When Goal Orientations Collide: Effects of Learning and Performance Orientation on Team Adaptability in Response to Workload Imbalance

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The authors draw on resource allocation theory (Kanfer & Ackerman, 1989) to develop hypotheses regarding the conditions under which collective learning and performance orientation have interactive effects and the nature of those effects on teams' ability to adapt to a sudden and dramatic change in workload. Consistent with the theory, results of a laboratory study in which teams worked on a computerized, decision-making task over 3 performance trials revealed that learning and performance orientation had independent effects on team adaptability when teams had slack resources available for managing their changed task. Time helped explain the independent effects of performance orientation. Results also revealed that learning and performance orientation had interactive effects when teams did not have slack resources. Finally, the results of this study indicate that teams lacking slack resources were better able to balance high levels of learning and performance orientation over time with practice on the changed task.

Keywords: goal orientation, collective learning orientation, collective performance orientation, learning orientation and performance orientation interactions, team adaptability

Team adaptability is "the extent to which a team is able to modify its configuration of roles into a new configuration of roles using knowledge acquired through interaction in the course of task execution as well as through more explicit exploration of transaction alternatives" (LePine, 2005, p. 1154). Adaptability is the extent to which a team achieves correspondence between its behavior and a set of novel demands it faces (e.g., Chan, 2000; LePine, 2005). Because the environmental influences and changes that organizations and their subunits face often occur without warning and can have significant negative effects (e.g., American Management Association & Human Resources Institute, 2006; Thompson, 1967), it is important to devote more attention to understanding how organizations, teams, and individuals adapt to sudden and often drastic environmental changes.

Although most previous research has focused on goal orientation as an individual-level motivational quasi-trait (DeShon & Gillespie, 2005), some recent studies have found goal orientation to have important effects on team adaptability and adaptive teamwork processes (Bunderson & Sutcliffe, 2003; LePine, 2005; Porter, 2005). A learning orientation is associated with adaptive response patterns in achievement situations and is characterized by challenge seeking, persistence, acquisition of knowledge, and mastery of uncertain environments. A performance orientation underlies a maladaptive response pattern in which challenges are avoided and is characterized by a tendency to seek to prove oneself in achievement situations, often by completing a task as quickly as possible (Dweck, 1986; Gully & Phillips, 2005).[1]

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[1] Although some researchers conceptualize goal orientation as consisting of three factors (e.g., VandeWalle, 1997) or even four factors (e.g., Elliot & McGregor, 2001), we intentionally focused on the two-factor conceptualizations for three reasons. First, there already exists ambiguity regarding how these two factors alone may influence team adaptability. Second, our interest in the interactive effects of learning and performance orientation was already sufficiently complex. Third, given the complexity of the relationships we sought to examine, the more extensive theoretical and empirical literature on the two-factor conceptualization of goal orientation provided richer insight for formulating predictions about the potential independent and interactive effects than that conceptualizing goal orientation as a three- or four-factor construct.

There are at least two important limitations of the research linking goal orientation to team adaptability. First, this research has focused almost exclusively on goal orientation as a composition variable (Bunderson & Sutcliffe, 2003, and DeShon, Kozlowski, Schmidt, Milner, & Wiechmann, 2004, are noteworthy exceptions), which is based on a relatively simple emergence process (Kozlowski & Klein, 2000). As a result, we know little about how more complex forms of goal orientation operate and influence team adaptation. Second, much of this work has examined relatively simple relationships. Many of the findings have been ambiguous (e.g., those regarding performance orientation), but just as important, no empirical work exists in which a priori predictions regarding patterns of interactions among the goal orientation dimensions in teams are tested (Porter, 2008). Of the studies that have explored the interactive effects of learning and performance orientation, most have been conducted in educational settings at the individual level of analysis. The findings of these studies have been mixed, with some demonstrating evidence of interactive effects (Bouffard, Boisvert, Vezeau, & Larouche, 1995; Meece & Holt, 1993) and others not (Ames & Archer, 1988; Schraw, Horn, Thorndike-Christ, & Bruning, 1995). Among studies conducted in work and/or organizational settings (Hofmann & Strickland, 1995; Janssen & Van Yperen, 2004; Yeo & Neal, 2004), findings have been mixed. A lack of theory may explain why researchers do not formulate testable predictions about these interactive effects and why research is scarce on this topic. Both of these factors contribute to our inability to fully understand the effects of goal orientation on team behaviors, performance, and adaptability.

We address these limitations by drawing on resource allocation theory (Kanfer & Ackerman, 1989) to develop predictions regarding both the conditions under which learning and performance orientation will have interactive effects and the nature of those effects. We then describe a study designed to test our hypotheses in which teams working on a complex, decision-making task in a laboratory setting experienced a sudden workload imbalance after the first performance trial. In research on human factors considerable attention has been devoted to the influence of workload amount and distributions on individuals, but little attention has been devoted to understanding workload distributions at higher levels (e.g., groups and teams; Bowers, Braun, & Morgan, 1997). The teams in our study were randomly assigned to one of two conditions, one in which they had slack resources at their disposal for managing the workload imbalance and one in which they did not. Because adaptability suggests performance improvement over time, our teams performed over three performance trials, which allowed us to compare performance improvements across the trials.

Hypotheses

Kanfer and Ackerman (1989) developed resource allocation theory as a general theory of cognitive or attentional resource allocation that argues that individuals and, by extension, teams have limited (i.e., scarce) amounts of cognitive and attentional resources. With resource-limited tasks (see Barnes et al., 2008, for more on the resource-limited nature of team tasks), as resources are allocated toward performing one function, less will be available and be allocated to other functions. The introduction of a sudden and unanticipated workload imbalance decreases the overall amount of attentional resources available to teams, because

changed tasks require teams to devote resources to modifying their approach to their task (LePine, 2005). Resource allocation theory suggests that when teams devote resources to adapting to a changed task, the resources are drawn from those available to pursue other objectives, such as the pursuit of learning goals and performance goals.

Our extension of resource allocation theory to the team level is based on the assumption of functional equivalence across levels of analysis (Morgeson & Hofmann, 1999). Stated another way, the predictions we derive from resource allocation theory are similar to those one might make at the individual level, although it is likely that the process by which the theory operates across levels is somewhat different (i.e., primarily cognitive–behavioral processes at the individual level and primarily social–behavioral processes at the team level; cf. Chen & Kanfer, 2006). In this way, our approach is consistent with that of other team scholars who have extended resource allocation theory to the team level (e.g., Barnes et al., 2008; Porter, Gogus, & Yu, 2010). Whereas these scholars have used the theory to formulate predictions regarding the conditions under which different teamwork behaviors might have different effects on team performance (Porter et al., 2010) and to highlight the similarity between the theory's notion about finite resource availability and the trade-offs that teams often make between engaging in teamwork or taskwork behaviors (Barnes et al., 2008), we focus specifically on the theory's predictions regarding the implications of attentional resources on goal pursuit.

We expected, in an extension of resource allocation theory, that learning and performance orientation, which are assumed to exert functionally equivalent motivating influences at the team and the individual level, will have independent effects on adaptability among teams with excess, or slack, resources. We expected this because those slack resources enable these teams to simultaneously pursue learning and performance goals and at the same time manage their changed task. However, resource allocation theory also suggests that a lack of slack resources creates a zero-sum situation because it forces teams to divide their limited resources toward focusing on learning *or* performance goals. Thus, we expected that among teams lacking slack resources, there would be interactive effects between learning and performance orientation.

Effects of Learning and Performance Orientation When Teams Have Slack Resources

Effective adaptation requires teams to experiment in determining more efficient modes of operating to fit their changing external demands (LePine, 2005). Gully and Phillips (2005) explained the positive relationship between learning orientation and adaptability by suggesting that a learning orientation is associated with experimentation, willingness to make errors, and risk taking. This association creates knowledge and, in turn, enables adaptability. The increased experimentation that comes with attempts to master new and uncertain environments is likely to lead to double-looped learning, resulting in improved innovations, new group or team processes, and the development of new and different role configurations (Argyris & Schon, 1978; Kozlowski, Gully, Nason, & Smith, 1999). In addition, learning orientation is positively associated with persistence in the face of task difficulty and consistent effort toward mastering task requirements (Dweck, 1986). Because

it couples consistent effort with a focus on learning, learning orientation should be positively associated with continued convergence to an optimal organization–environment fit when teams have slack resources.

> *Hypothesis 1:* For teams with slack resources, learning orientation will be positively related to initial performance improvements and positively related to later performance improvements following an unanticipated workload imbalance.

Previous research on performance orientation has yielded ambiguous effects on team adaptability. LePine (2005) found performance orientation was negatively related to the adaptation of teams to an unforeseen breakdown in their communication channels, whereas Porter (2005) found no relationship between performance orientation and backing-up behavior (a type of adaptive behavior) among teams working on a complex decision-making task. We expect that time may help explain the independent effects of performance orientation on team adaptability.

In their attempt to improve performance and minimize mistakes, teams high on performance orientation quickly establish routines that are implanted as the correct way of doing things. These routines are not easily abandoned, even when these teams experience a change in their task. Any adjustments these teams make in their approach to their task following a sudden change are not profound or dramatic but rather slow and incremental in nature due to attempts to maintain existing levels of performance and avoid mistakes (Gully & Phillips, 2005). Thus, performance orientation should be associated with continuing to utilize performance strategies and routines that were previously developed and inappropriate for a changed task. However, although a reliance on existing performance routines may fail to provide teams high on performance orientation with insights regarding how they might better approach their changed tasks, it is not altogether dysfunctional. These teams are likely to persist in employing any strategies that have yielded some success in the past. This persistence should initially offset their failure to develop new performance routines.

Over time, however, performance orientation should be associated with lower levels of adaptation following a sudden and unexpected change in a team's workload balance. Resistance to making dramatic changes makes it difficult to improve performance. Teams high on performance orientation are also likely to become demotivated following change. Because their existing routines may no longer fit their current demands, performance improvements may be limited (Gong & Fan, 2006). Teams high on performance orientation are also likely to interpret changes in their task and task environment as a threat (Gully & Phillips, 2005). As such, performance orientation will be negatively related to persistence and effort over time.

> *Hypothesis 2:* For teams with slack resources, performance orientation will be unrelated to initial performance improvements and negatively related to later performance improvements following an unanticipated workload imbalance.

Effects of Learning and Performance Orientation When Teams Lack Slack Resources

Bunderson and Sutcliffe (2003) suggested that when teams high on learning orientation and low on performance orientation seek to master a changing task, they will overemphasize experimentation and longer term learning outcomes to the detriment of short-term adaptation and performance. In contrast, teams low on learning orientation and high on performance orientation will underemphasize experimentation to discover better performance strategies and focus almost exclusively on utilizing what has worked in the past to maximize short-term performance. This suggests that learning orientation may not be unambiguously positively associated with adaptability when performance orientation is also taken into account. We expected, drawing on resource allocation theory, that these interactive effects would occur when teams lack slack resources. In particular, we predicted that the tendency for teams high on learning orientation to underemphasize performance would reduce the capability of these teams to capitalize on their previous attempts to develop new and more effective routines if they are also low on performance orientation. Moreover, we predicted that these teams would focus too heavily on learning and would not transform their new knowledge into performance-based routines over time.

Also of interest are teams that are high on both learning and performance orientation. Previous research suggests that, despite the potential benefits of being high on both orientations, it can be difficult to strike a balance between the pursuit of learning and performance goals (e.g., Bunderson & Sutcliffe, 2003; Button, Mathieu, & Zajac, 1996). We believe that resource allocation theory may also shed light on the conditions under which teams may be able to strike this balance most effectively. Although we expected that it would be initially difficult for teams lacking slack resources to balance the competing demands of focusing on both learning and performance goals, we predicted that this would become easier over time with more experience on the changed task. This prediction is consistent with resource allocation theory's suggestion that practice on a task decreases its demands on attentional resources (Kanfer & Ackerman, 1989). We also expected that early efforts spent taking risks to discover more effective methods of performing a changed task might pay off later in terms of adaptability when these teams also focused on their performance.

> *Hypothesis 3:* For teams without slack resources, there will be an interactive effect between learning and performance orientation such that (a) learning orientation will be negatively related to initial performance improvements and positively related to later performance improvements for teams high on performance orientation and (b) learning orientation will be unrelated to both initial and later performance improvements for teams low on performance orientation following an unanticipated workload imbalance.

Method

Sample, Research Task, and Procedures

We collected data from 548 undergraduate business students who voluntarily served as participants in our study in exchange for extra credit in a management course. Our participants also had an opportunity to receive a monetary prize ($100) based on their team's performance across the three performance trials. Participants were informed of this opportunity before they signed up for the research.

The task was a modified version of the Distributed Dynamic Decision-making (DDD) simulation. DDD simulates a military command-and-control situation in which four team members work to protect an on-screen geographic area containing restricted and highly restricted no-fly zones from potential threats. To the extent that teams make accurate decisions regarding whether or not to eliminate potential threats and execute those decisions quickly, they receive higher scores on the task. The specific variant of the task we used was developed for contexts in which team members have little or no military experience. Each of our participants had a networked PC at his or her workstation and used a computer mouse to control military subplatforms, or assets, such as tanks, helicopters, jets, and AWACS reconnaissance planes, all of which had varying capabilities to disable enemy threats, or tracks. Teams worked together in a common room that was partitioned so that members could not see each other's computer screens but could easily speak to one another (for more details on the task, see Hollenbeck et al., 2002).

We randomly assigned our participants to four-person work teams ($N = 137$). When participants arrived at the laboratory, we also randomly assigned them to work at one of the four computer stations (i.e., Decision Maker [DM] 1, 2, 3, 4). Each computer station was associated with one of the four subsections of the larger geographic area the team was to protect. After being seated at their stations, participants received declarative and procedural training that lasted for approximately one hour. Teams were then allowed to practice the task for 10 min without direct assistance from the team's trainer. After the practice session, the teams worked on the first, second, and third trials, each consisting of 100 separate tracks and lasting roughly thirty minutes. We introduced a workload imbalance to all of our teams between the first and second trials. The first trial was one in which each team member experienced a surge in enemy tracks at some point throughout the task. During this surge, the team member experienced an objective and dramatic increase in the number of enemy tracks entering his or her quadrant all at once. As a result, during the first trial, each member experienced a situation in which his or her workload was disproportionately heavy compared to that of the rest of the team. We suddenly and dramatically changed the nature of the task for the second and third trials for all of our teams. Beginning with the second performance trial, one member of the team (i.e., the individual randomly assigned to the DM2 computer station) received all four surges in enemy tracks. The introduction of this change required all of the teams to revise the way they approached the task to be successful during the later two performance trials. The study lasted approximately three hours.

Manipulations and Measures

Slack resources. We manipulated whether teams had slack resources for managing their workload imbalance by randomly assigning teams to one of two different resource allocations. All teams were assigned a total of 16 subplatforms, and every member had four subplatforms. Approximately half (67) of our teams were assigned a resource allocation in which DM1 had four AWACS radar planes, DM2 had four tanks, DM3 had four helicopters, and DM4 had four jets. Given this resource allocation, DM2 had the most powerful of the team's resources. When teams assigned to this resource allocation experienced the sudden workload imbal-

ance, they were well equipped to manage the change because DM2 had the resources necessary to handle his or her increased individual share of the team's workload. Because DM2 possessed all of the most powerful resources in the team, the team as a whole had slack resources that could be devoted to the task (i.e., there were fewer demands on the remainder of the team than in the first task). The rest of our teams were assigned a resource allocation in which DM1, DM2, DM3, and DM4 had one of each of the four types of resources. Given this allocation, DM2 had no more or less resources to devote to managing his or her increased share of the team's workload. When teams assigned to this resource allocation experienced the sudden workload imbalance, they were ill equipped to manage the task. Given the nature of DM2's resources, the remaining team members had increased demands (they primarily needed to assist DM2); thus, compared to the teams assigned to the other resource allocation, these teams lacked slack resources to devote to the second and third trials.

Team performance. Team performance was measured at the end of the first, second, and third performance trials by the computer simulation and was based on the team's defensive performance consistent with the task mission. Each team began the task with 50,000 defensive points and lost 1 point and 2 points for each second that any enemy target was in the restricted zones and highly restricted zones, respectively. High defensive performance scores at the end of each 30-min trial were indicative of higher levels of performance. Because we were ultimately interested in performance improvements, our analyses predicted the change (i.e., slope) in performance from Time 1 to Time 2 and Time 2 to Time 3 (see the Analytical Strategy section below).

Collective goal orientation. We assessed collective learning orientation and performance orientation immediately after teams completed their third performance trial, as did DeShon et al. (2004), given the need to have our team members interact and work together on the task over time to allow collective goal orientation to emerge as a shared climate-like construct. We measured each dimension with an eight-item scale adapted from the measure developed by Button et al. (1996), in which we changed each item's referent from the individual to the team. Confirmatory factor analysis indicated that a two-factor solution fit the data significantly better than did a one-factor solution. We also examined the appropriateness of aggregating these measures to the team level. Overall, there was sufficient justification for aggregating our collective learning and performance orientation measures to the team level, $r_{wg(j)} = .91$, ICC(1) $= .15$, $F(136, 411) = 1.70$, $p < .01$, and $r_{wg(j)} = .90$, ICC(1) $= .03$, $F(136, 411) = 1.13$, $p = .21$, respectively.

Analytical Strategy

Given our interest in adaptability (i.e., performance improvements) over time, we tested our hypotheses using piecewise linear growth modeling, which is a special application of hierarchical linear modeling (Raudenbush & Bryk, 2002). We estimated two-piece linear growth models. We predicted, in each set of piecewise growth models, the grand mean, $\beta 0$, which represented average initial team performance (i.e., performance at Time 1); the slope between performance at Time 1 and Time 2, $\beta 1$; and the slope between performance at Time 2 and Time 3, $\beta 2$. These slopes represented performance improvements from Time 1 to Time 2

and Time 2 to Time 3 (i.e., initial and later performance improvements following the introduction of the workload imbalance, respectively). We estimated separate growth models for our slack and no slack teams, because we had limited degrees of freedom resulting from the complexity of our models (i.e., the need to include a two-way interaction between learning and performance orientations) and our relatively small number of time periods (i.e., 3). For each set of models, Model 1 added the independent effects for learning and performance orientation and Model 2 added a learning and performance orientation interaction term.

Results

Table 1 presents the means, standard deviations, and zero-order correlations among our measured variables. Both learning and performance orientations were unrelated to Time 1 performance but were positively related to Time 2 performance ($r = .23$, $p < .01$ and $r = .27$, $p < .01$, respectively) and Time 3 performance ($r = .31$, $p < .01$ and $r = .22$, $p < .01$, respectively). The correlation between learning and performance orientation in our data is worth noting. We found a positive relationship between these two variables ($r = .57$, $p < .01$), as have other scholars (e.g., Hofmann & Strickland, 1995; Meece & Holt, 1993), but we did not expect to find such a high correlation.

Table 2 presents the results of our piecewise growth models for our teams with slack resources. These teams initially scored, on average, 35,572.81 points, $\beta 0$, on the task. As can be seen in Model 1, and consistent with Table 1, neither learning orientation ($\gamma 01 = 953.48$, $p = .58$) nor performance orientation ($\gamma 02 = -748.49$, $p = .71$) was associated with these team's initial performance at Time 1, although we made no predictions about these effects. As shown in Model 1, slack teams improved, on average, 8,650.84 points, $\beta 1$, on the task between Time 1 and Time 2 and 3,670.66 points, $\beta 2$, on the task between Time 2 and Time 3. Consistent with Hypothesis 1, learning orientation was positively related to improvement between Time 1 and Time 2 ($\gamma 11 = 3,314.44$, $p < .05$, $d = 1.09$, $r_b = .25$).[2] Learning orientation was also positively related to improvement between Time 2 and Time 3 ($\gamma 21 = 2,483.39$, $p < .10$, $d = 0.87$, $r_b = .20$), suggesting modest support for Hypothesis 1. Consistent with Hypothesis 2, performance orientation was unrelated to levels of improvement between Time 1 and Time 2 ($\gamma 12 = 1,284.66$, $p = .50$, $d = 0.40$, $r_b = .08$). Modest support, however, was found for the hypothesized negative relationship between performance orientation and improvement between Time 2 and Time 3 ($\gamma 22 = -3,516.10$, $p < .10$, $d = 1.24$, $r_b = .24$). We did not predict any interactive effects between learning and performance orientation for our slack teams, nor did we find evidence of any such effects on improvement between Time 1 and Time 2 ($\gamma 13 = 7,476.88$, $p = .28$, $d = 2.29$, $r_b = .14$) or improvement between Time 2 and Time 3 ($\gamma 23 = -5,619.63$, $p = .37$, $d = 1.92$, $r_b = .11$; Model 2).

Table 3 presents the results of our piecewise growth models for our teams without slack resources. On average, these teams initially scored 35,909.65 points, $\beta 0$, on the task. Performance orientation was associated with even higher levels of initial performance ($\gamma 02 = 4,208.87$, $p < .05$), but learning orientation was not ($\gamma 01 = 2,406.43$, $p = .18$). On average, teams without slack improved 2,371.69 points, $\beta 1$, on the task between Time 1 and Time 2 and 3,576.24 points, $\beta 2$, on the task between Time 2 and Time

3. Contrary to our results for slack teams, there was no evidence of independent effects for learning orientation on levels of improvement between Time 1 and Time 2 ($\gamma 11 = -624.36$, $p = .74$, $d = 0.25$, $r_b = .05$) or between Time 2 and Time 3 ($\gamma 21 = 656.84$, $p = .72$, $d = 0.27$, $r_b = .05$). Similarly, there was no evidence of independent effects for performance orientation on levels of improvement between Time 1 and Time 2 ($\gamma 12 = 2,656.85$, $p = .24$, $d = 0.74$, $r_b = .12$) or between Time 2 and Time 3 ($\gamma 22 = -2,211.84$, $p = .30$, $d = 0.83$, $r_b = .12$). However, we found an interactive effect between learning and performance orientation on levels of improvement between Time 1 and Time 2 ($\gamma 13 = -7,632.27$, $p < .05$, $d = 2.47$, $r_b = .26$) and modest support for an interactive effect between learning and performance orientation on levels of improvement between Time 2 and Time 3 ($\gamma 23 = 5,572.67$, $p < .10$, $d = 2.18$, $r_b = .21$).

We plotted these interactions following the recommendations of Cohen, Cohen, West, and Aiken (2003) and using regression slopes for low ($-1\ SD$) and high ($+1\ SD$) levels of our predictors around their means. Figure 1 plots the interaction between learning and performance orientation on initial performance improvements. As can be seen in the figure, learning orientation was virtually unrelated to performance improvements for teams that were low on performance orientation but negatively related to performance improvements for teams that were high on performance orientation. Figure 2 plots the interaction between learning and performance orientation on later performance improvements. As can be seen in this figure, learning orientation was virtually unrelated to performance improvements for teams that were low on performance orientation but positively related to performance improvements for teams that were high on performance orientation. Finally, teams that were high on both learning and performance orientation improved less initially than they did later. These patterns are consistent with those predicted in Hypotheses 3a and 3b.

Discussion

Our primary purpose in this study was to better understand when collective learning orientation and performance orientation would have independent effects, when they would have interactive effects, and the nature of those interactive effects on teams' ability to adapt to a drastic environmental change in the form of a sudden and unanticipated change in workload. We found, consistent with the predictions we derived from resource allocation theory, that the effects of learning and performance orientation were independent

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[2] To provide another means of interpreting our hypothesized effects, we calculated and report two effect size measures, namely, d (Hedges, 2007; Morris & DeShon, 2002) and $r_{equivalent}$ (or r_b, Rosenthal & Rubin, 2003). d represents the standard deviation change in the outcome variable as a result of the predictor variable. It was calculated with the formula $d = \beta/(\tau)^{1/2}$, where β represents the fixed effect of the predictor variable and $(\tau)^{1/2}$ represents the standard deviation of the Level 1 outcome in our unconditional piecewise linear growth model. r_b, like the effect size r, is a standard effect size that is bounded between 0 and 1. It can be interpreted like r and represents an appropriate estimate of effect size in cases in which no generally accepted effect size estimate exists, as is the case of piecewise linear growth models such as ours, and in which directly computed effect sizes might be misleading and are not well understood (Cohen, 1988; Rosenthal & Rubin, 2003).

Table 1
Means, Standard Deviations, and Zero-Order Correlations Between Measured Study Variables

Variable	M	SD	1	2	3	4
1. Time 1 performance	30,909.11	4,600.77	—			
2. Time 2 performance	36,351.61	4,795.25	.45**	—		
3. Time 3 performance	39,974.03	3,689.67	.41**	.72**	—	
4. Learning orientation	3.69	0.30	.09	.23**	.31**	—
5. Performance orientation	3.47	0.25	.09	.27**	.22**	.57**

Note. $N = 137$.
** $p < .01$.

when teams had slack resources. Our findings regarding performance orientation are particularly noteworthy. We found that, initially, performance orientation was unrelated to early performance improvements. This was not the case with regard to later performance improvements, as teams with higher levels of performance orientation demonstrated smaller performance improvements over time. We suspect that the tendency of teams with higher levels of performance orientation to focus on, and continue using, strategies and routines established prior to the change (a) ultimately became a liability for these teams and (b) may have led them to withdraw from the task (Bell & Kozlowski, 2002; Porter, 2005). Taken together, our findings help explain the inconsistent results of previous studies on performance orientation and team adaptability. Yeo and Neal (2004) suggested that the inconsistencies found in the literature regarding performance orientation may be explained, in part, by the lack of research that examines its effects over time. Our results clearly support this idea and suggest that future research should continue to take into account the effects of time when examining the effects of performance orientation in teams.

Our results regarding the interaction between learning and performance orientation among teams that did not have slack resources lend support for the utility of resource allocation theory,

both in its ability to suggest when such interactions will occur and the nature of these interactions. It appears that when teams without slack resources initially face a sudden and unanticipated change, a focus on experimentation, risk taking, and discovering better performance strategies can negatively affect their ability to adapt if they are also attempting to meet performance goals. Our findings suggest the opposite over time. We also found that learning orientation was virtually unrelated to performance improvements for teams low on performance orientation. Taken together, these findings suggest that although teams lacking slack resources need to balance a pursuit of learning and performance goals, they can do this more effectively with time and that early investments in learning can, in fact, lead to performance benefits in later time periods.

Our findings should be compared to those of other scholars who have explored learning and performance orientation interactions. Bunderson and Sutcliffe (2003) suggested that being too high on learning orientation could be costly for teams, because without a focus on performance (as motivated by a performance orientation), teams high on learning orientation may sacrifice performance. Yeo and Neal (2004) suggested, on the contrary, that being simultaneously high on learning and performance orientation will hurt

Table 2
Multilevel Model Predicting Initial Performance, Change in Performance From Time 1 to Time 2, and Change in Performance From Time 2 to Time 3 for Teams With Slack Resources

Parameter	Model 1		Model 2	
	Estimate	SE	Estimate	SE
Grand mean, $\beta 0$				
Intercept, $\gamma 00$	35,572.81***	425.02	35,572.81***	425.59
Learning orientation, $\gamma 01$	953.48	1,720.24	−20,766.58	23,974.77
Performance orientation, $\gamma 02$	−748.49	2,028.47	−24,081.86	25,769.17
Learning × Performance Orientation, $\gamma 03$			6,292.03	6,927.24
Time 1 to Time 2 slope, $\beta 1$				
Intercept, $\gamma 10$	8,650.84**	400.34	8,650.84**	401.22
Learning orientation, $\gamma 11$	3,314.44**	1,620.39	−22,495.71	22,601.95
Performance orientation, $\gamma 12$	1,284.66	1,910.72	−26,442.61	24,293.60
Learning × Performance Orientation, $\gamma 13$			7,476.88	6,530.58
Time 2 to Time 3 slope, $\beta 2$				
Intercept, $\gamma 20$	3,670.66***	381.85	3,670.66***	381.85
Learning orientation, $\gamma 21$	2,483.39*	1,545.54	21,882.34	21,550.14
Performance orientation, $\gamma 22$	−3,516.10*	1,822.46	17,323.76	23,163.07
Learning × Performance Orientation, $\gamma 23$			−5,619.63	6,226.67

Note. $N = 67$. SE = standard error.
* $p < .10$.   ** $p < .05$.   *** $p < .01$.

Table 3
Multilevel Model Predicting Initial Performance, Change in Performance From Time 1 to Time 2, and Change in Performance From Time 2 to Time 3 for Teams Without Slack Resources

Parameter	Model 1		Model 2	
	Estimate	SE	Estimate	SE
Grand mean, $\beta 0$				
Intercept, $\gamma 00$	35,909.65***	407.79	35,909.65***	409.49
Learning orientation, $\gamma 01$	2,406.43	1,753.49	9,793.53	11,211.38
Performance orientation, $\gamma 02$	4,208.87**	2,077.79	12,189.53	12,142.53
Learning $\times$ Performance Orientation, $\gamma 03$			−2,178.34	3,265.04
Time 1 to Time 2 slope, $\beta 1$				
Intercept, $\gamma 10$	2,371.69**	437.12	2,371.69***	431.75
Learning orientation, $\gamma 11$	−624.36	1,879.56	25,257.86**	11,820.88
Performance orientation, $\gamma 12$	2,656.85	2,227.21	30,618.75**	12,802.65
Learning $\times$ Performance Orientation, $\gamma 13$			−7,632.27**	3,442.54
Time 2 to Time 3 slope, $\beta 2$				
Intercept, $\gamma 20$	3,576.24***	419.41	3,576.24***	413.99
Learning orientation, $\gamma 21$	656.84	1,803.44	−18,240.96*	11,334.63
Performance orientation, $\gamma 22$	−2,211.84	2,137.02	−22,628.12*	12,276.01
Learning $\times$ Performance Orientation, $\gamma 23$			5,572.67*	3,300.93

Note. $N = 70$. SE = standard error.
* $p < .10$. ** $p < .05$. *** $p < .01$.

performance. Our findings are more in line with those of Bunderson and Sutcliffe (2003) and the predictions of Button et al. (1996).

One additional point worth noting about our results is the high correlation we found between collective learning orientation and performance orientation. Our study is one of only two published studies (see DeShon et al., 2004) that have measured and reported the correlation between these variables in a single study. Given the relative newness of this area of research, it is unclear how the relationship between collective measures of these two goal-orientation dimensions compares to that when these dimensions are measured at the individual level as traits among individuals. Studies involving the latter tend to report little to no relationship (e.g., Button et al., 1996) or positive relationships (e.g., Meece & Holt, 1993). Although we are uncertain what the true relationship between collective learning orientation and performance orientation might be, we warn researchers against assuming that collec-

tive measures of goal orientation are completely analogous to individual-level measures of goal orientation (Morgeson & Hofmann, 1999). Indeed, Ostroff (1993) provided a detailed explanation as to why collective constructs are likely to covary more strongly than their individual-level analogues that included the potential presence of statistical artifacts or meaningful differences. Our findings suggest that the difference in these relationships across levels is an important area for future research, as is examining multiple conceptualizations of goal orientation across multiple levels in single studies (Porter, 2008).

Our results indicate, practically speaking, that the goals that teams pursue have important and complex effects on their ability to adapt. As Gully and Phillips (2005) noted, these goals stem from a number of sources, including members, teams' functional purpose, structural features such as feedback and reward systems, and leaders. Organizations should devote more attention to shaping
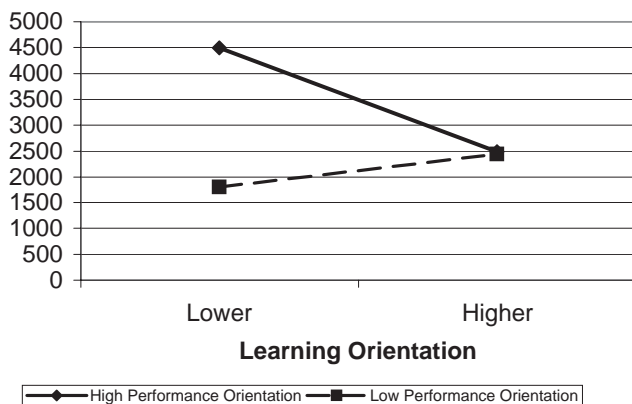

Figure 1. Plotted Learning Orientation $\times$ Performance Orientation interaction for teams without slack at Time 1 to Time 2. Values along the y-axis denote change in performance.
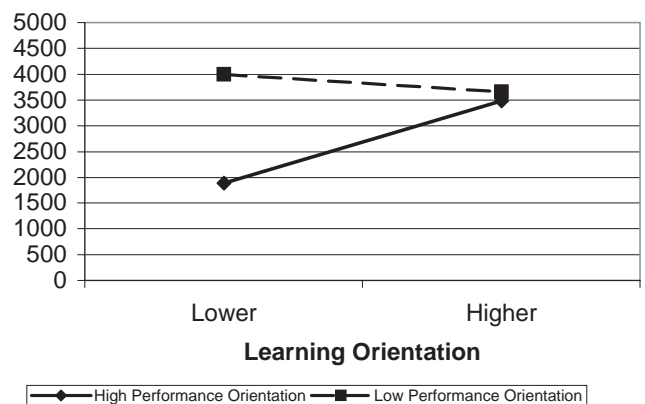

Figure 2. Plotted Learning Orientation $\times$ Performance Orientation interaction for teams without slack at Time 2 to Time 3. Values along the y-axis denote change in performance.

these goals with an explicit focus on these sources. Our findings also suggest that no single type of collective goal orientation will satisfy an organization's needs in every context. Instead, organizations should consider the goals their teams pursue in light of their broader organizational goals and needs. Our findings suggest that levels of dynamism faced by the organization might be one important consideration. Teams high on performance orientation may be ideal when task demands are stable and well defined. Teams high on learning orientation and teams high on both learning and performance orientation may be ideal when demands shift constantly.

Limitations and Directions for Future Research

Our study is not without limitations. One important limitation stems from our decision to measure collective goal orientation at the end of the performance trials. We conceptualized and assessed collective goal orientation as a shared, climate-like, unit-level construct (see Kozlowski & Klein, 2000); thus, it was important that team members be able to reach some consensus regarding their collective goal orientations. We therefore felt it necessary to assess goal orientation after team members had a substantial amount of time working together as a team. In this way, our hypotheses and methodology are somewhat similar to those of DeShon et al. (2004), who assessed team mastery and performance orientation as an antecedent team characteristic, yet measured these constructs after team members had sufficient opportunity to interact with and observe one another. One possibility is that our teams could have retrospectively determined their levels of learning and performance orientation on the basis of their performance on the task. We do not believe this was the case, because the teams had no information about their performance relative to that of other teams with which to make these determinations. Perhaps more important, however, is that our design prevented us from testing and drawing any causal inferences about the effects of goal orientation on team adaptability. Our findings should be interpreted with this in mind, and future research should address this limitation. Research designs in which collective goal orientation is measured earlier than it was in our study might allow researchers to examine the development of collective goal orientations over time. Designs in which collective goal orientations are experimentally manipulated (e.g., Poortvliet, Janssen, Van Yperen, & Van de Vliert, 2007) or in which individuals possessing various levels of dispositional goal orientation are intentionally assigned to teams would allow researchers to make inferences that we simply cannot make with our data. We also recommend that researchers employing these designs examine the effects of collective goal orientation in teams that vary on the extent to which they experience workload imbalances and other forms of disruptions.

Other limitations worth mentioning are the laboratory context in which our study occurred and our use of undergraduate students as participants working on a computerized decision-making simulation, both of which raise potential concerns about generalizability. A benefit of our setting was that it allowed us to introduce a significant change to our teams' workload. In addition, our laboratory setting made it possible for us to collect data on a sufficient number of teams to test the complex relationships in which we were interested and to observe our teams' responses to the change over multiple performance trials. Both were critical for our focus

on team adaptability. A significant opportunity now exists for researchers to examine our predictions in the field.

Finally, although our study represents an important first step in that we used resource allocation theory to guide our development of a priori predictions regarding the interactive effects of learning and performance orientation, future research should explore a broader range of boundary conditions that might explain the conditions under which these interactive effects will be found and the nature of these effects. For example, we suspect that novel and unfamiliar tasks or changes in team membership could also stretch teams' resources so that it would become difficult to balance potentially competing demands, such as pursuing different types of goals.

References

American Management Association & Human Resources Institute. (2006). *Agility and resilience in the face of continuous change.* New York, NY: American Management Association.

Ames, C., & Archer, J. (1988). Achievement goals in the classroom: Students' learning strategies and motivation processes. *Journal of Educational Psychology, 80,* 260–267.

Argyris, C., & Schon, D. (1978). *Organizational learning.* Reading, MA: Addison-Wesley.

Barnes, C. M., Hollenbeck, J. R., Wagner, D. T., DeRue, D. S., Nahrgang, J. D., & Schwind, K. M. (2008). Harmful help: The costs of backing-up behavior in teams. *Journal of Applied Psychology, 93,* 529–539.

Bell, B. S., & Kozlowski, S. W. J. (2002). Goal orientation and ability: Interactive effects on self-efficacy, performance, and knowledge. *Journal of Applied Psychology, 87,* 497–505.

Bouffard, T., Boisvert, J., Vezeau, C., & Larouche, C. (1995). The impact of goal orientation on self-regulation and performance among college students. *British Journal of Educational Psychology, 65,* 317–329.

Bowers, C. A., Braun, C. C., & Morgan, B. B. (1997). Team workload: Its meaning and measurement. In M. T. Brannick, E. Salas, & C. Prince (Eds.), *Team performance assessment and measurement: Theory, methods, and applications* (pp. 85–108). Mahwah, NJ: Erlbaum.

Bunderson, J. S., & Sutcliffe, K. M. (2003). Management team learning orientation and business unit performance. *Journal of Applied Psychology, 88,* 552–560.

Button, S. B., Mathieu, J. E., & Zajac, D. M. (1996). Goal orientation in organizational research: A conceptual and empirical foundation. *Organizational Behavior and Human Decision Processes, 67,* 26–48.

Chan, D. (2000). Understanding adaptation to changes in the work environment: Integrating individual differences and learning perspectives. In G. R. Ferris (Ed.), *Research in personnel and human resources management* (Vol. 19, pp. 1–42). New York, NY: Elsevier Science.

Chen, G., & Kanfer, R. (2006). Toward a systems theory of motivated work behavior in teams. *Research in Organizational Behavior, 27,* 223–267.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.

Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied multiple regression/correlation analysis for the behavioral sciences.* Mahwah, NJ: Erlbaum.

DeShon, R. P., & Gillespie, J. Z. (2005). A motivated action theory account of goal orientation. *Journal of Applied Psychology, 90,* 1096–1127.

DeShon, R. P., Kozlowski, S. W. J., Schmidt, A. M., Milner, K. R., & Wiechmann, D. (2004). A multiple-goal, multilevel model of feedback effects on the regulation of individual and team performance. *Journal of Applied Psychology, 89,* 1035–1056.

Dweck, C. S. (1986). Motivational processes affecting learning. *American Psychologist, 41,* 1040–1048.

Elliot, A. J., & McGregor, H. A. (2001). A 2 × 2 achievement goal framework. *Journal of Personality and Social Psychology, 80,* 501–519.

Gong, Y., & Fan, J. (2006). Longitudinal examination of the role of goal orientation in cross-cultural adjustment. *Journal of Applied Psychology, 91,* 176–184.

Gully, S. M., & Phillips, J. M. (2005). A multilevel application of learning and performance orientations to individual, group, and organizational outcomes. In J. Martocchio (Ed.), *Research in personnel and human resources management* (Vol. 24, pp. 1–51). Greenwich, CT: JAI Press/Elsevier Science.

Hedges, L. V. (2007). Effect sizes in cluster-randomized designs. *Journal of Educational and Behavioral Statistics, 32,* 341–370.

Hofmann, D. A., & Strickland, O. J. (1995). Task performance and satisfaction: Evidence for task- by ego-orientation interaction. *Journal of Applied Social Psychology, 25,* 495–511.

Hollenbeck, J. R., Moon, H., Ellis, A. P. J., West, B. J., Ilgen, D. R., Sheppard, L., . . . Wagner, J. A., III. (2002). Structural contingency theory and individual differences: Examination of external and internal person–team fit. *Journal of Applied Psychology, 87,* 599–606.

Janssen, O., & Van Yperen, N. W. (2004). Employees' goal orientations, the quality of leader–member exchange, and the outcomes of job performance and job satisfaction. *Academy of Management Journal, 47,* 368–384.

Kanfer, R., & Ackerman, P. L. (1989). Motivation and cognitive abilities: An integrative/aptitude treatment interaction approach to skill acquisition. *Journal of Applied Psychology, 74,* 657–690.

Kozlowski, S. W. J., Gully, S. M., Nason, E. R., & Smith, E. M. (1999). Developing adaptive teams: A theory of compilation and performance across levels and time. In D. R. Ilgen & E. D. Pulakos (Eds.), *The changing nature of work and performance: Implications for staffing, personnel actions, and development* (pp. 240–292). San Francisco, CA: Jossey-Bass.

Kozlowski, S. W. J., & Klein, K. (2000). A multilevel approach to theory and research on organizations: Contextual, temporal, and emergent processes. In K. J. Klein & S. W. J. Kozlowski (Eds.), *Multilevel theory, research, and methods in organizations: Foundations, extensions, and new directions* (pp. 3–90). San Francisco, CA: Jossey-Bass.

LePine, J. A. (2005). Adaptation of teams in response to unforeseen change: Effects of goal difficulty and team composition in terms of cognitive ability and goal orientation. *Journal of Applied Psychology, 90,* 1153–1167.

Meece, J. L., & Holt, K. (1993). A pattern analysis of students' achievement goals. *Journal of Educational Psychology, 85,* 582–590.

Morgeson, F. P., & Hofmann, D. A. (1999). The structure and function of collective constructs: Implications for multilevel research and theory development. *Academy of Management Review, 24,* 249–265.

Morris, S. B., & DeShon, R. P. (2002). Combining effect size estimates in meta-analysis with repeated measures and independent-groups designs. *Psychological Methods, 7,* 105–125.

Ostroff, C. (1993). Comparing correlations based on individual-level and aggregated data. *Journal of Applied Psychology, 78,* 569–582.

Poortvliet, P. M., Janssen, O., Van Yperen, N. W., & Van de Vliert, E. (2007). Achievement goals and interpersonal behavior: How mastery and performance goals shape information exchange. *Personality and Social Psychology Bulletin, 33,* 1435–1447.

Porter, C. O. L. H. (2005). Goal orientation: Effects on backing up behavior, performance, efficacy, and commitment in teams. *Journal of Applied Psychology, 90,* 811–818.

Porter, C. O. L. H. (2008). A multilevel, multiconceptualization perspective of goal orientation in teams. In V. I. Sessa & M. London (Eds.), *Work group learning: Understanding, improving, and assessing how groups learn in organizations* (pp. 149–173). New York, NY: Erlbaum/Taylor & Francis.

Porter, C. O. L. H., Gogus, C. I., & Yu, R. C. (2010). When does teamwork translate into improved team performance? A resource allocation perspective. *Small Group Research, 41,* 221–248.

Raudenbush, S. W., & Bryk, A. S. (2002). *Hierarchical linear models: Applications and data analysis methods* (2nd ed.). Thousand Oaks, CA: Sage.

Rosenthal, R., & Rubin, D. B. (2003). $r_{equivalent}$: A simple effect size indicator. *Psychological Methods, 8,* 492–496.

Schraw, G., Horn, C., Thorndike-Christ, T., & Bruning, R. (1995). Academic goal orientations and student classroom achievement. *Contemporary Educational Psychology, 20,* 359–368.

Thompson, J. D. (1967). *Organizations in action: Social science bases of administrative theory.* New York, NY: McGraw-Hill.

VandeWalle, D. (1997). Development and validation of a work domain goal orientation instrument. *Educational and Psychological Measurement, 57,* 995–1015.

Yeo, G. B., & Neal, A. (2004). A multilevel analysis of effort, practice, and performance: Effects of ability, conscientiousness, and goal orientation. *Journal of Applied Psychology, 89,* 231–247.

Correction to Meade (2010)

In the article "A Taxonomy of Measurement Invariance Effect Size Indices" by Adam Meade (*Journal of Applied Psychology,* 2010, Vol. 95, No. 4, pp. 728-743), there was an error in Formula 6 on page 731 for the pooled standard deviation of the ESSD index. The $SD_{ItemPooled}$ should be:

$$SD_{ItemPooled} = \sqrt{\frac{(N_F - 1)\sigma^2_{ES(i\|\gamma F)} + (N_F - 1)\sigma^2_{ES(i\|\gamma R)}}{2*N_F - 2}} \quad (6)$$

Related to this, in Table 8 on page 739, the ETSSD statistic should have been .094 for the cross cultural comparison and .001 for the Administration Format example.