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

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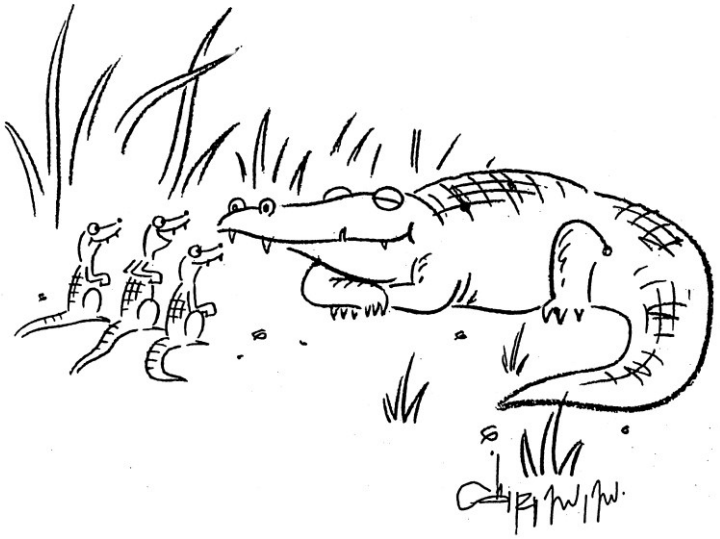
STORYTELLING / NARRATIVE DISCOURSE

- 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

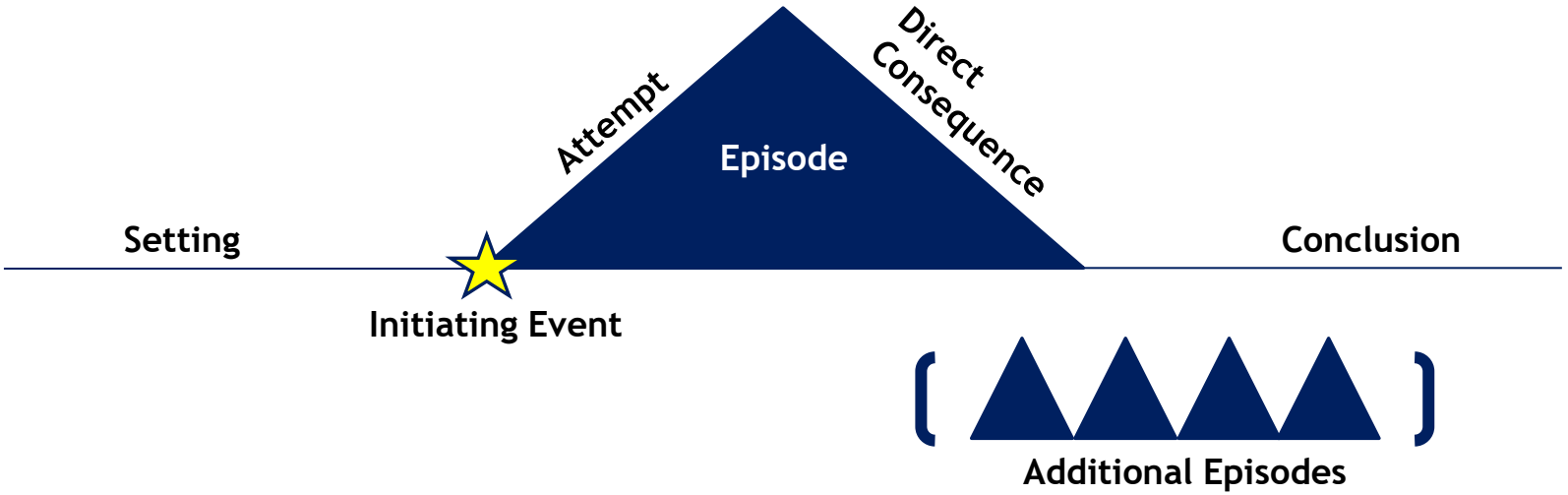
EFFECT OF DISCOURSE CHALLENGES IN TBI

- Can have negative impact on social participation
- Correlates with community reintegration as well as employment, relationship, and other psychosocial outcomes [4,5]

[4] Galski et al., 1998; [5] Elbourn, Kenney, Power, & Togher, 2019

STORY GRAMMAR

- Story grammar [6] is a framework used in Western narratives to organize content in a predictable, linear event sequence.



[6] Stein & Glenn, 1975

TBI & NARRATIVE MACROLINGUISTIC ANALYSIS

- 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

RESEARCH AIMS

- 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]

[12] Elbourn, Kenney, Power, Honan, et al. 2019

PARTICIPANTS

	Sex (M:F)	Age (years)	Years of Education	Length of PTA (days)	Primary Language	Monolingual
TBI (*N*=57)	46:11	35.25 (±13.11) 16-66	13.58 (±2.99) 8-20	52.88 (±40.03) 6-215	52 English 5 Other	43 Monolingual 11 Other (8 Bilingual, 3 Multilingual)
NBI (*N*=57)	35:22	35.61 (±13.03) 18-66	14.43 (±1.54) 12-18		56 English 1 Not reported	35 Monolingual 3 Other (3 Multilingual) 19 Not reported

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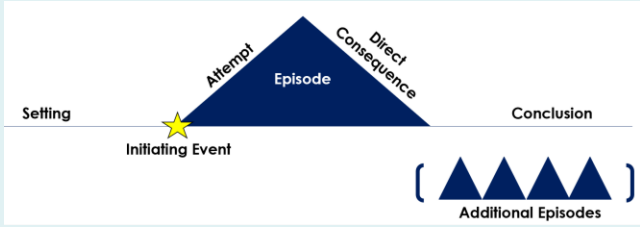
METHODS

Step 1

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

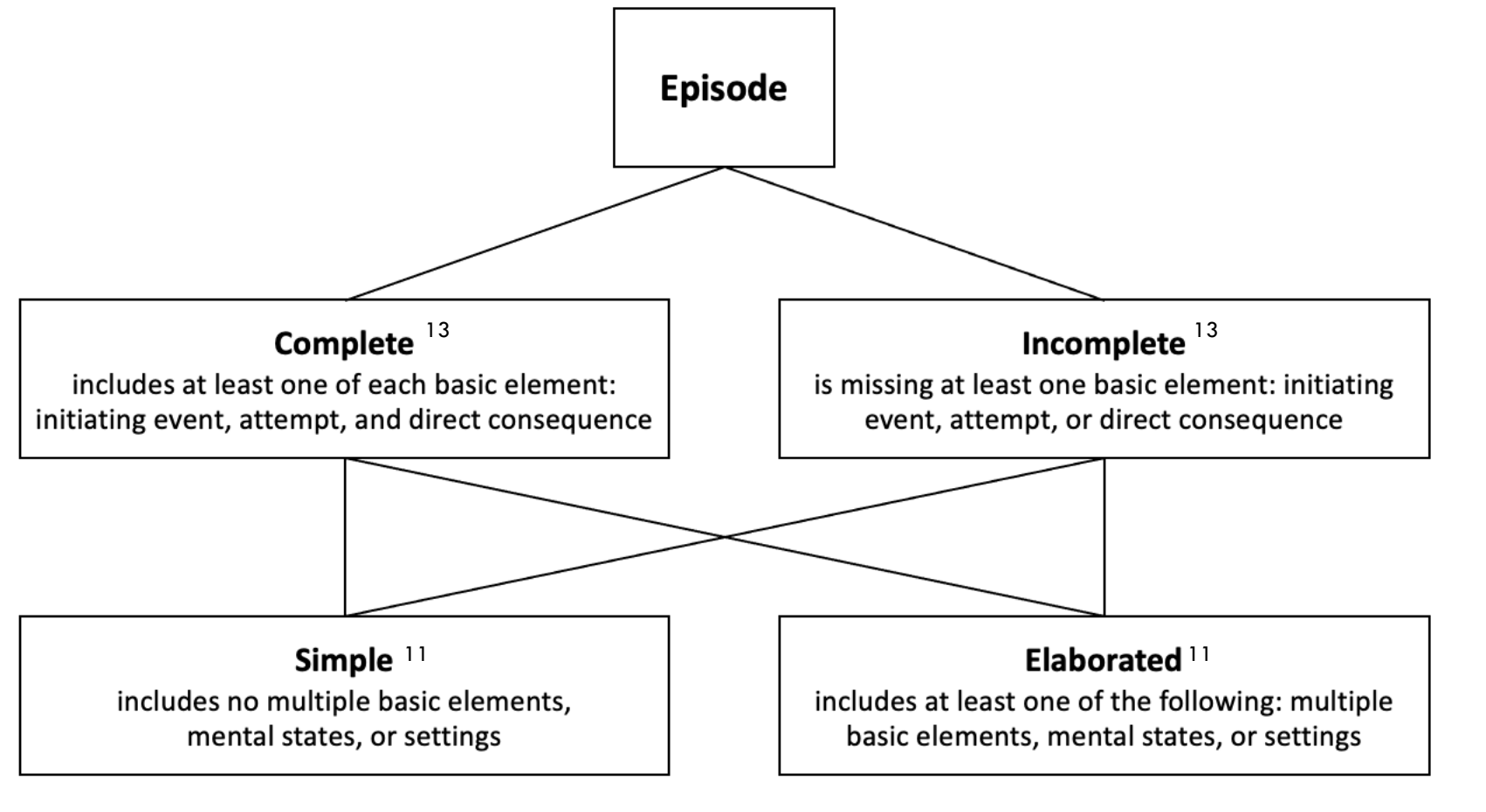
Step 2

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

42so she got close to twelve o'clock .	IE	3	
43it was time for her to leave .	IE	3	
44and she &+b basically ran away from the [/] the prince .	A	3	
45and <left her shoe> [//] lost her shoe on the way back	DC	3	
that the 46prince then found .	DC	3	Ep3: EC-MB

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:

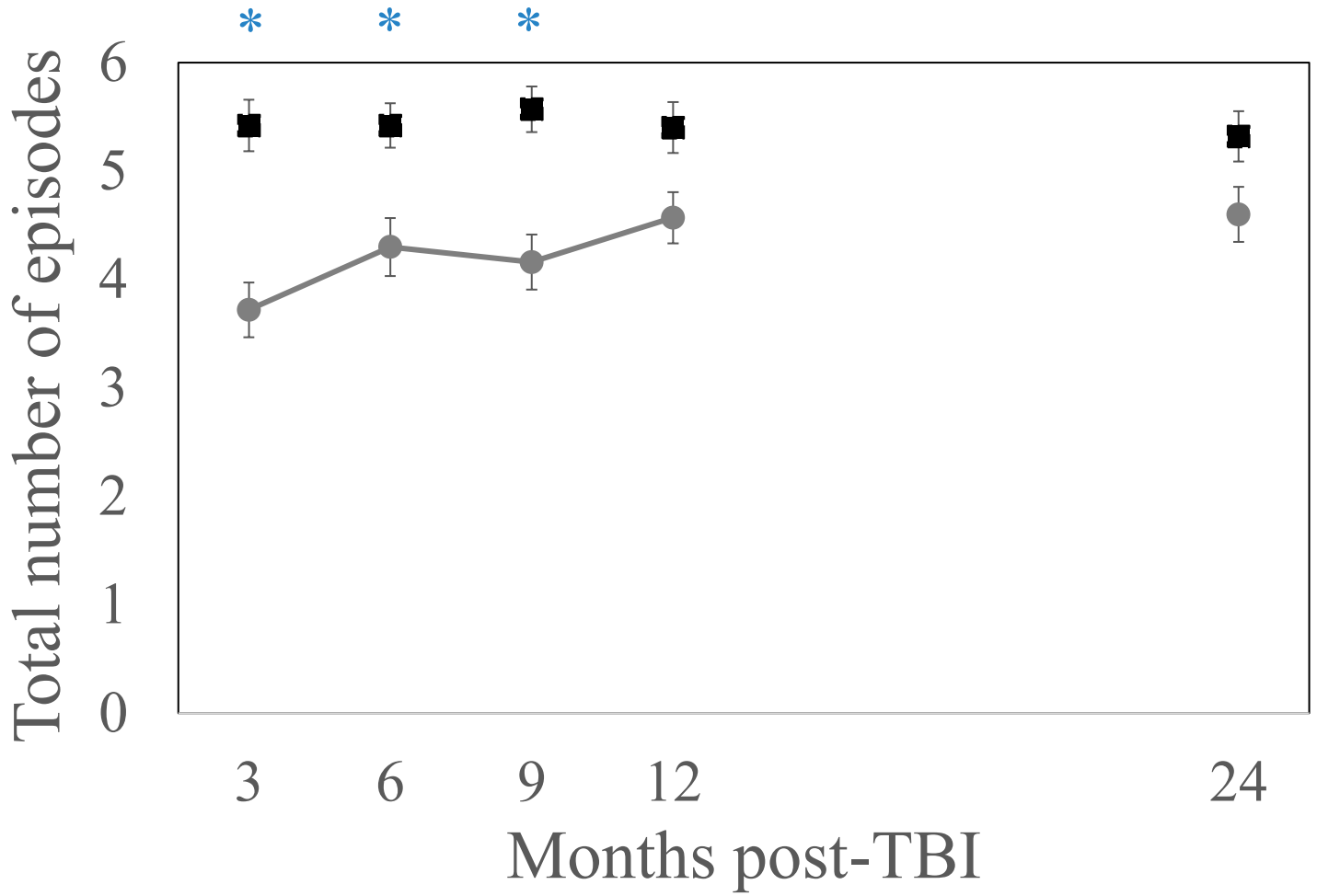
SG variables were all non-normally distributed

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

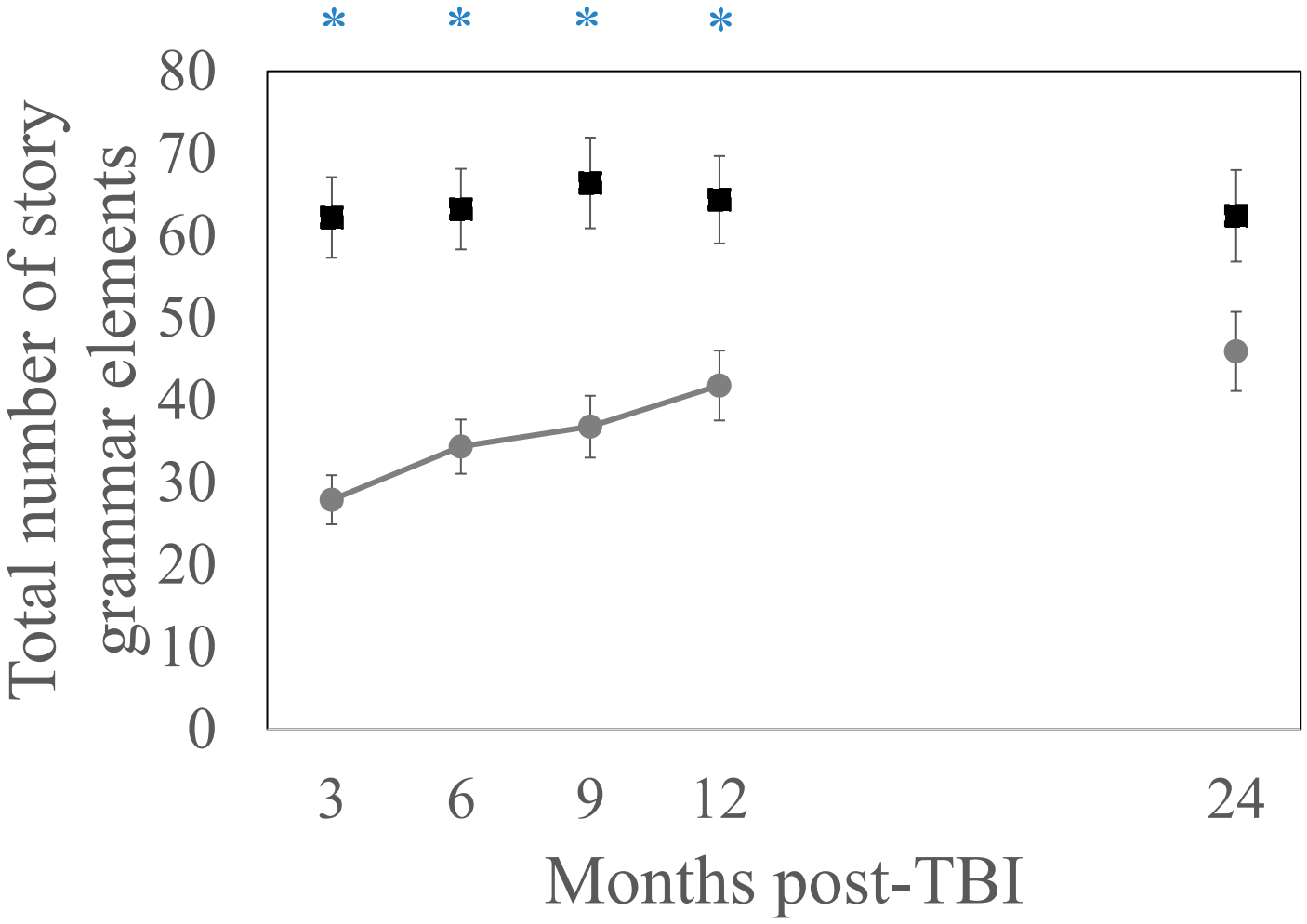
RQ2: Generalized estimating equation (GEE) models:

- 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)

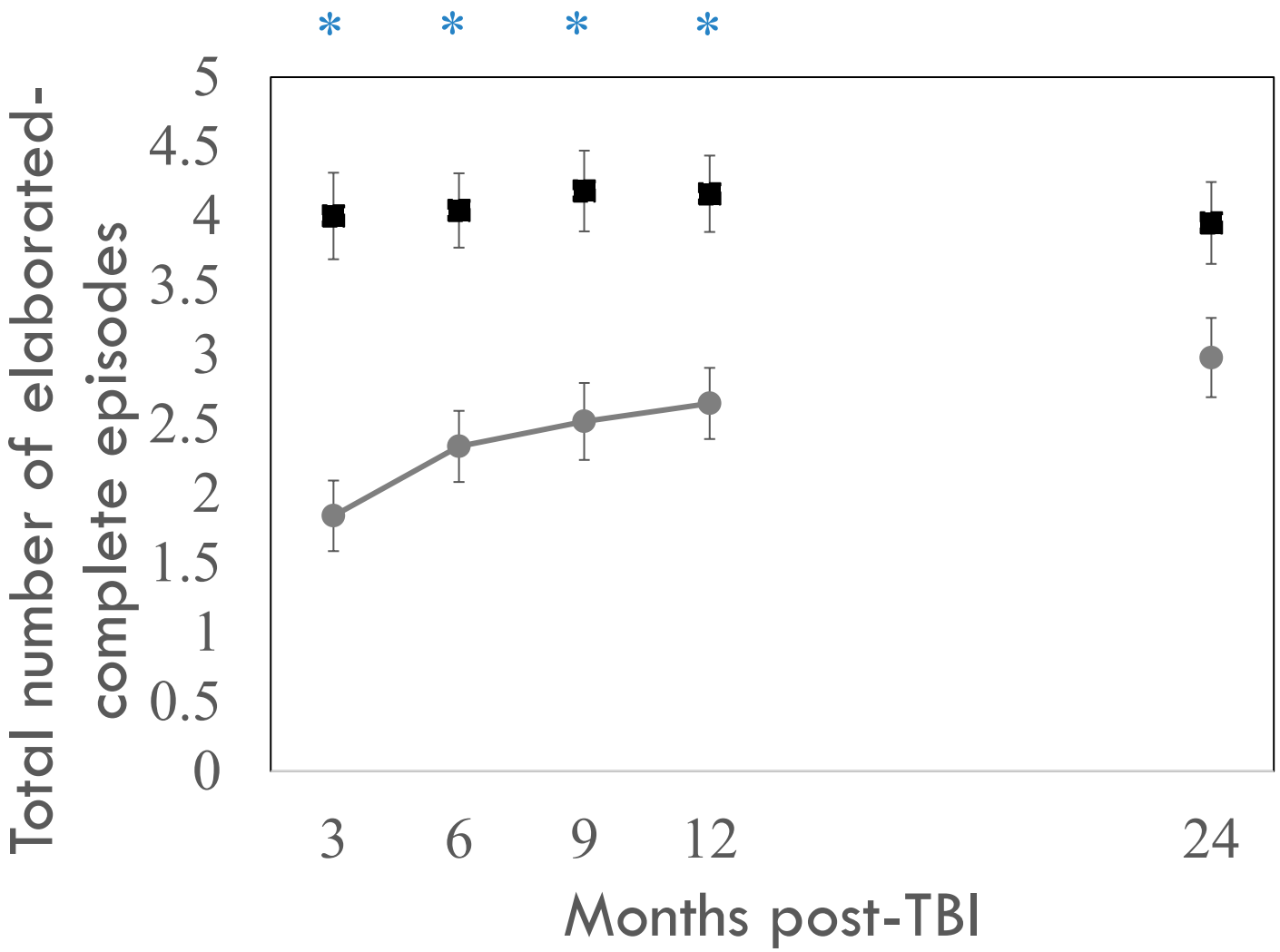
RESULTS: Total Number of Episodes



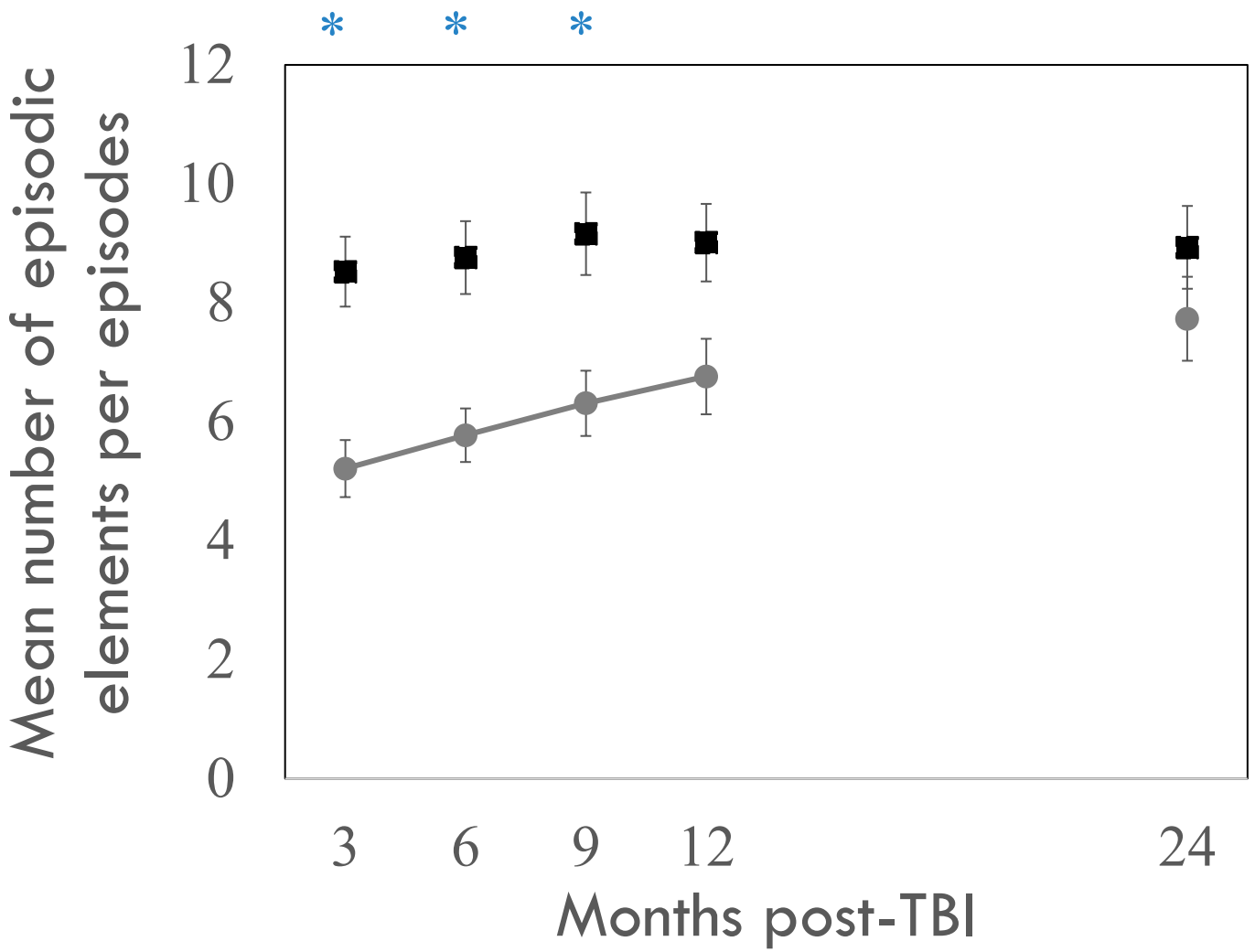
RESULTS: Total Number of Story Grammar Elements



RESULTS: Total Number of Elaborated-Complete Episodes



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

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