Learning to Share: Exploring Temporality in Shared Leadership and Team Learning

Lan Wang, Boston University, lanwang@bu.edu

Jian Han, CEIBS, jianhan@ceibs.edu

Colin M. Fisher, University College London, colin.fisher@ucl.ac.uk

Yan Pan, CEIBS, ppolly@ceibs.edu

Accepted for publication December, 2016:

Wang, L., Han, J., Fisher, C. M., & Pan, Y. (2017). Learning to Share: Exploring Temporality in Shared Leadership and Team Learning. *Small Group Research*.

Lan Wang (Corresponding Author)
Boston University
Questrom School of Business
595 Commonwealth Avenue
Boston, MA 02215 USA
Phone: 1- 617-353-4405
Fax: 1-617-353-5244
E-mail: lanwang@bu.edu

Jian Han
China Europe International Business School
699 Hongfeng Road, Pudong
Shanghai 201206, P.R. China
E-mail: jianhan@ceibs.edu

Colin M. Fisher
University College London
School of Management
One Canada Square
London E14 5AB
United Kingdom
E-mail: colin.fisher@ucl.ac.uk

Yan Pan
China Europe International Business School
699 Hongfeng Road, Pudong
Shanghai 201206, P.R. China
E-mail: ppolly@ceibs.edu

Learning to Share: Exploring Temporality in Shared Leadership and Team Learning

Abstract

Using data from 310 executive MBA students in 66 teams on a business simulation project, we explored (a) how shared leadership and team learning behaviors influence each other over time in self-managed teams, and (b) how the stability of the leadership network structure (i.e., network churn) is associated with team learning behaviors. We found that shared leadership stimulated team learning behaviors in a manner consistent with previous research at the early stages of teams' work together, but not at the middle and later stages of the task. We also found that teams that engaged in more learning behaviors early in the task were more likely to keep their leadership network structure stable. This stability was positively associated with team learning behaviors at the midpoint and end of the task. We use these findings to elaborate theory on how leadership and learning in self-managed teams develop, change, and influence each other over time.

Keywords

shared leadership, team learning behaviors, network churn, self-managed teams, time

Sharing to Learn and Learning to Share: Exploring Temporality in Team Learning

Organizations rely on self-managed teams for much of their important and uncertain work (e.g., Cohen & Bailey, 1997). At their best, self-managed teams can learn to work together effectively without much need for top-down, hierarchical leadership (e.g., Hackman, 2002). Such teams, however, still need to fulfill critical leadership functions – and fulfilling them often exceeds the capacity of any one person (e.g., Morgeson, DeRue, & Karam, 2010). Self-managed teams thus often obtain the leadership they need by distributing leadership among members, rather than concentrating it in a single team leader (e.g., Carson, Tesluk, & Marrone, 2007; Wageman & Fisher, 2014). Scholars call this *shared leadership*: "a dynamic, interactive influence process among individuals in groups for which the objective is to lead one another to the achievement of group or organizational goals or both" (Pearce & Conger, 2003, p. 1). All teams can be assessed on the degree to which they share leadership; some teams consolidate leadership narrowly in one or two individuals, while others share it broadly among all members. High levels of shared leadership can promote team effectiveness by providing teams with intangible, relational resources that facilitate sharing information, expressing diverse opinions, and coordinating member actions in the face of uncertain and ambiguous situations (Carson et al., 2007).

Indeed, one crucial benefit of sharing leadership in teams is that it promotes *team learning behaviors*: "activities through which individuals acquire, share, and combine knowledge through experience with one another" (Argote, Gruenfeld, & Naquin, 2001, p. 370), including challenging assumptions, reflecting on past performance, and providing high-quality feedback (Edmondson, Bohmer, & Pisano, 2001). Shared leadership is thought to have a positive, linear relationship with team learning behaviors (Liu, Hu, Li, Wang, & Lin, 2014), because it facilitates

trust, interdependence and coordination among members, reduces team conflict, and overcomes the communication barriers associated with unequal status, or low psychological safety (Bergman, Rentsch, Small, Davenport, & Bergman, 2012; Drescher, Korsgaard, Welpe, Picot, & Wigand, 2014). Those factors are essential antecedents of team learning (e.g., Edmondson, 1999).

Self-managed teams, however, are not static entities (Arrow, Poole, Henry, Wheelan, & Moreland, 2004; Humphrey & Aime, 2014) – what helps a team at one time may have little effect at another (e.g., Wageman, Fisher, & Hackman, 2009). Shared leadership and team are also likely to have complex interrelations over time, but little is known about the dynamics of these relationships. Indeed, research presents contradictory (though indirect) suggestions about these relationships over the course of a team task. The relationship between shared leadership and team learning behaviors might be strongest at the beginning of a task because learning new tasks inherently requires more communication and negotiation (Kozlowski & Bell, 2008; London & Sessa, 2007), which are associated with shared leadership. On the other hand, the relationship could be weaker earlier in the task because groups need to accrue collective experience before reflecting on it (Schippers, Homan, & van Knippenberg, 2013); further, trust and psychological safety take time to develop (Raes, Kyndt, Decuyper, van den Bossche, & Dochy, 2015). These factors might make shared leadership a stronger influence on learning behavior later in the task. These conflicting ideas make it unclear how the relationship between shared leadership and team learning behaviors waxes and wanes throughout a task.

Further, research on shared leadership has generally focused on the amount of shared leadership at a single point in time (i.e., whether a team has high vs. low levels of shared leadership). However, the network pattern of how members influence each other is likely to

change during a task, even if the overall amount of shared leadership remains constant. We suggest that these changes in network patterns of influence are themselves of substantive interest. Though few studies have directly addressed the effect of the stability vs. change in shared leadership structure on team learning behaviors, prior studies have shown that stability of roles enhances coordination because it makes task performance more predictable (Valentine & Edmondson, 2014), but changes in member roles and responsibilities are often necessary to flexibly adapt to changes in the task or environment (Day, Gronn, & Salas, 2004; Pearce & Conger, 2003). Thus, change and stability in shared leadership networks may be critical factors in promoting or inhibiting team learning behaviors.

In a study of 66 self-managed executive MBA teams participating in a multi-day simulation, we explored two primary questions: (a) How do shared leadership and team learning behaviors influence each other over time? and (b) How does the stability of the network structure of shared leadership affect team learning behaviors? To address these questions, we took a social network approach to measuring shared leadership (Carson, et al., 2007) at three points in time during the simulation. We assessed the amount of shared leadership using *network density*, which captures the overall amount of leadership influence distributed throughout a team (Carson et al, 2007), and assessed the stability of the network using *network churn,* which measures the number of leadership ties added or dissolved over time (Sasovova, Mehra, Borgatti, & Schippers, 2010). We use our results to elaborate theory on shared leadership and team learning behaviors, integrating the notions of changing relationships at different task stages and stability in shared leadership networks.

The Dynamics of Shared Leadership and Team Learning Behaviors over Time

Several streams of research suggest that the relationship between shared leadership and team learning behaviors may vary over time. We detail this research below. To ground our analyses, we adopt Kozlowski and colleagues' "task dynamics" approach to analyzing group dynamics over time (e.g., Kozlowski, Watola, Nowakowski, Kim, & Botero, 2009). Task dynamics emphasizes the episodic nature of team task performance (Marks, Mathieu, & Zaccaro, 2001), in which teams cycle between preparing to work on a focal task, engaging in action to complete the task, and reflecting on their performance. This cycle creates the opportunity for learning in the latter phase, when members reflect on their performance and plan for subsequent task performance cycles (Hackman & Wageman, 2005). The extent to which task dynamics actually results in learning and improvement over time depends largely on when and how critical leadership is enacted in the team (Kozlowski et al., 2009).

Need for shared leadership and team learning. First, several theorists have proposed that team needs vary throughout a task for both sharing leadership (e.g., Kozlowski, Mak, & Chao, 2016) and engaging in learning behaviors (e.g., Hackman & Wageman, 2005). New teams working on new tasks will have especially strong demands for both leadership activities and learning behaviors. Planning for new tasks inherently require learning, such as how to approach the task and what roles and norms members adopt (Kozlowski & Bell, 2008). When team members share leadership in a new task, the exploration, planning, and re-engineering of tasks, roles and norms should bring more communication and negotiation (London & Sessa, 2007), which require learning behaviors, such as reflecting on the process and questioning current procedures. Thus, sharing leadership early in the task is likely to lead to higher levels of learning behaviors.

However, these effects may weaken over time as demand for sharing leadership and learning behaviors decreases. Once a team has developed norms and routines for dealing with a task, members tend to resist altering those approaches (Bettenhausen & Murnighan, 1991; Gersick & Hackman, 1990). As deadlines draw nearer, teams become more hesitant to engage in learning behaviors, which are necessary to change the interaction patterns and role structures (Ericksen & Dyer, 2004). Moreover, as the task becomes more familiar and existing work processes are solidified (keeping the amount of shared leadership constant), learning behaviors become less common. Thus, as the team and task become more familiar in later task cycles, the relationship between shared leadership and team learning behaviors could weaken. This logic is consistent with recent meta-analytic results showing that shared leadership has a weaker influence on team outcomes as team tenure increases (Nicolaides, et al., 2014), although the relationship to learning behaviors was not assessed.

Readiness for learning behaviors. On the other hand, scholars have suggested that teams are not "ready" to learn at the beginning of task cycle. It is thus only after a cycle is complete that a team can focus on learning and reflection, rather than worrying about the task itself (Kozlowski, Gully, Nason, Smith, 1999; Marks, et al., 2001). For instance, Hackman and Wageman (2005) argued that "the end of the task cycle is the time when a team has as much data as it is likely to get for members to use in exploring what can be learned from the collective work just completed." (p. 278). In other words, even if teams share leadership early on, members have less collective experience to learn from, making it difficult to raise questions, offer feedback, or reflect on past performance. Thus, they will not be able to engage in learning behaviors early in a performance cycle as later.

Further, it may take time for shared leadership to engender the trust and psychological safety necessary for members to engage in learning behaviors. For instance, Raes, et al (2015) found that teams displayed significantly more learning behaviors later, rather than earlier, in their work because of the time it took the group to develop psychological safety. Thus, even though teams may need to engage in learning behaviors earlier in the task, it may be difficult for them to take the interpersonal risks necessary to do so early in the task cycle, when members do not know each other well, or when working intensely on the task. This logic suggests that the ends of tasks are more likely moments in which shared leadership can engender team learning behaviors.

Reciprocal relationships between shared leadership and team learning. Moreover, team learning and shared leadership may have reciprocal relationships, reinforcing or diminishing each other over time. Team learning behaviors require members to share or create knowledge (Wilson, Goodman, & Cronin, 2007), which requires interpersonal risks (Bunderson & Reagans, 2011) when members challenge assumptions, reflect on what task progress, evaluate alternatives, or criticize the work of others (Edmondson et al, 2001). During this process, different team members uncover their different levels of willingness and capacities to help the team to learn. Once their sharing and engagement in team learning are perceived by others as contributions to team outcomes, those sharing their knowledge should be viewed by teammates as exercising leadership (Berger & Webster, 2006). Following these arguments, shared leadership and team learning behaviors may have a reciprocal and self-reinforcing relationship.

Given the complex and contradictory implications of the literature, we pose the following exploratory research question to detail the dynamics of the relationship between shared leadership and team learning behaviors. We took an exploratory approach to address complex and seemingly conflicting theory; such an approach can both generate new insights on current

seemly contradictory findings, and also detect previously unknown relationships which facilitate future theory development (Bamberger & Ang, 2016).

Research Question 1: How do shared leadership and team learning behaviors influence each other over time?

Change and Stability in Shared Leadership Structure and Team Learning Behaviors

The research above focuses on how the *amount* of shared leadership influences team learning behavior. However, sharing leadership is often conceptualized as a network concept, in which each member has their own perception of who is providing leadership for the team (e.g., Carson et al., 2007; Mehra, Smith, Dixon, & Robertson, 2006). In this framework, it is possible for the amount of shared leadership to stay constant, but the specific members who provide it to change. For instance, in a team of three, Person A and Person B could be seen by all three members as providing leadership at Time 1, but Person B and Person C were perceived by all three members as providing leadership at Time 2. In this example, the amount of shared leadership remains constant, but the members who provided it changed.

We argue that the amount of stability vs. change in the structure of shared leadership is also related to team learning behavior. Network scholars have conceptualized changes in network structure as "network churn," defined as the volume of ties added and dissolved from one time to another (Sasovova et al., 2010). Teams with low churn have more stable shared leadership structures, with members perceiving leadership to emanate from the same people over time. Such stable leadership structures may promote team learning behaviors because stable role structures are associated with predictability that enables effective and consistent coordination (e.g., Valentine & Edmondson, 2014). Unstable leadership structures introduce uncertainty and stress, lessening the chances that members engage in interpersonally risky behaviors (Bunderson

& Reagans, 2011) and creating ambiguity about who should receive questions or feedback. This logic suggests that stable leadership structures (i.e., low churn) should lead to more team learning behaviors.

This logic, however, runs afoul of the notion that shared leadership provides a way to flexibly deploy members' knowledge and skills. A benefit of shared leadership is that, theoretically, it allows members to choose who should exercise leadership based on the particular demands of the task at that time (Day et al., 2004). Different members may be better suited to lead or follow at different times, based on their particular capabilities (Hackman, 2002). A team that is constantly learning about the task and member capabilities should be more likely to fluidly change its leadership structure as the task demands it. Indeed, changes in a network may reflect "a group's adaptive capacity to resolve immediate concerns and to adjust to ad-hoc events." (Quintane, Pattison, Robins, & Mol, 2013, p. 529). This logic suggests that learning behaviors and churn in the shared leadership network should be positively associated.

Because there are no empirical studies directly examine the relationship between the change of shared leadership structure and team learning behaviors, we aim to shed light on these seemingly contradictory views. Therefore, our second exploratory research question is:

Research Question 2: How does the stability of shared leadership network structure impact team learning behaviors?

Method

Sample

We studied executive MBA student teams in a business strategy simulation course at an international business school in Asia. The entire course work lasted for five days with three and a half consecutive days' simulation game and one and a half days' discussion and reflection. Sixty-

six teams were composed of 310 executives from a wide variety of companies and functional backgrounds. Their average age was 40.5 years old, with 16.9 years of work experience and 12.2 years of management experience. The team size ranged from 4 to 5 members.

Research Context

Teams participated in a computer-simulated strategic management business game called "Business Strategy Game" (the Game hereafter), developed by Thompson and Stapenbeck (2008). The Game consisted of 6 rounds, representing 6 consecutive fiscal years. Each round lasted for 150 minutes. The whole game lasted for three and a half days.

The task was for each team to operate a company in an athletic footwear industry, selling sneakers in a global market and competing against each other for survival and success. It involved coordination of multiple business functions such as marketing, finance, human resource, supply chain, and manufacturing. Teams had autonomy in time management, decision making, and division of labor. Each team member took one of the executive roles such as CEO, CFO, COO, and CMO. They had freedom to decide and alter those roles throughout the simulation and to enact them whenever needed.

All teams started with the same initial conditions (e.g., stock price, inventory, manufacturing capability, labor) at round 1. At the end of each round, teams were given team-level performance score and ranking, which were generated by the Game by using a balanced scorecard approach based on six simulated indices: revenue, earnings per share, return on investment, bond rating, market value, and strategy rating. The performance was highly competitive between teams. To perform well, team members must assess and forecast market conditions, evaluate their marketing positions, make financial and operational decisions, and

react to competitors' movements. Therefore, they needed to intensively coordinate their responsibilities and skills across different functions.

We repeatedly collected data on shared leadership and team learning behaviors at three points during the simulation. Time 1 data were collected at the end of the first day after the first round. Time 2 data were collected at the end of the second day after the third round (midpoint). Time 3 data were collected in the middle of the third day before the beginning of the fifth round.

Measures

Shared leadership. We adopted Carson et al.'s (2007) network approach to measuring shared leadership, which has been shown in a meta-analysis to be more predictive than alternative measures (Nicolaides et al., 2014). Team members rated every member on the following question: "To what degree does your team rely on this individual for leadership during team discussion and interaction?" (*0 = not at all*, *10 = to a very great extent*). The density of the network was used to measure shared leadership. Density is "the number of direct actual connections divided by the number of possible direct connections in a network" (Kadushin, 2012, p. 29). It indicates the total amount of leadership in a team, and is maximized when all the team members are rating all the others as leaders.

In our study, shared leadership was calculated by the equation:

$$D = \frac{\sum_{i=1}^{N}\sum_{j=1}^{N} w\alpha_{ij}}{N(N-1)}$$

where α_{ij} is tie that a team member *i* was nominated by other team member *j*; *w* is the weight of leadership influence; *N* is the team size. Within-team agreement on leadership influence was sufficient to aggregate these data to the team level ($M = 9.74$, $SD = 1.05$, $r_{wg} = 0.76$). Within-team agreement at each time could be found in Table 1.

[Insert Table 1 here]

Network churn. Network churn is an indicator of network change and stability. Following Sasovova, et al (2010)'s method, we used the volume of ties added or dropped over time to measure network churn. First, we dichotomized ties based on the scale midpoint of 5. At each time period, value larger than 5 indicates a tie between two individuals, while other value indicates no tie. Next, we measured network churn by counting *new leadership ties,* defined as ties that existed at T_i but not at T_{i-1} and *lost leadership ties,* defined as ties that existed at T_{i-1} but not at T_i. We also created a dichotomous variable that indicated whether teams had no change in their leadership structures, defined as new leadership ties = 0 and lost leadership ties = 0 for a given time period (i.e., *stable leadership structure*; *1= stable, 0 = change*). Examples of network churn are shown in Figure 1.

[Insert Figure 1 here]

Team learning behaviors. Team learning behaviors were measured by the mean score of three items adapted from van der Vegt and Bunderson (2005), which were translated into Chinese ("Our team criticizes each other's work in order to improve performance," "our team freely challenges the assumptions underlying each other's ideas and perspectives," and "our team engages in evaluating their weak points in attaining effectiveness.") (*0 = extremely disagree, 10 = extremely agree*). The fourth item, "our team utilizes different opinions for the sake of obtaining optimal outcomes," was deleted because it significantly decreased the internal reliability of the scale. Within-team agreement on team learning behaviors was sufficient to aggregate these data to the team level (M = 6.28, SD = 1.54, r_{wg} = 0.75). Within-team agreement at each time could be found in Table 1.

Time. Time was coded as dummy variables for Time 1, 2 and 3.

Control variables. *Size* was measured by the number of team members in a team. Teams were a part of five different classes; we controlled for the effect of being part of different *classes* using dummy variables for each class. Because classes were not significant and did not affect the patterns of results presented here, we excluded them from the models below.

Analytic strategy. For analyses across all three time periods, we used the generalized estimating equations (GEE) model which allows for correlation in the repeatedly measured dependent variables across time by estimating the correlation structure of the error terms (Ballinger, 2004). We chose the GEE model because the repeated measurement of the dependent variable (i.e., team learning behaviors) were nested within teams, making these measures non-independent and violating the assumptions of regression-based analyses. Further, alternative approaches, such as repeated measures ANOVAs, cannot be used when predictors (i.e., shared leadership) also vary over time (Ballinger, 2004). The unit of analysis for GEE models is team-time (e.g., Team 1, Time 1; Team 1, Time 2, etc.).

GEE model is based on a quasi-likelihood function and includes two steps: (1) by assuming independence between team learning behaviors within and across teams, it fits a naïve linear regression, and (2) it estimates parameters of the working correlation matrix using residuals in the naïve linear regression model and refit a regression model to adjust standard error and confidence interval for within-team dependence (Wedderburn, 1974; Twisk, 2003). Following Ballinger's (2004) suggestions, we defined the correlation structure as autoregressive, which models team learning behaviors closer in time as more highly correlated, and used an identity link function and the Gaussian link family. We used an autoregressive with lag-one structure, which is most likely to be correct considering the repeated measures over time. This

choice was confirmed by the Wooldridge test for autocorrelation in panel data ($p < .05$) (Wooldridge, 2010).

Results

How Do Shared Leadership and Team Learning Behaviors Influence Each Other over Time?

To investigate our first research question, we analyzed the overall relationship between shared leadership and team learning behaviors during the simulation. Table 2 shows the GEE coefficient estimates for these models.

[Insert Table 2 here]

Model 1 is the baseline model (i.e., controls only) testing for differences in the amount of team learning behaviors at different times. This analysis showed that teams engaged in less learning behaviors at Time 2 than at Time 1 (β =- 2.31, p <.000). Model 2 tests for a positive, linear relationship between shared leadership and team learning behavior across all time periods. This model did not show a significant relationship between shared leadership and team learning behaviors when all time periods were examined simultaneously.

Model 3 examines whether that relationship was moderated by time. We found that, indeed, there was a significant interaction between time and shared leadership, such that there was a weaker relationship at Time 2 than at Time 1 (β =- 0.60, p <.000). We also examined whether there was a curvilinear relationship at different times by using the squared term for shared leadership. Model 4 showed that the squared term was not significant overall, but, in Model 5, we found an interaction between Time 3 and shared leadership squared (β =- 0.38, p <.000). Goodness of fit indices (i.e., *QIC* and *QICC*) suggest that Model 5 fits the data best.

[Insert Figure 2 here]

Figure 2 depicts the effects of the interaction between time and shared leadership on team learning behaviors. To deconstruct this interaction, we conducted OLS regressions within each time period. As shown in Table 3, at Time 1, shared leadership was positively related to team learning behaviors ($\beta = 0.33$, $p < .01$). However, at Time 2, there was no significant relationship between the two. At Time 3, shared leadership and team learning behaviors showed an inverted U-shaped relationship ($\beta = -0.30$, $p < .05$), such that moderate levels of shared leadership were associated with the highest level of team learning behaviors, but, in contrast to Time 1, the highest levels of shared leadership were associated with lower levels of team learning behaviors.

[Insert Table 3 here]

How Does the Stability of the Network Structure of Shared Leadership Affect Team Learning Behaviors?

To address Research Question 2, we used network churn (Sasovova et al., 2010) as a measure of network change. From Time 1 to Time 2, we found that the majority of teams changed their leadership structure: 44 teams added new leadership ties ($M = 1.84$, $SD = 0.96$) or lost existing ones ($M = 2.33$, $SD = 1.44$), while the other 22 teams kept a stable structure (i.e., no changes). From Time 2 to Time 3, there was a similar pattern: 44 teams changed their leadership structure, adding ($M = 2.24$, $SD = 2.24$) or losing leadership ties ($M = 1.72$, $SD = 0.96$). The other 22 teams kept a stable structure. Over the course of the simulation, 11 teams kept a stable leadership structure from beginning to end, while 55 changed their shared leadership structure from Time 1 to Time 3.

We used these measures to examine whether change in leadership structure predicted team learning behaviors. As shown in Table 4, Model 2, teams with a stable leadership structure engaged in more learning behaviors than teams that changed their leadership structure ($\beta = 0.47$,

$p < .05$). As shown in Model 3, the interaction between time and stability is not significant, suggesting that this effect does not vary over time. In Models 4 and 5, we examined the effects of new leadership ties and lost leadership ties independently. Although neither variable had an overall effect (Model 4), there was a significant interaction between time and lost leadership ties ($\beta = 0.26$, $p < .05$), such that lost leadership ties had a significant negative effect on team learning at Time 3 and the negative effect of lost leadership ties on team learning is larger at Time 3 than at Time 2 (Model 5). However, goodness of fit was not improved in Model 5. Therefore, these findings should be seen as provisional.

[Insert Table 4 here]

The Effect of Early Team Learning Behaviors on Stability of Shared Leadership Structure

Finally, we analyzed the extent to which team learning behaviors earlier in the task predicted stability in the shared leadership network later. We use binary logistic regression to test whether the amount of team learning behavior during Time 1 predicted maintaining a stable shared leadership network at later times. We found that teams engaging in more learning behaviors at Time 1 were more likely to keep their shared leadership structures stable throughout the entire simulation ($\beta = -.85$, $p = .05$). As detailed above, the stable leadership structures were associated with increased team learning at Times 2 and 3. Thus, team learning early in the task was associated with stable leadership structures later in the task, which were associated with subsequent team learning behaviors.

Discussion

This study addressed two exploratory research questions: 1) How do shared leadership and team learning behaviors influence each other over time? and 2) How does the stability of the shared leadership network structure impact team learning behaviors? In analyzing the

relationship between shared leadership and team learning behaviors over time, this study showed a dynamic, reciprocal relationship between shared leadership and team learning behaviors in self-managed teams over the course of a task. These findings suggest that the relationship between shared leadership and team learning behaviors is more complex than previously theorized.

Our findings can elaborate theory in several ways. First, we propose that shared leadership and team learning behaviors have a positive, linear association only at the beginning of a new task, but that association weakens as the task progresses. We found that, at the beginning of a new task, shared leadership had a positive, linear relationship with team learning behaviors, a result consistent with previous research (e.g., Liu, et al., 2014). However, around the midpoint, there was no significant relationship and, near the end of the task, there was a curvilinear relationship. Consistent with prior research, these results suggest that low levels of shared leadership inhibit team learning behaviors. However, later in a task, sharing leadership may have diminishing returns (Nicolaides, et al., 2014), with the positive effects of high levels of shared leadership waning.

Sharing leadership early in the task may be beneficial for teams for several reasons. First, consistent with the task dynamics perspective (Kozlowski, et al., 2009), new teams working on new tasks have stronger demands for learning behaviors than they do later in their work: members need to orient to themselves to the task and to each other (Kozlowski & Bell, 2008). When engaged in these activities, shared leadership may be especially valuable, in that it facilitates the development of shared mental models and intragroup trust (e.g., Boies, Lvina, & Martens, 2010), which promote learning behaviors. Further, after completing several task cycles, teams develop habitual routines, making them more resistant to change (Gersick & Hackman,

1990) and, thus, less likely to engage in learning behaviors. However, teams also tend to adopt relatively stable roles early in their work together (Bettenhausen & Murnighan, 1991; Ericksen & Dyer, 2004), suggesting that shared leadership could remain constant over time, while learning behaviors decline from their high levels early in the task. These findings therefore do not support the notion that shared leadership would promote more learning near the ends of tasks. Indeed, while members may be more ready to learn at the end of a task cycle (Hackman & Wageman, 2005; Raes, et al, 2015), the promotive effects of shared leadership were weaker at these times.

Second, we asked the extent to which the stability of shared leadership network structure influenced team learning behaviors. Although shared leadership has been theorized to allow different members to exhibit leadership as situational demands change (e.g., Pearce & Manz, 2005), we found that change in shared leadership structure was associated with lower levels of team learning behaviors, and that dropping leadership ties toward the end of the task was particularly harmful. Our interpretation is that stable leadership structure can help team members to clarify their roles, reducing the uncertainty associated with frequent changes of leader/follower roles and the ambiguity about the changing responsibilities for the task (e.g., Valentine & Edmondson, 2014). Reducing uncertainty and ambiguity allows team members to better predict the behavior of other team members, which reduces stress and improves coordination, thus promoting more effective team learning behaviors.

These findings about the stability of shared leadership networks and team learning contribute to the literature in two ways. First, it brings a conceptualization and operationalization of network churn to the team level; this approach may be fruitful to studying changes in other intra-team network constructs, such as shared mental models, intra-team friendship, or communication patterns. Second, it lends credence to the benefits of stability (and the costs of

change) in self-managing teams (Hackman, 2002). Although teams can adjust their processes as they work (e.g., Fisher, 2017), they may have more difficulty shifting roles and responsibilities, which can disrupt existing routines and communication patterns. Indeed, it is possible that teams alter their shared leadership networks more readily when they perceive that leadership is too diffuse or concentrated, creating stress for members and taking their attention away from other potential areas of change.

Elaborating Theory on Shared Leadership and Team Learning Behaviors

Integrating across our two research questions, these findings suggest a reciprocal relationship between team learning behaviors and shared leadership, which leads to several propositions about how the relationship between shared leadership and team learning behaviors emerges and changes over time. At the early stages of a new task, shared leadership promotes the communication and psychological safety necessary to engage in learning behaviors, creating a positive linear relationship between the two. By engaging in learning behaviors, the team develops a robust understanding of both the task and member strengths and weaknesses (e.g., Kozlowski & Bell, 2008). This robust understanding promotes the stability of the shared leadership network because the team is more likely to allocate leadership functions to members in ways that align well with task demands and member interests and skills. In contrast, teams that have engaged in fewer learning behaviors are likely to share leadership based on a more impoverished understanding of the task and each other, forcing them to revise that structure in the future. Teams with a stable leadership structure will then be able to better coordinate their actions because they have a clear, shared sense of who knows what (i.e., transactive memory system, Lewis, 2003) and who is responsible for which leadership functions. This should reduce stress on members, increasing psychological safety and work-based trust. These will make future

learning behaviors more likely, and further reinforce the stability of the shared leadership network.

These propositions expand prior theory on shared leadership, which was focused on the antecedents (e.g., Carson et al., 2007) and consequences (e.g., Nicolaides et al., 2014) of shared leadership. This paper elaborates these assertions by focusing on the changing relationship between shared leadership and team learning over time. In exploring development over time, we propose that the relationship between shared leadership and team learning behaviors changes at different stages of a task, and that teams with stable shared leadership structure are more likely to learn later. These assertions are consistent with prior research showing that the effects of shared leadership wane as team tenure increases (Nicolaides, et al., 2014), yet also emphasize the critical role that beginnings play in team development (e.g., Wageman, et al., 2009).

Limitations and Future Directions

This study had several limitations, which suggest directions for future research. First, our exploratory approach to the quantitative analyses means that these findings should not be regarded as a test of the propositions above. Instead, these analyses were a means to elaborating theory when existing research did not yield clear predictions (Bamberger & Ang, 2016). The correlational research design and exploratory analyses suggest that future experimental research manipulating shared leadership may be necessary to test causality.

Second, the self-reported measure of team learning behaviors may not capture the full range of team learning. Following van der Vegt and Bunderson's (2005) measure of team learning behaviors, we focused on aspects of team learning that involve discussing mistakes, disagreement, and offering feedback. However, other kinds of learning behaviors, such as feedback-seeking and reflection (e.g., Schippers, Den Hartog, & Koopman, 2007) might yield

different results. Further, self-reports of learning behaviors may omit tacit or non-conscious learning behaviors. Using alternative team learning approaches, such as video coding, is thus a promising direction for future research.

Similar issues occur with the network measure of shared leadership. Although the network measure of shared leadership has been shown to be more predictive than alternative approaches (Nicolaides et al., 2014), such measures rely on perceptions of "leadership," rather than unpacking the observed behaviors underlying them (van Knippenberg & Sitkin, 2013). It may be that team members perceive some learning behaviors as indicators of leadership. If this were true, these constructs would not be totally independent. Because shared leadership is a socially constructed and occurs through members claiming-granting leadership attributions (e.g., Carson et al, 2007; DeRue & Ashford, 2010), members' perceptions are the main way to assess shared leadership. However, further research that investigates the particular behaviors that are associated with attributions of leadership are necessary to further refine the constructs and measures.

Third, time frames (short and long term) can influence team dynamics and social network development, and provide different meanings for team members to engage in interaction and coordination (Quintane, et al, 2013). Our study was conducted within three and a half days. Some team dynamics may be still relatively early in such a compressed time window. The current results are best interpreted by the round of the game, or the stages of a task, rather than the developmental stages of teams. For example, some teams may need more rounds to develop their norms than others. Future research should investigate an extended time window to further explore the dynamics between shared leadership and team learning behaviors.

Beyond these methodological improvements, studies of shared leadership and team learning should investigate whether these proposed relationships hold across a wide variety of tasks and contexts. Although the competitive environment was dynamic in our study, the task was consistent in its demands and each round required similar behaviors. More fluidity in shard leadership might be necessary when task demands change more rapidly. Thus, future research should investigate different kinds of tasks and contexts in which task demands, especially demands for expertise, change rapidly (e.g., creative teams, start-up management teams, crisis management teams). This study also did not measure variables mediating the relationship between learning behaviors and leadership structure stability. Future research should measure or manipulate potential mediating variables, such as psychological safety, coordination, and shared mental models. Future research should also measure characteristics of teams beyond team size, such as gender composition.

Practical Implications and Conclusion

This study also has several practical implications. Early in the task, self-managed teams should strive to share leadership broadly, which should facilitate learning behaviors that allow them to refine specific way in which they share it. Further, teams should try to keep stable the shared leadership network structure that they initially put in place, and be aware of the potential coordination costs of changing who provides leadership in the team. Although sharing leadership broadly among members is effective early in the task, team members should be cautious about sharing leadership too broadly late in the task, as this may inhibit learning behaviors.

In sum, this study presents a dynamic view of shared leadership and team learning behaviors over time, wherein sharing leadership early in the task promotes team learning behaviors. Such early learning increases the chances of maintaining a stable leadership network,

which engenders subsequent learning. By examining shared leadership over time, this research answers calls for temporally-oriented studies of teams (Humphrey & Aime, 2014) and team leadership (Kozlowski et al., 2016). In combining network and longitudinal methods, this study lays the foundation for continuing to unpack these and other approaches to studying social structure in teams, and help scholars and practitioners better understand the balance between flexibility and stability in group dynamics.

References

Argote, L., Gruenfeld, D., & Naquin, C. (2001). Group learning in organizations. In M. E. Turner (Eds.), *Groups at work: theory and research* (pp. 369-411). New York: Routledge.

Arrow, H., Poole, M., S., Henry, K., B., Wheelan, S., & Moreland, R. (2004). Time, change, and development: The temporal perspective on groups. *Small Group Research*, *35*(1), 73–105. doi: 10.1177/1046496403259757.

Ballinger, G. A. (2004). Using generalized estimating equations for longitudinal data analysis. *Organizational Research Methods*, *7*(2), 127-150. doi: 10.1177/1094428104263672.

Bamberger, P., & Ang, S. (2016). The quantitative discovery: What is it and How to get it published. *Academy of Management Discoveries*, *2*(1), 1-6. doi: 10.5465/amd.2015.0060.

Berger, J., & Webster Jr, M. (2006). Expectations, status, and behavior. In P. J. Burke (Eds.), *Contemporary social psychological theories* (pp. 268-300). Stanford, CA: Stanford University Press.

Bergman, J. Z., Rentsch, J. R., Small, E. E., Davenport, S. W., & Bergman, S. M. (2012). The shared leadership process in decision-making teams. *Journal of Social Psychology, 152*(1), 17-42. doi: 10.1080/00224545.2010.538763.

Bettenhausen, K. L., & Murnighan, J. K. (1991). The development of an intragroup norm and the effects of interpersonal and structural challenges. *Administrative Science Quarterly*, *36*(1), 20-35. doi: 10.2307/2393428.

Boies, K., Lvina, E., & Martens, M. L. (2010). Shared leadership and team performance in a business strategy simulation. *Journal of Personnel Psychology, 9*(4), 195-202. doi: 10.1027/1866-5888/a000021.

Bunderson, J. S., & Reagans, R. E. (2011). Power, status, and learning in organizations. *Organization Science, 22*(5), 1182-1194. doi: 10.1287/orsc.1100.0590.

Carson, J. B., Tesluk, P. E., & Marrone, J. A. (2007). Shared leadership in teams: An investigation of antecedent conditions and performance. *Academy of Management Journal, 50*(5), 1217-1234. doi: 10.1109/EMR.2016.7559064.

Cohen, S. G., & Bailey, D. E. (1997). What makes teams work: Group effectiveness research from the shop floor to the executive suite. *Journal of Management*, *23*(3), 239–290. https://doi.org/10.1016/S0149-2063(97)90034-9

Day, D. V., Gronn, P., & Salas, E. (2004). Leadership capacity in teams. *The Leadership Quarterly*, *15*(6), 857-880. doi: 10.1016/j.leaqua.2004.09.001.

DeRue, D. S., & Ashford, S. J. (2010). Who will lead and who will follow? A social process of leadership identity construction in organizations. *Academy of Management Review*, *35*(4), 627-647. doi: 10.5465/AMR.2010.53503267.

Drescher, M. A., Korsgaard, M. A., Welpe, I. M., Picot, A., & Wigand, R. T. (2014). The dynamics of shared leadership: Building trust and enhancing performance. *Journal of Applied Psychology*, *99*(5), 771-783. doi: 10.1037/a0036474.

Edmondson, A. (1999). Psychological safety and learning behavior in work teams. *Administrative science quarterly*, *44*(2), 350-383. doi: 10.2307/2666999.

Edmondson, A. C., Bohmer, R. M., & Pisano, G. P. (2001). Disrupted routines: Team learning and new technology implementation in hospitals. *Administrative Science Quarterly, 46*(4), 685-716. doi: 10.2307/3094828.

Ericksen, J., & Dyer, L. (2004). Right from the start: Exploring the effects of early team events on subsequent project team development and performance. *Administrative Science Quarterly*, *49*(3), 438-471. doi: 10.2307/4131442.

Fisher, C. M. (in press). An ounce of prevention or a pound of cure? Two experiments on in-process interventions in decision-making groups. *Organizational Behavior and Human Decision Processes*.

Gersick, C. J., & Hackman, J. R. (1990). Habitual routines in task-performing groups. *Organizational Behavior and Human Decision Processes*, *47*(1), 65-97. doi: 10.1016/0749-5978(90)90047-D.

Hackman, J.R. (2002). *Leading teams: Creating conditions for great performances*. Boston: Harvard Business School Press.

Hackman, J. R., & Wageman, R. (2005). A theory of team coaching. *Academy of Management Review*, *30*(2), 269-287. doi: 0.5465/AMR.2005.16387885.

Humphrey, S. E., & Aime, F. (2014). Team microdynamics: toward an organizing approach to teamwork. *The Academy of Management Annals*, *8*(1), 443–503. doi: 10.1080/19416520.2014.904140.

Kadushin, C. (2012). *Understanding social networks: Theories, concepts, and findings*. New York: Oxford University Press.

Kozlowski, S. W., & Bell, B. S. (2008). Team learning, development, and adaptation. In V. I. Sessa, & M. London (Eds.), *Work group learning: Understanding, improving & assessing how groups learn in organizations* (pp. 15-44), New York: Lawrence Erlbaum Associates.

Kozlowski, S.W., 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 performance: implications for staffing, motivation, and development. Frontiers of industrial and organizational psychology* (pp. 240–292). San Fransisco, CA: Jossey-Bass

Kozlowski, S. W. J., Mak, S., & Chao, G. T. (2016). Team-centric leadership: an integrative review. *Annual Review of Organizational Psychology and Organizational Behavior*, *3*(1), 21–54. doi: 10.1146/annurev-orgpsych-041015-062429.

Kozlowski, S. W. J., Watola, D. J., Nowakowski, J. M., Kim, B. H., & Botero, I. C. (2009). Developing adaptive teams: A theory of dynamic team leadership. In E. Salas, G. F. Goodwin, & C. S. Burke (Eds.), *Team effectiveness in complex organizations: Cross-disciplinary perspectives and approaches* (SIOP Frontiers Series). Mahwah, NJ: LEA.

Lewis, K. (2003). Measuring Transactive Memory Systems in the Field: Scale Development and Validation. *Journal of Applied Psychology*, *88*(4), 587–604. doi: 10.1037/0021-9010.88.4.587.

Liu, S., Hu, J., Li, Y., Wang, Z., & Lin, X. (2014). Examining the cross-level relationship between shared leadership and learning in teams: Evidence from China. *Leadership Quarterly, 25*(2), 282-295. doi: 10.1016/j.leaqua.2013.08.006.

London, M., & Sessa, V. I. (2007). The development of group interaction patterns: How groups become adaptive, generative, and transformative learners. *Human Resource Development Review*, *6*(4). doi: 353-376. 10.1177/1534484307307549.

Marks, M. A., Mathieu, J. E., & Zaccaro, S. J. (2001). A temporally based framework and taxonomy of team processes. *Academy of Management Review*, *26*(3), 356-376. doi: 10.2307/259182.

Mehra, A., Smith, B. R., Dixon, A. L., & Robertson, B. (2006). Distributed leadership in teams: The network of leadership perceptions and team performance. *The Leadership Quarterly*, *17*(3), 232–245. doi: 10.1016/j.leaqua.2006.02.003

Morgeson, F. P., DeRue, D. S., & Karam, E. P. (2010). Leadership in teams: A functional approach to understanding leadership structures and processes. *Journal of Management*, *36*(1), 5-39. doi: 10.1177/0149206309347376.

Nicolaides, V. C., LaPort, K. A., Chen, T. R., Tomassetti, A. J., Weis, E. J., Zaccaro, S. J., & Cortina, J. M. (2014). The shared leadership of teams: A meta-analysis of proximal, distal, and moderating relationships. *The Leadership Quarterly*, *25*(5), 923-942. doi: 10.1016/j.leaqua.2014.06.006.

Pearce, C. L., & Conger, J. A. (2003). *Shared leadership: Reframing the hows and whys of leadership*. Thousand Oaks, CA: Sage Publications.

Pearce, C. L., & Manz, C. C. (2005). The new silver bullets of leadership: The importance of self-and shared leadership in knowledge work. *Organizational Dynamics*, *34*(2), 130-140. doi: 10.1016/j.orgdyn.2005.03.003.

Quintane, E., Pattison, P. E., Robins, G. L., & Mol, J. M. (2013). Short-and long-term stability in organizational networks: Temporal structures of project teams. *Social Networks*, *35*(4), 528-540. doi: 10.1016/j.socnet.2013.07.001.

Raes, E., Kyndt, E., Decuyper, S., van den Bossche, P., & Dochy, F. (2015). An exploratory study of group development and team learning. *Human Resource Development Quarterly*. *26*(1). 5-30. doi: 10.1002/hrdq.21201.

Sasovova, Z., Mehra, A., Borgatti, S. P., & Schippers, M. C. (2010). Network churn: The effects of self-monitoring personality on brokerage dynamics. *Administrative Science Quarterly*, *55*(4), 639-670. doi: 10.2189/asqu.2010.55.4.639.

Schippers, M. C., Den Hartog, D. N., & Koopman, P. L. (2007). Reflexivity in Teams: A Measure and Correlates. *Applied Psychology*, *56*(2), 189–211. https://doi.org/10.1111/j.1464-0597.2006.00250.x

Schippers, M. C., Homan, A. C., & van Knippenberg, D. (2013). To reflect or not to reflect: Prior team performance as a boundary condition of the effects of reflexivity on learning and final team performance. *Journal of Organizational Behavior*, *34*(1), 6-23. doi: 10.1002/job.1784.

Thompson, A. A., & Stappenbeck, G. J. (2008). The Business Strategy Game. Chicago, IL: Irwin.

Twisk, J.W.R. (2003). Applied longitudinal data analysis for epidemiology: a practical guide. Cambridge, UK: Cambridge University Press

Valentine, M. A., & Edmondson, A. C. (2014). Team scaffolds: How mesolevel structures enable role-based coordination in temporary groups. *Organization Science*, *26*(2), 405-422. doi: 10.1287/orsc.2014.0947.

van der Vegt, G. S., & Bunderson, J. S. (2005). Learning and performance in multidisciplinary teams: The importance of collective team identification. *Academy of Management Journal, 48*(3), 532-547. doi:10.5465/AMJ.2005.17407918.

Van Knippenberg, D., & Sitkin, S. B. (2013). A Critical Assessment of Charismatic—Transformational Leadership Research: Back to the Drawing Board? *The Academy of Management Annals, 7*(1), 1–60. https://doi.org/10.1080/19416520.2013.759433

Wageman, R., & Fisher, C. (2014). Who's in charge here? The team leadership implications of authority. In D. Day (Eds,). *The Oxford Handbook of Leadership and Organizations* (pp. 455-481), New York: Oxford University Press.

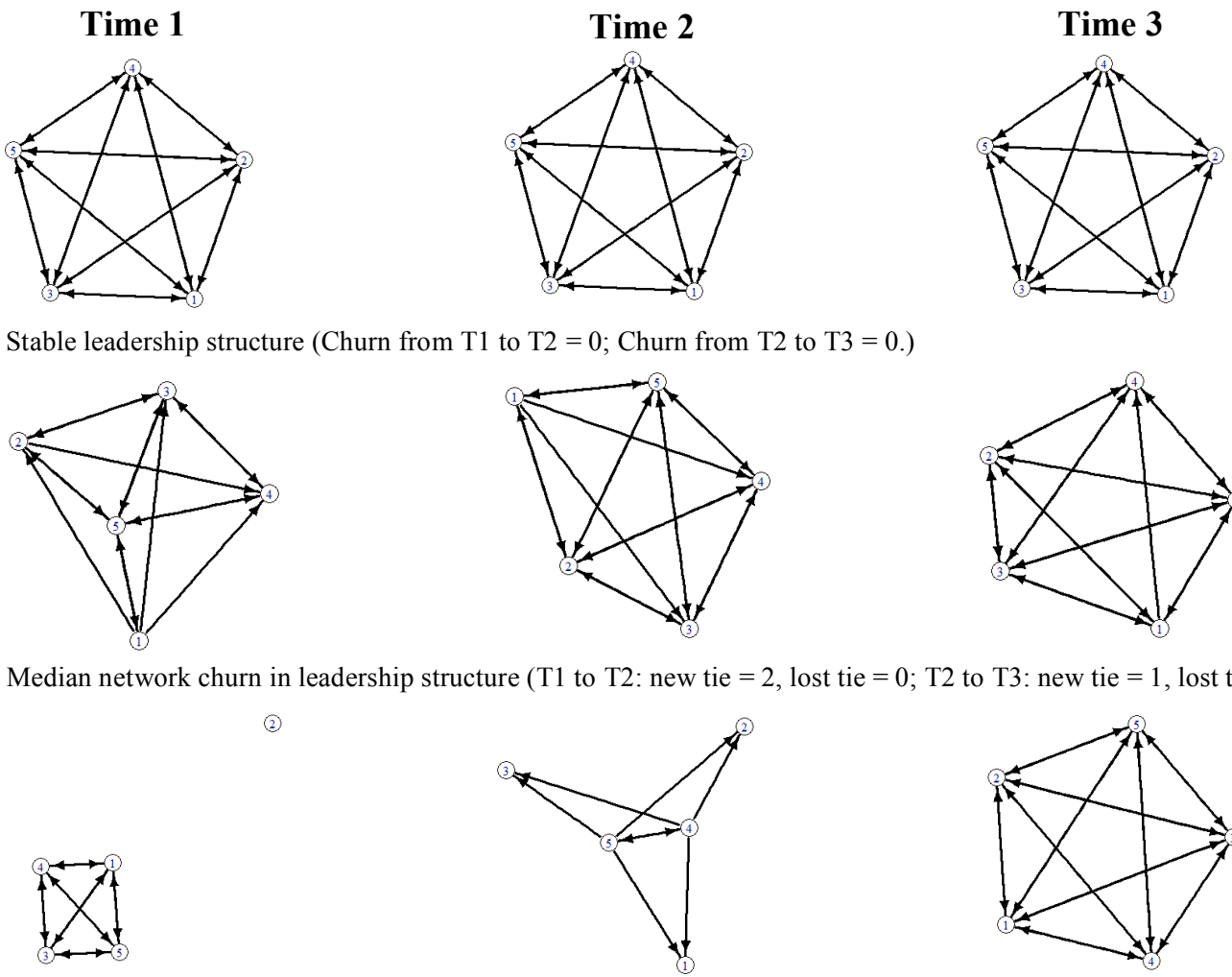
Wageman, R., Fisher, C. M., & Hackman, J. R. (2009). Leading teams when the time is right: Finding the best moments to act. *Organizational Dynamics*, *38*(3), 192-203. doi:10.1016/j.orgdyn.2009.04.004.

Wedderburn, R. W. (1974). Quasi-likelihood functions, generalized linear models, and the Gauss-Newton method. *Biometrika*, 61, 439–447. doi: 10.1093/biomet/61.3.439.

Wilson, J. M., Goodman, P. S., & Cronin, M. A. (2007). Group learning. *Academy of Management Review, 32*(4), 1041-1059. doi:10.5465/AMR.2007.26585724.

Wooldridge, J. M. (2010). *Econometric analysis of cross section and panel data*. Cambridge, MA: MIT Press.

Figure 1 Shared leadership structures and network churn



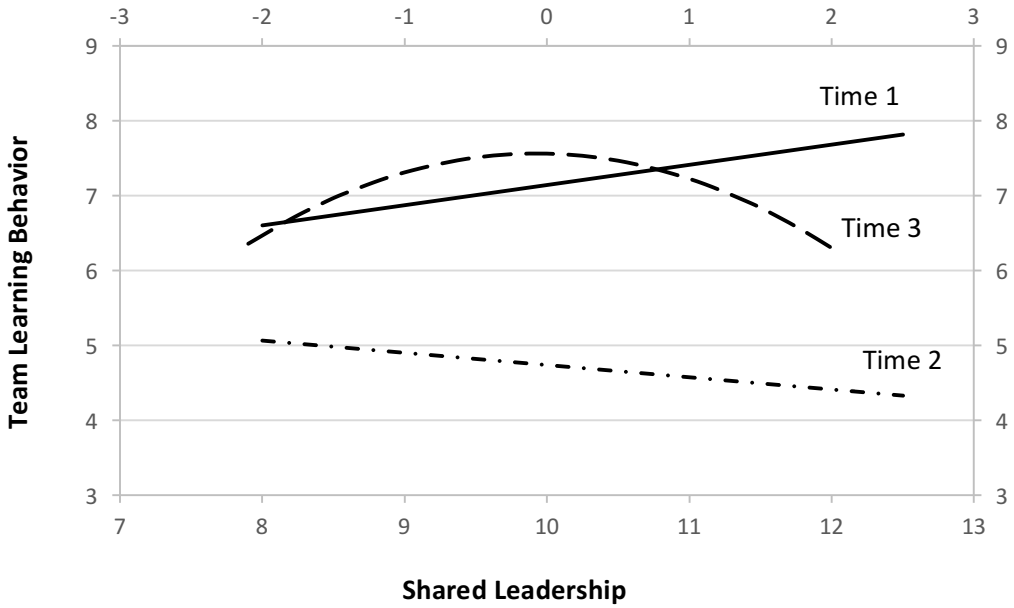
Team 15: Stable leadership structure (Churn from T1 to T2 = 0; Churn from T2 to T3 = 0.)

Team 29: Median network churn in leadership structure (T1 to T2: new tie = 2, lost tie = 0; T2 to T3: new tie = 1, lost tie = 0.)

Team 60: Highly dynamic leadership structure (T1 to T2: new tie = 2, lost tie = 6; T2 to T3: new tie = 12, lost tie = 0.)

Notes: The circles represented team members. Lines were leadership relations. An arrow pointing from one member ① to another ② meant that ② was perceived as a source of leadership by ①.

Figure 2 Shared leadership and team learning behavior at different times



Note: Because the squared term of shared leadership is centered while other variables are not centered, the X axis below is the scale for shared leadership at Time 1 and Time 2, and the X axis above is the scale for shared leadership at Time 3.

Table 1 Descriptive Analysis of Variables

Variables	Time	*Mean*	*SD*	*N*	α	r_{wg}	1	2	3	4
1. Shared leadership	1	9.65	1.25	65		0.75				
	2	9.90	0.92	66		0.77				
	3	9.67	0.94	66		0.76				
	Overall	9.74	1.05	197		0.76				
2. Team learning behavior	1	7.08	1.11	65	0.86	0.78				
	2	4.81	1.27	66	0.83	0.73				
	3	6.96	1.02	66	0.74	0.75				
	Overall	6.24	1.55	197		0.75	-0.03			
3. New leadership ties	1 to 2	1.03	1.16	66 [a]						
	2 to 3	0.85	1.75	66						
	Overall	0.94	1.48	132			-0.15	-0.08		
4. Lost leadership ties	1 to 2	0.83	1.09	66						
	2 to 3	0.85	1.42	66						
	Overall	0.84	1.26	132			-0.59***	0.01	-0.04	
5. Stability of leadership structure	1 to 2	0	0	22						
	2 to 3	0	0	22						
6. Size	1	4.52	0.50	64						
	2	4.50	0.50	63						
	3	4.56	0.50	64			-0.26***	0.07	0.19*	0.17
	Overall	4.53	0.50	191						

Notes:

a. The teams include those who didn't add leadership ties. Same for the variable lost leadership ties.

*p<.05, *** p<.001

Table 2: GEE Model Estimating Team Learning Behaviors

	Dependent Variable: Team Learning Behaviors									
	Model 1		Model 2		Model 3		Model 4		Model 5	
Independent Variables	**Coeff**	**SE** [a]	**Coeff**	**SE**	**Coeff**	**SE**	**Coeff**	**SE**	**Coeff**	**SE**
Intercept	6.53***	0.83	5.14***	1.40	3.44*	0.90	5.81**	1.84	2.22	1.73
Size	0.12	0.18	0.18	0.18	0.16	0.18	0.13	0.20	0.18	0.20
Time [b]										
Time 2	-2.31***	0.20	-2.34***	0.20	3.51	1.61	-2.36***	0.21	4.39*	1.72
Time 3	-0.08	0.18	-0.10	0.17	1.95	1.61	-0.11	0.18	3.29	1.45
Shared Leadership			0.11	0.09	0.30**	0.10	0.08	0.12	0.41**	0.11
*Time * Shared Leadership*										
Time 2 * Shared Leadership					-0.60**	0.19			-0.67***	0.18
Time 3 * Shared Leadership					-0.21	0.17			-0.32*	0.15
Shared Leadership squared							-0.05	0.06	0.10*	0.05
*Time * Shared Leadership squared*										
Time 2 * Shared Leadership squared									-0.27	0.17
Time 3 * Shared Leadership squared									-0.38***	0.10
Model Statistics										
QIC	251.904		252.197		246.348		252.952		238.786	
QICC	251.490		251.416		246.331		251.650		241.073	

Notes:

a. Standard errors are robust standard errors

b. Time 1 was omitted as a reference group

n = 197 observations, 66 teams;

*p<.05, ** p<.01, *** p<.00

Table 3: OLS Model Estimating Team Learning Behaviors

	Dependent Variable: Team Learning Behaviors					
	Time 1		Time 2		Time 3	
	Model 1		Model 2		Model 3	
Independent Variables	**Coeff**	**SE**	**Coeff**	**SE**	**Coeff**	**SE**
Intercept	2.34	1.76	8.72**	2.80	5.74**	2.16
Size	0.34	0.27	-0.24	0.34	0.25	0.27
Shared Leadership	0.33**	0.11	-0.30	0.20	0.03	0.14
Shared Leadership Squared [a]					-0.30*	0.11
Model Statistics						
R^2	0.132		0.037		0.135	
Number of Groups	64		64		65	

Note

a. All the squared terms for lagged effects are not significant and are not reported here.

*p<.05, ** p<.01

Table 4: GEE Model Estimating Team Learning Behaviors

	Dependent Variable: Team Learning Behaviors									
	Model 1		Model 2		Model 3		Model 4		Model 5	
Independent Variables	**Coeff**	**SE** [a]	**Coeff**	**SE**	**Coeff**	**SE**	**Coeff**	**SE**	**Coeff**	**SE**
Intercept	7.07***	0.86	6.64***	0.89	6.61***	0.88	7.00***	0.87	7.09***	0.80
Size	-0.02	0.18	0.04	0.19	0.03	0.18	0.01	0.19	0.01	0.17
Time [b]	-2.22***	0.14	-2.21***	0.13	-2.10***	0.16	-2.21***	0.14	-2.30***	0.18
Stable Leadership Structure [c]			0.47*	0.21	0.65**	0.24				
Time * Stable Leadership Structure					-0.36	0.25				
New Leadership Ties [d]							-0.04	0.05	0.03	0.05
Lost Leadership Ties							-0.04	0.08	-0.19*	0.09
Time * New Leadership Ties									-0.14	0.12
Time * Lost Leadership Ties									0.26*	0.13
Model Statistics										
QIC	173.173		175.728		176.441		175.667		176.525	
QICC	173.438		176.253		178.391		176.942		179.500	

Notes:

a. Standard errors are robust standard errors
b. Time 2 = 1, Time 3 = 0.
c. Stable leadership structure = 1, leadership structure with ties change (new/lost) = 0
d. New/lost leadership ties includes 0 (stable leadership structure)

n = 128 observations, n = 66 teams

*p<.05, ** p<.01, *** p<.00

Bio:

Lan Wang is a PhD candidate in Organizational Behavior at Questrom School of Business, Boston University. Her research investigates learning and social network effect in team management, talent management, and career development.

Dr. Jian Han is Associate Professor of Management and Co-Director of the Centre on China Innovation at CEIBS. Her research and teaching interests mainly focus on strategic human resource management, team management, and incentives.

Colin M. Fisher is an Assistant Professor of Organizational Behavior at University College London. His research deals with collaboration and temporal dynamics (i.e., timing, rhythm, development over time) in three areas: (1) leading, helping, and coaching teams, (2) collective creativity and improvisation, and (3) group decision-making and negotiations.

Yan Pan is a senior research assistant at China Europe International Business School. Her work involves shared leadership and group dynamics.