Narrative Discourse Recovery in Acute Post-Stroke Aphasia: the Importance of Thematic Informativeness

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Background

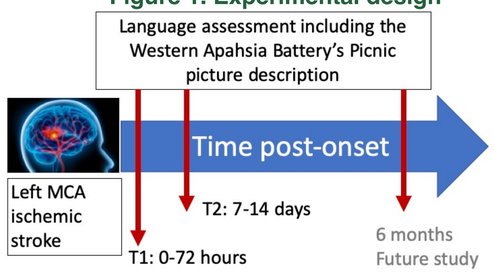
- Discourse analysis is commonly included in comprehensive language assessments of patients with aphasia (PWA).[1]
- However, very few studies documented discourse recovery following stroke,[2] even less in the early stage.
- Some microlinguistic variables (e.g., MLU, words/min) and macrolinguistic variables (e.g., informativeness) are good indicators [4, 5] of language impairments.
- Recent findings indicate that some discourse measures are of special interest in the acute stage following a stroke.[6]

Aim: Document and measure thematic informativeness in the acute stage of recovery following a left hemisphere stroke

Methods

Participants: Twenty-three PWA following a first ischemic stroke of the left middle cerebral artery, all aphasia types and severities, all French-Canadian speakers, 10/23 received thrombolysis.

Figure 1. Experimental design



Thematic informativeness variables

- Thematic units (TUs): Relevant information units specific to the WAB Picnic scene
- General Informativeness Measure (GIM): TUs + other relevant informations and phonemic or syntactic errors

Microlinguistic variables

Total words, words/minute, MLU (words), MATTR, Density, % semantic paraphasia, % phonological errors, % adequate utterances

Data analysis

- Transcription and data analysis: using CHAT convention
- Extraction of microlinguistic data using CLAN program

Statistical analysis (with SPSS® v25.0. software)

- Two-factor mixed-design ANOVAs with group (treated with thrombolysis and untreated) as the between-subject factor and time (T1 and T2) as the within-subject factor

Results

Inter-rater reliability (IRR)

- 10 randomly selected participants; speech samples at both testing times (n=20 transcriptions)
- Two-way random effects intra-class correlations (ICC)
- High IRR (ICC >.80) for most microlinguistic variables, and thematic informativeness variables, GIM (ICC = .993) and TUs (ICC= .997).

Table 1. Microlinguistic results

	T1 (0-72 h)	T2 (7-14 days)	Main effect of time	
	M (SD)	*M (SD)*	*F (1,21)*	*p*
Total words	87.39 (84.32)	100.26 (107.83)	1.220	.282
Words/minute	98.81 (62.81)	95.82 (61.22)	.005	.944
MLU (words)	4.55 (3.40)	5.22 (4.30)	2.667	.117
MATTR	0.69 (0.36)	0.66 (0.40)	.198	.661
Verbs/utterance	0.22 (0.26)	0.26 (0.35)	1.248	.277
Density[a]	0.20 (0.14)	0.22 (0.15)	1.079	.311
% semantic paraphasia	0.99 (1.40)	1.18 (2.09)	.007	.935
% phonological errors	3.39 (4.49)	2.44 (3.84)	2.701	.115
% adequate utterances	59.72 (38.70)	66.78 (37.51)	1.900	.183

Microlinguistic results summary

- Positive changes for 7 out of 10 variables
- No significant changes in the first week post-onset

Table 2. Thematic informativeness results

	T1 (0-72 h)	T2 (10-14 d)	Time effect		Group effect	
	M (SD)	M (SD)	F (1, 21)	*p*	F (1, 21)	*p*
TUs	**5.35 (5.12)**	**7.39 (5.64)**	**7.731**	**.011***	**8.048**	**.010***
TUs/minute	**6.39 (6.69)**	**9.33 (9.66)**	**4.787**	**.040***	1.892	.183
TUs/utterance	0.37 (0.52)	0.51 (0.47)	1.995	.173	2.122	.160
GIM	**4.65 (6.07)**	**7.48 (7.42)**	**6.393**	**.020***	**8.502**	**.008***
GIM/min	**4.56 (6.37)**	**8.44 (9.47)**	**7.972**	**.010***	3.774	.066
GIM/utterance	0.29 (0.47)	0.48 (0.54)	3.290	.084	3.739	.067

Thematic Informativeness results summary

- Positive changes for all variables
- Significant improvement of raw and time efficiency scores
- Significant thrombolysis effect on TU and GIM at T1 and T2

Figure 2. General Informativeness Measure

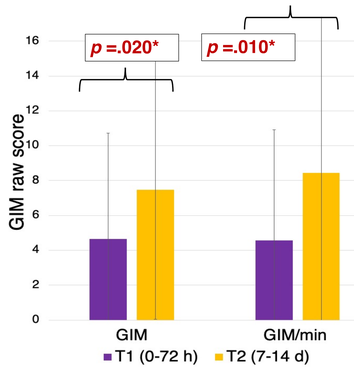
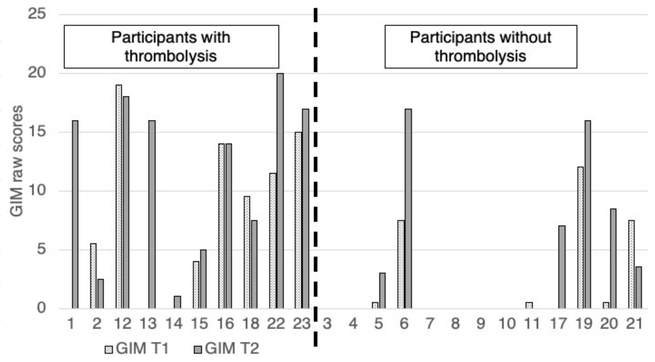


Figure 3. GIM Individual raw scores



Discussion /Conclusions

In the early stage of language recovery:

- ✓ Thematic informativeness measures are more sensitive to language recovery than microlinguistic variables;
- ✓ GIM and TUs are reliable measures of informativeness;
- ✓ Most patients that received thrombolysis obtained higher scores.

Future studies should:

- Investigate discourse in very early stages of post-stroke recovery to document the impact of thrombolysis administration;
- Explore long term changes in discourse production;
- Develop new language tests based on these knowledges and specifically designed for SLP working in acute care facilities.

References

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