Preparing for a PhD: A Transactive Memory Approach

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Integrating theoretical insights from transactive memory theory, the current manuscript describes ways in which individuals may develop a cognitive and behavioral division of labor to mobilize the tasks, expertise and people necessary to successfully gain admission to doctoral programs. We employ this transactive memory framework to organize insights gained from the authors' experience with and observations of the Annual Conference of The PhD Project, a non-profit organization dedicated to increasing ethnic diversity in corporate boardrooms by diversifying business classrooms in higher education. Implications, recommendations and directions for future research are offered.

INTRODUCTION

There is a diversity problem in higher education. Data from the National Center for Education Statistics notes that as of Fall 2013, African Americans held 6%, Hispanic Americans 5% and Native Americans less than 1% of full-time faculty positions in degree-granting post-secondary institutions despite being 13.2%, 17.4% and 1.2% of the overall population in the United States respectively (National Center for Education Statistics, 2015; United States Census Bureau, 2015). Observers note that the underrepresentation of these ethnic minority groups creates a number of challenges for students such as a lack of mentorship, role models and a supportive learning environment (Flaherty, 2015). These challenges are not limited to students. Faculty reports of isolation and being overburdened by the

'invisible labor' (June, 2015) of community service, student mentoring and counseling contributes to a 'leaky pipeline' in which faculty members, many of whom do not gain tenure, leave the profession. Attrition experienced by underrepresented minorities (URMs) may be a protective response in order to preserve their financial, mental, physical and emotional wellbeing (Hobfoll, 1989). Colleges and universities also suffer from a lack of diversity, being frequently criticized by those for and against policies such as affirmative action, and other diversity and inclusion efforts. For example, in the most recent United States Supreme Court case, Fisher v. University of Texas, race used as a factor in college admissions brought concerns regarding diversity in higher education to the forefront (Byrne-Jiménez & Borden, 2015).

To address the problem of minority faculty underrepresentation, leaders from the governmental, academic, and philanthropic sectors have placed greater emphasis on expanding and repairing the small and leaky pipeline of URMs that enter and matriculate through doctoral programs. Efforts often include providing a greater number of opportunities for URM undergraduates to gain research experience and to secure faculty mentors. Examples include programs such as the National Institute of General Medical Sciences' Postbaccalaureate Research Education Program (PREP) which provides support for URMs seeking admission to doctoral programs in biomedical science. The PREP program has had great success with having more than 80% of their participants begin PhD training (Gazley, 2014).

While these efforts may be moving the needle on achieving greater representation, several gaps remain. First, prior research has yet to address ways in which URMs initially learn about the professoriate as a viable career path. Second, once aware, how do URMs gather, sort and make sense of the vast amount of information needed to make a quality decision about doctoral programs? For example, all potential doctoral students, regardless of race, are faced with the daunting task of processing large amounts of information such as learning about and deciding among potential research interests; doctoral program capabilities and reputation; faculty members' ability and interest in taking on new doctoral students; program benefits and expenses; residential quality of life; organizational culture; and other concerns. Compared to well-represented majority students who are more likely to have faculty role models in their families or extended networks (June, 2015), URMs often lack these informal social supports. Disproportionately low access to people, information and resources may cause would-be URM doctoral candidates to face greater cognitive load, emotional exhaustion and stress during the information gathering process. Many URMs come from backgrounds where they are first generation college graduates. They may also feel the burden of being the primary source of human and social capital for their families. Moreover, faced with fewer resources than the doctoral admissions process demands, URMs may be particularly susceptible to stress, burnout and emotional exhaustion prior to gathering the information needed to make a quality decision (e.g. de Croon, Sluiter, Blonk, Broersen, & Frings-Dresen, 2004). As a consequence, these factors likely frustrate the best efforts and intentions of those working to diversify the pool of faculty and students.

The current manuscript takes a novel approach towards addressing the issue of diversity in higher education by framing it as a cognitive problem. Specifically, we leverage insights from transactive memory theory, a socio-cognitive framework that describes the extent to which individuals develop a cognitive and behavioral division of labor to mobilize the tasks, expertise and people necessary to set and pursue collective goals (Brandon & Hollingshead, 2004). We posit that by establishing such a cooperative arrangement for learning and employing the nuances of selecting, applying to and securing admission to doctoral programs, prospective doctoral students can minimize the likelihood of emotional overload, stress and fatigue that may delay or deter the admissions process.

We proceed as follows. First, we review previous research on transactive memory as it has appeared in the social, psychological and organizational literatures. We then offer recommendations to academic, philanthropic and governmental leaders on how to encourage the development of transactive memory between and among URM students, faculty and administrators. These recommendations are informed by the authors' first-person experiences with and observations of *The PhD Project*, a non-profit organization established in 1994 by the KPMG Foundation, Graduate Management Admission Council (GMAC), Citi

Foundation and the Association to Advance Collegiate Schools of Business (AACSB) to increase workforce and business education diversity. A signature initiative of *The PhD Project* is an annual conference in which high potential URM students and working professionals are offered an all-expense paid trip to Chicago where they spend 2.5 days asking questions, attending workshops and moderated panel sessions, gathering information, and making connections with other students, faculty and administrators. In this way, *The PhD Project* seeks to "change the face of academia". We also highlight the cognitive benefit to university administrators of participating in such transactive memory systems. Specifically, by reducing the amount of time, attention and energy needed to identify high potential URM doctoral students, university administrators are better equipped to address the diversity goals of their respective academic programs.

CONTEXTUAL AND THEORETICAL BACKGROUND

The PhD Project

To date, a number of studies have addressed the issue of minority faculty underrepresentation within academic institutions. For example, the AACSB was been forewarning of business faculty shortfalls for over a decade (AACSB International, 2003). Such shortages create ripple effects from academia into the workforce. The lack of minority professors exemplifies a dearth of role models and mentors present to encourage minority students to pursue degrees in higher education beyond their undergraduate studies. This was an issue experienced by KPMG LLP, a Big Four Accounting Firm, as they attempted to diversify their workforce. Out of the difficulty faced in their own efforts, *The PhD Project* was born. Through the KPMG Foundation, this initiative aimed to promote the diversification of business school faculty as a means to address workplace diversity. Specifically, the idea behind *The PhD Project*'s approach is to increase the number of minority faculty in business schools that could serve as mentors and role models for current and future URM students. In turn, better faculty representation would improve the career preparation of URM students, attract more URM students to business disciplines, and help prepare all students (not just URMs) for working in a diverse workplace (Rama, Milano, Salas, Liu, 2009). What began as a meeting between the KPMG Foundation and a few other associations, has evolved into a robust 501(c)(3) non-profit organization. As we note in the following section, one of the ways in which *The PhD Project* addresses faculty representation involves providing a platform through which faculty, administrators and students develop transactive memory systems.

Transactive Memory Theory

The doctoral admissions process can place a significant strain on individuals' already limited information processing capacities. This strain may be particularly pronounced for those navigating the process alone, with limited resources (e.g. time, attention and energy) or with little familiarity with the process. Transactive memory (TM) theory is a socio-cognitive framework that describes ways in which individuals rely on external sources to cope with heavy information processing demands (Lewis, 2003). Memory is a multi-stage information processing function that includes the attending, encoding, storing and retrieving of information (Ellis, 2006). While memory is typically thought to exist in the mind of one individual, memory can also be *shared* such as when two or more people work together to store and recall information (e.g. John, don't let me forget to pick up an application before we leave). Sharing and coordinating of memory occurs through transactions (e.g. information exchange and combination). Memory becomes transactive when an individual adjusts the information to which they attend, encode, store and/or retrieve from memory according to their knowledge of what others attend to, encode, store and/or retrieve (Lewis, 2003).

For example, consider John and Sara, two coworkers looking to gain admission to a doctoral program. Through conversation, Sara and John learn that they each received undergraduate degrees at the other's top choice for doctoral programs. Armed with this knowledge, they begin to rely on one another for information useful in developing their respective application packages. Not only does this mutual reliance greatly reduce the amount of time each is required to spend gathering information, it also allows each of them to reinvest this time savings towards other tasks (e.g. preparing for the GMAT or GRE).

Additionally, because they each possess deep knowledge of the school, culture, city and faculty, their respective application packages are more personalized and competitive.

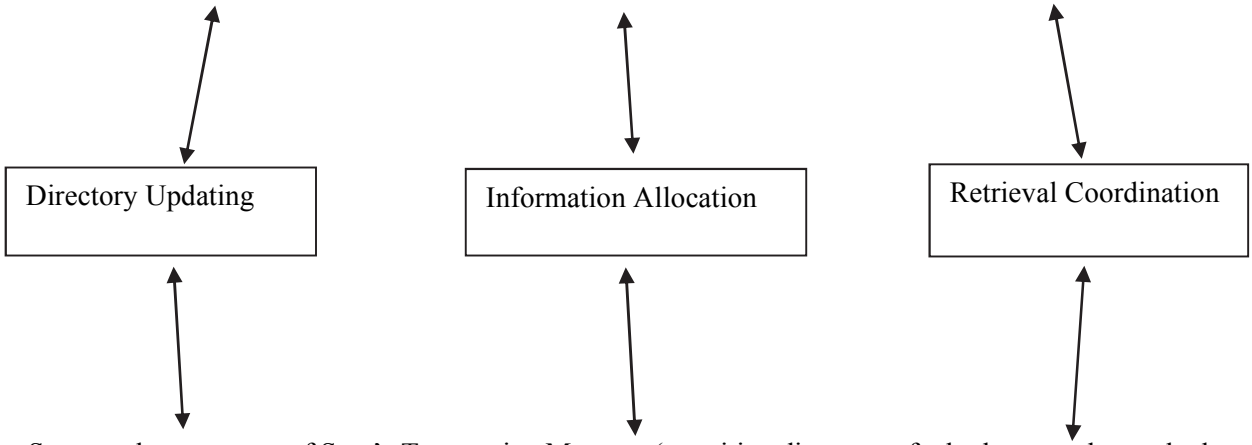
Structural component of TMS

This vignette is one of a prototypical transactive memory system (TMS). A TMS begins to form as two or more people learn about each other's knowledge and capabilities and use this information to coordinate their respective transactive memories (Lewis, 2003). According to transactive memory theory, a TMS is a group-level phenomenon consisting of 2 primary components which are structural and procedural in nature (Lewis & Herndon, 2011). The *structural component* of TMS consists of *metaknowledge* or a *cognitive directory* consisting of tasks, expertise and people and the associations between them (Brandon & Hollingshead, 2004; Mell, van Knippenberg and van Ginkel, 2004). These triadic associations are what Brandon and Hollingshead (2004) refer to *as task-expertise-people* (i.e. TEP) units. The building blocks of these triadic associations are the *dyadic linkages* between "who knows what" (a P-E unit), "who does what" (a P-T unit) and what expertise is needed to accomplish a task (an E-T unit). See Figure 1 for a brief illustration.

FIGURE 1
ILLUSTRATION OF THE STRUCTURAL AND PROCEDURAL COMPONENTS OF AN UNDERDEVELOPED TRANSACTIVE MEMORY SYSTEM

Structural component of John's Transactive Memory (cognitive directory of who knows what and who does what)

Tasks	Expertise	People
??	Attended ABC University	Sara
??	??	??



Structural component of Sara's Transactive Memory (cognitive directory of who knows what and who does what)

Tasks	Expertise	People
Get CV Reviewed	??	John
Prepare for the GMAT	Personal Coaching	??
??	??	??

An individual's cognitive directory may be incomplete, consisting of numerous dyadic structures lacking a T, E or P element (Brandon & Hollingshead, 2004). For example, John may know that Sara has specialized expertise regarding ABC University (P-E unit) due to her spending 5 years there as an undergrad. However, he may be unaware of how Sara may be able to help him in the application process. In the case of a P-T unit, John may offer to review Sara's CV, however she may be reluctant to accept the help not knowing if John is actually qualified to do so. An E-T unit could involve Sara's belief that she needs a personal coach to do well on the GMAT, while not knowing who in her network is capable and/or willing to coach her.

Procedural component of TMS

The *procedural component* of TMS involves three primary processes: directory updating, information allocation, and retrieval coordination (Wegner, 1995). *Directory updating* refers to the processes through which individuals develop, correct and modify the TEP linkages that make up their TM structures (Lee. Bachrach & Lewis, 2014). Individuals update their respective cognitive directories as they learn new information about the tasks, expertise and people needed to pursue and achieve certain outcomes. Due to individuals' tendency towards bias, prejudice and stereotypes, initial cognitive directories are likely to be inaccurate, incomplete and inconsistent with those of others. As such, misalignments of cognitive TEP units are likely (Brandon & Hollingshead, 2004; Hollingshead, 1989).

Forming complete TEP units can be a labor intensive process that may increase cognitive load and deplete individuals' scarce personal resources such as attention, energy, emotions and time (Hobfoll, 1989). As a result, individuals tend to look to others to help with the development and refinement of their individual and collective cognitive directories. Previous research suggests that directory updating may occur in a number of ways. For instance, John may update his own directory by asking Sara what she knows about campus life at her alma mater or by questioning her understanding of the GMAT (Hollingshead, 1998; Gupta and Hollingshead, 2010). Directory updating may also involve asserting, defending or demonstrating one's own expertise to others (Hollingshead, 1998; Gupta and Hollingshead, 2010) such as when Sara informs John that she knows for a fact that he doesn't need a master's degree to get into her alma mater's doctoral program or when she provides John a certificate of completion from a GMAT prep course she completed in response to John's reluctance to accept Sara's GMAT advice.

Information allocation refers to the ongoing alignment and realignment of tasks and expertise with the people most likely to facilitate their processing (Wegner, 1987). Information allocation involves identifying individuals with the requisite willingness and ability to perform certain tasks and to process information. Assigning people to take responsibility for tasks and expertise domains requires confidence in others' knowledge and capabilities. In addition to knowing who knows what (P-E) and who does what (P-T), effective role assignments are also contingent on accurate, complete and shared understanding of what expertise is needed to accomplish which tasks (E-T) (Brandon and Hollingshead, 2004). As such, suboptimal alignments of tasks, expertise and people require cognitive directory updates as well as potential reassignments of people to different tasks, expertise or both.

Retrieval coordination involves the routines through which information is sought, located, accessed, evaluated, and integrated (Wegner, 1987). Previous research suggests that the extent to which information is sought and retrieved requires that an individual is aware of its location, believes that it is valuable and accessible, and is not too costly to obtain (Borgatti and Cross, 2003; Yuan, Fulk, Monge, & Contractor, 2009). Continuing with our example, Sara may be reluctant to coordinate her TM with John if she believes that John's work schedule often makes him unavailable when she needs assistance. John may be hesitant to seek help from Sara if he feels that in doing so he will "owe her" more than what he receives. Finally, Sara may avoid coordinating TMs with John if she feels his knowledge of the management program would be unhelpful since she is applying to the marketing program.

Through the use of metaknowledge and transactive processing, a TMS allows members to develop a division of cognitive labor with members *specializing* in monitoring, learning and retaining expertise in

different domains, developing *confidence* in other member's expertise, and effectively *coordinating* one another's unique expertise (Lewis, 2003). We posit that such a cooperative arrangement can alleviate some of the mental and emotional demands placed on prospective doctoral students.

Using this transactive memory framework as a guide, the following section discusses ways in which the Annual Conference of *The PhD Project* helps prospective doctoral students a) develop an understanding of the tasks, expertise and people necessary to successfully navigate the doctoral admissions process; and b) cultivate a network of relationships that promotes the updating, sharing and coordinating of applicants' transactive memories (e.g. Wegner, 1987).

TABLE 1
THE PHD PROJECT'S MISSION, VISION AND OBJECTIVES

Mission	• to increase workplace diversity of Business school faculty who encourage, mentor, support and enhance the preparation of tomorrow's leaders.
Vision	• a significantly larger talent pipeline of African-Americans, Hispanic-Americans and Native Americans for business leadership positions
Objectives	• to inform and educate minorities about all aspects of business doctoral programs, and to follow their dream of becoming a professor • to provide a nurturing support network for minorities as they navigate their doctoral programs • to improve the preparation of all students by allowing them to experience the richness of learning from a Faculty with diverse backgrounds • to increase the number of minority business professors who can function as role models and mentors; • to influence more minorities to pursue business degrees/careers; • to increase the number of qualified minority applicants to fill critical positions in the business disciplines • to influence more minorities to pursue business degrees/careers; • to reach the goal of a better prepared and more diversified workforce to service a diversified customer base.

PHD PROJECT CONFERENCE: BEING PREPARED

The following section is derived in part by the authors' first person experiences with *The PhD Project* as prospective doctoral students, faculty presenters and university recruiters. The Annual Conference of *The PhD Project* is a 2.5-day event held in Chicago, IL. The conference is attended by approximately 350 prospective URM doctoral candidates selected via a thorough and competitive search process. Other attendees include university representatives, sponsors and alumni of *The PhD Project*, and current doctoral students (who are often there to recruit for their respective universities). The conference creates a socially inviting atmosphere conducive for networking, knowledge exchange (e.g. metaknowledge) and the development of meaningful relationships (e.g. transactive processes). Such relationships are vital to obtaining the information needed to add to or modify one's initial cognitive directory. Relationships also serve as the distinct beginnings of mentorships and role models for prospective doctoral candidates.

Pre-conference

Once selected to the conference, *The PhD Project* mails out a book, *Living the Dream,* which details stories of former participants of *The PhD Project* who have gone on to become professors and how they made the decision to pursue their PhDs. The motivating stories of overcoming obstacles, beating the odds, perseverance and determination serve to motivate prospective doctoral students to have an open mind and heart about their future possibilities before coming to the conference.

Once applicants are notified of their acceptance to *The PhD Project* Conference, they are invited to join a private Facebook group. Current faculty and doctoral students registered to attend the conference are also encouraged to participate in the group. The aim of the Facebook group is to facilitate relationship building among students and faculty members prior to their arrival in Chicago. Participants are encouraged to introduce themselves as well as start basic conversations with other members of the Facebook group. These pre-conference discussions allow participants to become familiar with who has what expertise for which tasks. For example, if a student is interested in a specific university, they can reach out to a professor who teaches at that institution. Even though the professor might not be in the specific field of research in which the student is interested, the professor may have the knowledge and the network in order to connect the student with the right person who can answer their questions.

As more participants engage in conversations, they begin to categorize members of the Facebook group based on what they learn about the members. Through the process of information allocation, members form subgroups wherein more meaningful conversations take place. For example, participants might categorize other participants by their geographical location, where they can form a subgroup with those from their area. Through subgroup formation, members not only learn about one another on a deeper level, but they also begin to divide conference tasks. For example, one member may agree to focus on gathering information about financing a PhD while another agrees to pay particular attention to average GMAT scores required by top programs.

During Conference

Day 1 of the conference begins with a GMAT preparation workshop sponsored by The Princeton Review and the Graduate Management Admission Council. The workshop promotes transactive memory development by providing participants with a list of people, organizations and resources that can be sought after the conference for continued GMAT assistance. The workshop is followed by an informal buffet reception and networking opportunity among participants, presenters, university representatives and other guests. Directory updating occurs as attendees are introduced to one another and inquire about each other's goals and areas of expertise (P-E & P-T units).

Day 2 is packed with sessions that include an overview of *The PhD Project*, a session on the different ways of entering business doctoral programs and what to expect during the admissions/application process. Participants are presented with first person accounts of life as a doctoral student. Panel discussions allow presenters to answer questions and offer suggestions for avoiding common mistakes, overcoming obstacles and staying focused during doctoral studies. Breakout sessions by discipline allow prospective students to hear personal testimonies and receive tips on balancing doctoral studies and family. The day is filled with meals and breaks wherein participants are encouraged to meet and share with one another. For example, during one of the meals, dining tables are divided by discipline (e.g. Organizational Behavior, Finance, Economics, etc) whereby prospective students are encouraged to dine and chat informally with faculty and current PhD students according to their respective areas of interest. These informal spaces offer valuable opportunities for continued transactive memory development and refinement.

One of the highlights of the conference is the Doctoral Program Fair which offers representation from nearly 100 academic institutions. The fair offers prospective doctoral students an opportunity to speak with current doctoral students and faculty and obtain specific information to aid in selecting the school that is the best fit for them.

Another way in which the conference promotes transactive memory is through roommate debriefing. Roommate debriefing usually happens once the conference day is over, either in the hotel lobby, bar or in participant hotel rooms. During that time, roommates and sometimes other participants get together and discuss the day and what they've learned. These informal interactions offer an opportunity for each conversant to learn something they may not have known or have missed. Moreover, these debriefings help attendees to update or correct their cognitive directories with more accurate information regarding who knows and does what (i.e. TEP units). For example, a common misconception is that a master's degree is needed before one pursues a PhD.

Post Conference

Opportunities for continued transactive memory development and operation do not end with the conference. Participants are encouraged to form accountability groups whereby they set goals and deadlines for applying to programs and for funding. Other students have been known to form groups to aid in studying for and taking the GMAT, preparing statements of purpose and CVs. The closed Facebook group remains active after the conference, allowing participants to continue seeking and sharing information such as conference notes, faculty contact information, application deadlines and motivational articles.

CONCLUSION

The current manuscript leverages the framework of transactive memory systems to describe ways in which annual conference of *The PhD Project* is helping to address the persistent problem of underrepresentation of racial minorities among business school faculty. By identifying, convening and connecting 350 high potential African-American, Native-American and Hispanic-American participants to people, resources, organizations and schools, *The PhD Project* is helping to facilitate more accurate understandings of who knows what and who does what in the context of doctoral admissions. In addition to the actual conference, the pre- and post-conference support provided by *The PhD Project* facilitates a community of practice through which current and future PhD holders can maintain mutual awareness and cooperative working arrangements.

We encourage future research to empirically test the ideas advanced in this manuscript. For example, a common way transactive memory is assessed is with Lewis' (2003) 15-item transactive memory scale. According to TM theory, transactive memory can be said to exist when members cooperate in such a way that they develop expertise among them that is specialized, credible and well-coordinated. The scale includes 5 items that tap each of these elements. A pre- and post-test design could be utilized to assess the extent to which participants' respective memories become more transactive as a result of participating in the annual conference. Moreover, a social network design could be used to evaluate which factors explain why transactive memory develops among some conference participants and not others (e.g. Lee et al., 2014). Recent research suggests that transactive memory development is affected by the personality of those involved as well as the extent to which individuals feel psychologically safe to take interpersonal risks (Hood, Bachrach, Zivnuska, & Bendoly, 2015). Admitting mistakes, acknowledging deficiencies, asking for help, challenging faulty assumptions and experimentation are types of interpersonal risk taking (e.g. Edmondson, 1999; Edmondson & Lei, 2014; Hollingshead, 1998) that prospective doctoral students are likely to face when attempting to develop and refine their individual and collective transactive memories. As such, future research would do well to evaluate how participant personality and propensity to feel psychologically safe impacts the accuracy and maturity of their transactive memories.

Lastly, while this manuscript focuses exclusively on efforts to promote diversity in business education, we encourage future research to evaluate transactive memory development in other fields such as the biomedical sciences. Indeed, policy makers have begun to acknowledge the critical role that diversity plays in the development of team science. For example, a recent report by entitled *Enhancing the Effectiveness of Team Science* (National Research Council, 2015) lists research team diversity as a key

factor influencing the performance of research teams such as publication frequency, citation counts, and interpersonal conflict. Testing for the presence of transactive memory and its correlates among trainees and mentors in programs such as the aforementioned PREP program may help to provide guidance to administrators desirous of promoting more collaborative research arrangements across lines of race and faculty/student status.

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The PhD Prep Lab (not to be confused with *The PhD Project*) is a basic and applied science startup that was founded in 2015 by Dr. Hood to complement the educational and workforce diversity efforts of the *The PhD Project*. The PhD Prep Lab offers underrepresented minorities and women hands-on research, training and mentoring opportunities in the areas of team-based science, leadership, innovation and entrepreneurship. At the time of this writing, co-authors Ajigbeda, Allman, and Foksinska were Fellows of the PhD Prep Lab where they were being equipped with the knowledge and skills necessary to successfully identify, evaluate, and enter doctoral programs in business. For more on this initiative visit, www.phdpreplab.com.

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