Alexander Towell
Department of Computer Science
Southern Illinois University Edwardsville
Edwardsville, IL 62026, USA

February 24, 2026

Editorial Board
PLOS Complex Systems
Special Issue: Complex Networks 2025

Dear Editors,

We are pleased to submit our manuscript, "Temporal evolution of cognitive knowledge networks in AI-assisted conversations," by Alexander Towell and John Matta, for consideration in the PLOS Complex Systems special issue on Complex Networks 2025 (Submission ID: 41).

This manuscript extends our conference paper published in the Springer proceedings of Complex Networks 2025, "Cognitive MRI of AI Conversations: Analyzing AI Interactions through Semantic Embedding Networks" (Towell & Matta, 2025). The conference paper introduced a methodology for transforming ChatGPT conversation archives into semantic similarity networks and analyzed the resulting static network structure.

The present journal extension adds substantial new material, constituting approximately 60% new content beyond the conference paper. The core new contribution is a comprehensive temporal evolution analysis tracking the network's growth over 29 monthly snapshots. Specifically, we contribute:

- Discovery of super-linear densification ($\gamma = 1.405$, $R^2 = 0.993$) following the same power-law form observed in citation and social networks.
- Empirical measurement of sub-linear preferential attachment ($\beta = 0.763$) with statistical validation via permutation testing.
- Community lifecycle tracking across 29 snapshots using Jaccard-based alignment, revealing 40 tracked communities with early stabilization.
- Bridge formation dynamics showing persistence of cross-domain connector conversations.
- Model era comparison revealing distinct topological signatures across LLM generations.

These findings demonstrate that individual AI-assisted knowledge exploration self-organizes according to the same macroscopic laws observed in collective knowledge systems—a result we believe fits well within the scope of this special issue on complex networks.

All data and code for reproducing the analyses are publicly available at `https://github.com/queelius/chatgpt-complex-net` (DOI: 10.5281/zenodo.15314235).

This manuscript has not been submitted elsewhere and is not under consideration at any other

journal. All authors have approved the manuscript for submission.

Sincerely,

Alexander Towell
Department of Computer Science
Southern Illinois University
Edwardsville
Edwardsville, IL, USA
atowell@siue.edu
ORCID: 0000-0001-6443-9897