

# Position is Perception: Using CIGA to Bridge Film Content and the Mental Representation of Characters

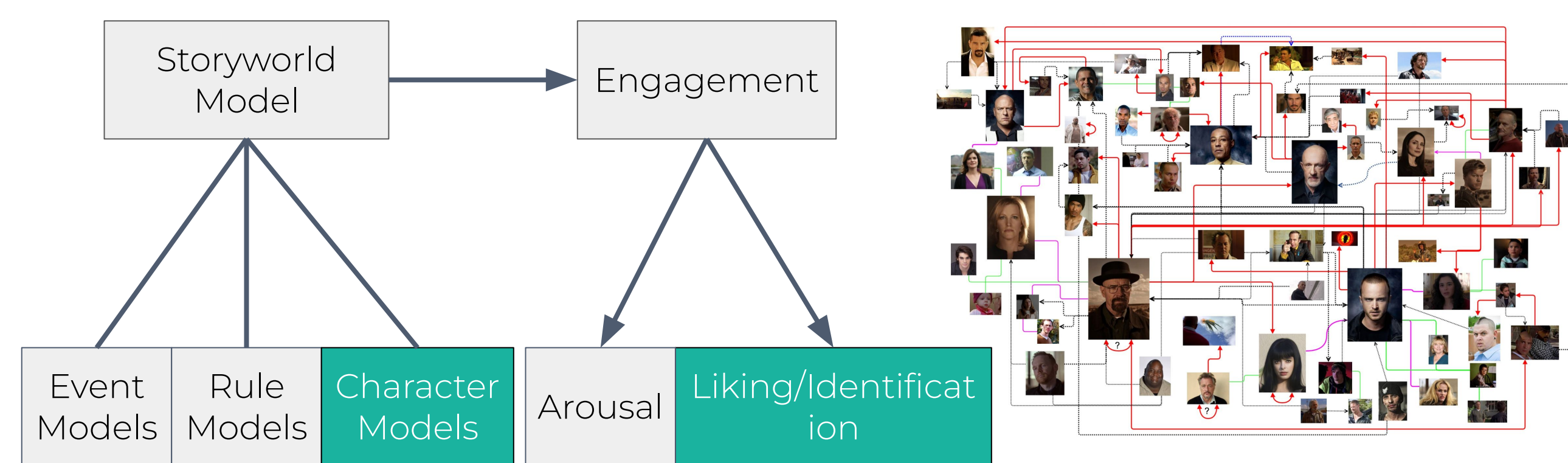
Shu Hu<sup>1</sup>, Lingfei Luan<sup>2</sup>, Jaime Lopez<sup>3</sup>, Hector Perez<sup>4</sup>, Joseph P. Magliano<sup>1</sup>  
 Georgia State University<sup>1</sup>, Belmont University<sup>2</sup>, Complutense University of Madrid<sup>3</sup>, Valencia Polytechnic University<sup>4</sup>



## Problem

Theories of comprehension argue that comprehending narratives involves building mental models as one is experiencing them, which are iteratively updated as the narrative unfolds (Kintsch, 1988). Traditionally, theories of narrative comprehension have emphasized the role of mental models in representing the events that comprise a narrative plot (Zwaan & Radvansky, 1998). However, Saerys-Foy and Magliano (2021) argue that long narratives such as novels, movies, and TV shows involve not only representing events, but also constructing representations of many other aspects.

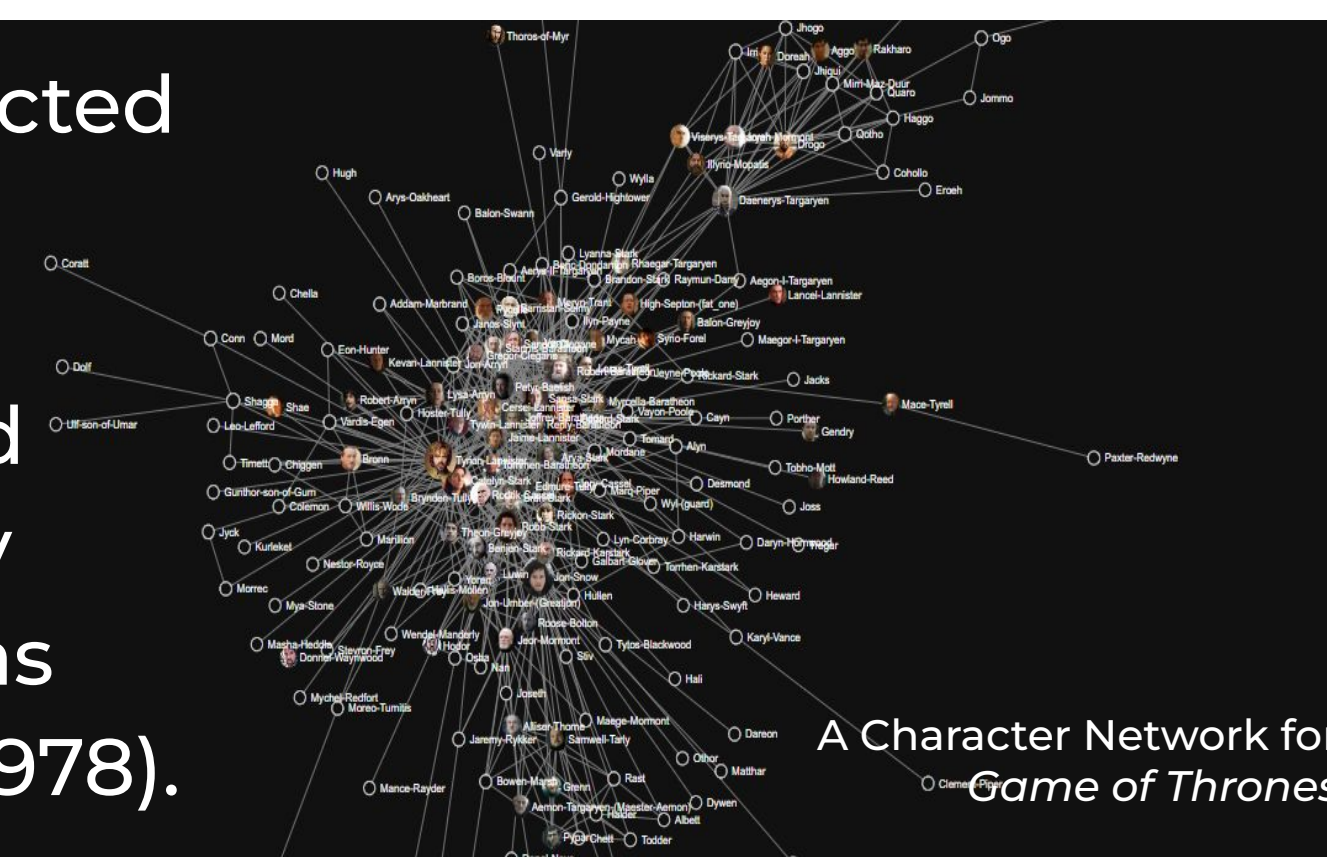
## Storyworld Framework



## Social Network Analysis

Character social networks have long been used to quantitatively analyze the structure of fiction (Elson et al., 2010). However, traditional quantitative approaches, such as literary network analysis, mainly focus on the narrative materials themselves but not audiences' experiences (Elson et al., 2010).

The number of people connected to a character in a social environment reflects their perceived social standing and visibility, a structural property that is classically formalized as degree centrality (Freeman, 1978).



We introduce the Character Interaction Graph Analysis (CIGA) as a bridge between the narrative material and the audiences' experience. CIGA represents characters and their relationships based on who is talking to whom as a story progresses.

### CIGA: Character Interaction Graph Analyzer

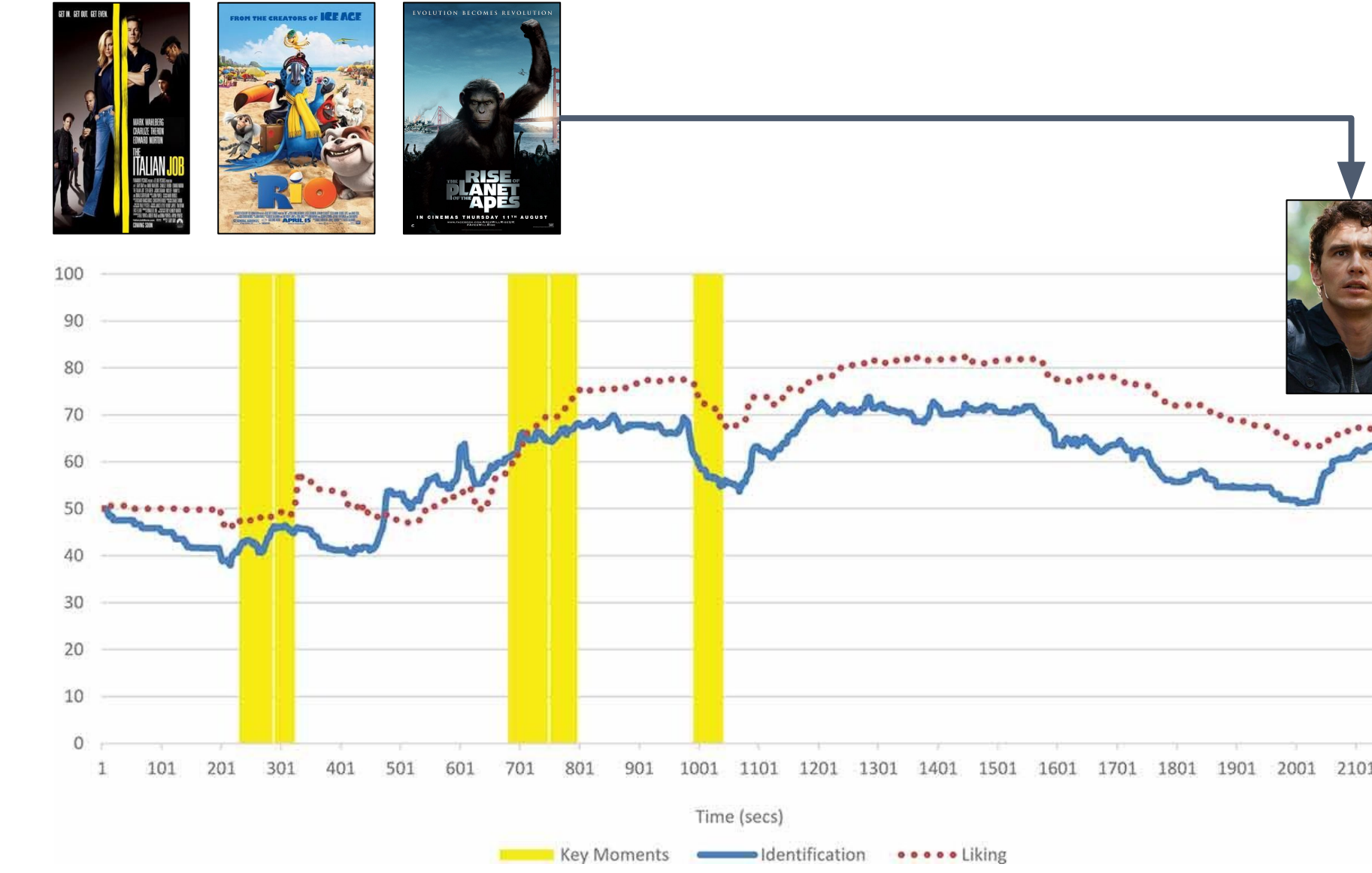
CIGA is a Python package designed for performing graph analysis on social interactions between individuals across time. It is a redesign of CharNet using igraph.

• Github: <https://github.com/MediaCompLab/CIGA>

## Study

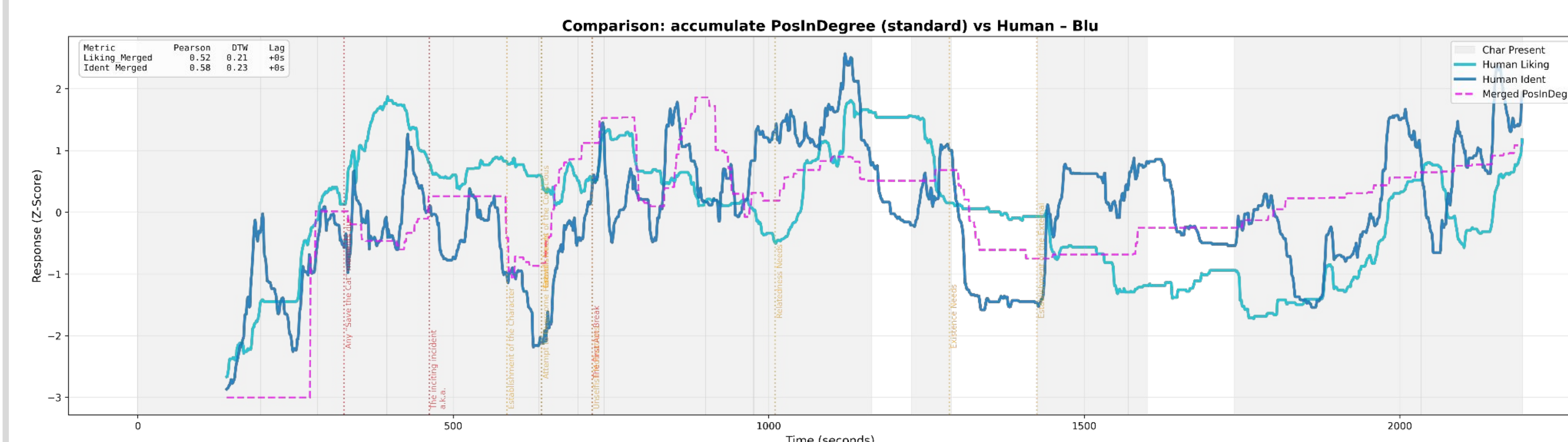
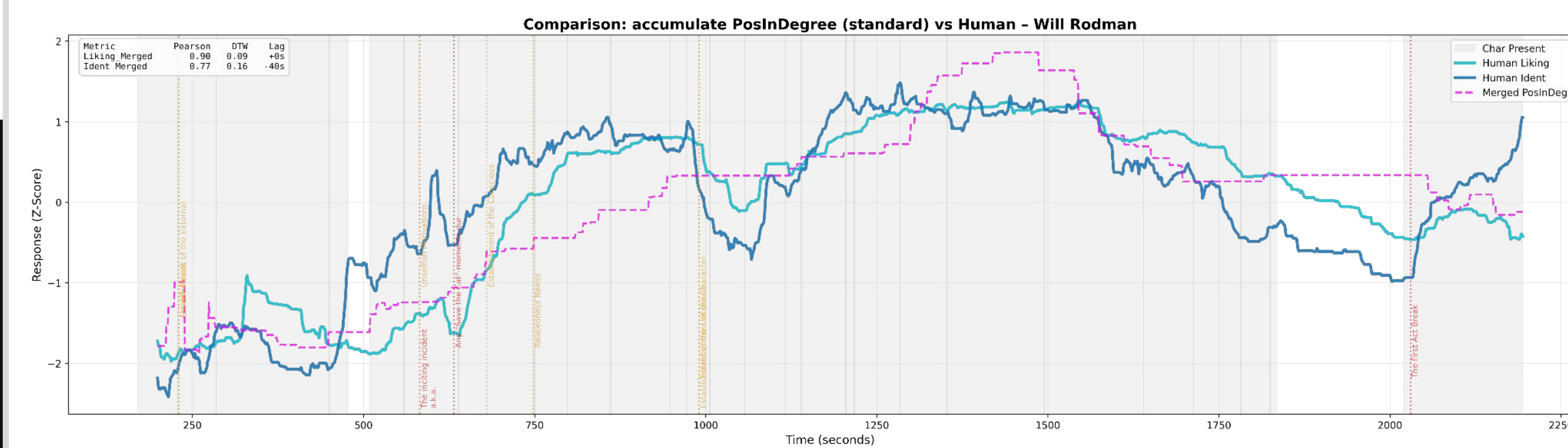
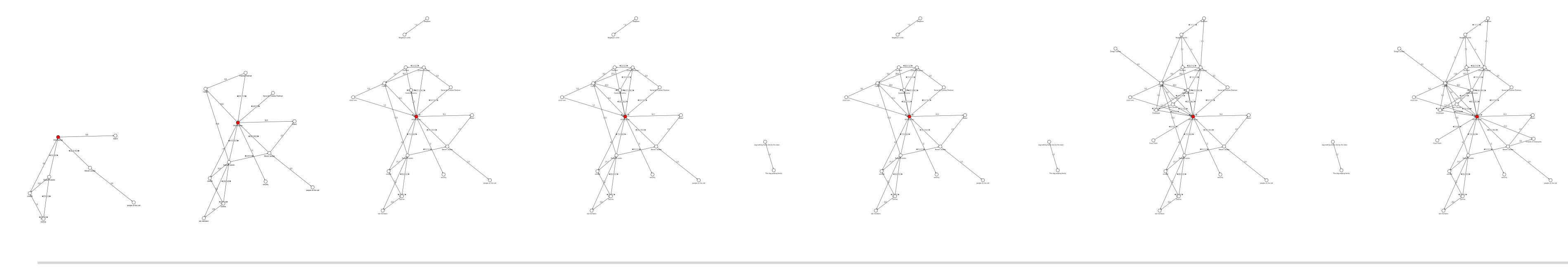
To validate CIGA, we investigate whether character centrality derived from CIGA is correlated with continuous human evaluation of characters. Archived data from Tchernev (2022) was used, in which participants reported their liking and identification toward the protagonists of the first 35 minutes of three films

- Rise of the Planet of the Apes
- Rio
- The Italian Job



## Procedure

- CIGA builds temporal social networks based on dialogue exchanges between characters.
  - CIGA requires a human in the loop coding of who is talking to whom.
- Three coders identified roles of characters in each dialogue exchange in the film segments used in Tchernev (2022).
  - Speaker, listeners, and targets of exchanges
- The temporal social networks can derive a measure of characters' centrality in the social network
  - Centrality measure was correlated with judgments of liking and identification.



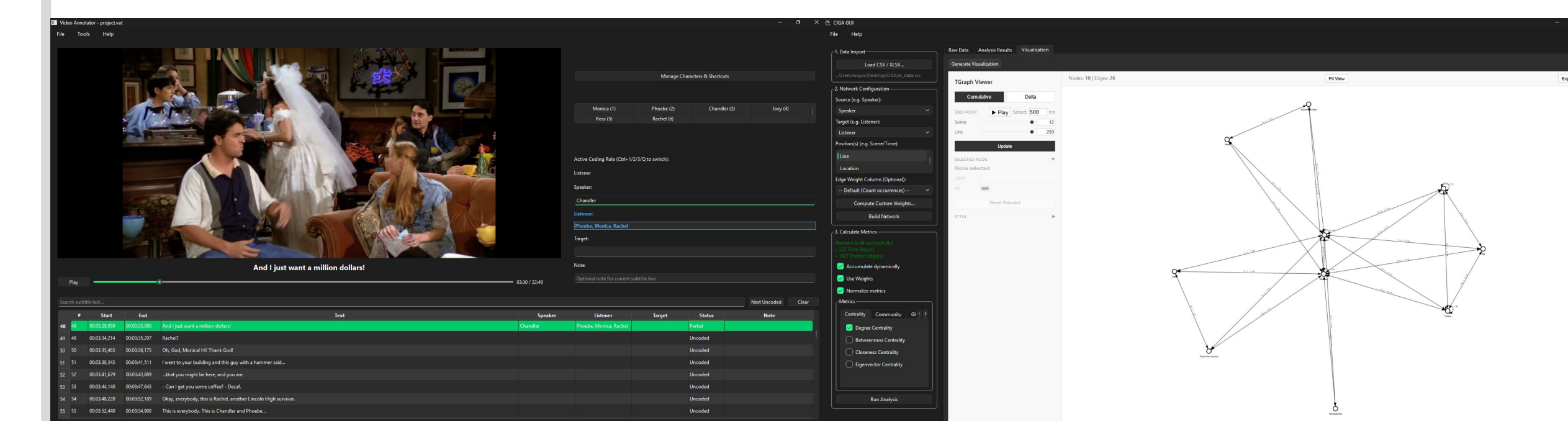
## Insights

With accumulated temporal graphs using positive in degree centrality, the associations between CIGA generated data and human data are listed below.

	Liking			Identification		
	Ape	Rio	Italian Job	Ape	Rio	Italian Job
Pearson Corr	0.90	0.52	0.91	0.77	0.58	0.77
DTW	0.09	0.21	0.14	0.16	0.23	0.21
Lag	+0s	+0s	+0s	+40s	+0s	+0s

## Future Work

- Using more strict analysis, such as General Linear Mixed Effects Model with autocorrelation variance, to evaluate the relationship between CIGA centrality time course and human evaluation.
- GUI-based applications for annotation and analysis are underdeveloped.
- Applying CIGA to serialized TV (Big Bang Theory)
- Add support of more advanced graph based indices (e.g., topological data analysis, time-respecting analysis, etc).



## References

Elson, D., Dames, N., & McKeown, K. (2010). Extracting social networks from literary fiction. In *Proceedings of the 48th Annual Meeting of the Association for Computational Linguistics* (pp. 138-147). Association for Computational Linguistics.

Freeman, L. C. (1978). Centrality in social networks conceptual clarification. *Social Networks*, 1(3), 215-239.

Kintsch W. (1988). The role of knowledge in discourse comprehension: a construction-integration model. *Psychological review*, 95(2), 163-182. <https://doi.org/10.1037/0033-295x.95.2.163>

Saerys-Foy, J. E., & Magliano, J. P. (2022). From shots to storyworlds: The cognitive processes supporting the comprehension of serialized television. In T. Nannicelli & H. J. Pérez (Eds.), *Contemporary serial television: Cognition, emotion, and aesthetics* (pp. 97-116). Routledge.

Tchernev, J. M. (2022). Creating character identification and liking in narratives: The impact of protagonist motivations on real-time audience responses. *Media Psychology*, 25(5), 740-761. <https://doi.org/10.1080/15213269.2022.2067878>

Zwaan, R. A., & Radvansky, G. A. (1998). Situation models in language comprehension and memory. *Psychological Bulletin*, 123(2), 162-185. <https://doi.org/10.1037/0033-2909.123.2.162>