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GETTING TO KNOW YOU: MOTIVATING CROSS-UNDERSTANDING FOR IMPROVED TEAM AND INDIVIDUAL PERFORMANCE

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Key words: Team cognition, cross-understanding, team goal orientation, team performance, individual performance

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GETTING TO KNOW YOU: MOTIVATING CROSS-UNDERSTANDING FOR IMPROVED TEAM AND INDIVIDUAL PERFORMANCE

Many contemporary organizations depend on team-based organizing to achieve high performance, innovate services and products, and adapt to environmental turbulence. Significant research focuses on understanding how teams develop, assimilate, and apply diverse information; yet organizational practices have evolved in new ways that are not fully explored in the teams literature. Individuals with diverse motivations, knowledge and perspectives are often assigned to teams, creating burdens for members to develop effective ways to work together, to learn from each other, and to achieve goals amid the complexity of today's organizational contexts. In this paper we examine a multilevel model of how team goal orientation affects cross-understanding—the extent to which team members understand the other members' mental models—which in turn affects team and individual performance. We examine these effects using 160 teams of 859 participants who completed a semester-long business simulation. Findings show that the more team members are motivated by learning goals, the greater a team's cross-understanding and subsequent team and individual performance. These effects are dampened when members are motivated by performance goals—to avoid mistakes or prove competence. This study expands the cross-understanding literature, revealing motivational antecedents that explain why some teams develop higher cross-understanding than others. We also contribute to the goal orientation literature by demonstrating that team goal orientation influences members' learning about other members, and in so doing, also affects team and individual performance. As team motivation can be influenced by organizational practices, our findings also contribute practical insights for organizational leaders.

Key words: Team cognition, cross-understanding, team goal orientation, team performance, individual performance

GETTING TO KNOW YOU: MOTIVATING CROSS-UNDERSTANDING FOR IMPROVED TEAM AND INDIVIDUAL PERFORMANCE

In today's organizations, team-based work is a dominant factor in producing organizational performance and innovation. Contemporary organizational teams are often comprised of diverse individuals with varied expertise and capabilities, making it challenging to achieve common ground, utilize these capabilities, and work harmoniously. Developing an awareness and understanding of members' differences becomes crucial for teams to remain effective. Many theories have been advanced to address these team management challenges, including theories of collective cognition, which attempt to elucidate the processes by which team members exchange knowledge, and learn together to produce collective outcomes. In this paper, we leverage theory on cross-understanding (Huber & Lewis, 2010) to explain how members, as well as teams, can benefit from *understanding* members' mental representations.

Huber and Lewis (2010) argued that when team members understand the mental representations of other members, higher team and individual learning, and higher performance result. Cross-understanding is highest when all (or most) members understand how other members think about the task and task situation, and lowest when all (or most) members have little understanding or awareness of other members' thinking, which is conceptualized in terms of members' *mental models*. Higher levels of cross-understanding in a team is theorized to positively influence the way in which teams present, assimilate, and utilize knowledge. Empirical research on cross-understanding is still emerging, but the available evidence from published studies (Meslec & Graff, 2015; Otoiu, Andrei, & Băban, 2012) and conference presentations (Bayer & Lewis, 2013; Lewis & Herndon, 2015; Rariden & Lewis, 2013) suggests that teams with higher cross-understanding perform at higher levels as theorized. The current study adds to this literature with a large-scale empirical investigation of not only the effects of cross-understanding on team performance, but also its effects on *individual* performance (Huber & Lewis, 2010), which has not yet been examined.

Given the importance of cross-understanding to performance, it is essential to understand the

factors that lead to higher cross-understanding. While Huber and Lewis (2010) noted that members who have worked together in the past may have accurate understandings of each member's mental model, stability in team membership is rare (Lewis, Belliveau, Herndon, & Keller, 2007; Summers, Humphrey, & Ferris, 2012). How might teams composed of members who do not know each other develop cross-understanding? How might familiar members develop deeper and more accurate perceptions of others' mental models to increase learning and performance? We argue that one critical antecedent of cross-understanding is the nature of a team's *goal orientation*—a form of team-level motivation (Hirst, van Knippenberg, & Zhou, 2009; LePine, 2005; Porter, 2005) that describes the average dispositional tendency of team members to strive towards mastery or performance-oriented pursuits under achievement situations (Dweck, 1986). We focus on team goal orientation because learning about other members' mental models requires effort, persistence, and a focus on understanding members. When a team's members are motivated to learn about others, cross-understanding should increase. The team goal orientation literature, however, has focused mainly on motivations related to task learning and performance (Hirst et al., 2009; LePine, 2005; Porter, 2005). Our study departs from that literature by explaining how goal orientations also affect the extent to which members are motivated to learn about other members, and thereby influence the strength of a team's cross-understanding. Our study addresses the question: What types of team goal orientations motivate teams to develop high cross-understanding and to realize learning and performance benefits?

Our research further advances the team goal orientation literature by explicating a cognitive mechanism, rather than a specific behavioral mechanism—e.g. backing-up behaviors (Porter, 2005), adaptive behaviors (LePine, 2005; Porter, Webb, & Gogus, 2010), or information exchange behaviors (Gong, Kim, Lee, & Zhu, 2013)—through which a team's collective motivations influence team and individual performance. The cognitive mechanism we offer in this paper—the development of cross-understanding—provides a generalized account of how team goal orientations may affect team and individual performance, as cross-understanding itself is likely to produce a variety of behaviors that help members more effectively communicate, avoid unnecessary conflicts, anticipate other members' actions,

and coordinate activities (Huber & Lewis, 2010). The results of the current study are relevant to many types of teams in organizations, including those with great information-processing demands and those whose members are informationally or demographically diverse (Huber & Lewis, 2010), because cross-understanding offers a basis for interpreting and leveraging members' contributions beyond surface-level member characteristics. Thus, our insights can apply to multi-functional teams working on complex tasks, such as project teams, founding teams, or top-management teams, as well as in team-based organizations in which previously unfamiliar individuals are brought together for specific projects or tasks.

CROSS-UNDERSTANDING AND PERFORMANCE

Cross-understanding is defined as the extent to which a team's members understand the mental models of other members (Huber & Lewis, 2010). Higher cross-understanding is theorized to produce greater learning and team performance by improving communication effectiveness among members, avoiding disruptive conflicts, helping members to learn more about the task and task context, and facilitating close coordination of members' activities (Huber & Lewis, 2010). Cross-understanding depends on the extent to which a team's members understand how other members think—more specifically, how well members understand the mental models of other members. As stated in Huber and Lewis (2010: 7), "mental model refers to a person's mental representation of a system and how it works (Johnson-Laird, 1983; Rouse & Morris, 1986). This definition takes into account (1) the variables included in the system, (2) the properties and states of those variables, and (3) the causal or other relationships among those variables". Huber and Lewis (2010) explained that the content of a mental model relevant to cross-understanding encompasses an individual's factual knowledge, beliefs about cause and effect, sensitivities to particular issues, and preferences for certain means or ends. Importantly, each member's knowledge, cause-effect beliefs, sensitivities, and preferences may be different – indeed, some teams are composed to capitalize on such differences (Bantel & Jackson, 1989; Eisenhardt & Tabrizi, 1995). In such teams, collective performance depends on members adjusting to, accommodating, and integrating their different perspectives, experiences, and knowledge (Brodbeck, Kerschreiter, Mojzisch, & Schulz-Hardt, 2007; Bunderson, 2003). Thus, an important distinction between cross-

understanding and other team cognition constructs is that cross-understanding does not depend on similar or overlapping mental representations, but rather on members' *understandings* of other members' mental representations (see Online Appendix A1 for a theoretical comparison of team cognition constructs).

Cross-understanding and Team Performance

Cross-understanding is thought to lead to higher team performance for at least three reasons. First, understanding others' mental representations of the task (comprised of what a member knows, believes, is sensitive to, and prefers) allows team members to communicate diverse and potentially complex information in ways that can be easily understood by others on the team. Cross-understanding helps teams avoid conversations that could be unacceptable to its constituent members, trigger disagreements, or escalate conflicts. Second, cross-understanding allows teams to better utilize diverse knowledge, engage in divergent thinking, and elaborate on perspectives that might have been inconsistent with members' initial preferences (Levine & Thompson, 1996). As such, cross-understanding increases members' comprehension of the team's tasks. Third, when cross-understanding is high, teams are able to engage in better coordination and avoid redundancies and process losses, as team members anticipate others' behaviors and adapt their own actions accordingly (Huber & Lewis, 2010).

The few empirical studies that have been published on cross-understanding have found beneficial effects of cross-understanding on member behaviors and team performance. For example, Otoiu, Andrei, and Băban (2012) presented qualitative evidence that cross-understanding leads to more effective allocation of roles based on knowledge and expertise, and eliminates dysfunctional routines that could affect individual members' beliefs, preferences, and sensitivities. Hutzschenreuter and Horstkotte (2013) suggested that cross-understanding results in better cohesion and improved decision-making routines. Although quantitative research on cross-understanding is still emerging, a recent study by Meslec and Graff (2015) demonstrated that cross-understanding positively affects team performance. Examining student teams engaged in complex research projects in organizations, Meslec and Graff (2015) showed that teams with low cross-understanding are unable to utilize diverse perspectives, and therefore perform worse than their higher cross-understanding counterparts. In accordance with the theoretical predictions

and emerging empirical support for the team-level benefits of cross-understanding, we hypothesize the following:

Hypothesis 1a: Cross-understanding is positively related to team performance.

Cross-understanding and Individual Performance

While most prior research on team cognition has focused on collective outcomes, researchers and practitioners alike have recently begun to recognize how cross-level processes may explain outcomes at different levels of analysis (Chen & Kanfer, 2006; DeDreu, 2008; Kozlowski, Chao, Grand, Braun, & Kuljanin, 2013; Troth, Jordan, Lawrence, & Tse, 2012). Huber and Lewis (2010) theorized that higher cross-understanding in a team will improve not only team performance, but also individual performance. Cross-understanding prompts members to voice and discuss what they know, believe, or prefer, thereby increasing the likelihood that other members develop a fuller understanding of relevant aspects of the task and task situation. The enhanced communication effectiveness brought about by cross-understanding also encourages members to consider information inconsistent with their initial preferences (Levine & Thompson, 1996), enabling members to develop more nuanced insights about the team's tasks. Thus, by being exposed to relevant information, members are more likely to expand their comprehension of the team's task when cross-understanding is high versus low.

We note that cross-understanding may also stimulate members' learning because cross-understanding does not force a particular mental organizing structure on that learning. Other collective cognition concepts, including shared mental models (Cannon-Bowers, Salas, & Converse, 1993) and transactive memory systems (Hollingshead, 2001; Wegner, 1986), emphasize *shared* cognitive structures. This sharedness yokes individuals' mental models to other members' mental models, which could interfere with an individual's ability to encode (learn) and retrieve information in the form that is best suited for him or her. In contrast, cross-understanding does not necessitate that members share a common understanding of members' mental models or of the task. Therefore, members can possess idiosyncratic understandings that do not completely overlap with the understandings of all other members. This means that each individual can encode information in the mental structure that is most understandable for him or

her, increasing the chance that the information can be retrieved from memory later and used for better individual performance in future tasks of a similar nature (Bechky, 2003; Hollingshead, 1998a; 1998b). In sum, members in high cross-understanding teams are likely to learn and perform better because (a) they learn more about the task from higher exposure to task-relevant information in the course of interacting with others, and (b) they encode information in a way that facilitates faster retrieval of information when it is needed. Therefore, we hypothesize:

Hypothesis 1b: Cross-understanding is positively related to individual performance.

To explain why some teams are more effective in developing cross-understanding than others, we now examine the collective motivation to pursue learning versus performance goals, and how these orientations affect a team's propensity to develop cross-understanding. The theoretical model is illustrated in Figure 1.

INSERT FIGURE 1 ABOUT HERE

TEAM GOAL ORIENTATION MOTIVATES CROSS-UNDERSTANDING

Goal orientation was first proposed by Dweck and colleagues as a relatively stable predisposition of individuals to pursue ability-developing or ability-demonstrating goals in challenging situations (Dweck, 1986; Dweck & Leggett, 1988; VandeWalle, 1997). The goal orientation literature distinguishes the motivation to learn or master a task, called *learning orientation* (Hirst et al., 2009), from the motivation to demonstrate existing task-related capabilities to obtain positive judgments (*performance-prove orientation*) and to avoid negative judgments (*performance-avoid orientation*; Brett & VandeWalle, 1999; Elliot & Harackiewicz, 1996; VandeWalle, 1997). Although most goal orientation research has focused on the individual level of analysis, recent work has conceptualized team goal orientation as a meaningful form of team-level motivation that predicts team member behaviors and outcomes (Hirst, et al., 2009; LePine, 2005; Porter, 2005). Team learning orientation refers to the average propensity within the team to invest effort towards building competence and task mastery. Team performance orientation refers to the average propensity within the team to seek positive judgments by demonstrating existing

competence (performance-prove orientation) or to avoid appearing incompetent (performance-avoid orientation) (Hirst et al., 2009; Porter, 2005).[1]

Some research has examined how different goal orientations may combine or interact. For example, Button, Mathieu, and Zajac (1996) found that an individual can be simultaneously motivated by learning and performance goal orientations. At the team level, the possibility that different goal orientations exist in a single team becomes even more likely, as teams can be composed of some individuals who are motivated by both learning and performance goals, some who are more learning goal-oriented, and others who are more performance goal-oriented (Porter et al., 2010). Recent research that has examined the co-occurrence and interactions of different goal orientations in teams (Hirst et al., 2009; Porath & Bateman, 2006; Porter et al., 2010; van Mierlo & van Hooft, 2015) explains how learning, performance-prove, and performance-avoid goal orientation types are related. Learning and performance-prove goal orientations have in common a proactive tendency to invest cognitive effort, albeit towards different ends. Cognitive resources devoted to learning goals (i.e., to seek information and expand knowledge) could be redirected for pursuing performance goals, which are associated with a different set of behaviors (including demonstrating capabilities and managing impressions: Bunderson & Sutcliffe, 2003; Porter et al., 2010). This may explain why empirical results often find a positive association between learning and performance-prove goal orientations (Dierdorff & Ellington, 2012; Hirst et al., 2009). The two types of performance goal orientation (performance-prove and performance-avoid) tend to be positively related because they are both concerned with appearing competent, although the former involves active effort while the latter does not (Dierdorff & Ellington, 2012; Elliot & Harackiewicz,

[1] Team goal orientation has been conceptualized in one of two ways: either as a composite of individual (i.e., trait) goal orientations (operationalized as an average of members' dispositions to pursue learning or performance goals; Dierdorff & Ellington, 2012; Dietz, van Knippenberg, Hirst, & Restubog, 2015; Hirst et al., 2009; LePine, 2005; Porter, 2005), or as an emergent team state (operationalized as members' perceptions of their teams' propensity as a whole to engage in the pursuit of learning or performance goals; Bunderson & Sutcliffe, 2003; Gong et al., 2013). In this paper, we adopted the composite or individual trait approach because we are interested in antecedents of cross-understanding – i.e., our inquiry focuses on the characteristics of the team and its members before cross-understanding has developed. Team state goal orientation is a condition that emerges during, or as a result of, team member interactions. In order to isolate the impact of goal orientation as an antecedent to cross-understanding, we focus on members' dispositions prior to team formation – a composite of individual (i.e., trait) goal orientations.

1996). Negative associations are more often found between learning goal orientation and performance-avoid orientation (Dierdorff & Ellington, 2012), in part because the directions of effort associated with these different goal orientations are likely to be incompatible. Learning goals promote effort towards gaining knowledge and mastery, while performance-avoid goals promote restraint to ensure appearing competent in front of others, which might mean withholding knowledge that could expose low mastery.

In this study, we examine the combined effects of team learning goal orientation and the two types of team performance goal orientations. We first hypothesize that high team learning orientation promotes development of cross-understanding, which in turn, results in higher team and individual performance. We then examine the interactive effects of learning and performance orientations on cross-understanding and performance.

Team Learning Orientation Positively Motivates Cross-Understanding

Research on team learning orientation has focused primarily on task-related learning (Lee, 1997; Poortvliet, Janssen, van Yperen, & van de Vliert, 2007; VandeWalle & Cummings, 1997). We depart from past research to posit that team learning orientation affects not only learning about the task, but also learning about other members' mental models—leading to an increase in a team's cross-understanding. Evidence shows that members high in learning orientation are more likely to envisage benefits to sharing information with others and seeking feedback (Poorvliert et al., 2007; VandeWalle & Cummings, 1997). This suggests that in a team composed of members high in learning orientation, team members are likely to seek knowledge about each other as a way to better conceptualize and channel their efforts collectively toward competence development. Research has demonstrated that team learning orientation is also associated with high levels of psychological safety (Wilkens & London, 2006) and higher quality interpersonal interactions (Porath & Bateman, 2006), thereby creating an environment where diverse perspectives can be openly shared and discussed. Such eagerness and openness towards learning about, understanding, and reflecting upon team members' varied perspectives and behaviors has also been shown to lead to greater cross-understanding (Meslec & Graff, 2015). In contrast, low team learning orientation is unlikely to lead to cross-understanding. LePine (2005) showed that teams low in learning

orientation engaged less in adaptive interpersonal behaviors when working on challenging tasks. Members of teams with low learning orientation also did not exchange, consider, or evaluate alternative viewpoints and opinions of fellow team members about how to perform the team task (LePine, 2005). By failing to understand, consider, and probe other members' views and opinions, members are unlikely to develop a good understanding of others' mental models. Together, these points lead us to hypothesize the following:

Hypothesis 2: Team learning orientation is positively related to cross-understanding.

Cross-Understanding Transmits the Indirect Effect of Team Learning Orientation on Performance

We argue that cross-understanding is an intermediate cognitive mechanism that transmits the indirect relationship between team learning orientation and team performance. Our characterization of cross-understanding as a mediator of the goal orientation to performance relationship is supported by past research, which similarly characterizes the effects of team goal orientation on performance as *indirect.* For example, research shows that the effects of team learning orientation on team performance are mediated by team behaviors such as adaptation (Dierdorff and Ellington, 2012; LePine, 2005; Porter et al., 2010), information-sharing (Gong et al., 2013), and backing-up behaviors (Porter, 2005).

Team learning orientation is also associated with reflective learning behaviors that help the team's overall success (Dierdorff & Ellington, 2012; Hirst et al., 2009; Yanghua, 2008). Reflective (or *reflexive)* learning involves thinking about members, their roles, their current, past, and potential contributions, and about a team's task and task strategies to adapt to changing circumstances (Schippers, Den Hartog, & Koopman, 2007; West, 1996). If learning orientation prompts members to reflect about other members in relation to the team and task context, then team learning orientation ought also to be related to cross-understanding. Indeed, recent evidence suggests that reflective communication had an indirect positive effect on team performance via cross-understanding, because the ability to reflect on and analyze "how others perceive their communication" facilitates teams to develop a better understanding of members' knowledge, beliefs, preferences, and sensitivities, and therefore achieve better coordination and performance (Meslec & Graff, 2015, p. 10). This suggests that cross-understanding is implicated both as a

proximal outcome of team learning orientation and as an antecedent of higher team performance. Without cross-understanding, a direct effect of team learning orientation on team performance may not be observed.

Individuals are also likely to benefit from working in a high learning goal-oriented team. Team learning orientation is associated with more inclusive knowledge exchange and information elaboration, not only with respect to the nature of information discussed, but also in ensuring that such discussions are understood by every team member (Chadwick & Raver, 2015). Therefore, when teams are high in learning orientation, team members are likely to consider diverse perspectives and opinions of all fellow team members and therefore build an understanding of their mental models. For any one individual team member, the more their fellow team members understand his or her mental models, the higher the members' exposure to team discussions and decisions, and the more pertinent the feedback, both of which have been shown to increase individual task learning (Brodbeck et al., 2007). Individuals in high cross-understanding teams are likely to learn more about the team task, develop a deeper understanding of success criteria, and therefore perform better on similar subsequent tasks (Huber & Lewis, 2010).

Hypothesis 3: Team learning orientation is indirectly positively related to (a) team performance, and (b) individual performance, via cross-understanding.

Conditions Modifying the Team Learning Orientation to Cross-Understanding Relationship

We predict that the indirect relationship between team learning orientation and team performance will vary depending on the level of performance-prove and performance-avoid orientation, such that performance orientations weaken the positive effects of learning goal orientation. Team performance orientations are characterized by high motivation toward demonstrating, safeguarding, and obtaining favorable judgments about existing capabilities (Dweck & Leggett, 1988). Performance-prove orientation is associated with a tendency to demonstrate capabilities and competence to manage impressions (Mehta, Field, Armenakis, & Mehta, 2009), and performance-avoid orientation is associated with risk-averse and self-protective tendencies to prevent failures (Chi & Huang, 2014; Elliot & Church, 1997). We note that performance orientations produce efforts that are not necessarily related to gaining knowledge—in that

sense, performance orientations are distinct from a learning orientation and are likely to influence team performance in competing ways (Bell & Kozlowski, 2002). For example, teams high in performance-prove orientation tend to be selective and biased in information elaboration (Gully & Phillips, 2005), and share information only if it demonstrates their abilities and shows them in good light (Porter, 2005). Such teams may perceive sharing of information about themselves as counterproductive (Poortvliet, et al., 2007), leading to a general lack of openness and reflectivity, which in turn makes for a less conducive environment for developing cross-understanding and high performance (Meslec & Graff, 2015).

Performance-avoid orientation would similarly attenuate the beneficial effects of team learning orientation on cross-understanding and team performance. Performance-avoid orientation is linked to high negative affective tone, which hinders feedback-seeking and team performance (Chi & Huang, 2014; VandeWalle & Cummings, 1997). Unlike performance-prove orientation, performance-avoid orientation makes teams less proactive in general, and therefore attenuates the exchange of information in teams, because such information exchange could lead to negative perceptions and judgments among team members (van Mierlo & van Hooft, 2015). Thus, the eagerness of team members to engage in learning pursuits (brought on by team learning orientation) is dampened by their avoidance-focused disposition and associated psychological risk prevalent in such teams. The anxiety resulting from the fear of negative feedback can lead to rigidity and restrictions around any interactions intended to find out more about team members (Staw, Sandelands, & Dutton, 1981). Therefore, when team performance-avoid orientation is high, the effect of team learning orientation on cross-understanding and team performance is weakened.

We expect a similar dampening effect of both types of performance orientation on cross-understanding and subsequent *individual* performance. For individual team members, as the general propensity to seek out information, help, and feedback is lower in high performance-prove orientation teams and almost nonexistent in high performance-avoid orientation teams (Chadwick & Raver, 2015). In contrast, when team performance orientations (prove or avoid) are low, high learning orientation team members are less apt to redirect their cognitive efforts towards avoiding feedback or negative judgements—efforts that are antithetical to a learning orientation (VandeWalle, 1997). High team

learning orientation, coupled with low performance goal orientations means that members are more open to seeking out knowledge and opinions from all constituent members, thereby enhancing individual team members' participation, learning, and performance.

Hypothesis 4: The mediated relationships between (a) team learning orientation and team performance, and (b) team learning orientation and individual performance, via cross-understanding, are less positive when team performance-prove orientation is higher.

Hypothesis 5: The mediated relationships between (a) team learning orientation and team performance, and (b) team learning orientation and individual performance, via cross-understanding, are less positive when team performance-avoid orientation is higher.

METHODS

Sample

Participants in this study included 859 advanced undergraduate students (40% female; 63% white, 4% Latino, 6% African-American, 14% Asian, and 13% others) enrolled in a required capstone strategic management course at a large mid-Atlantic university. Participants were assigned to one of 163 teams, such that teams were diverse in terms of members' gender, race, ethnicity, and majors (e.g., accounting, marketing, finance, and logistics). Teams were formed during the third week of the semester, ranged in size from 3 to 6 (M = 5.4, $S.D.$ = 0.67), and remained intact for the rest of the term. Participants were offered extra credit and participation in a lottery for cash prizes in exchange for completing several online surveys during the term. Eight hundred fifty-nine (859) of 887 possible participants provided usable results, for a response rate of 97%. We obtained 100% survey participation from all members in 147 teams, and the remaining 16 teams had at least 80% of their members participate. The resulting sample sizes were 859 individuals in 163 teams.

Task and Procedure

Teams competed with each other as part of the Capstone® Business Simulation (Stephan, Parente, & Brown, 2002). A significant portion of the course grade was contingent on team and individual performance on the simulation, which ensured substantial team and individual incentives. Capstone®, a

widely available strategic management simulation, includes two practice rounds (weeks) of team decision-making to familiarize students with the protocol, followed by eight competition rounds in which teams within each class competed against each other in a virtual environment simulating a self-contained industry. Each round equals one year in the life of a company. The decisions made by each team affected the conditions facing the other teams. In each weekly period of decision-making, student teams made a complex series of decisions relevant to the strategic focus and operations of their firms. Typical decisions each week involved production (e.g., how many units to make), financing (e.g., whether to issue debt or pay dividends), marketing (e.g., promotion and sales budgets), and human resources (e.g., whether to automate or hire additional employees). Teams received financial and market-share feedback after each round, including their team's performance and their standing relative to other teams. Data on the independent and control variables were collected via online surveys at two points during the semester. Demographic and goal orientation variables were collected during the fourth week of the semester—after teams had been formed but prior to their working together in the practice rounds. Cross-understanding was measured during the second data collection, halfway through the competition rounds, after teams had been working together for six weeks. Team performance was measured at the end of the team competition, four weeks later, and individual performance was measured approximately two weeks after the completion of the team competition.

Measures

Cross-understanding. We assessed the extent to which team members understood the mental models of other members using four items representing the four aspects of mental models thought to reflect cross-understanding (Huber & Lewis, 2010). We used the measure advocated in Huber and Lewis (2010), which has also been employed in several empirical conference papers (Bayer & Lewis, 2013; Lewis & Herndon, 2015; Rariden & Lewis, 2013). Details of the measure are available in the Online Appendix A2. Participants rated each of their teammates on each of the 4 items, creating a round-robin style (or network-style) measure of cross-understanding. An example item used for the measure was: (1) “How well do you understand what it is that this member prefers, with respect to the Capstone©

simulation?" We then computed a composite score for a team's cross-understanding by averaging members' ratings of other members on the four cross-understanding items; higher average scores indicate higher cross-understanding in the team.

Team Goal Orientation. We used VandeWalle's (1997) 13-item measure with a seven-point agreement scale to assess goal orientation. Example items include, "I am willing to select a challenging work assignment in which I can learn a lot" for learning orientation, "I prefer to work on projects where I can prove my ability to others" for performance-prove orientation, and "Avoiding a show of low ability is more important to me than learning a new skill" for performance-avoid orientation. Consistent with prior literature examining team goal orientation composition (LePine, 2005; Porter, 2005), we averaged members' scores to form team-level composite variables for these three types of goal orientation.

Team Performance. We assessed team performance using the standardized balanced scorecard index produced by the Capstone© simulation program. The balanced scorecard index is a weighted measure that assesses decision quality in four areas: financial health (i.e., profitability, leverage, and stock price), internal business process (i.e., contribution margin, plant utilization, and days of working capital), customer-related issues (i.e., how well the company's product lines satisfy buying criteria and awareness/accessibility levels), and learning and growth (i.e., employee productivity).

Individual Performance. An assessment of individual-level knowledge related to the simulated business context was collected approximately two weeks after the end of the team simulation, and was assessed based on two components. The first component was a shortened version of the simulation and the second component consisted of knowledge-based questions related to the simulation. In the first component, individuals made four sets of decisions on behalf of their companies, which operated in a simulated industry with three computer-controlled competitor companies. The three other competitor companies were the same for all students, creating a level playing field—all students competed against a standard set of competitors. This individual performance measure was evaluated across the same four areas as in the team simulation, although the content of the individual simulation was not identical to the team simulation. For the second component, individuals responded to questions assessing their functional

knowledge in a variety of domains (finance, marketing, management, logistics, etc.). The two components were combined to form a composite performance score, with each component forming 50% of the composite score.

RESULTS

Table 1 presents descriptive statistics and bivariate correlations among the study variables. Cross-understanding was significantly positively correlated with both team performance ($r = .21$, $p < .01$) and individual performance ($r = .10$, $p < .01$). As intelligent individuals generally perform better, we controlled for GPA in all our analyses.[2]

INSERT TABLE 1 ABOUT HERE

We first present results for hypotheses predicting effects at the team level—these include tests for hypotheses 1a, 2, 3a, 4a, and 5a. We then present results from a cross-level analysis of team-level influences on individual performance—these results examine hypotheses 1b, 3b, 4b, and 5b.

Team-Level Effects on Cross-Understanding and Team Performance

At the team level, we tested Hypotheses 1a and 2 using OLS regressions, as shown in Table 2. Cross-understanding was positively related to team performance (Model H1A, B = 82.17, SE = 31.29, $p < .01$), supporting Hypothesis 1a. Team learning orientation was positively related to cross-understanding (Model H2: B = .21, SE = .09, $p < .05$), supporting Hypothesis 2.[3]

INSERT TABLE 2 ABOUT HERE
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[2] In our sample, team size was relatively homogeneous across teams, ranging from 3 to 6 (mean = 5.36, SD = .69) with 90% of the teams having 5 or 6 members. On average, teams comprised 2 female members. As a robustness check, we reran our analysis controlling for team size and team gender composition. We found that all hypothesized effects remained significant, even when controlling for team size and gender composition, suggesting that variation in team size or the number of female members did not appreciably explain effects in our sample.

[3] In line with prior goal orientation research that has suggested that variability in goal orientation could influence team outcomes beyond aggregate levels (Dierdorff & Ellington, 2012; Nederveen Pieterse, Van Knippenberg, & van Ginkel, 2011), we re-ran our analysis to test Hypothesis 2 controlling for variability in team learning orientation (SD) and found that the regression coefficient of mean team goal orientation remained substantially the same, undermining the possibility that variability in goal orientation, rather than average goal orientation, is responsible for the effects on cross-understanding.

Hypothesis 3a states that the effect of team learning orientation on team performance is transmitted by cross-understanding. We tested Hypotheses 3a using the PROCESS macro (Hayes, 2017) with 10,000 bootstrap samples to generate 95% bias-corrected bootstrap confidence intervals for the indirect effect of team learning orientation on team performance.[4] Results show that the indirect effect of cross-understanding on team performance is positive and significant (estimate = 18.58, SE = 10.91, 95% C.I.: [2.71, 47.71], which excludes zero), showing the relationship between team learning orientation and team performance is mediated by cross-understanding, supporting Hypothesis 3a.

Hypotheses 4a states that the mediation relationship between team learning orientation and team performance via cross-understanding is moderated by team performance-prove orientation, such that the otherwise positive effects of team learning orientation are dampened when team performance-prove orientation is higher rather than lower. We tested Hypotheses 4a using the PROCESS macro for moderated mediation (or moderated indirect effect, Hayes, 2017, p. 465), with 10,000 bootstrap samples to generate the 95% confidence intervals for the index of moderated mediation (Preacher & Selig, 2008), and the conditional indirect effects of team learning orientation on team performance through cross-understanding for different levels of performance-prove orientation. The index of moderated mediation is significantly different from zero (estimate = -30.15, SE = 17.00, 95% C.I. = [-73.38, -4.29]), suggesting that the indirect effect of team learning goal orientation on team performance via cross-understanding varies significantly depending on team performance-prove orientation. An analysis of the conditional indirect effects indicates that the mediation effect of team learning orientation on team performance via cross-understanding is positive when team performance-prove orientation is low (-1SD, estimate = 27.85, SE = 13.57, 95% CI = [7.25, 62.08]), but not significant when team performance-prove orientation is high (+1SD, estimate = 4.47, SE = 10.72, CI = [-12.52, 29.94]). These results support Hypothesis 4a—i.e. the

[4] Our methodology to examine the indirect mediation effect of team learning orientation on performance via cross-understanding is consistent with recent methodological advances that demonstrate that a direct effect of the independent variable (X) on the dependent variable (Y) is not necessary to test an indirect effect of X on Y through a mediator variable (M), as the total effect of X on Y is often the sum of multiple possible paths and therefore may or may not be significant (Hayes, 2009).

indirect effect of team learning orientation on team performance through cross-understanding is strongest when team performance-prove orientation is relatively low.

Hypothesis 5a states that the indirect effect of team learning orientation on team performance via cross-understanding is moderated by team performance-avoid orientation, such that the otherwise positive effects of team learning orientation are dampened when team performance-avoid orientation is higher rather than lower. Similar to Hypothesis 4a, we used the PROCESS macro for moderated mediation (Hayes, 2017), with 10,000 bootstrap samples to generate 95% confidence intervals for the index of moderated mediation and the conditional indirect effects of team learning orientation on team performance through cross-understanding for different levels of performance-avoid orientation. The index of moderated mediation is significantly different from zero (estimate = -36.67, SE = 16.32, 95% C.I. = [-77.15, -10.27]), suggesting that the indirect effect of team learning goal orientation on team performance via cross-understanding varies significantly depending on team performance-avoid orientation. An analysis of the conditional indirect effects indicates that the mediation effect of team learning orientation on team performance via cross-understanding is positive when team performance-avoid orientation is low (-1SD, estimate = 37.90, SE = 16.27, 95% CI = [11.86, 78.11]), but not significant when team performance-avoid orientation is high (+1SD, estimate = 4.91, SE = 9.55, CI = [-11.38, 27.77]). These results support Hypothesis 5a—i.e. the indirect effect of team learning goal orientation on team performance through cross-understanding is strongest when team performance-avoid orientation is relatively low.

INSERT FIGURE 2 ABOUT HERE

Figure 2 graphically depicts how team performance-prove and performance-avoid orientations moderate the effect of team learning orientation on cross-understanding. Together these results show that cross-understanding mediates the relationship between team goal orientations and team performance, and that the positive effects on cross-understanding and performance are observed when a team's learning orientation is high and performance orientations (performance-prove or performance-avoid) are low.

Cross-level Effects on Individual Performance

Because the data were clustered by teams, and the variables were across two levels of analyses, we used a combination of ordinary least-squared (OLS) regression and hierarchical linear modeling (HLM) in R to test Hypotheses 1b, 3b, 4b, and 5b, which relate team goal orientation and cross-understanding to individual performance. Hierarchical or multilevel modeling accounts for the variation of cross-understanding and performance at the individual level that could be attributable to team membership. Following recommendations by Raudenbush and Bryk (2002), a null model with no predictors was conducted to decompose the variance in the dependent variable, individual performance. The results (Null Model 0 in Table 3) provided evidence that a small but significant portion of variation in individual performance is attributable to the team of which the individual is a member (ICC = 0.07). Therefore, we tested hypotheses using a hierarchical linear model, controlling for GPA and a random varying intercept. As shown in Table 3 (Model H1B), cross-understanding is positively related to individual performance (B = 17.53, SE = 6.26, $p < .01$), supporting Hypothesis 1b.

INSERT TABLE 3 ABOUT HERE

Hypotheses 3b states that the effect of team learning orientation on individual performance is mediated by team cross-understanding. To test for this hypothesis, we adopted the upper level mediation approach or the 2-2-1 model (Bauer, Preacher, & Gil, 2006; Krull & MacKinnon, 2001; Zhang, Zyphur, & Preacher, 2009), in which the predictor and the mediator variables are at the team level (Level 2), and the dependent variable is at the individual level (Level 1). Conceptually, the model evaluates whether the effect of a team-level variable on an individual-level outcome is transmitted through a team-level mediating variable. The first step of the procedure, as outlined in Krull & MacKinnon (2001), involves regressing the mediator variable (cross-understanding) on the predictor variable (team learning orientation) in an OLS regression. This step is equivalent to the test of Hypothesis 2 at the team-level—i.e. the positive effect of team learning orientation on cross-understanding. As described in the previous section, the path from team learning orientation to cross-understanding is significant (Table 2, Model H2,

B = .21, SE = .09, $p < .05$). The coefficient of team learning orientation provides an estimate *a* corresponding to the first stage of the mediation. The second step of the procedure involves regressing the dependent variable (individual performance) on the predictor variable (team learning orientation) and the mediator (cross-understanding). Results of the model show that controlling for learning orientation, the effect of cross-understanding on individual performance is significant (Table 3, Model H3B: B = 18.83, SE = 6.37, $p < .01$). The coefficient of cross-understanding provides an estimate *b* corresponding to the second stage of the mediation. We calculated the indirect effect as the product of the coefficients *a* and *b* from the two steps described previously (Krull & MacKinnon, 1999; Zhang et al., 2009), and used the nonparametric Monte Carlo method with 10,000 resamples to generate 95% confidence intervals for the indirect effect (Selig & Preacher, 2008). The indirect effect was significant (estimate = 3.94, SE = 2.27, 95% CI = [.31, 9.20], which excludes zero), showing that the relationship between team learning orientation and individual performance is mediated by cross-understanding, supporting Hypothesis 3b.

Hypothesis 4b states that the indirect effect of team learning orientation on individual performance via cross-understanding is moderated by team performance-prove orientation, such that the otherwise positive effects of team learning orientation are dampened when team performance-prove orientation is higher rather than lower. To test for moderated mediation, we use a similar two-step procedure as described previously (Krull & MacKinnon, 1999), where the first step involves regressing cross-understanding on the interaction between team learning orientation and team performance-prove orientation, and the second step involves regressing individual performance on cross-understanding (regression models are provided in Online Appendix A3). We then calculated the index of moderated mediation (Hayes, 2015) as the product of the coefficient of the interaction term of team learning orientation and team performance-prove orientation (in the first step) and the coefficient of cross-understanding (in the second step). We then used the nonparametric Monte Carlo method to generate 95% confidence intervals for the index of moderated mediation. The index of moderated mediation is significantly different from zero (estimate = -6.55, SE = 3.79, 95% CI = [-14.64, -.42]), demonstrating that the indirect effect of team learning orientation on individual performance via cross-understanding

varies significantly depending on team performance-prove orientation. An analysis of the conditional indirect effects show that the mediation effect of team learning orientation on individual performance via cross-understanding is positive when team performance-prove orientation is low (-1SD, estimate = 5.83, SE = 2.62, 95% CI = [1.32, 13.44]), but not significant when team performance-prove orientation is high (+1SD, estimate = 1.09, SE = 1.69, CI = [-3.14, 5.55]). These results suggest that the indirect effect of team learning orientation on individual performance via cross-understanding is strongest when a team's performance-prove orientation is relatively low, lending support to Hypothesis 4b.

Hypothesis 5b states that the indirect effect of team learning orientation on individual performance via cross-understanding is moderated by team performance-avoid orientation, such that the otherwise positive effects of team learning orientation are dampened when team performance-avoid orientation is higher rather than lower. We used a similar approach as with Hypothesis 4a to calculate the index of moderated mediation, which is significantly different from zero (Estimate = -7.13, SE = 3.87, 95% CI = [-16.03, -1.05]), demonstrating that the indirect effect of team learning orientation on individual performance via cross-understanding varies significantly depending on team performance-avoid orientation. An analysis of the conditional indirect effects show that the mediation effect of team learning orientation on individual performance via cross-understanding is positive when team performance-avoid orientation is low (-1SD, estimate = 7.42, SE = 3.18, 95% CI = [1.46, 15.46]), but not significant when team performance-avoid orientation is high (+1SD, estimate = 1.13, S.E. = 1.74, 95% CI = [-3.34, 6.08]. These results suggest that the indirect effect of team learning orientation on individual performance via cross-understanding is strongest when a team's performance-avoid orientation is relatively low, lending support to Hypothesis 5b.

As Hypotheses 4b and 5b involve a first stage moderation (Edwards & Lambert, 2007)—i.e. performance-prove and performance-avoid orientations influence the relationship between team learning orientation and cross-understanding—the interaction plots for these hypotheses are identical to the ones shown in Figure 2. Taken together, these results indicate that cross-understanding mediates the relationship between team goal orientations and individual performance, such that individuals perform

better in teams where learning orientation is high and performance orientations (performance-prove or performance-avoid) are relatively low.

DISCUSSION

By examining teams working on a complex simulation task requiring knowledge integration from different management domains, we sought to examine the motivational antecedents and consequences of cross-understanding (Huber & Lewis, 2010). Our results confirm that cross-understanding indeed brings about better performance in teams, providing further empirical support for team-level performance effects of cross-understanding (Meslec & Graff, 2015). Our results also provide new empirical evidence that cross-understanding improves *individual* performance. Findings from our study also explain why some teams develop cross-understanding and other do not. A team's collective motivation to develop knowledge and gain mastery (learning goal orientation) is predictive of the team's cross-understanding, which in turn predicts both team and individual performance. Our findings reveal interactions among the three different team goal orientations (learning, performance-prove, performance-avoid) that provide a new explanation of the effects of goal orientation on team and individual performance and suggest practical implications for managers and organizations.

Theoretical Implications

Our paper integrates insights from two streams of literature to advance understanding of the motivational drivers and performance effects of team cognition. We draw on the goal orientation literature to articulate how team members' motivations (Bunderson & Sutcliff, 2003; Hirst et al., 2009) can affect cross-understanding, which has been theorized to predict team and individual performance (Huber & Lewis, 2010). Our results reveal not only that cross-understanding affects both team and individual performance, but also that cross-understanding is a mechanism by which team goal orientations affect team and individual performance. These findings reinforce propositions by prior goal orientation scholars (Bunderson & Sutcliffe, 2003; Hirst et al., 2009) that team learning orientation motivates social learning in teams, i.e. gaining knowledge about the task and the task context by observing and interacting

with others (Rosenthal & Zimmerman, 1978). Our study results also provide an explanation for why individuals may benefit from being a part of learning-oriented teams (Chadwick & Raver, 2015; Dragoni & Kuenzi, 2012; Gong et al., 2013; Hirst et al., 2009)—that learning-oriented team members are motivated to invest extra effort in learning about one another's perspectives, thereby developing higher cross-understanding, and performing better on similar tasks individually.

Further, probing the interactions between learning goal orientation and the two types of performance goal orientation revealed that learning goal orientation is generally beneficial, but more so when a team's performance goal orientation (prove or avoid) is relatively low. This may be because when performance goal orientations are lower, team members are likely to be less concerned about appearing incompetent (Yeo & Neal, 2004), and can therefore devote resources to developing new knowledge and mastery over the task without worrying that their contributions to the team effort will evoke potentially negative appraisals. Results of the conditional process analysis corroborate prior findings that a combination of high learning orientation and low performance orientation enables teams to develop better meta-cognitive and self-reflective capabilities over time (Dierdorff & Ellington, 2012), and further demonstrate that cross-understanding may reflect these capabilities and thereby transmit the performance effects of goal orientations.

This study also contributes to the developing literature on cross-understanding. Our finding of a positive relationship between team cross-understanding and team performance in a fairly large sample establishes strong empirical support for theoretical claims that cross-understanding helps teams function better (Huber & Lewis, 2010) and lends additional validity (Antonakis, 2017) to existing empirical evidence on cross-understanding (Meslec & Graff, 2015). Ours is the first empirical paper to demonstrate cross-level implications of cross-understanding for *individual* performance. Our findings suggest that members working in teams with high cross-understanding are likely to learn in ways that help them perform better as individuals. We theorize that cross-understanding promotes members' comprehension of the team's task by exposing them to a greater amount of task-relevant information possessed by other

members and by creating a team context where information sharing, and feedback seeking and provision are welcome. In doing so we also contribute to emerging research on individual learning in teams (Curseu, Meslec, Pluut, & Lucas, 2015).

Strengths, Limitations and Future Research

Our large-scale longitudinal study design has several strengths. First, we took measures of goal orientation, cross-understanding, team performance, and individual performance at different points in time, allowing us to make inferences about the longitudinal effects of goal orientations and cross-understanding on team and individual performance. Second, these measures came from different respondents or sources—goal orientation measures are self-reported, cross-understanding is reported by others within the team and then aggregated, and performance measures are objectively captured. The multiple sources of our variables render our findings significantly more robust to common method variance concerns (Spector, 2006). Third, our measures of team performance and individual performance are sufficiently distinct, enabling us to make distinctive inferences about the effects of cross-understanding on team- versus individual performance,

Despite its strengths, the study does have limitations that affect the generalizability of the findings and offer opportunities for future research. The first limitation is that we examined only goal-orientation antecedents of cross-understanding. While this is itself a contribution to the cross-understanding literature, it is important for future research to examine not only other antecedents, but also the relative influences of different antecedents in producing cross-understanding. Demographic diversity, previous experience with some or all members, and status hierarchies are theorized to affect cross-understanding (Huber & Lewis, 2010). Other emergent team processes and states might affect or be affected by cross-understanding—these include communication and patterns of information exchange (Lee, Bachrach, & Lewis, 2014) and collective intelligence (Engel, Woolley, Jing, Chabris, & Malone, 2014; Woolley, Chabris, Pentland, Hashmi, & Malone, 2010). Boundary conditions, such as contextual factors affecting the team or organizational environment should also be considered.

Another opportunity for future research is in identifying the behavioral mechanisms that cross-understanding produces to further explicate the effects of goal orientations on team and individual performance. Much of the past research on team goal orientation has emphasized the behavioral mechanisms that transmit the effects of goal orientation to team or individual performance. We offer an alternative, cognitive mechanism, as the explanation for why team goal orientation affects performance. Might a cognitive mechanism such as cross-understanding account for some existing findings that certain behaviors explain the goal orientation to performance link? Although we do not examine these outcomes explicitly in our study, cross-understanding has been shown to lead to higher levels of team trust (Otoiu et al., 2012) that can also lead to effective helping and backing-up behaviors (Porter, 2005; Porter, et al., 2003), which are in turn known to mediate the team goal orientation to team performance relationship. Thus, cross-understanding may provide an explanation for the effects of goal orientation on other adaptive team behaviors that improve team performance. Exploring the relationship between cross-understanding and these other explanatory mechanisms, including behaviors, is likely a fruitful direction for future research.

Finally, while the Capstone® simulation is rich and complex, requiring hundreds of decisions, we recommend caution in generalizing beyond the simulation environment to teams in organizations. Using a simulation allowed us to control for extraneous variables introduced in field settings by having teams with different tasks, and to objectively assess the performance of teams and individuals separately, which is rarely possible in the field. Our longitudinal team task provided a fitting context to study cross-understanding, as teams were designed to have a balanced demographic composition and heterogeneous functional knowledge, and also had the time to develop cross-understanding and reap its benefits over time. However, examining cross-understanding across different contexts and task types among teams with varying levels of diversity would help provide insights into the boundary conditions for the antecedents of cross-understanding and the effects of cross-understanding on team and individual outcomes.

Practical implications

Results from this study show that cross-understanding in teams can increase both team and individual performance. Members of organizational teams are often brought together for a specific purpose, and as a result, may be strangers to one another with limited prior knowledge of members' knowledge and thinking processes. Team members coming together from different functions, divisions, or locations are likely to have different sets values, opinions, non-negotiables, task priorities, and success criteria (Bonner, Soderberg, & Romney, 2017; Kane & Rink, 2016). Achieving common ground among such team members is often challenging (Ferraro & Buenza, 2018). In such contexts, managers may help teams develop cross-understanding by fostering a learning orientation among members as a way to improve team and individual performance. For example, managers might set learning-based goals for knowledge development, knowledge re-use (knowledge that could be used for future projects), and knowledge transfer (knowledge that could be useful to other teams). Importantly our findings argue that managers might enable their teams to achieve better performance by reducing pressure to demonstrate capabilities and manage impressions, enhancing the safety of sharing diverse perspectives, and promoting a climate of helpful feedback and support.

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FIGURES AND TABLES

Table 1. Descriptives and Correlations

	Variables	Mean	S.D.	1	2	3	4	5	6	7
	Individual-level Variables									
1	GPA	3.71	.87	--						
2	Individual Performance	375.88	60.96	.32**	--					
	Team-level Variables									
3	Learning Orientation	4.86	.32	.07	-.05	*.82*				
4	Performance-prove Orientation	4.41	.39	.09	.05	.33**	*.70*			
5	Performance-avoid Orientation	3.38	.45	.03	.01	-.35**	.23**	*.83*		
6	Cross-understanding	4.08	.38	.20*	.23**	.19*	.10	-.10	*.94*	
7	Team Performance	605.17	151.82	.07	.23**	-.05	.06	-.05	.21**	--

Note. ** $p < .01$; * $p < .05$; Minimum $N = 850$ individuals, nested in 163 teams. The goal orientation variables (Learning orientation, Performance-prove orientation, and Performance-avoid orientation) are team-level composition variables. Italicized diagonal elements represent Cronbach's alphas.

Table 2. Regressions: Team goal orientation, Cross-understanding, and *Team Performance*

Variables	**Model H1A DV: Team Performance**	**Model H2 DV: Cross-Understanding**
Intercept	239.67 (141.76)	2.52** (.49)
Team Average GPA	8.07 (24.49)	.15* (.06)
Learning Orientation		.21* (.09)
Cross-Understanding	82.17** (31.29)	
Adjusted R-Squared	.03	.07
Model F-statistic	3.83*	5.98**

Note. ** $p < .01$; * $p < .05$; values in parentheses denote standard errors.

Table 3. Regressions: Team goal orientation, Cross-understanding, and *Individual Performance*

Variables[a]	Null Model 0 DV: Indiv. Performance	Model H1B DV: Indiv. Performance	Model H3B DV: Indiv. Performance
Fixed Effects			
Intercept	375.89**	375.93**	375.92**
	(2.40)	(2.37)	(2.37)
Indiv. GPA[b]		21.42**	21.42**
(Level 1)		(2.64)	(2.64)
Learning orientation			-8.79
			(7.83)
Cross-understanding		17.53**	18.83**
		(6.26)	(6.37)
Random Effects			
Residual Var.	3440.2	3158.4	3157.5
(Std. deviation)	(58.65)	(56.20)	(56.19)
Team intercept Var.	278.2	303.4	303.2
(Std. deviation)	(16.68)	(17.42)	(17.41)
Pseudo R-squared	-	.08	.08

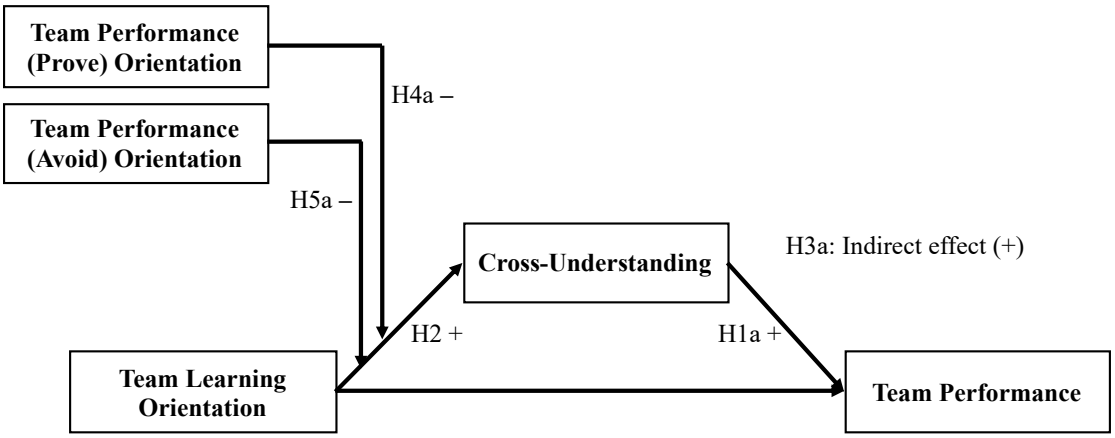
Note. ** $p < .01$; * $p < .05$; values in parentheses denote standard errors unless otherwise stated. Var. = variance.

[a] All variables are at team level (Level 2) unless specified otherwise, and are grand-mean centered.

[b] Individual GPA (Level 1) is group-mean centered

Figure 1. Theoretical Model

Team-level effects on *Team Performance*



Cross-level effects on *Individual Performance*

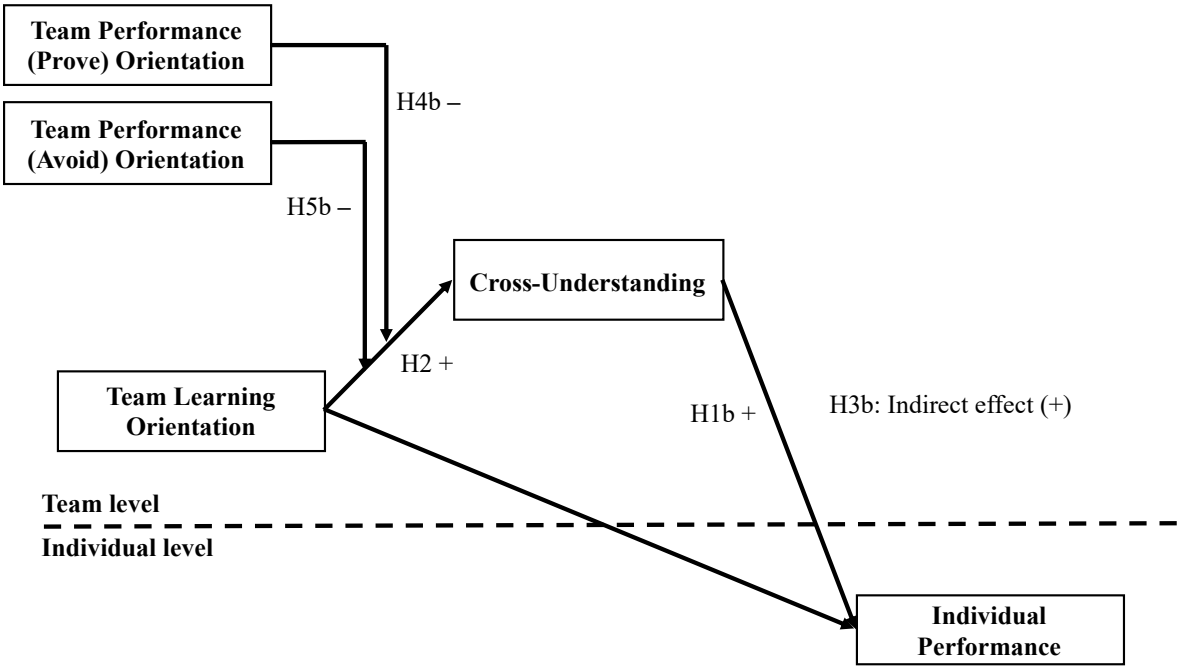
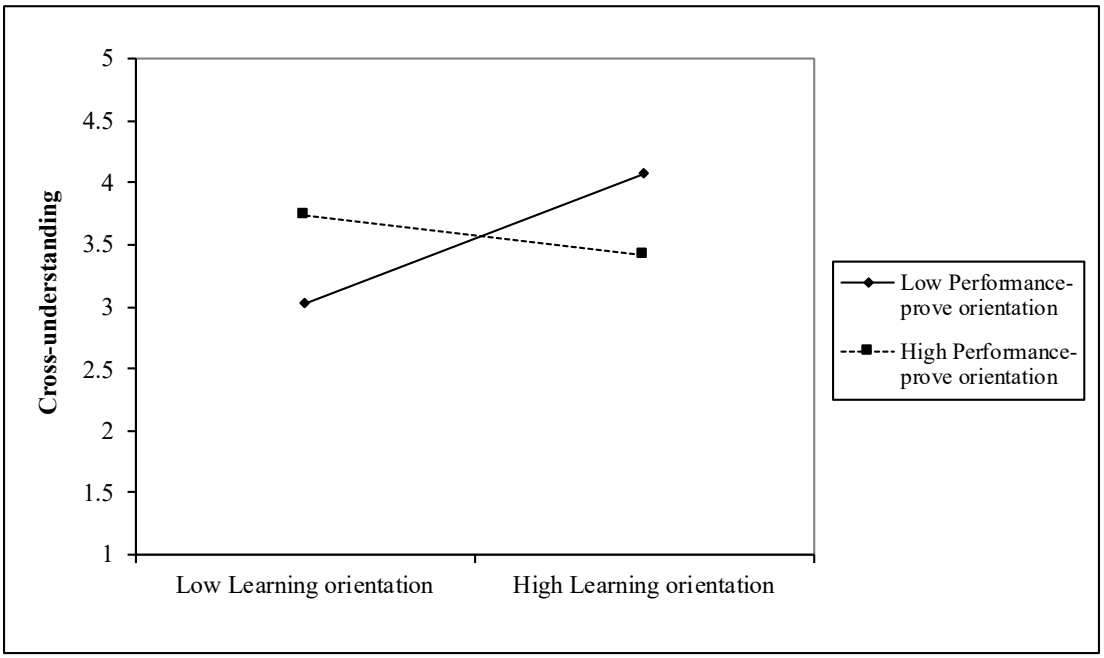
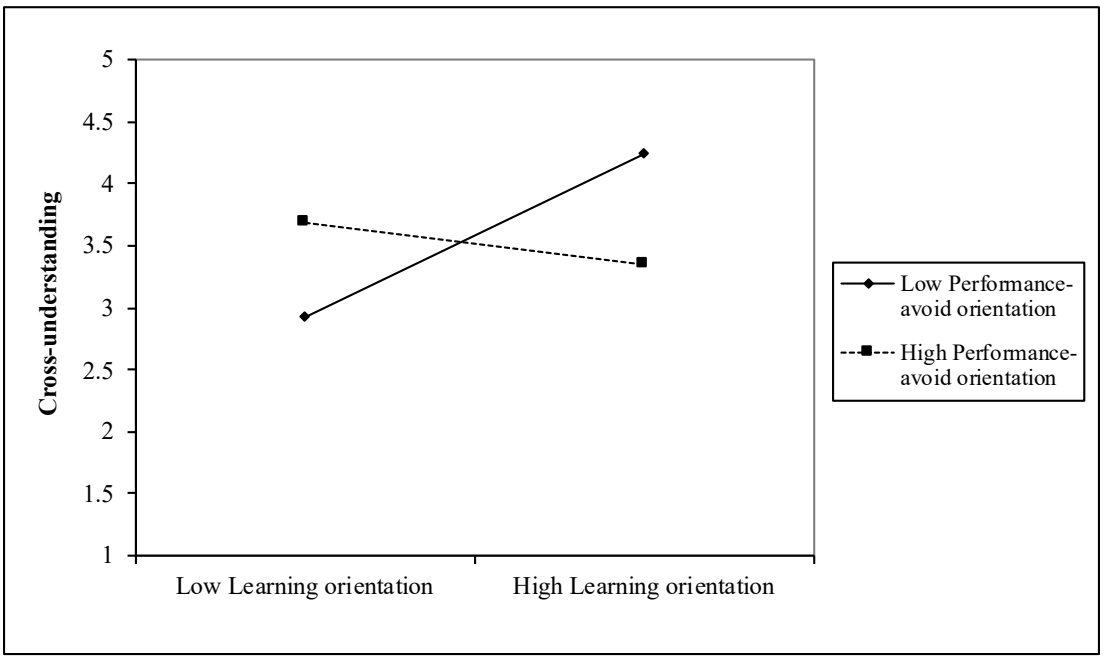


Figure 2. Interaction Plots

Joint effects of team performance-prove orientation and team learning orientation on cross-understanding



Joint effects of team performance-avoid orientation and team learning orientation on cross-understanding