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Openness to Experience and Knowledge Integration in Knowledge-Diverse Teams

ABSTRACT

Despite their prominence, knowledge-diverse teams' capacity to make successful decisions may be hindered by weak communication or unshared information between team members. We explore the influence of openness to experience within Salazar et al.'s (2012) integrative capacity model to better comprehend enablers of team performance. Results depict that openness to experience was positively correlated to knowledge consideration, assimilation, and accommodation. No indirect relationship was found between knowledge consideration and knowledge transformation through assimilation/accommodation.

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Openness to Experience and Knowledge Integration in Knowledge-Diverse Teams

Despite the reliance on knowledge-diverse teams to navigate complex organizational problems across industries, successful decision making in these teams may, at times, be challenged by poor communication practices and unshared conceptualization of the team's task or problem. The purpose of the proposed study is to understand the impact of openness to experience on knowledge integration in teams as well as the influence of knowledge integration on team decision making when knowledge is dispersed. Exploring the antecedents of knowledge integration is essential when attempting to better comprehend factors that support desired team outcomes in knowledge-diverse teams.

It is well understood that the quality of team decision making can vary greatly. For instance, highly motivated groups perform better than individual members working separately (e.g., Hertel et al., 2000; Michaelsen et al., 1989; Tindale & Larson, 1992) and can often solve a problem that no group member could working independently (e.g., Fraidin, 2004; Laughlin et al., 2006). Still, team decisions can often be viewed as suboptimal by team members or other normative standards (De Dreu et al., 2008; Kerr & Tindale, 2003). De Dreu and colleagues (2008) specify that new ideas and solutions generated by team members help the team achieve high-quality judgments and decisions. Such integration is only effective if teams are actively processing the information presented. Notably, it is the notion that teams operate as information processors that has helped researchers understand the role cognitive tasks have on team performance (Hinsz et al., 1997). For instance, team-level information processing relates to the degree to which shared knowledge is considered, assimilated, accommodated, and transformed by the team (Salazar et al., 2012). In knowledge-diverse teams, where relevant task information

is dispersed among team members, effective decision making and problem solving will be contingent on appropriate sharing and integration of knowledge.

Knowledge Integration

Knowledge integration is a process that involves the thoughtful processing, by others, of shared information, and using the new information to create transformed knowledge (Salazar et al., 2012). As organizations continue to tackle complex environmental challenges and rely on knowledge-diverse teams to combine varied expertise, generate novel solutions, and make critical decision, it is necessary to understand the factors that support effective knowledge integration. In knowledge-diverse teams, the integration of uniquely held expertise or knowledge is proposed to be a critical driver to increase the likelihood of team members making connections between their diverse knowledge, expertise, insights, ideas, and perspectives (Salazar et al., 2012).

Process of Knowledge Integration

The knowledge integration process is comprised of three primary components that can yield knowledge transformation: knowledge consideration, assimilation, and accommodation (Salazar et al., 2012). When discussing this process, shared information refers to pieces of information that all group members possess, and unique information pertains to pieces of information that differ between group members. Within the process, knowledge consideration captures members' processing of unique information contributed by other team members. For example, if an individual has come to a conclusion that explains some observed phenomena of interest, but they are presented with new information they had not previously accounted for, they have the opportunity to consider this unique information in relation to their previously developed conclusion. Upon considering this information, the individual can then assimilate this into their

existing cognitive structure, or accommodate this knowledge and develop a new way of understanding (Salazar et al., 2012).

Considering this in reference to the previously mentioned example, this individual can attempt to fit the new information into their existing knowledge structure, or the conclusion being used to explain what they have observed. If this information does not align with or fit into this existing structure, they can opt to integrate the different pieces of information to create new knowledge (Gibson, 2001). This is an interactive process in which the members are actively trying to make sense of their shared and unique pieces of information. Within the provided example, this would entail each team member sharing what pieces of information they possess, and the team trying to develop a new conclusion or explanation for what is being observed. This process of knowledge integration can result in knowledge transformation, which is the generation of new knowledge, based on all pieces of information (e.g., shared and unique) being presented.

Openness to Experience and Knowledge Integration

Openness to experience is a widely researched personality trait that captures characteristics such as an individual's imaginativeness, their sensitivity to aesthetics, curiosity, independent thinking, and values (Costa & McCrae, 1992). Those measuring high on openness to experience tend to be curious and possess a wide variety of interests, which can lead to a desire for intellectual stimulation (Nie & Zacher, 2015). Furthermore, openness to experience is also strongly related to creativity, with one of its facets centering on idea generation (George & Zhou, 2001).

Within the context of the present study, members' openness to experience is an interesting trait to consider, as the transformation of knowledge through assimilation,

accommodation, and consideration relies on the ability to adapt one's thinking. Because individuals measuring high on openness are characterized by creativity, receptivity to change and new information, and are more willing to try new approaches, it is expected these individuals are more flexible in their way of thinking (LePine et al., 2000). Thus, when provided with unique information from others, individuals measuring high on openness are likely better able to accommodate such new contributions from others.

Hypothesis 1. Individuals measuring high on openness to experience are more likely to consider unique information.

Beyond knowledge consideration, openness to experience can also contribute to the assimilation and accommodation of unique information shared. The higher team members measure on openness to experience, the more likely they will be adaptable and able to adjust their way of thinking or decision-making to incorporate the unique information provided by others (LePine et al., 2000).

Hypothesis 2. Individuals measuring high on openness to experience are more likely to assimilate and accommodate unique knowledge shared.

For knowledge to be transformed, team members should first consider the unique contributions or alternative ideas presented by others within the team. Consideration involves the thoughtful processing of information (Salazar et al., 2012), which is a necessary, though not sufficient, condition for knowledge to be transformed. When information is carefully considered, this creates increased opportunity for exiting knowledge to be updated or changed.

Hypothesis 3. Knowledge consideration is positively related to knowledge transformation.

Once new knowledge is considered, the creation of transformed knowledge may occur by both changing new knowledge and ideas to fit with the existing mental representation (i.e., assimilation) or by changing the existing mental representation to fit the new information or ideas (i.e., accommodation; Salazar et al., 2012). As such, we expected that knowledge consideration would influence knowledge transformation through the processes of assimilation and accommodation.

Hypothesis 4. The positive relationship between knowledge consideration and knowledge transformation is mediated by assimilation/accommodation.

When knowledge transformation occurs, the previously dispersed knowledge within a team is converted to an integrated and novel knowledge product at the team level (Salazar et al., 2021). This renewed integrated knowledge will be representative of the diverse array of knowledge that is present within the team and function to support team outcomes more collectively. Using the signal-detection perspective, with increased knowledge diversity, team members will have more signals to detect cognitive resources (Aggarwal & Woolley, 2019), which can be supportive of more effective decision making.

Hypothesis 5. Knowledge transformation is positively related to decision quality.

Method

Participants. The sample included 61 teams including 3 individuals per team. Participants from all demographic backgrounds (e.g., gender, race) were allowed to participate; however, all participants were at least 18 years old. Participants were recruited through Prolific.

Measures. Study measures included an attention check and openness to experience (sample item: “I have a vivid imagination.”; $\alpha = .75$), measured during phase 1. After completing the team discussion, participants completed the integrative capacity measure (Salazar et al.,

2012), which included a measure of knowledge consideration (sample item: “Even if my team members have opposing perspectives, I evaluate each in order to consider all issues”; $\alpha = .92$), knowledge accommodation and assimilation (sample item: “My understanding of my work tasks often changes after my team members have shared a different perspective.”; $\alpha = .89$), knowledge transformation (sample item: “The team was able to approach a problem differently by incorporating the alternatives provided by its members.”; $\alpha = .86$, rwg median = .66), and demographics. After a team discussion, members arrived at a consensus about the problem presented in the task, which represented the quality of the team’s decision.

Procedure. After providing consent, participants were redirected to the LIONESS Lab to begin the study. LIONESS Lab is a web-based platform used to facilitate interactive experiments (Giamattei et al., 2020). To participate in this study, participants first answered four screening questions to assess their understanding of the study instructions and expectations. Participants who fail to answer these questions after two attempts were directed to the exit screen. Participants who passed the screening phase were assigned a unique identifier and directed to the virtual waiting area in LIONESS where they waited for other participants to be matched to their teams.

Participants were matched based on availability and successful completion of the screening questions. Once the teams were matched, each participant individually completed the brief orientation (phase 1) where they were introduced to the task and completed the openness to experience measure. Upon concluding the orientation, participants were provided with a packet of materials, each containing 24 total pieces of information. Participants reviewed the task materials before proceeding to phase 2 of the study (phase 2). In phase 2, participants were directed to a shared space where they conversed with their team members regarding the task to

arrive at a decision. After the team discussion, participants completed the post-discussion survey (phase 3) including measures of knowledge consideration, knowledge accommodation and assimilation, and knowledge transformation.

Participants completed a fictitious homicide investigation task (Campbell & Stasser, 2006; Stasser et al., 1995). The information packet contained interviews, newspaper articles, handwritten notes, a map of the crime scene, and other background information related to the investigation. The participants were tasked with identifying the guilty suspect, based on the information presented. Each team members' information packet included some shared and some unique (i.e., unshared information). To successfully identify the guilty suspects, team members needed to share their unique information during the team discussion.

Results

Study descriptives and correlations can be found in Table 1. As predicted, openness to experience was significantly correlated to knowledge consideration ($r = .48; p < .001$) and assimilation/ accommodation ($r = .51; p < .001$). Hypotheses 1 and 2 were supported. Further, results show that knowledge consideration was positively related to knowledge transformation ($B = .58; p = .0011$), supporting hypothesis 3; however, there was no indirect effect through assimilation/accommodation. Hypothesis 4 was not supported. Table 2 includes the unstandardized regression coefficients for the direct and indirect effects. To test Hypothesis 5 that knowledge transformation is positively related to decision quality, we will review the chat log to code the teams' decision. We will have this coding completed to test the relationship between knowledge transformation and decision quality prior to the conference in April 2023.

Discussion

The purpose of this study was to examine the impact of openness to experience on knowledge integration in teams and explore knowledge integration on team decision making when knowledge is dispersed. Our findings demonstrate that, in fact, openness to experience relates significantly to knowledge consideration and assimilation/accommodation. Furthermore, knowledge consideration predicts knowledge transformation; however, this effect occurs directly and not through knowledge assimilation/accommodation. Our findings have several implications.

For starters, organizations would be well served to optimize their knowledge-diverse teams for openness to experience and knowledge consideration. Doing so would create an atmosphere that celebrates differences, promotes cohesion, and leverages what made knowledge-diverse teams special to begin with. Specific industries, such as health care, have long understood the importance of knowledge integration and have designed team development interventions to promote knowledge sharing (Lacerenza et al., 2018). Constructing teams with these factors in mind might help organizations minimize the cost of training and increase successful decision-making.

Second, this study provides valuable methodological insights. The successful completion of this study provides a useful model for future researchers, studying teamwork virtually, recruiting participants via Prolific, and facilitating interaction and data collection via LIONESS. Specifically, we hope that future researchers looking to leverage online labor markets (e.g., Prolific, Amazon Mechanical Turk) for virtual interaction and data collection adopt specific tactics implemented within our study to help minimize attrition. Strategies to reduce attrition have been previously documented (e.g., Horton et al., 2011) and we have found success using these tactics with minor alterations. We have found it helpful to have a control question that reminds participants that fellow team members are real people and not robots. Additionally, it is

vital to stress the time commitment expected of participants. Furthermore, implementing a conditional payment that awards full payment to teams that successfully complete the study together and partially rewards team members with missing members discourages attrition, maintains data quality, and ensures all participants are treated fairly. Finally, implementing a study progress bar or progress reports throughout the experiment has helped manage participant engagement.

The present study found no indirect effect of knowledge consideration on knowledge transformation through assimilation and accommodation and there might be several explanations for this finding. For example, there is the possibility that the teams' task (i.e., murder mystery task) was not complex enough to enable assimilation or accommodation. For either assimilation or accommodation to occur the knowledge presented would have to be impactful enough to elicit a change in how the knowledge is fit within a mental model or how the mental model fits to new information. Thus, it is possible that the clues presented to participants during the murder mystery task were not ambiguous enough to elicit such demands. Future research looking to solve this limitation should aim to use tasks that are not clear cut and slightly cognitively intensive.

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Table 1

Means, Standard Deviations, and Correlations Between Team-Level Study Variables

Variable	M	SD	1	2	3	4	5	6
1 Age (years)	37.05	11.57	--					
2 Work experience (years)	5.21	.96	.37*	--				
3 Openness to experience	4.10	.35	.03	-.15	(.75)			
4 Consideration	6.38	.54	.30	-.07	.48**	(.92)		
5 Assimilation/ Accommodation	5.46	.79	-.11	-.07	.51**	.43**	(.89)	
6 Transformation	5.51	.73	.06	-.08	.38**	.50**	.37**	(.86)

Note: $n = 40-61$ (due to missing data on some demographic variables). * $p < .05$; ** $p < .01$.
Reliability estimates are presented on the diagonal.

Table 2

Unstandardized Regression Coefficient, Direct and Indirect Effects

	Assimilation/Accommodation		Transformation	
	B	SE	B	SE
Intercept	1.42	1.10	.90	.98
Consideration	.63**	.17	.58**	.17
Assimilation/ Accommodation			.17	.11
R2	.19**		.28**	
Direct Effect ^a			.58**	.17
Indirect Effect ^b			.11	.10
CI of Indirect Effect			[-.0455]	[.3641]

Note: $n = 61$. * $p < .05$; ** $p < .01$. CI = confidence interval. a Direct effect of consideration on knowledge transformation. b Indirect effect of consideration on knowledge transformation through knowledge assimilation/accommodation.