Conversational discourse analysis: appropriate and useful sample sizes

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Abstract

The time required to transcribe and analyse lengthy conversation puts conversational discourse analysis (CDA) out of reach for most practising clinicians. However, standards have not been established for appropriate conversation sample size. Data are presented supporting the use of conversation samples of 5–10 minutes when studying conversation repair, speaking rate, and utterance length. Ten minute samples adequately represented 'parent' conversations from which they were derived when measuring conversation repair for six of eight cases. For measuring speaking efficiency (length of utterance and speaking rate) 5 minutes was adequate for all eight cases. For variables occurring once per minute, 10 minute samples were adequate, and for variables occurring three times per minute, 5 minute samples were adequate.

Introduction

Conversation has been used to study several populations and communicative contexts recently, including children with specific language impairment (Fujiki *et al.* 1990, Tomasello *et al.* 1990), psychotherapy interactions (Weingarten 1992), the study of gossip (Besnier 1989), traumatic brain injury (Damico and Housewright 1992, Damico and Schweitzer 1991) and aphasia (Boles 1996, 1997, Ferguson 1994, Perkins 1995). Conversational discourse analysis (CDA) has not enjoyed widespread clinical use, possibly because of the time required for transcription and analysis. Sampling of conversational discourse is one method for circumventing the laborious task of transcribing lengthy conversations. However, the issue of sample duration becomes problematic when the variables examined are unevenly dispersed. For example, when a variable occurs once every 20 minutes, a 5 minute sample is unlikely to estimate it adequately. Further, if the variable occurs eight times in 1 minute and not at all for 10 minutes, a 5 minute sample is unsatisfactory.

In a study involving analysis of clinician–patient interactions, Brookshire *et al.* (1978) concluded that any sampling procedure should sample events distributed throughout sessions. For example, a series of 1 minute samples taken every 5 minutes resulted in only 3% error for 39 categories. Brookshire and Nicholas (1994) concluded that short connected speech samples were highly unstable from test to test. The purpose of the current study is to present data supporting the use of conversation discourse samples of 5–10 minutes when studying conversation repair, speaking rate, and utterance length. The current study is one approach to quantifying the degree to which events are evenly distributed, as expressed by Brookshire *et al.* (1978) and Brookshire and Nicholas (1994).

It is important to note that the method of CDA is quite different from the method

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Table 1. **Results on standardized, non-standardized, and satisfaction measures**

	N.K.Y.		W.A.N.		L.S.O.		L.C.P.	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Western Aphasia Battery[a] (AQ)	66·3	72·3	66·7	74·6	64·4	64·3	85·4	85·2
Aphasia type	Broca's		Anomic		Transcortical sensory		Anomic	
Communicative Abilities in Daily Living[b]	92	117	109	117	54	59	125	126
Pre-morbid occupation	Elementary school teacher		Clerical worker		Retired construction contractor		Clerical worker	
Lesion	Left basal ganglia haemorrhagic infarct		Left hemisphere thromboembolic infarct		Left hemisphere thromboembolic infarct		Left hemisphere haemorrhage secondary to arteriovenous malformation (×2)	
Time post-onset	7 months		7 years		1 year		20 years; 1 year	
Partner	Sister-in-law		Living partner		Daughter		Husband	

[a] Kertesz (1982).
[b] Holland (1980).

Table 2. Measures of verbal output

Words	Total words spoken by participant during the sample Excluded were gestures and other non-verbal communicative efforts
Utterances	Total utterances spoken by participant during the sample. These were defined according to guidelines by Kennedy *et al.* (1994) as follows: 1. a period of silence by the speaker signalling the relinquishment of the turn; 2. an intonational change by the speaker signalling the relinquishment of the turn; 3. the taking of a turn, or interruption, in the absence of a signal by the speaker; 4. the grammatical completion of an ideational unit or strings of ideational units; or 5. one-word utterances such as 'yes', 'oh', 'uh-huh', if occurring with characteristics 1 or 2
Self-repair	Including self-correction, repeating oneself, paraphrasing oneself, etc.
Other-repair	
1. Cue	Any 'hint' given where it appears the speaker is aware of the target utterance and is attempting to induce that target
2. Model	Often follows a cue, where the speaker simply speaks the target utterance for the other participant
3. Reflection	Rephrasing or paraphrasing what the other participant has said. May be used specifically to induce a known target, and/or simply as a kind of 'bookmark' to keep the conversation flowing
4. Request for clarification	A specific request for a repetition or rephrasing when the speaker did not understand the other participant's utterance
5. Undifferentiated request for clarification	Similar to request for clarification above, but often expressed as simply, 'what?', 'huh?', etc.

of conversation analysis (CA). First, the focus of CA is always on the case rather than on groups of individuals. Second, CA is designed to capture the most salient properties of conversation and requires the researcher to let the conversation 'reveal itself' (Psathas 1995). That is, the researcher does not determine *a priori* what variables are most salient in a conversation. In the present study, five variables were chosen for study from conversational discourse samples obtained in a clinical environment. The reader is referred to Simmons-Mackie and Damico (1996) for a CA analysis which demonstrates usefulness for the clinician.

Methods

Participants

Four dyads comprising an adult with aphasia and his or her significant other engaged in weekly conversations for use in previous research (Boles 1997). In that study, CDA was used to monitor the communicative progress of four individuals with aphasia. Subjects were consecutive admissions to a university clinic who had (i) a diagnosis of aphasia; (ii) a conversational partner willing to participate; and (iii) no prior history of hearing, vision, psychiatric or other neurologic impairments. Demographic information appears in table 1. Eleven conversations
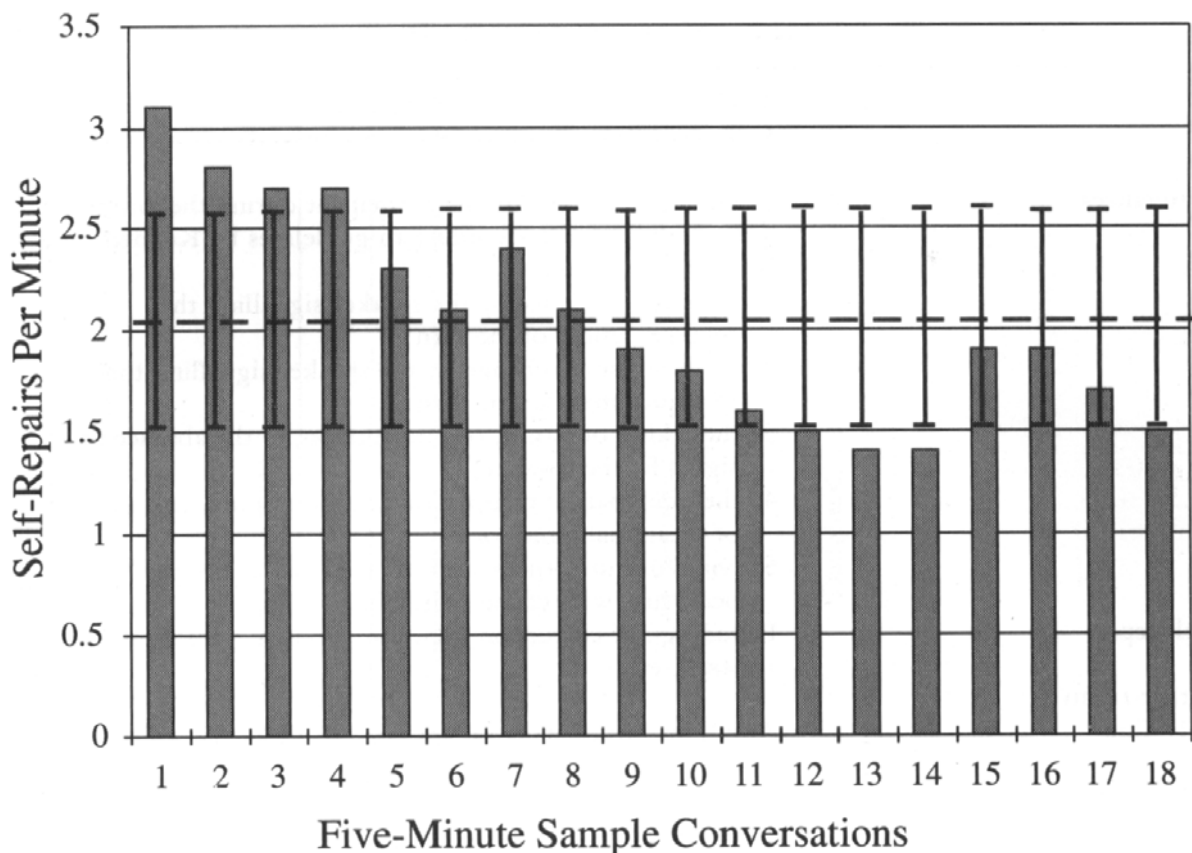
Figure 1.   Eighteen conversations representing a parent conversation. The mean of the parent
conversation (2·1) is represented by the dashed line. Coefficient of variation for these data is
0·25. Thus, the standard deviation of this distribution (represented by the error bars) is 25 %
of the mean for the parent conversation.

of 15–40 minutes were obtained per dyad—the first three on consecutive days and
the following eight at weekly intervals. These conversations were elicited in the
clinic prior to the first therapy session each week. Participants were simply
instructed to talk about anything they wished. Paper and pencils were present, but
no extraneous stimuli were provided.

Conversational discourse analysis

Conversations were videotaped and transcribed orthographically. Measures of
verbal efficiency (see table 2) comprised words per utterance, frequency of words,
utterances, and conversation repair (Sacks *et al.* 1974). Conversation repair was
defined as an attempt to modify one's own or the other person's utterance for the
purpose of clarification. Repairs were further classified into self- and other-repair
(table 2).

Reliability

A second judge transcribed and coded 20 % of all conversational interaction. For
this purpose, nine of the 44 conversations were re-transcribed and recoded by the
investigator and by a trained graduate student. These nine conversations were
chosen at random from the pool of conversations. Inter-judge reliability was
established for transcribed words (13 975/14 558 agreements, 0·96), utterance
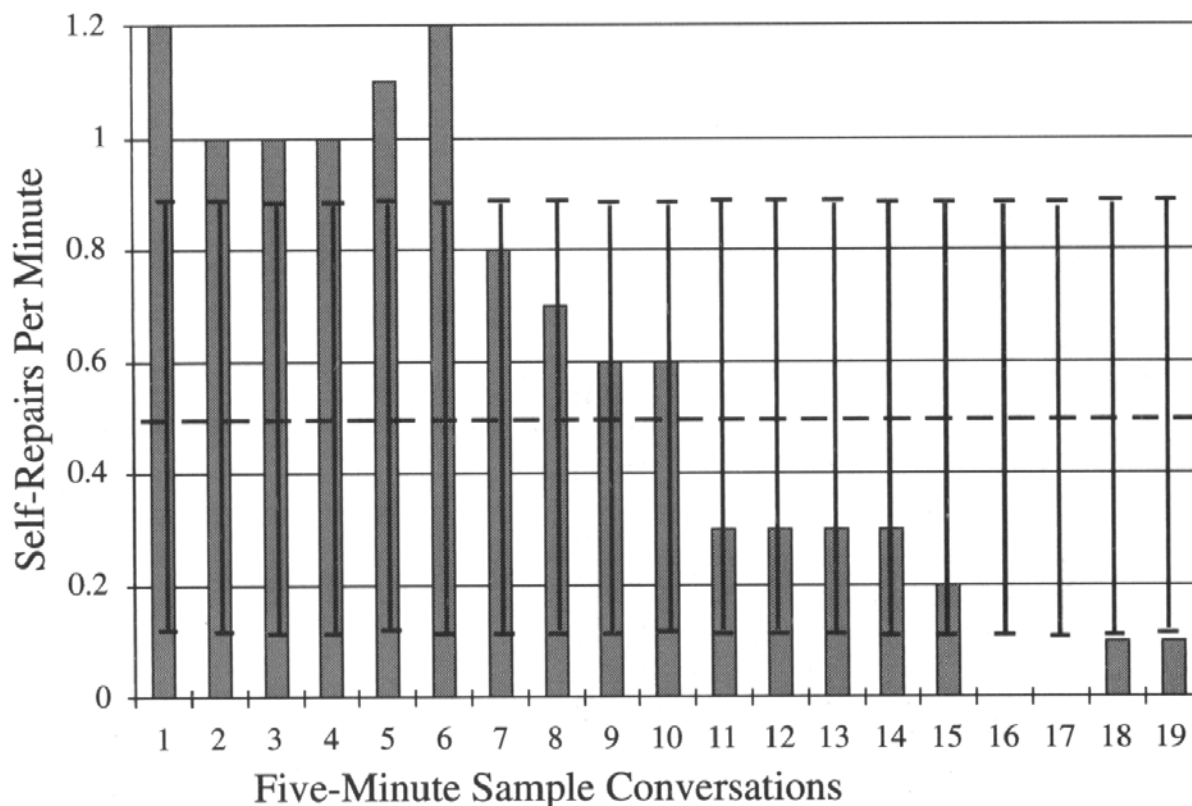
Figure 2. Nineteen conversations representing a parent conversation. The mean of the parent conversation (0·50) is represented by the dashed line. Coefficient of variation for these data is 0·74. Thus, the standard deviation of this distribution (represented by the error bars) is 74% of the mean for the parent conversation.

boundaries (2705/2847 agreements, 0·95) and for conversation repair (972/1130 agreements, 0·86). Intra-judge reliability was established for transcribed words (14415/14558 agreements, 0·99), utterance boundaries (2829/2847 agreements, 0·99), and for coding of conversation repair (1074/1130 agreements, 0·95). Disagreements were resolved by consensus.

Coefficient of variation

The above 44 'parent' conversations (11 per dyad) were segmented into 5 and 10 minute samples for comparison. Thus, a 20 minute parent conversation yielded 16 consecutive 5 minute samples, with 4/5 overlap in each 5 minute sample. For example, minutes 0–5, 1–6, 2–7 ... 15–20. Similarly, 11 consecutive 10 minute samples were obtained from a 20 minute parent conversation. Means and standard deviations were calculated for dependent variables in the samples.

The coefficient of variation (CV) is a measure of relative dispersion, defined as the standard deviation of the sampling distribution divided by the population mean (Arney 1990). The CV controls for the magnitude of case values. In the present study, for example, the number of words per utterance is vastly different for the person with Broca's aphasia compared to non-aphasic participants. A unitless number, the CV quantifies the degree to which, in this case, sample conversations adequately represent parent conversations.

The current authors considered the mean of the parent conversation to represent a population mean. Thus, the calculation of the CV for self-repair was obtained by

Table 3. Frequency of occurrence for parent conversations, dyad 1

Conversation number	Minutes	Self-repairs	Other-repairs	Words per utterance	Words per conversation	Utterances per conversation
N.K.Y.						
1	40	21 (0·53)	2 (0·05)	1·1	169 (4·23)	160 (4·00)
2	40	20 (0·50)	2 (0·05)	1·1	169 (4·23)	160 (4·00)
3	40	7 (0·18)	3 (0·08)	1·2	211 (5·28)	181 (4·53)
4	27	11 (0·41)	1 (0·04)	1·4	166 (6·15)	120 (4·44)
5	36	18 (0·50)	0 (0)	1·5	181 (5·03)	118 (3·28)
6	28	16 (0·57)	1 (0·04)	1·4	206 (7·36)	146 (5·21)
7	27	56 (2·07)	0 (0)	2·1	367 (13·59)	179 (6·63)
8	28	35 (1·25)	4 (0·14)	1·7	279 (9·96)	163 (5·82)
9	24	44 (1·83)	0 (0)	1·7	231 (9·63)	134 (5·58)
10	25	39 (1·56)	2 (0·08)	1·8	266 (10·64)	146 (5·84)
11	19	23 (1·21)	1 (0·05)	1·6	185 (9·74)	114 (6·00)
T.A.N. (conversational partner)						
1	40	52 (1·30)	110 (2·75)	7·4	2338 (58·45)	317 (7·93)
2	40	32 (0·80)	159 (3·98)	6·5	1739 (43·48)	269 (6·73)
3	40	36 (0·90)	123 (3·08)	7·3	2226 (55·65)	305 (7·63)
4	27	36 (1·33)	72 (2·67)	8·8	1910 (70·74)	216 (8·00)
5	36	52 (1·44)	56 (1·56)	9·8	2284 (63·44)	233 (6·47)
6	28	22 (0·79)	88 (3·14)	7·1	1617 (57·75)	229 (8·18)
7	27	10 (0·37)	120 (4·44)	4·1	806 (29·85)	197 (7·30)
8	28	31 (1·11)	80 (2·86)	6·1	1444 (51·57)	238 (8·50)
9	24	10 (0·42)	63 (2·63)	5·4	808 (33·67)	150 (6·25)
10	25	9 (0·36)	106 (3·44)	5·3	890 (35·60)	168 (6·72)
11	19	24 (1·26)	61 (3·21)	6·2	904 (47·58)	146 (7·68)

Upper half of table contains data for N.K.Y., while the lower half contains data pertaining to T.A.N., the non-aphasic communication partner. Values outside parentheses represent occurrences per parent conversation. Values inside parentheses represent values per minute.

dividing the standard deviation for self-repair for the 10 minute segments by the mean number of self-repairs per minute for the parent conversation. This was computed for each of the eleven parent conversations for each member of the dyad, then repeated for the 5 minute segments.

When the CV is above 0·50, it is advisable to abandon it as a measure of dispersion (McCormick 1941). Although this 0·50 figure is somewhat arbitrary, a graphic illustration should clarify. Figure 1 represents self-repair scores. The apparent low degree of variability in these 5 minute samples is reflected in the CV value of 0·25. A value of 0·25 indicates that the standard deviation for that distribution is 25% as large as the mean for that distribution (see error bars in figures 1 and 2). Figure 2, derived from a different parent conversation, shows a similar scenario, with the variability reflected in the CV of 0·74. Thus a 5 minute sample adequately represents the parent conversation for the data in figure 1, but not for the parent conversation in figure 2.

Results

For clarification, tables 3–6 represent the values for each of the five variables in the parent conversations for dyads 1–4, respectively. The CVs in tables 7–10 are based on 5 and 10 minute segments of the parent conversations represented in tables 3–6.

Table 4. Frequency of occurrence for parent conversations, dyad 2

Conversation number	Minutes	Self-repairs	Other-repairs	Words per utterance	Words per conversation	Utterances per conversation
W.A.N.						
1	27	5 (0·19)	16 (0·59)	3·8	661 (24·48)	172 (6·37)
2	23	32 (1·39)	2 (0·09)	5·5	547 (23·78)	100 (4·35)
3	26	20 (0·77)	10 (0·39)	4·7	424 (16·31)	90 (3·46)
4	24	30 (1·25)	9 (0·38)	3·9	456 (19·00)	118 (4·92)
5	19	17 (0·90)	9 (0·47)	4·0	340 (17·89)	86 (4·53)
6	18	14 (0·78)	7 (0·33)	4·0	261 (14·50)	65 (3·61)
7	18	22 (1·22)	7 (0·39)	4·3	408 (22·67)	96 (5·33)
8	17	14 (0·82)	8 (0·47)	4·4	297 (17·47)	68 (4·00)
9	18	20 (1·11)	8 (0·44)	6·4	403 (22·39)	63 (3·50)
10	23	11 (0·48)	7 (0·30)	5·7	311 (13·52)	55 (2·39)
11	21	24 (1·14)	6 (0·29)	4·0	497 (23·67)	124 (5·91)
R.I.C. (conversational partner)						
1	27	27 (1·00)	87 (3·22)	8·4	1961 (71·26)	233 (8·56)
2	23	68 (2·96)	17 (0·74)	11·0	1437 (62·48)	131 (5·70)
3	26	65 (2·50)	6 (0·23)	11·8	1724 (66·31)	146 (5·62)
4	24	74 (3·08)	41 (1·71)	10·0	1658 (69·08)	166 (6·92)
5	19	44 (2·32)	37 (1·95)	10·0	1133 (59·63)	113 (5·95)
6	18	70 (3·89)	20 (1·11)	12·0	1378 (76·56)	115 (6·39)
7	18	53 (2·94)	39 (2·17)	10·3	1358 (75·44)	132 (7·33)
8	17	45 (2·65)	11 (0·65)	11·6	1206 (70·94)	104 (6·12)
9	18	70 (3·89)	4 (0·22)	12·3	1360 (75·56)	111 (6·17)
10	23	41 (1·78)	18 (0·78)	10·1	1237 (53·78)	122 (5·30)
11	21	32 (1·52)	29 (1·38)	8·7	1157 (55·10)	133 (6·33)

Upper half of table contains data for W.A.N., while the lower half contains data pertaining to R.I.C., the non-aphasic communication partner. Values outside parentheses represent occurrences per parent conversation. Values inside parentheses represent values per minute.

The authors arbitrarily decided that 'adequate representativeness' would be met when 8 of 11 sample conversations achieved a 0·50 cut-off point for the CV.

Dyad 1 (*tables 3, 7*)

Self-repair

Self-repair was distributed such that a 10 minute sample adequately estimated that information for T.A.N., but not for N.K.Y. Five minute samples were not adequate.

Other-repair

Ten minute samples did not adequately represent parent conversations for other-repair for N. K. Y. in any conversation. It should be noted that her frequency of other-repair was rarely more than twice per parent conversation (see table 4). For T.A.N., 10 minute samples adequately represented parent conversations. Five minute samples did not adequately represent parent conversations for N.K.Y. or T.A.N.

Table 5. Frequency of occurrence for parent conversations, dyad 3

Conversation number	Minutes	Self-repairs	Other-repairs	Words per utterance	Words per conversation	Utterances per conversation
L.S.O.						
1	20	6 (0·30)	64 (3·20)	2·3	485 (24·25)	211 (10·55)
2	20	53 (2·65)	44 (2·20)	4·4	989 (49·45)	224 (11·20)
3	18	14 (0·78)	21 (1·17)	3·1	478 (26·56)	155 (8·61)
4	15	5 (0·33)	15 (1·00)	3·5	389 (25·93)	112 (7·47)
5	15	11 (0·73)	21 (1·40)	3·8	472 (31·47)	123 (8·20)
6	15	19 (1·27)	16 (1·07)	4·5	524 (34·93)	117 (7·80)
7	16	17 (1·06)	13 (0·81)	3·4	404 (25·25)	120 (7·50)
8	15	66 (4·40)	31 (2·07)	4·9	1045 (69·67)	214 (14·27)
9	15	48 (3·20)	9 (0·60)	4·7	773 (51·53)	163 (10·87)
10	15	65 (4·33)	7 (0·47)	5·7	874 (58·27)	153 (10·20)
11	15	52 (3·47)	19 (1·27)	4·0	700 (46·67)	175 (11·67)
S.Z.A. (conversational partner)						
1	20	104 (5·20)	54 (2·70)	5·6	1715 (85·75)	304 (15·20)
2	20	86 (4·30)	50 (2·50)	5·8	1450 (72·50)	248 (12·40)
3	18	87 (4·83)	51 (2·83)	6·7	1468 (81·56)	218 (12·11)
4	15	40 (2·67)	48 (3·20)	6·4	860 (57·33)	134 (8·93)
5	15	30 (2·00)	47 (3·13)	5·7	810 (54·00)	143 (9·53)
6	15	34 (2·27)	42 (2·80)	6·0	729 (48·60)	122 (8·13)
7	16	34 (2·13)	48 (3·00)	6·8	916 (57·25)	135 (8·44)
8	15	41 (2·73)	42 (2·80)	4·7	859 (57·27)	223 (12·27)
9	15	14 (0·93)	77 (5·13)	5·1	706 (47·07)	138 (9·20)
10	15	6 (0·40)	53 (3·53)	3·8	477 (31·80)	124 (8·27)
11	15	42 (2·80)	74 (4·93)	4·4	803 (53·53)	214 (12·20)

Upper half of table contains data for L.S.O., while the lower half contains data pertaining to S.Z.A., the non-aphasic communication partner. Values outside parentheses represent occurrences per parent conversation. Values inside parentheses represent values per minute.

Measures of verbal efficiency

For verbal efficiency, both 10 and 5 minute samples adequately represented parent conversations.

Dyad 2 (*tables 4, 8*)

Self-repair

Ten minute samples adequately represented parent conversations for self-repair for both participants. Five minute samples were not adequate.

Other-repair

Ten minute samples adequately represented parent conversations for other repair for W.A.N., but not for R.I.C. Five minute conversations were inadequate estimates of parent conversations.

Measures of verbal efficiency

Both 5 and 10 minute samples adequately represented parent conversations for both participants in dyad 2.

Table 6. Frequency of occurrence for parent conversations, dyad 4

Conversation number	Minutes	Self-repairs	Other-repairs	Words per utterance	Words per conversation	Utterances per conversation
L.C.P.						
1	15	44 (2·93)	5 (0·33)	5·5	536 (35·73)	97 (6·47)
2	15	31 (2·07)	4 (0·27)	4·7	479 (31·93)	103 (6·87)
3	15	46 (3·07)	9 (0·60)	4·2	525 (35·00)	125 (8·33)
4	15	32 (2·13)	8 (0·53)	4·2	410 (27·33)	98 (6·53)
5	15	34 (2·27)	4 (0·27)	6·5	521 (34·73)	80 (5·33)
6	15	44 (2·93)	7 (0·47)	3·8	477 (31·80)	126 (8·40)
7	15	41 (2·73)	6 (0·40)	4·6	499 (33·27)	108 (7·20)
8	15	53 (3·53)	2 (0·13)	4·3	478 (31·87)	111 (7·40)
9	15	31 (2·07)	4 (0·27)	5·6	611 (40·73)	109 (7·27)
10	15	25 (1·67)	6 (0·40)	5·1	471 (31·40)	92 (6·13)
11	15	18 (1·20)	9 (0·60)	5·1	505 (33·67)	99 (6·60)
C.H.S. (Conversational partner)						
1	15	12 (0·80)	18 (1·20)	4·7	349 (23·27)	75 (5·00)
2	15	16 (1·07)	32 (2·13)	5·3	502 (33·47)	95 (6·33)
3	15	20 (1·33)	35 (2·33)	4·7	514 (34·27)	110 (7·33)
4	15	23 (1·53)	24 (1·60)	6·1	608 (40·53)	100 (6·67)
5	15	12 (0·80)	20 (1·33)	5·3	342 (22·80)	65 (4·33)
6	15	40 (2·67)	32 (2·13)	4·9	700 (46·67)	142 (9·47)
7	15	39 (2·60)	24 (1·60)	5·3	640 (42·67)	120 (8·00)
8	15	34 (2·27)	26 (1·73)	4·5	504 (33·60)	112 (7·47)
9	15	8 (0·53)	15 (1·00)	4·9	374 (24·93)	76 (5·07)
10	15	7 (0·47)	22 (1·47)	6·2	506 (33·73)	81 (5·40)
11	15	18 (1·20)	20 (1·33)	6·4	709 (47·27)	110 (7·33)

Upper half of table contains data for L.C.P., while the lower half contains data pertaining to C.H.S., the non-aphasic communication partner. Values outside parentheses represent occurrences per parent conversation. Values inside parentheses represent values per minute.

Dyad 3 (tables 5, 9)

Self-repair

Ten minute samples adequately represented parent conversations for self-repair in all conversations for both participants. Five minute samples were adequate for S.Z.A.

Other-repair

Ten minute samples adequately represented parent conversations for other-repair for both participants. Five minute samples were adequate for S.Z.A.

Measures of verbal efficiency

Both 5 and 10 minute samples adequately represented parent conversations for both participants in dyad 3.

Table 7. Coefficients of variation for dyad 1 (N.K.Y. and T.A.N.)

Conversation number	Self-repair/min		Other-repair/min		Words/utterance		Words/min		Utterances/min	
	10 min	5 min	10 min	5 min	10 min	5 min	10 min	5 min	10 min	5 min
N.K.Y.										
1 (40)	0·56	0·98	1·01	1·82	0·08	0·22	0·19	0·42	0·15	0·35
2 (40)	0·66	0·85	1·20	2·24	0·23	0·34	0·26	0·46	0·28	0·41
3 (40)	1·29	1·01	3·12	1·95	0·04	0·10	0·24	0·26	0·22	0·23
4 (27)	0·93	1·52	1·38	2·09	0·06	0·25	0·36	0·47	0·36	0·48
5 (36)	0·67	1·00	N/A	N/A	0·21	0·27	0·47	0·57	0·29	0·39
6 (28)	0·74	0·92	0·88	1·58	0·14	0·32	0·37	0·51	0·37	0·48
7 (27)	0·25	0·39	N/A	N/A	0·08	0·19	0·09	0·21	0·02	0·03
8 (28)	0·21	0·60	0·63	1·14	0·13	0·18	0·18	0·31	0·09	0·24
9 (24)	0·21	0·24	N/A	N/A	0·07	0·20	0·24	0·16	0·26	0·21
10 (25)	0·24	0·38	1·07	1·28	0·08	0·13	0·17	0·26	0·14	0·23
11 (19)	0·29	0·60	2·00	1·93	0·29	0·14	0·34	0·34	0·37	0·29
T.A.N.										
1 (40)	0·69	0·57	0·41	0·40	0·12	0·16	0·13	0·23	0·26	0·28
2 (40)	1·26	1·58	0·27	0·38	0·26	0·32	0·30	0·40	0·16	0·29
3 (40)	0·25	0·55	0·12	0·25	0·11	0·18	0·14	0·31	0·08	0·22
4 (27)	1·08	0·77	0·84	0·55	0·30	0·26	0·14	0·25	0·30	0·24
5 (36)	0·33	0·50	0·44	0·63	0·11	0·16	0·14	0·24	0·11	0·17
6 (28)	0·13	0·61	0·55	0·71	0·16	0·32	0·12	0·27	0·17	0·24
7 (27)	0·48	0·82	0·09	0·16	0·17	0·30	0·20	0·34	0·03	0·06
8 (28)	0·44	0·68	0·18	0·36	0·18	0·28	0·22	0·31	0·07	0·16
9 (24)	0·43	0·67	0·32	0·40	0·09	0·21	0·34	0·30	0·31	0·27
10 (25)	0·35	0·81	0·18	0·39	0·17	0·33	0·12	0·24	0·54	0·87
11 (19)	0·49	0·92	0·35	0·51	0·03	0·14	0·04	0·34	0·85	1·24

Values of 0·50 or less represent 'acceptable' representations of parent conversations. Values in parentheses in the first column represent the length in minutes of parent conversations. Upper half of table contains data for N.K.Y.; the lower half contains data pertaining to T.A.N., the non-aphasic communication partner. 'N/A' refers to zero occurrences of that variable.

Dyad 4 (tables 6, 10)

Self-repair

Ten minute samples adequately represented parent conversations for self-repair for both participants. Five minute samples were adequate for L.C.P., but not for C.H.S.

Other-repair

Ten minute samples adequately represented parent conversations for other-repair for both participants. Five minute samples were adequate for C.H.S., but not for L.C.P.

Measures of verbal efficiency

Both 5 and 10 minute samples adequately represented parent conversations for both participants in dyad 4.

Overall pattern

A clear pattern noted from the findings of this study was an even dispersion of variables, given a minimum occurrence of that variable. That is, given a frequency of occurrence of once per minute, a 10 minute segment was adequate in nearly all cases, and with a frequency of three times per minute, a 5 minute segment was

Table 8. Coefficients of variation for dyad 2 (W.A.N. and R.I.C.)

Conversation number	Self-repair/min		Other-repair/min		Words/utterance		Words/min		Utterances/min	
	10 min	5 min	10 min	5 min	10 min	5 min	10 min	5 min	10 min	5 min
W.A.N.										
1 (27)	0·27	0·73	0·41	0·72	0·13	0·23	0·25	0·32	0·30	0·41
2 (23)	0·47	0·67	0·01	1·18	0·07	0·14	0·14	0·29	0·16	0·30
3 (26)	0·27	0·53	0·25	0·78	0·17	0·33	0·12	0·26	0·18	0·26
4 (24)	0·39	0·81	0·58	0·92	0·26	0·33	0·30	0·71	0·20	0·40
5 (19)	0·12	0·29	0·27	0·64	0·21	0·36	0·16	0·32	0·05	0·09
6 (18)	0·35	0·69	0·18	0·49	0·13	0·24	0·12	0·23	0·16	0·27
7 (18)	0·26	0·41	0·15	0·35	0·04	0·11	0·14	0·22	0·13	0·20
8 (17)	0·12	0·22	0·11	0·45	0·07	0·11	0·06	0·18	0·03	0·16
9 (18)	0·13	0·41	0·49	1·02	0·02	0·08	0·13	0·24	0·13	0·24
10 (23)	0·47	0·89	0·53	0·83	0·14	0·33	0·13	0·33	0·15	0·33
11 (21)	0·11	0·23	0·85	1·32	0·06	0·12	0·06	0·14	0·08	0·12
R.I.C.										
1 (27)	0·51	0·65	0·63	0·98	0·28	0·36	0·16	0·23	0·13	0·24
2 (23)	0·10	0·21	0·33	0·75	0·11	0·24	0·12	0·23	0·04	0·13
3 (26)	0·27	0·35	0·61	1·11	0·09	0·12	0·19	0·24	0·10	0·15
4 (24)	0·79	0·72	0·71	0·78	0·13	0·31	0·54	0·46	0·39	0·25
5 (19)	0·05	0·39	0·12	0·27	0·11	0·24	0·08	0·19	0·05	0·20
6 (18)	0·34	0·60	0·28	0·65	0·05	0·11	0·24	0·44	0·20	0·35
7 (18)	0·17	0·37	0·20	0·51	0·02	0·13	0·05	0·17	0·06	0·12
8 (17)	0·05	0·11	0·39	0·84	0·02	0·10	0·04	0·07	0·03	0·13
9 (18)	0·07	0·18	0·15	1·68	0·03	0·07	0·08	0·18	0·07	0·13
10 (23)	0·32	0·43	0·61	0·94	0·05	0·11	0·08	0·16	0·06	0·13
11 (21)	0·17	0·61	0·36	0·66	0·09	0·18	0·08	0·16	0·03	0·08

Values of 0·50 or less represent 'acceptable' representations of parent conversations. Values in parentheses in the first column represent the length in minutes of parent conversations. Upper half of table contains data for W.A.N.; the lower half contains data pertaining to R.I.C., the non-aphasic communication partner.

adequate in nearly all cases. For example, in table 3, conversation number 11 for N.K.Y. has a frequency of occurrence for self-repairs of 1·21 per minute. Comparing this with the values in table 7, a 10 minute sample adequately represented the parent conversation (CV = 0·29), but a 5 minute sample did not (CV = 0·60). Using these criteria, there were 20 exceptions in 352 data points (excluding words per utterance, as they were not divided by the number of minutes), for a 94% 'hit' rate.

Discussion

This study examined the degree to which five variables were evenly distributed throughout conversations. With even distribution, smaller conversational segments could be used to estimate the occurrence in parent conversations. In examining conversation repair, for seven of the eight participants, 10 minute segments rarely 'missed the mark' for estimating self-repair frequency of parent conversations. The one exception, N.K.Y., rarely self-repaired, thus it was not surprising that these occurrences were unevenly distributed.

'Other-repair' usually took the form of requesting clarification from the other participant. If one were to use a 10 minute sample from the conversations in this study, those samples would yield a reasonable estimate of the parent conversation most of the time for six of the eight participants. Once again, N.K.Y. rarely requested clarification. Similarly, R.I.C. rarely used repair strategies more than twice per minute.

Table 9. Coefficients of variation for dyad 3 (L.S.O. and S.Z.A.)

Conversation number	Self-repair/min		Other-repair/min		Words/utterance		Words/min		Utterances/min	
	10 min	5 min	10 min	5 min	10 min	5 min	10 min	5 min	10 min	5 min
L.S.O.										
1 (20)	0·40	0·58	0·11	0·31	0·12	0·19	0·07	0·12	0·12	0·18
2 (20)	0·42	0·86	0·13	0·25	0·08	0·18	0·09	0·18	0·02	0·06
3 (18)	0·12	0·35	0·23	0·55	0·10	0·22	0·18	0·31	0·09	0·12
4 (16)	0·36	0·61	0·04	0·38	0·04	0·14	0·03	0·11	0·02	0·05
5 (16)	0·27	0·50	0·11	0·23	0·06	0·15	0·06	0·12	0·02	0·04
6 (16)	0·18	0·42	0·19	0·41	0·08	0·12	0·08	0·22	0·03	0·12
7 (17)	0·14	0·55	0·22	0·38	0·13	0·21	0·15	0·28	0·05	0·14
8 (16)	0·46	0·35	0·10	0·48	0·01	0·07	0·03	0·06	0·02	0·06
9 (16)	0·11	0·18	0·39	0·80	0·09	0·18	0·06	0·08	0·06	0·15
10 (16)	0·16	0·25	0·11	0·52	0·09	0·20	0·12	0·25	0·30	0·39
11 (16)	0·18	0·40	0·32	0·69	0·06	0·29	0·06	0·28	0·25	0·31
S.Z.A.										
1 (20)	0·14	0·35	0·17	0·47	0·04	0·11	0·09	0·18	0·06	0·12
2 (20)	0·05	0·16	0·22	0·42	0·09	0·14	0·15	0·27	0·09	0·18
3 (18)	0·11	0·14	0·25	0·36	0·06	0·13	0·07	0·13	0·03	0·06
4 (16)	0·13	0·25	0·14	0·33	0·01	0·07	0·11	0·11	0·03	0·06
5 (16)	0·11	0·37	0·09	0·25	0·04	0·10	0·05	0·16	0·05	0·09
6 (16)	0·13	0·31	0·12	0·27	0·05	0·14	0·10	0·19	0·07	0·10
7 (17)	0·18	0·36	0·25	0·42	0·07	0·15	0·05	0·12	0·03	0·05
8 (16)	0·02	0·27	0·24	0·64	0·07	0·22	0·03	0·14	0·04	0·13
9 (16)	0·26	0·52	0·11	0·25	0·08	0·09	0·11	0·18	0·05	0·13
10 (16)	0·30	0·47	0·08	0·13	0·10	0·15	0·02	0·08	0·33	0·46
11 (16)	0·22	0·42	0·13	0·31	0·05	0·11	0·06	0·18	0·13	0·33

Values of 0·50 or less represent 'acceptable' representations of parent conversations. Values in parentheses in the first column represent the length in minutes of parent conversations. Upper half of table contains data for L.S.O.; the lower half contains data pertaining to S.Z.A., the non-aphasic communication partner.

Five minute conversations may be adequate for measuring speaking efficiency for some individuals. There were few exceptions in this study. Thus a clinician may estimate speaking efficiency from a reasonably brief sample.

This study brings conversational discourse analysis one step closer to clinical use. In short, behaviours which occur at least three times per minute can be estimated reliably with 5 minute samples. Behaviours which occur once per minute can be estimated reliably with 10 minute samples. With a minimum frequency of occurrence standard, clinicians can select variables likely to be amenable to CDA. Less frequently occurring variables can be monitored with larger sample sizes and/or using another method.

Two alternate solutions for using CDA to monitor less frequently occurring variables are to abandon the measurement of such variables or to develop a 'real-time' procedure. The former solution appears unsatisfactory, as many of the behaviours aphasiologists are concerned with may be unevenly distributed. However, it would be useful for the aphasiologist periodically to put aside the picture cards and workbooks and listen to a conversation for 10 minutes, monitoring such variables as repairs and speaking efficiency. A typical didactic therapy interaction might look like the following:

Client: I uh a dog.
Clinician: Yes, and what is this?
Client: Uh, pillow.
Clinician: Very good.

Table 10. Coefficients of variation for dyad 4 (L.C.P. and C.H.S.)

Conversation number	Self-repair/min		Other-repair/min		Words/utterance		Words/min		Utterances/min	
	10 min	5 min	10 min	5 min	10 min	5 min	10 min	5 min	10 min	5 min
L.C.P.										
1 (15)	0·06	0·15	0·31	0·47	0·03	0·14	0·04	0·09	0·04	0·09
2 (15)	0·23	0·32	0·34	0·62	0·07	0·10	0·11	0·15	0·05	0·07
3 (15)	0·17	0·51	0·23	0·58	0·07	0·18	0·10	0·22	0·04	0·05
4 (15)	0·09	0·37	0·25	0·47	0·07	0·16	0·03	0·18	0·04	0·09
5 (15)	0·07	0·20	0·15	6·02	0·05	0·15	0·05	0·16	0·05	0·09
6 (15)	0·09	0·22	0·30	0·67	0·05	0·17	0·08	0·20	0·04	0·07
7 (15)	0·14	0·32	0·01	0·39	0·04	0·16	0·08	0·20	0·06	0·11
8 (15)	0·10	0·33	0·01	1·25	0·03	0·09	0·08	0·18	0·06	0·23
9 (15)	0·35	0·59	0·53	0·49	0·11	0·17	0·16	0·27	0·06	0·13
10 (15)	0·05	0·43	0·19	0·32	0·08	0·16	0·08	0·15	0·03	0·10
11 (15)	0·16	0·33	0·14	0·30	0·11	0·22	0·14	0·31	0·04	0·14
C.H.S.										
1 (15)	0·34	0·58	0·06	0·32	0·02	0·15	0·03	0·16	0·03	0·10
2 (15)	0·28	0·60	0·05	0·14	0·07	0·17	0·07	0·13	0·03	0·09
3 (15)	0·19	0·30	0·15	0·34	0·05	0·12	0·07	0·14	0·03	0·06
4 (15)	0·15	0·36	0·17	0·28	0·05	0·22	0·08	0·31	0·05	0·15
5 (15)	0·30	0·61	0·06	0·18	0·05	0·09	0·15	0·31	0·10	0·32
6 (15)	0·10	0·44	0·05	0·29	0·03	0·12	0·05	0·27	0·05	0·20
7 (15)	0·24	0·45	0·09	0·27	0·04	0·09	0·09	0·24	0·06	0·17
8 (15)	0·11	0·25	0·13	0·21	0·06	0·17	0·06	0·19	0·05	0·17
9 (15)	0·51	0·72	0·10	0·45	0·15	0·25	0·29	0·37	0·14	0·22
10 (15)	0·11	0·48	0·24	0·60	0·04	0·10	0·10	0·17	0·06	0·10
11 (15)	0·37	0·71	0·18	0·36	0·12	0·27	0·16	0·39	0·05	0·11

Values of 0·50 or less represent 'acceptable' representations of parent conversations. Values in parentheses in the first column represent the length in minutes of parent conversations. Upper half of table contains data for L.C.P., while the lower half contains data pertaining to C.H.S., the non-aphasic communication partner.

A conversational interaction where repair strategies are included in the therapy objectives might look like the following:

Client: I uh a dog.
Spouse: The dog? What about the dog?
Client: Sick, sick.
Spouse: Oh yes, she's been sick since this morning.
Clinician: Very good. Reflecting 'What about the dog' seems to help.

The current study does not, of course, provide efficacy data for the use of such strategies. However, this study does support the reliable measurement of such data, given a minimum frequency of occurrence.

References

ARNEY, W. R. 1990, *Understanding Statistics in the Social Sciences* (NY, Freeman), pp. 73–74.

BESNIER, N. 1989, Information withholding as a manipulative and collusive strategy in Nukulaelae gossip. *Language in Society*, **18**, 315–341.

BOLES, L. 1996, When therapy works: conversation analysis on an individual who showed improvement in therapy. Unpublished paper presented at the Clinical Aphasiology Conference, Newport, Rhode Island.

BOLES, L. 1997, Conversation analysis as a dependent measure in communication therapy with four individuals with aphasia. *Asia Pacific Journal of Speech, Language and Hearing*, **2**, 43–61.

BROOKSHIRE, R. H. and NICHOLAS, L. S. 1994, Test–retest stability of measures of connected speech in aphasia. *Clinical Aphasiology*, **22**, 119–133.

BROOKSHIRE, R. H., NICHOLAS, L. S. and KRUEGER, K. 1978, Sampling of speech pathology treatment activities: an evaluation of momentary and interval sampling procedures. *Journal of Speech and Hearing Research*, **21**, 652–667.

DAMICO, J. S. and HOUSEWRIGHT, B. 1992, Conversational style-shifting and traumatic brain injury. A descriptive study. Unpublished paper presented at the American Speech-Language-Hearing Association Annual Convention, San Antonio.

DAMICO, J. S. and SCHWEITZER, L. A. 1991, Getting the message: investigating transactional ability after mild head injury. Unpublished paper presented at the American Speech-Language-Hearing Association Annual Convention, Atlanta.

FERGUSON, A. 1994, The influence of aphasia, familiarity and activity on conversational repair. *Aphasiology*, **8**, 143–157.

FUJIKI, M., BRINTON, B. and SONNENBERG, E. A. 1990, Repair of overlapping speech in conversations of specifically language-impaired and normally developing children. *Applied Psycholinguistics*, **11**, 201–215.

HOLLAND, A. H. 1980, *Communicative Abilities in Daily Living* (Baltimore: University Park).

KENNEDY, M. R. T., STRAND, E. A., BURTON, W. and PETERSON, C. 1994, Analysis of first-encounter conversations of right-hemisphere-damaged adults. *Clinical Aphasiology*, **22**, 67–80.

KERTESZ, A. 1982, *The Western Aphasia Battery* (NY: Grune & Stratton).

McCORMICK, T. C. 1941, *Elementary Social Statistics* (NY: McGraw-Hill), p. 130.

PERKINS, L. 1995, Applying conversation analysis to aphasia: clinical implications and analytic issues. *European Journal of disorders of Communication*, **30**, 372–383.

PSATHAS, G. 1995, *Conversation Analysis: The Study of Talk-in-Interaction* (Thousand Oaks, CA: Sage).

SACKS, H., SCHEGLOFF, E. A., and JEFFERSON, G. 1974, A simplest systematics for the organization of turn-taking for conversation. *Language*, **50**, 696–735.

SIMMONS-MACKIE, N. N. and DAMICO, J. 1996, Accounting for handicaps in aphasia: communicative assessment from an authentic social perspective. *Disability and Rehabilitation*, **18**, 540–549.

TOMASELLO, M., CONTI-RAMSDEN, G. and EWERT, B. 1990, Young children's conversations with their mothers and fathers: differences in breakdown and repair. *Journal of Child Language*, **17**, 115–130.

WEINGARTEN, K. 1992, A consideration of intimate and non-intimate interactions in therapy. *Family Process*, **31**, 45–59.