D I S S E R T A T I O N P R O P O S A L

Pranav Gupta

"Transactive Attentional Coordination (TAC): The Study of Emergence and Role of Attention in Collectively Intelligent Behavior"

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1:30 pm
Tepper Quad 2119/2120

Historically, organizations get work done by putting together the right people, creating the right structure, and equipping them with the right technology. In modern times, teamwork of this kind can be increasingly characterized as temporary (flash teams), dynamic (shifting membership), as well as simultaneous (multi-teaming). In short, modern professionals expect themselves to be juggling multiple quick-turnaround projects with colleagues who themselves are juggling. This leads to the need for the coordination of attention among members across tasks and over time, or Transactive Attentional Coordination (TAC), a team-level ability enabling team members to attract each others' attention as needed, and prioritize and focus on the right information and goals. Furthermore, I believe that well-developed TAC behaviors are foundational to a team's ability to perform collectively. Thereby, TAC is hypothesized as a key cognitive process underlying collective intelligence in teams.

This leads to the main research questions of this dissertation: How does TAC emerge from individual member actions? What are the collective observable behavior patterns that emerge? And how does transactive attention relate to transactive memory? In this dissertation, I intend to answer these questions by proposing a theoretical framework and validating aspects of it with large-scale archival data and agent-based simulation models.

I start the first chapter by building on our understanding of the foundations of individual intelligence and extend it to inform the relationship between collective intelligence, transactive memory system (TMS), and transactive attentional coordination (TAC). Next, I narrow down the focus on the emergence of TAC to theorize the functional components, transactive processes, and consequent observable behaviors. I do this by drawing a parallel with our understanding of individual attention and proposing micro-processes that allow for it to emerge from the bottom up. In doing so, I also deduce testable hypotheses that suggest the relationship of TAC processes with team performance and key project characteristics as antecedents.

In the second chapter, I plan to test my proposed model of TAC behaviors in a dataset of open source software teams. I do this using large-scale developer activity data for about 34,000 teams mined from GitHub and NPM. Doing so, this work provides preliminary evidence of the existence and benefits of TAC as well as explicates a set of observable and calculable behavioral measures. And finally, in the third chapter, I propose building a cognitively-plausible agent-based simulation model for validating the bottom-up emergence of TAC behaviors from individual member actions detailed in chapter 1. Further, I propose virtual experiments to decompose the independent and joint effects of transactive attention and transactive memory on collective performance and identify under what conditions does one prove to be more useful than the other.