

The current study was designed to answer one research question: what is the inter-rater reliability for scoring of story grammar units (SGU) in narratives generated for stories A1 and A3 of the Edmonton Narrative Norms Instrument?

Method

Participants

Experienced professional speech language pathologists (SLPs) (n=4) were recruited for this study. Prior to participant recruitment, it was determined that 4 to 5 participants would be needed for accurate estimation of reliability. Participants were recruited through the Community Health Sector of the Capital Healthy Authority in Edmonton, Alberta. A letter of recruitment was sent out to all eligible SLPs and those who were interested responded. These were the only respondents; therefore, all respondents were selected for involvement. The participants had been working as SLPs for a range of 2-18 years with an average of 7.3 years of experience. All participants expressed either previous awareness of the ENNI or a professional interest in increasing their familiarity with the instrument.

Table 1. Years of Experience as a Speech Language Pathologist and Previous ENNI Experience.

	Rater 1	Rater 2	Rater 3	Rater 4
Years as SLP	6;5	2;9	2	18
ENNI Experience	None	Limited*	Limited**	None

^{*} Aware of the ENNI, intended to use clinically, but had not

Procedure

The participants were provided with transcripts of narratives elicited from children (n=18) using stories A1 and A3 of the Edmonton Narrative Norms Instrument. The transcripts were produced from narratives created by these children who were part of the group of 377 (aged 4;0-9;11) children who made up the normative sample of the instrument. Each participant scored the same set of transcripts. The transcripts given to the SLPs represented the range of ages represented in the normative sample. Thus, the transcripts generated by three children from each age grouping were randomly selected. This sample also included children with specific language impairment (SLI) so that approximately four of the 18 children had been children diagnosed with SLI. This was the original proportion of children used in the development of the Instrument who had been classified with SLI. The number of transcripts was selected to give 90 % power to detect a coefficient of 0.9 using a two-tailed alpha of 0.05 (Kramer & Triemann, 1987).

^{**} Learned about ENNI at the University of Alberta while in the MSLP program

The participants scored the transcripts for story grammar. They were given scoring protocols that were developed for each of the stories and were asked to use them to generate a score for the story grammar.

Statistical Analysis

Inter-rater reliability can be determined using Pearson's correlation coefficient or intra-class correlation. Pearson's correlation coefficient is one way to determine the correlation between the scores generated by the judges, but does not take into consideration how they might differ in their scoring of individual transcripts; thus the correlation coefficient generated may not accurately represent the scorers' differences (Garson, no date). For this reason, intra-class correlation was used to determine inter-rater reliability for the scoring of A1 and A3 transcripts.

Inter-rater reliability was determined using the scores generated by the participants. The judges scored 36 transcripts (18 of each story). Intraclass correlation was used to determine the inter-rater reliability. SPSS 15.0 (SPSS Inc.) was the software used to determine this value. A measure of 0.80 or greater with an alpha of 0.05 was selected as the criterion for adequate inter-rater reliability for the story grammar scores of the ENNI. Average measures reliability measures the reliability of the mean of all of the values provided by the raters (Garson, no date). This is in contrast to single

measures reliability which gives the reliability of the ratings of one rater. Average measures reliability was used in this study.

Results

Ratings of all four raters were included in the determination of interrater reliability. While there was noticeable difference between raters on some items (Tables 2,3), overall there were no raters excluded from the sample.

Table 2. Scores given for A1 Transcripts.

Child	Rater 1	Rater 2	Rater 3	Rater 4	Language	Child Age
1	5	8	4	6	Typical	4
2	8	8	8	7	SLI	4
3	7	8	8	8	Typical	4
4	9	9	9	9	Typical	5
5	7	7	6	5	Typical	5
6	11	9	9	9	SLI	5
7	9	7	7	7	Typical	6
8	10	10	10	10	Typical	6
9	6	3	4	3	SLI	6
10	10	10	8	10	Typical	7
11	8	10	8	8	Typical	7
12	10	7	9	9	Typical	7
13	10	10	10	10	Typical	8
14	10	8	10	10	Typical	8
15	5	6	7	8	SLI	8
16	10	8	10	10	Typical	9
17	10	9	10	10	Typical	9
18	8	8	10	10	Typical	9

	T		1	1		1
Child	Rater 1	Rater 2	Rater 3	Rater 4	Language	Child Age
1	13	9	7	5	Typical	4
2	15	10	13	9	SLI	4
3	15	16	20	9	Typical	4
4	14	16	18	9	Typical	5
5	22	19	19	22	Typical	5
6	23	22	25	25	SLI	5
7	21	21	21	21	Typical	6
8	25	26	26	26	Typical	6
9	8	10	8	4	SLI	6
10	18	17	21	19	Typical	7
11	20	25	25	26	Typical	7
12	14	16	16	16	Typical	7
13	23	21	21	23	Typical	8
14	26	26	26	26	Typical	8
15	18	20	23	24	SLI	8
16	23	24	23	21	Typical	9
17	23	26	26	28	Typical	9
18	24	23	23	25	Typical	9

Table 3. Scores given for A3 Transcripts.

Inter-rater reliability was calculated using intra-class correlation and average measures reliability using the individual total scores for each transcript determined by each of the raters (Table 4). For story A1, the intraclass correlation was 0.916. For Story A3, the intra-class correlation was 0.962. The minimum acceptable level of inter-rater reliability for the ENNI was 0.80 so the calculated inter-rater reliability measures for both stories exceed the criterion. The inter-rater reliability for the ENNI is adequate.

Table 4. Inter-rater reliability of Story A1 and A3.

Story	Intra-class	95 % Confidence Interval		
	Correlation	Lower Bound	Upper Bound	
A1	0.916	0.829	0.965	
A3	0.962	0.923	0.984	

Discussion

Four speech language pathologists with a range of 2 – 18 years of clinical experience, but with limited or no experience of the ENNI, scored transcripts from children in the normative sample who had typical language development or language impairment. Stories A1 and A3, the two stories for which Story Grammar scoring are available, were scored in order to determine the inter-rater reliability of the scores. Intra-class correlation was used with average measures to produce an inter-rater reliability of 0.916 for A1 and 0.962 for A3. This supports the previous finding of 0.92 which was the inter-rater reliability determined by the authors of the instrument (Schneider, Hayward & Dubé, 2006). The results of the current study revealed that the inter-rater reliability was still adequate even when the scorers were not familiar with the instrument and were provided with written instructions only.

McCauley and Swisher (1984) laid out the measures that are required for an instrument to be psychometrically sound. One of these was inter-rater reliability which they reported should be at least 0.80 to be adequate. As this current study revealed that the inter-rater reliability of both stories A1 and A3 was in excess of 0.80, it is adequate for the ENNI to be considered psychometrically sound. The results that are obtained through the elicitation

and scoring of narratives are therefore demonstrated to be accurate and reproducible.

In conjunction with the previously demonstrated construct validity, the adequacy of the inter-rater reliability provides further evidence that the Story Grammar measure of the ENNI is a psychometrically adequate instrument. As a result, the ENNI can be recommended for use as part of an assessment for the discrimination of children with language impairment from those who are typically developing in the Edmonton region.

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Appendix A

Instructions for Scoring Story Grammar

Story Grammar

Stories are coded for the information that they contain that correspond to a *story grammar* (*SG*) *unit*. SG units are units of information that are characteristic of stories judged by adults and children to be "good" stories (Stein & Policastro, 1984). The basic units are described below.

Story Grammar Units

Setting

Characters in the story

Location, activity, and/or habitual state or characteristic ('he was always hungry'; 'she liked to read')

Initiating Event [IE] -- event that sets off the story's events -- will cause the protagonist to respond in some way, evokes an immediate response

Internal Response [IR] -- reaction of protagonist to the initiating event. It can be expressed in dialogue, e.g., *oh no!* expresses an internal response

Internal Plan [IP] of protagonist to deal with the IE

Attempt [ATT] to obtain the goal

Outcome or Consequence of the attempt

Reaction [R] -- how the character(s) feel or think about the outcome, or how they react physically (e.g., run away)

In the ENNI, stories A1 and A3 have been analysed for Story Grammar (Schneider, Hayward, & Dubé, 2006). The Story Grammar scoring sheets specify what should count as each unit in these stories.

An important aspect of Story Grammar is the notion of goal-directed activity. Thus many of the units are coded with regard to goal-directedness. For example, a character may have an emotion at any time in the story; it is only scored as Internal Response if it is related to the Initiating Event of the

story (even if the child does not provide the IE), or as a Reaction if it is a reaction to the Outcome (again, even if not explicitly stated by the child). If it is an emotion that occurs elsewhere, it is not scored.

Three SG Units are considered to be "core" units: Initiating Event, Attempt, and Outcome. For this reason they are scored 2 points rather than 1.

The reason for using Story Grammar is to capture the elements that need to be included in the story for it to be considered an adequate story. The concern is whether or not a child is telling a story that will be understandable to the listener. Some children may tell stories that include much more detail; while these might be preferred on esthetic grounds over simpler stories, the score may not turn out to be higher for such stories because the scoring focus is on basic SG information.

Note that the emphasis is on relating what the child says to the scoring system. You may feel that a unit is actually being used as a different SG unit than the one in the scoring sheet (e.g., what we call "setting" is functioning as IE in the child's story). However, it should still be scored as it is listed on the scoring sheet.

The scoring sheets for each story give typical acceptable responses for each SG unit. The list is not exhaustive. If another response is given credit, note it down.

Scoring conventions for particular SG units

Characters:

Give credit if a noun (not a pronoun) is used to mention a character for the first time, regardless of the noun chosen. The only pronoun that is acceptable is if the child puts him/herself into the story and uses I/me, as in: "Me and the elephant were by the pool one day".

Score wherever the character is first mentioned, even if late in the story.

Distinguishing IP from Attempt:

IP is an indication of planning, e.g., the character decides to... or thinks he will....

Attempt is an indication of action to attain the goal, including movement towards the action, e.g., the character tries to..., goes to..., is going to.....

Internal Response and Reaction: Accept any plausible emotion or response, as long as it is a response to an IE (for IR) or outcome (for Reaction). The IE or Outcome do not have be provided for the child to get credit for IR or Reaction. Emotions can be inferred from speech; for example, *She said*, *Oh no!* implies that a character is upset.

There could be other emotions or responses that occur in other parts of the story; for example, the elephant could be worried that the giraffe will drown when getting the ball. That does not get credit for any story grammar element.

Scoring very 'sketchy' transcripts: Keep in mind that you are scoring the stories as expressive language samples, not as a comprehension task. Therefore the child should get credit for a story grammar unit only if the listener would be able to understand. If a child has provided incomplete units, judge them according to whether a listener could understand them without knowing the story or seeing the pictures. For example, if a child says "bouncing" for the first picture, do not give it credit as setting, since there is not enough information. However, if a child says "happy" or "thank you" at the end of the story, give credit for Reaction, since it is at least clear that someone is happy or grateful.

Appen	dix	В.	

Edmonton Narrative Norms Instrument	
Story Grammar Scoring Sheet for Story A	۱1

Child's Name:	Age:	Date:	
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Please read the section of the Manual on scoring SG units before using this sheet.

SG Unit	Acceptable [child need only have one alternative per unit to get credit for that unit]	So	ore
Character 1	giraffe / male / boy (or any type of animal such as horse) [not acceptable: pronoun]	0	1
Character 2	elephant / female / girl (or any type of animal such as cow) [not pronoun]	0	1
Setting	swimming pool had a ball / playing with ball / want to play ball	0	1
Initiating Event	ball goes in water/pool/sand/mud ball is in water they see a ball	0	2
Internal Response	one / both want to get ball elephant says, e.g., "look what happened," "what am I going to do?" Elephant upset / sad [not: he/she/they want to go swimming]	0	1
Internal Plan	giraffe decides to / thinks he will get the ball	0	1
Attempt	giraffe jumps in pool / swims toward ball / tries to get ball [not: giraffe swimming (without goal); giraffe falls in water]	0	2
Outcome	giraffe gets ball / gives ball to elephant [not: elephant gives ball to giraffe, unless it is noted as unexpected, e.g., 'but instead, Elephant gets it and gives it to him']	0	2
Reaction of Giraffe	giraffe is happy / proud / smiles giraffe says "You're welcome" giraffe's teeth are chattering / giraffe is cold/wet	0	1
Reaction of Elephant	elephant is happy / is grateful / says thank you elephant hugs the ball [not: holds/has the ball]	0	1
Reaction both or unknown	"they" are happy/in love [code only as replacement for Reaction of Character 1 or 2; there should not be more than 2 reactions total]	0	1

Total raw score:	
Standard Score:	

Edmonton Narrative Norms Instrument

Story Grammar Scoring Sheet for Story A3
Child's Name: _____ Age: ____ Date:
Please read the section of the Manual on scoring SG units before using this sheet.

SG Unit	Acceptable [child need only have one alternative per unit to get credit for that unit]	Score
Character 1	giraffe / male / boy (or any type of animal such as horse) (not acceptable: pronoun)	0 1
Character 2	elephant / female / girl (or any type of animal such as cow) [not pronoun]	0 1
Setting	at swimming pool / going swimming / are playing has/is holding airplane / one asks other to play	0 1
Initiating Event	G playing with airplane/making airplane fly G shows/gives E his airplane	0 2
Internal Response	E wants / is interested in airplane	0 1
Internal Plan	E decides to take airplane	0 1
Attempt	E takes airplane / zooms airplane around / makes airplane fly / G gives E a turn	0 2
Outcome	airplane falls in pool / E throws plane in pool	0 2
Reaction of Giraffe	G angry/yells/stares at plane	0 1
Reaction of Elephant	E feels bad/embarrassed/scared / E stares at plane/says oops	0 1
Reaction - both/unknown	"they" are unhappy [code only as replacement for Reaction of Character 1 or 2; there should not be more than 2 reactions total]	0 1
Character 3 (C3)	lifeguard / other elephant /other male / her father / her brother	0 1
Initiating Event	C3 shows up/comes over / E sees C3 / C3 sees plane in water / C3 asks what happened	0 2
Internal Response	E/G hopes C3 can help / C3 wants to help	0 1

Internal Plan	E/G decides to ask for help/explains what happened /asks C3 to get plane / lifeguard decides to try NOT: E talks to C3 (without specifying what about)	0	1
Attempt	C3 tries to get plane / reaches for plane	0	2
Outcome	C3 can't reach plane / plane was too far/sinking	0	2
Reaction C1	G upset / sad / worried / cries / stares at plane	0	1
Reaction C2	E upset / feels bad / feels guilty / looks sheepish / apologizes	0	1
Reaction C3	C3 disappointed / shrugs / says he can't reach it	0	1

Reaction of both/unknow n	"they" are disappointed/feels bad [code only as replacement for Reaction of another character; there should not be more than 3 reactions total]	0	1
Character 4 (C4)	other lifeguard / other elephant / other female / her mother / her sister /other person	0	1
Initiating Event	C4 comes over / has net	0	2
Internal Response	C4 wants to help / knows how to get plane / offers to help	0	1
Internal Plan	C4 decides to try / has idea / says she will get it E/G/C3 asks C4 to get it	0	1
Attempt*	C4 reaches for plane / is going to get it / tries to get it C4 gets plane	0	2
Outcome*	C4 gives plane to G / G has plane	0	2
Reaction of Giraffe	G happy / amazed / excited / hugs plane / says thanks	0	1
Reaction of Elephant 1	E happy / relieved / feels better / says thanks	0	1
Reaction C4	female lifeguard relieved / pleased	0	1
Reaction of both/ unknown	"they" are happy/excited / say thanks [code only as replacement for Reaction of another character; there should not be more than 3 reactions total]	0	1

Total score:

Standard Score: