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Reliability of main event measurement in the discourse of individuals with aphasia

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Background: Quantitative measures of discourse skills of adults with aphasia can be valuable in documenting evidenced-based practice. Comprehensive assessment of narrative discourse should include a measure of the ability to relay main events (Nicholas & Brookshire, 1995; Wright, Capilouto, Wagovich, Cranfill, & Davis, 2005). Wright et al. (2005) compared the ability of younger and older healthy adults to relate main events in response to pictured stimuli. Results indicated that the younger group produced a significantly higher proportion of main events as compared to the older group and that the main events measure was stable for individual participants over time. However, performance data and data supporting the stability of the main events measure for individuals with aphasia are needed to extend the clinical usefulness of the main events measure as an assessment tool.
Aims: The purpose of this study was (a) to compare the performance of healthy adults and adults with aphasia on their ability to convey main events in pictured stimuli and (b) to establish session-to-session reliability of the authors' main events measure.
Methods & Procedures: Eight adults with aphasia (APH) and eight neurologically intact adults (NI) participated in the study. Participants attended two sessions, 7–21 days apart. Each time, participants gave an account of the events from two pictures and two picture sequences (Nicholas & Brookshire, 1993). The resulting language samples were analysed for the proportion of main events conveyed, and test–retest reliability of the measure was assessed.
Outcomes & Results: NI adults told a significantly higher proportion of main events than adults with aphasia. The main effect for picture stimulus was also significant; participants told significantly more main events in response to sequential versus single picture stimuli, regardless of group. Test–retest results yielded strong, positive correlations between sessions for both groups.
Conclusions: Results indicate that adults with and without aphasia differ in their ability to express the relations and causal links among units of information. Results also indicate that Wright and colleagues' (2005) main events measure demonstrates sufficient stability to provide the foundation for its potential use as a pre- and post-treatment measure. Finally, the finding that the proportion of main events provided in response to

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stimuli varied according to the nature of the stimuli is consistent with the findings of Wright et al. (2005) and suggests that even for individuals with aphasia, relationships between elements depicted in pictures may be more easily identified and conveyed when sequential pictures are provided as stimuli.

Analysis of discourse ability in adults with aphasia is an important, ecologically valid component of clinical assessment (Brownell, 1988; Nicholas & Brookshire, 1993). Moreover, discourse analysis has been shown to be a sensitive indicator of the pragmatic, linguistic, and cognitive abilities of individuals with neurological deficits such as aphasia (Ulatowska, Allard, & Chapman, 1990) and traumatic brain injury (Coelho, 1995; Tucker & Hanlon, 1998). *Discourse* is the broad term used to describe four forms of connected speech: conversation, expository, procedural discourse, and narrative (Rosenbek, LaPointe, & Wertz, 1989).

A number of different analyses have been used to quantify and describe an individual's performance in connected language. These include what Brownell (1988) described as *within-sentence* analyses, such as Yorkston and Beukelman's (1980) content unit analysis and Nicholas and Brookshire's (1993) correct information unit analysis; word-by-word analyses that provide information with respect to informativeness and efficiency. Other word-by-word analyses include measures of utterance length, speech rate (words per minute), and percentage of personal pronouns (Prins, Snow, & Wagenaar, 1978). Investigators have also employed techniques for quantifying *between-sentence* (Brownell, 1988) analyses such as number of episodes and episode length (Coelho, 2002), the ability to describe an episode from beginning to end (Chapman et al., 1992), and the degree of logical and referential cohesion (Davis & Coelho, 2004).

The type of clinical task used to elicit a language sample (e.g., conversation, interview with open-ended questions, story retelling, recounting an event, describing a picture, relating a procedure) varies, influencing both the quality and quantity of the discourse sample (Davis & Coelho, 2004; Olness & Ulatowska, 2002). Language analyses performed on samples vary as well, and can enable estimation of an individual's lexical, semantic, and pragmatic abilities in discourse. In summary, the multifaceted nature of discourse and discourse analysis requires comprehensive clinical assessment that includes a variety of elicitation tasks and elicitation procedures along with appropriate methods of analyses (Davis & Coelho, 2004).

Differentiation of discourse type is important clinically since it impacts both the interpretation of data collected and the ability to consider study results in the broader context of discourse and aphasia. Integrative models of discourse (e.g., Ska, Duong, & Joanette, 2004) describe comprehension and production of discourse as consisting of four levels of cognitive-linguistic operations: surface, semantic, situational, and structural. Our primary interest is in the development of a valid and reliable measure focused on performance at the *structural* level of discourse. Specifically, we are interested in between-sentence performance obtained via a set of picture elicitation tasks.

The present study focuses on analyses of *narrative* discourse. Heath (1986) described four forms of narrative discourse; eventcasts, recounts, accounts, and stories. Eventcasts are narratives that explain a scene of activities. Recounts are verbal reiterations of an event, whereas accounts are spontaneous sharing of experiences, and stories are fictionalised, highly structured forms. The type of

language typically elicited via eventcast involves coordinating and subordinating conjunctions, as well as constructions that convey how events are related (Wallach & Miller, 1988). Thus, the present study is an attempt to develop a *controlled* performance measure that emphasises the expression of relationships between characters and events within picture stimuli. Ulatowska and Olness (2000) have warned that measures of sentence-level production may not truly measure discourse: "Discourse is not realized through the additive accumulation of sentence-level structures, but rather through the relationship between and among elements, which, in concert, achieve a discourse function" (p. 249).

We have interpreted this statement as support for our observation that older healthy adults, when confronted with a picture stimulus, tended to simply "list" events without considering underlying relationships between them (Capilouto, Wright, & Wagovich, 2005). Clinically, this observation notwithstanding, it is important to tap an individual's abilities to relate causally and temporally related actions by stating what happens, why it happens, and the resulting consequences (Wallach & Miller, 1988).

In keeping with this idea, Wright et al. (2005) developed a measure well suited to analysing an individual's ability to relate what Tucker and Hanlon (1998) describe as the "essential elements" and "implied meanings" depicted in a pictorial scene. Kintsch and van Dijk (1978) have suggested that one way that speakers accomplish this in narrative discourse is by communicating the relations and causal links among units of information. We refer to these "essential elements" and "implied meanings" as *main events* (Wright et al., 2005). Following a priori review of the picture stimuli from Nicholas and Brookshire (1993), the authors independently generated a list of main events, which were analysed for commonalities. A main event was defined as an event that was (a) of sufficient importance to the story as a whole and (b) independent from the other events in the story. Operationally, a main event was defined as one cited independently by at least two of the three authors (Wright et al., 2005). The narratives of younger and older healthy adults were measured against the a priori lists. Results suggested that the younger group relayed a higher proportion of main events as compared to the older group. Results further indicated that the main events analysis was found to be a stable measure of narrative discourse performance.

Lacking in the previous investigations were (a) data pertaining to the relative performance of adults with aphasia on the main events measure and (b) session to session stability of the measure with adults with aphasia. The purpose of the present investigation, then, was twofold. The first objective was to compare the performance of healthy adults and adults with aphasia in their ability to convey main events in pictured stimuli. By including adults with and without brain damage, the intent was to collect data on a measure of narrative discourse that can eventually be used as a comparative reference when evaluating the same abilities of adult clinical populations.

Based on previous studies investigating narrative discourse ability in adults with aphasia (Bond, Ulatowska, Macaluso-Haynes, & May, 1983; Ulatowska, North, & Macaluso-Haynes, 1981; Ulatowska, Olness, Wertz, Samson, Keebler, & Goins, 2003), we expected that the participants would produce a lower proportion of main events compared to their non-brain-damaged counterparts. Ulatowska and colleagues (Bond et al., 1983; Ulatowska et al., 1981) reported that individuals in their study with mild to moderate aphasia produced less information compared to

non-brain-damaged participants during a narrative discourse task. Specifically, they reported that the participants with aphasia omitted information about *why* the particular events happened. Because our main events analysis measures the ability to express the relationships between characters and events, we anticipated frequent statements of *why* and *how* events occurred within the samples. The second objective was to evaluate the session-to-session stability of the main events measure with adults with aphasia. Based on our previous work with neurologically intact individuals (Wright et al., 2005), and because we have included only adults with chronic aphasia, we predicted that the measure would, in fact, be stable across sessions.

METHOD

Participants

A total of 16 adults participated in the study: 8 adults with aphasia (APH) and 8 neurologically intact adults (NI). The APH group consisted of five females and three males, and the NI group consisted of six females and two males. The mean ages for the groups were 66.5 years and 69.4 years, respectively. The mean years of education completed were 13.0 for the APH group and 12.5 for the NI group. The groups did not differ significantly in age, $F(1, 14) = 0.34$, $p = .57$, or years of education completed, $F(1, 14) = 0.13$, $p = .73$. Criteria for inclusion in the study included aided or unaided visual acuity within normal limits, as indicated by passing a vision screening, and aided or unaided hearing acuity within normal limits, as indicated by passing a hearing screening. Additional criteria for participants with aphasia included (a) at least 3 months post onset of the stroke, (b) mild to moderate severity of aphasia, and (c) negative history for cognitively deteriorating conditions such as Alzheimer's or Parkinson's.

Presence of aphasia was confirmed by clinical diagnosis, through performance on the *Western Aphasia Battery* (WAB; Kertesz, 1982) and, for one participant, through performance on the *Boston Diagnostic Aphasia Examination – 3* (BDAE-3; Goodglass, Kaplan, & Baressi, 2000). Aphasia quotients (AQ) were calculated for each participant ($N = 7$) who was tested with the WAB. The mean AQ was 71.7. The severity score for the participant who received the BDAE was 3. Participants demonstrated different aphasia typologies, including Broca's aphasia, anomic aphasia, and conduction aphasia. The NI participants completed the *Mini-Mental Status Examination* (MMSE; Folstein, Folstein, & McHugh, 1975), a cognitive screening measure, and received scores of 26 or higher. See Table 1 for group demographics.

Tasks

Language samples consisted of participants' responses to the two single pictures and two picture sequences from Nicholas and Brookshire (1993). The single pictures each depict multiple events that can be developed, with some degree of inference, into an eventcast. The picture sequences each consist of six frames depicting a related sequence of activities. The pictures are referred to as Birthday Cake (single picture), Cat in the Tree (single picture), Fight (picture sequence), and Directions (picture sequence). Following Nicholas and Brookshire's instruction (1993), for each picture

TABLE 1
Summary of aphasia and neurologically intact (NI) groups' demographic and clinical data

Participant	*Age*	*Educ (yrs)*	*Gender*	*MMSE*	*WAB*	*MPO*	*Aphasia type*
NI group							
1	66	8	Female	26	–	–	–
2	57	14	Male	30	–	–	–
3	62	12	Female	24	–	–	–
4	67	12	Female	29	–	–	–
5	77	18	Male	29	–	–	–
6	72	12	Female	30	–	–	–
7	83	12	Female	30	–	–	–
8	71	12	Female	29	–	–	–
Mean (*SD*)	69.4 (8.3)	12.5 (2.8)		28.4 (2.2)			
Aphasia group							
1	62	13	Female	–	–[4]	24	Conduction
2	53	13	Female	–	78.6	38	Broca's
3	61	9	Male	–	55.8	27	Broca's
4	74	12	Male	–	98.3	11	Anomia
5	80	14	Female	–	53.9	18	Broca's
6	76	19	Female	–	68.2	9	Conduction
7	75	12	Female	–	50.5	3	Conduction
8	51	12	Male	–	95.8	96	Anomia
Mean (*SD*)	66.5 (11.2)	13.0 (2.8)			71.7 (19.9)	28.3 (29.6)	

[1]Cerebrovascular accident; [2]Western Aphasia Battery aphasia quotient; [3]Mini-Mental Status Examination; [4]This participant received the BDAE rather than the WAB. Her BDAE severity score was 3.

or picture sequence, participants were asked to talk about what was going on in the picture(s). If participants stopped after 15 seconds or less, they were prompted with "Can you tell me more?". No other instructions were given. These procedures were repeated for each picture or picture sequence in both sessions. The samples were audio recorded then orthographically transcribed.

Language analysis

Participants' samples were evaluated for the proportion of main events included. As stated previously, the motivation for the development of the main events analysis was its pragmatic focus. Thus, in contrast to propositional analyses, the main events analysis assesses what an individual views as salient and important to relate about the picture(s). The purpose of the main events analysis, then, was to capture the extent to which participants understood and expressed relationships between characters, actions, and ideas. Each picture stimulus included a different number of main events, as follows: Cat in the Tree – 4; Birthday Cake – 5; Fight – 7; and Directions – 8. The main events for the Birthday Cake stimulus and the Directions stimuli are provided in Table 2.

A binary scoring system was used for scoring the main events and calculating the raw scores. Responses were scored as either correct, indicating that all the necessary information was provided, or incorrect. For example, with the Birthday Cake

TABLE 2
Main events for the Birthday Cake picture and the Directions picture sequence

Main events: Birthday Cake
1. It is the boy's birthday (birthday party).
2. The boy is crying because the dog ate (some of) his cake.
3. The dog is hiding under the sofa/couch.
4. The mother is mad at the dog/is scolding the dog (with a broom).
5. The guests are arriving.

Main events: Directions
1. A man and a woman are driving/travelling and see/greet/say hello to a farmer on the side of the road.
2. The farmer is planting a tree.
3. The couple/the man ask(s) for directions.
4. The farmer directs them/gives them directions/tells them which way to go.
5. (The farmer watches as …) the man and woman take off/they continue on their way.
6. The farmer goes back to work digging the hole/planting the tree.
7. A little while (a few minutes) later, the couple sees the farmer (stops in front of the farmer) on the side of the road again.
8. They are angry with the farmer because he misdirected/gave them bad directions/did not give them good directions.

The essential information for each main event is provided. Information in parentheses represents alternative ways a component of the main event could be stated. [/] represents alternative information that could have been stated to complete the main event.

picture, if the participant said *the boy is crying* but did not mention *because the dog ate his cake*, then that main event was scored as incorrect.

Point-to-point inter-rater agreement was tabulated for the coding of main events. Two trained assistants independently completed the main events analysis on all samples, and agreements and disagreements were subjected to the following formula: (total agreements / [total agreements + total disagreements] $\times$ 100). Inter-rater agreement for number of main events told was 85%. Disagreements were resolved through consensus; the assistants were provided with each other's coded language sample transcripts and instructed to discuss and resolve any instances of disagreement.

Experimental procedures

Participants attended two sessions, 7 to 21 days apart. The testing protocol was completed first and, following testing, the four experimental tasks were administered. The second session consisted of a second administration of the experimental tasks. The order of presentation of the picture stimuli was randomised for each session and across participants. Prior to administration of the tasks in the first session, participants were instructed on how to perform the tasks, and practised by describing the events in the Cookie Theft picture (Goodglass & Kaplan, 1983). Following the practice item, the experimental stimuli were shown to each participant. Each single picture or picture sequence was placed on the table in front of the participant.

Computing proportion of main events

Each picture had a different number of main events. The total number of main events an individual could produce for the single pictures was 9 (Cat in Tree: 4 +

Birthday Cake: 5=9) and the total for the sequential pictures was 15 (Fight: 7 + Directions: 8=15). We computed the proportion of main events produced for each and subjected these numbers to statistical analysis. For example, the formula used with the single picture stimuli was as follows: (number of main events produced for the Birthday Cake and Cat in Tree pictures/9). This permitted comparison of performance across tasks without biasing the results since the sequential pictures involved a higher number of main events compared to the single pictures.

RESULTS

Main event analysis

A mixed analysis of variance (ANOVA) of group (APH, NI) by picture task (single, sequence) by session (Session 1, Session 2) was performed. The main effect for group approached significance, $F(1, 14) = 4.28$, $p = .057$, and the main effect for picture task was significant, $F(1, 14) = 16.90$, $p < .01$. A higher proportion of main events were provided in response to sequential picture stimuli, compared to single picture stimuli. The session main effect and interactions were not significant.

Because the group main effect approached significance, post hoc analyses were conducted, controlling for a familywise error rate of .05 (.05/2 = .025). The purpose of these analyses was to determine if group differences in proportion of main events emerged when single picture and sequence picture stimuli were considered separately. For these analyses, we collapsed the data across the sessions. Results indicated that, relative to the APH group, the NI group told a significantly higher proportion of main events for the single pictures, critical difference = .183, $p < .025$, as well as for the sequence pictures, critical difference = .198, $p < .025$. See Table 3 for group means across tasks.

Test–retest reliability

Test–retest reliability of the main events measure was estimated in two ways: (a) the absolute value of the change in performance from Session 1 to Session 2, and (b) Pearson correlations between Session 1 and Session 2. Similar to Nicholas and Brookshire (1993, 1995) and Wright et al. (2005), we report absolute value of change between sessions for two reasons: (a) the negative differences would cancel out positive differences, and (b) the amount of change, rather than the direction, was important for determining stability of the measure. The mean absolute value of

TABLE 3
Means (*SD*) for proportion of main events (ME) told by the groups for single and sequential picture stimuli across sessions

	Aphasia group			*NI group*		
	Session 1	*Session 2*	*Combined*[1]	*Session 1*	*Session 2*	*Combined*
Proportion of ME						
Single pictures	.17 (.19)	.22 (.27)	.19 (.23)	.29 (.21)	.35 (.22)	.32 (.21)
Sequential pictures	.30 (.27)	.40 (.30)	.35 (.28)	.42 (.19)	.46 (.25)	.44 (.21)
Pictures combined	.25 (.23)	.32 (.29)		.35 (.20)	.40 (.23)	

[1]Sessions collapsed.

change was 10% (SD = 12%) for the aphasia group, and 8% (SD = 7%) for the NI group. Across the four sets of picture stimuli, there were a total of 24 main events, and a change of 8–10% from session to session represented a difference of 1.92–2.40 main events. Pearson Product Moment coefficients revealed significant correlations for the aphasia group, $r = .91$, $p < .0001$, and the NI group, $r = .71$, $p < .01$, indicating that the measure is relatively stable for both groups. See Table 3 for the groups' proportion of main events told across sessions.

DISCUSSION

The aims of this investigation were: (a) to compare the performance of healthy adults and adults with aphasia in their ability to convey main events in pictured stimuli, and (b) to evaluate the session-to-session stability of the main events measure with adults with aphasia. Our findings suggest that regardless of the type of picture used to elicit the narrative sample (i.e., single versus sequential), individuals with and without aphasia differ in the proportion of main events they provide in response to a picture stimulus. Individuals without aphasia conveyed a higher proportion of main events than adults with aphasia. With respect to the second objective, the results demonstrated that the authors' main events measure is stable for adults with aphasia, complementing previous work that indicated stability of the measure with healthy adults (Wright et al., 2005).

Proportion of main events

The finding that individuals with and without aphasia differed in the proportion of main events they related is not surprising. Our findings are consistent with those of other researchers who have reported differences in narrative discourse between healthy adults and adults with aphasia (Bond et al., 1983; Ulatowska et al., 1981, 2003). One possible explanation for this finding is that individuals with aphasia, relative to healthy adults, were less able to produce the *quantity* or the *complexity* of language for conveying relationships between ideas. However, it is doubtful that this alone could account for the differences observed, since linguistic complexity was not a factor in our scoring system. At the same time, because we did not conduct a syntactic analysis, this possibility cannot be ruled out. Future studies should attempt to examine the interplay between expressive syntactic abilities, picture comprehension, and the ability to express relationships among ideas.

A second underlying phenomenon that may have contributed to these results is the possibility that individuals with aphasia are compromised in their ability to *infer* relationships between characters and events as compared to healthy adults. Although a definitive explanation is beyond the scope of this paper, future studies should include a comprehension measure designed to tease out whether or not individuals with aphasia are capable of the inferences necessary to understand the events in the pictures. This is critical given research suggesting a difference in the comprehension of sentence level and discourse comprehension tasks for individuals with aphasia (Caplan & Evans, 1990).

It should be noted that the findings cannot be extended to any one particular aphasia type, because participants displayed a range of aphasia types. Moreover, the fact that our sample size was small is a limitation to the study. As such, these results should be viewed as preliminary.

The participants in the current study were similar in age and education to older participants in our previous studies (Capilouto et al., 2005; Wright et al., 2005). Because both age and education could influence narrative performance, these results need to be interpreted conservatively and can only be generalised to individuals who are similar in age and education to our participants. Further, based on our previous findings that younger and older adults differed significantly on proportion of main events produced, we would expect that younger adults with aphasia would perform better than their older counterparts, assuming they are similar in severity and aphasia typology.

Task and relating main events

Results of the impact of task on the proportion of main events expressed are consistent with the authors' previous investigations; participants communicated a greater proportion of relationships between characters, actions, and ideas in response to sequential versus single pictures. These results provide additional support for the notion that the nature of the task impacts language performance (Coelho, 2002; Cooper, 1990; Liles, Coelho, Duffy, & Zalagens, 1989). That is, there is substantial evidence to suggest that the quality and quantity of a given narrative sample varies in response to a single picture stimulus versus a sequential picture stimulus. For example, Potechin, Nicholas, and Brookshire (1987) compared the verbal descriptions of a single picture and a picture sequence in 10 individuals with aphasia. They found that the single picture yielded a shorter sample than the picture sequence. Moreover, although samples resulting from a single picture were adequate for word-by-word analyses (i.e., within sentence analyses), samples obtained from a sequential picture were better suited to sentence level analyses (i.e., between sentence analyses). Our results support this clinical distinction in that regardless of group, our subjects related a higher proportion of main events in response to sequential versus single pictures. As noted in Capilouto et al. (2005) it may be that the sequential pictures acted as a scaffold, by providing participants with temporal and causal information about the story. In the absence of such a scaffold (i.e., in the case of the single pictures) participants may have been more prone to simply "list" events without considering underlying relationships between them. In sum, results reinforce the notion that discourse is multifaceted and requires a variety of tasks and analyses for comprehensive assessment.

Of some interest, the NI group and aphasia group differed significantly in proportion of main events told for each stimulus type (single, sequential). This finding suggests that *both* types of stimuli may eventually be shown to be diagnostically sensitive enough for a main events analysis to distinguish groups of healthy adults from groups of individuals with aphasia. As stated previously, interpretation of these results must be guarded given the small n in our sample.

From a task development standpoint, it should be noted that the NI group did not perform at or near ceiling level on the measure. This finding is a replication of previous results (Capilouto et al., 2005; Wright et al., 2005) and may be due to our use of a binary scoring system; participants needed to provide all the necessary information for the main event to be scored as correct. In contrast, a multi-dimensional scoring system, similar to Nicholas and Brookshire's (1995), would likely have resulted in ceiling effects. We chose not to award partial credit since doing so would have masked a participant's ability to express the relationships of

interest. For example, by categorising a main event as ''accurate but incomplete'', a participant could list a series of depicted events without ever expressing the temporal and causal relationships between those events.

The instructions provided may have contributed to more modest performance in conveying relationships between events and characters. That is, the instructions may not have directed participants to consider relationships included in the pictures. Indeed, Olness (2005) has suggested that instructions that specifically request a beginning, middle, and end may result in narratives of greater quality.

Reliability of the main events measure

In our previous studies (Capilouto et al., 2005; Wright et al., 2005), we have found acceptable test–retest reliability for our main events measure in samples of healthy adults. The results reported here add to that finding, suggesting that the main events measure may be useful for characterising the narrative discourse abilities of individuals with aphasia. The fact that the proportion of main events told was greater for sequential versus single pictures led us to consider whether the reliability of samples would also vary according to the task. To investigate this idea, we examined the relationship between task performance and task stimulus across the two sessions. Results showed that, for healthy adults, sequential pictures appeared to yield more reliable narrative discourse samples as compared to single pictures. The correlation coefficient for proportion of main events across sessions was significant for sequential picture stimuli, $r = .93$, $p < .001$, but not significant for the samples obtained via single pictures, $r = .51$, $p = .195$.

For adults with aphasia, however, a different picture emerged. Both the single and sequential picture stimuli yielded significant correlations for the narrative samples across the two sessions, $r = .73$, $p = .039$, $r = .88$, $p = .004$, respectively. This finding provides support for a somewhat more flexible clinical application of picture stimuli in language sample elicitation. Even though picture sequences elicited a higher proportion of main events, the use of such stimuli is not necessarily qualitatively or quantitatively different from what is obtained via single pictures. Our reliability findings provide a foundation for eventually using the main event measure as a possible pre- and post-treatment measure. However, until we have a clearer explanation for why groups of individuals with aphasia differ from healthy adults on this measure; how picture comprehension, syntactic skills, and inferencing skills contribute to one's performance on the task; and how treatment influences the identified skills and abilities, it would be premature to consider this analysis a measure of change in response to treatment.

Conclusions and clinical implications

Adults with aphasia have greater difficulty than their healthy counterparts in expressing relations and causal links among units of information. Consistent with previous work were our findings that the proportion of main events provided by participants differed significantly for each picture type (i.e., single picture, sequential pictures). However, for individuals with aphasia, measurement of performance was stable over time whether single or sequential picture stimuli were used.

From a clinical perspective the findings suggest, first, that the measurement of narrative discourse is an important aspect of the assessment of individuals with

aphasia, because of the inherent importance of relaying the relationships between characters and events in everyday life, and because those with aphasia appear to have greater difficulty than healthy counterparts with this particular aspect of narrative discourse. Implications of this research are consistent with those of other studies, the authors of which have emphasised the clinical importance of narrative discourse analysis in adults with aphasia (Armstrong, 2000; Doyle, McNeil, Spencer, Goda, Cottrell, & Lustig, 1998; Olness, Ulatowska, Wertz, Thompson, & Auther, 2002; Prins et al., 1978). Second, this study identifies narrative discourse as a *measurable* area of difficulty. Main events analysis holds promise as a reliable measure of a client's performance in response to treatment, such that change could be attributable to the treatment itself, rather than to instability of the measure.

A third clinical contribution of the present study is that it offers an analysis that is structured enough to provide some modest controls for the elicited sample. Clinicians have long been advised to obtain a "language sample" as part of a comprehensive evaluation. Nicholas and Brookshire's (1993) stimuli, in conjunction with the authors' main events analysis, provide the necessary structure to obtain objective, reliable information about the nature of a client's discourse abilities. However, as with other clinic-based language sample tasks, the lack of ecological validity for the picture description-based measure is a weakness.

A final implication, related to clinical endeavours, is that sequential pictures may not be critical in the sampling of narrative discourse in individuals with aphasia. On the contrary, we found that single picture stimuli resulted in adequate stability of narrative discourse measurement. Our findings notwithstanding, sequential pictures may be preferable, because they tend to result in larger, more complete, and therefore inherently more valid eventcast narrative discourse samples. Of course, these conclusions relate only to the specific measures of the current study and not to sampling and analysis of discourse in general. Although the results of this investigation are preliminary and require replication with larger samples of persons with aphasia, they suggest that main events analysis holds promise as a clinical and research tool.

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