STORY GRAMMAR RECOVERY IN THE FIRST TWO YEARS FOLLOWING SEVERE TRAUMATIC BRAIN INJURY

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STORYTELLING / NARRATIVE DISCOURSE

❖ Storytelling involves generating or retelling a series of logically sequenced, causally connected events

❖ Narrative discourse is commonly impacted following traumatic brain injury (TBI)\(^1,2,3\)

"Tell us again, Grandpa, about the time you almost had Tarzan for lunch."

\(^1\) Coelho, 2002; \(^2\) Marini et al., 2017; \(^3\) Stout et al., 2000
EFFECT OF DISCOURSE CHALLENGES IN TBI

❖ Can have negative impact on social participation
❖ Correlates with community reintegration as well as employment, relationship, and other psychosocial outcomes¹,⁵

¹ Galski et al., 1998; ⁵ Elbourn, Kenney, Power, & Togher, 2019
Story grammar is a framework used in Western narratives to organize content in a predictable, linear event sequence. 

Stein & Glenn, 1975
Prior research comparing adults with TBI or no brain injury (NBI) has shown mixed results in terms of:

- **Story grammar productivity** \(^7, 8, 9\)
- **Completeness of story grammar episodes** \(^1, 10\)

Limited research on how story grammar changes over the first two years post-TBI

No prior research on adults has explored elaboration; only explored in child narrative analysis\(^{11}\)

\(^7\) Liles et al., 1989; \(^8\) Mozeiko et al., 2011; \(^9\) Snow et al., 1999; \(^{10}\) Power et al., 2020; \(^{11}\) Gillam et al., 2017
To use a complex Cinderella retells to:

1. Compare productivity, completeness, and elaboration in adults with TBI and NBI
   - Hypothesis: TBI differ from NBI group early in recovery, but become nonsignificant later in recovery\(^{10}\)

2. Examine longitudinal changes in these variables over the first two years following severe TBI and factors the influence these changes
   - Hypotheses: Productivity, completeness, and elaboration will improve over the first two years post-TBI, and changes will be related to injury severity and education\(^{12}\)
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<tr>
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<th>Sex (M:F)</th>
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METHODS

Step 1: Divide narratives into propositions (verb phrase/predicator or relational word + related arguments)

Step 2: Assign story grammar codes

Step 3: Assign episode number and type (complete vs. incomplete, simple vs. elaborated)
Episode Types:

- Simple Complete (SC)
- Simple Incomplete (SI)
- Elaborated Complete (EC)
- Elaborated Incomplete (EI)

11 Gillam et al., 2017; 13 Lê et al., 2011
### Example Episode

<table>
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<tr>
<th>Line</th>
<th>IE</th>
<th>DC</th>
<th>Ep3: EC-MB</th>
</tr>
</thead>
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<td>42so she got close to twelve o'clock.</td>
<td>IE</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>43it was time for her to leave.</td>
<td>IE</td>
<td>3</td>
<td></td>
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<tr>
<td>44and she &amp;+b basically ran away from the [/] the prince.</td>
<td>A</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>45and &lt;left her shoe&gt; [//] lost her shoe on the way back</td>
<td>DC</td>
<td>3</td>
<td>Ep3: EC-MB</td>
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<td>46prince then found.</td>
<td>DC</td>
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**IE = Initiating Event**  
**A = Attempt**  
**DC = Direct Consequence**
STORY GRAMMAR MEASURES

- Total number of episodes (productivity)
- Total number of story grammar elements (productivity)
- Total number of elaborated complete episodes (episodic completeness/elaboration)
- Number of episodic elements per episode (elaboration)
ANALYSES:

SG variables were all non-normally distributed

RQ1: Mann-Whitney U-tests: compare TBI vs. NBI at each time point

RQ2: Generalized estimating equation (GEE) models:

- Poisson distribution for Total Number of Episodes, Total Number of SG Elements, Total Number of Elaborated-Complete Episodes
- Gamma distribution with log link function (+constant of .001): Mean Number of Episodic Elements per Episode
- Covariates: age, years of education, length of PTA (days)
RESULTS: Total Number of Episodes

Total number of episodes vs. Months post-TBI
RESULTS: Total Number of Story Grammar Elements

![Graph showing the total number of story grammar elements over months post-TBI.](image)
RESULTS: Total Number of Elaborated-Complete Episodes

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<th>Months post-TBI</th>
<th>Total number of elaborated-complete episodes</th>
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<tr>
<td>3</td>
<td>3.0 ± 0.5</td>
</tr>
<tr>
<td>6</td>
<td>3.5 ± 0.5</td>
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<tr>
<td>9</td>
<td>4.0 ± 0.5</td>
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<td>4.5 ± 0.5</td>
</tr>
<tr>
<td>24</td>
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* indicates statistical significance.
RESULTS: Mean Number of Episodic Elements per Episode
DISCUSSION

Productivity and elaboration differed between the TBI and NBI groups at 3, 6, and 9-months post-TBI.

Only total number of story grammar elements and elaborated-complete episodes differed at 12-months.

No difference remained by 24-months.
DISCUSSION

Statistically significant improvements observed across all productivity & elaboration measures over the first 2-years post-TBI

Post-hoc comparisons showed improvements were first detected between:

- 3 and 6-months for total number of episodes
- 3 and 9-months for total number of story grammar elements
- 3 and 12-months for both elaboration measures

Longer PTA = risk factor for narrative recovery

Greater educational attainment = protective factor
LIMITATIONS

❖ TBI participants from Australia were compared to NBI controls from US

❖ Lack of longitudinal NBI data
FUTURE DIRECTIONS

❖ Explore relationships between narrative measures & executive functioning as well as declarative memory.

❖ Further examine elaboration deficits, including use of mental state terms.

❖ Develop analyses for more ecologically valid narrative tasks (personal recounts, anecdotes).

❖ Improve efficiency of training and transcription to enhance clinical feasibility.
CONCLUSIONS

Narrative productivity & elaboration are key story grammar variables that 1) differentiate narrative skills in TBI vs. NBI, & 2) document narrative improvements over the first two years post-TBI.

Story grammar analysis yields promising metrics for capturing discourse-level cognitive-communication difficulties post-TBI.
REFERENCES


REFERENCES CONT.


