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## **The Dynamics of Shared Leadership: Building Trust and Enhancing Performance**

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# The Dynamics of Shared Leadership: Building Trust and Enhancing Performance

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In this study, we examined how the dynamics of shared leadership are related to group performance. We propose that, over time, the expansion of shared leadership within groups is related to growth in group trust. In turn, growth in group trust is related to performance improvement. Longitudinal data from 142 groups engaged in a strategic simulation game over a 4-month period provide support for positive changes in trust mediating the relationship between positive changes in shared leadership and positive changes in performance. Our findings contribute to the literature on shared leadership and group dynamics by demonstrating how the growth in shared leadership contributes to the emergence of trust and a positive performance trend over time.

*Keywords:* shared leadership, trust, performance, groups, change over time

Shared leadership, the notion that individuals within a group can share leadership functions, has gained traction among both scholars and practitioners (Contractor, DeChurch, Carson, Carter, & Keegan, 2012; Denis, Langley, & Sergi, 2012). Shared leadership represents a fundamental shift away from the concept of unity of command (Wren, Bedeian, & Breeze, 2002) to a dynamic and emergent process (Denis et al., 2012). Proponents of shared leadership argue that leaders serve multiple functions that do not need to be—and perhaps should not be—performed by one individual within the group or organization (Locke, 2003; Pearce & Conger, 2003). Theory suggests that shared leadership can be beneficial to performance, a proposition that has been supported by some empirical studies (e.g., Wang, Waldman, & Zhang, 2014).

Despite the potential importance of shared leadership for the functioning and effectiveness of groups and organizations, prior research is lacking in insight into the dynamics of shared leadership. While theory suggests that shared leadership is a dynamic process (Contractor et al., 2012; Pearce & Conger, 2003), research on the dynamics of shared leadership and its consequences is underdeveloped. Relationships involving shared leadership are often posited without consideration of its dynamic nature (Denis et al., 2012). Further, most studies have adopted a cross-sectional or static approach to examining the consequences of shared leadership (e.g., Carte, Chidambaram, & Becker, 2006; Sivasubramanian, Murry, Avolio, & Jung, 2002). Two notable exceptions were a qualitative study of medical trauma teams (Klein, Ziegert, Knight, & Xiao, 2006) and an experiment in which participants were assigned expertise or roles (Aime, Humphrey, DeRue, & Paul, 2013). These studies indicated that when shared leadership is practiced, different individuals at times act as leaders and at other times act as followers. These studies revealed the dynamic nature of individual members' leadership behavior, but they did not examine the development or emergence of shared leadership. Thus, insight into the how shared leadership changes within a group and its consequences is limited.

Examining shared leadership as a dynamic phenomenon is critical, because the sharing of leadership may change over time in any number of ways. There are stable structural arrangements such as formal roles (Klein et al., 2006) and policies (Shamir & Lapidot, 2003) that in some cases may foster a relatively stable level of shared leadership (Sivasubramanian et al., 2002). At the same time, theory and research suggest that the practice of shared leadership evolves over time (Contractor et al., 2012). For exam-

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ple, Burke, Fiore, and Salas (2003) proposed that the more that group members share mental models of the situation, the more they engage in shared leadership. Similarly, Klein et al. (2006) observed that medical trauma teams were apt to share active leadership when the task was less novel and when there were routines in place to address problems. Thus, over time, as groups develop shared knowledge and develop routines (Kozlowski & Chao, 2012), shared leadership is likely to increase. On the other hand, if the group experiences crises or adverse environmental demands, leadership responsibilities may be restricted or even decrease over time (Staw, Sandelands, & Dutton, 1981). Thus shared leadership may increase, stabilize, or decrease over time.

Greater attention to the dynamics of shared leadership may help address inconsistencies in past research. Some studies have shown that shared leadership is positively related to performance (e.g., Carson, Tesluk, & Marrone, 2007; Ensley, Hmieleski, & Pearce, 2006), while others have failed to demonstrate this relationship and still others have demonstrated a negative relationship (Hmieleski, Cole, & Baron, 2012; O'Toole, Galbraith, & Lawler, III, 2003). These inconsistencies with regard to the effects of shared leadership may be attributable to a static view of shared leadership. At a given time, a certain level of shared leadership may reflect an increase in sharing of leadership responsibilities within one group, whereas the same level of shared leadership in another group may reflect a decrease. Thus, the absolute level of shared leadership at a given time does not capture the dynamics of the phenomenon (Cronin, Weingart, & Todorova, 2011) and may produce discrepant results.

Further, a dynamic view of shared leadership may provide crucial insights into mechanisms by which shared leadership benefits group performance. If shared leadership evolves over time, then it may foster the development of social structures and processes that enable group effectiveness. Theory suggests that building trust among group members is one route through which changes in shared leadership may benefit performance (Bligh, Pearce, & Kohles, 2006; Wang et al., 2014). Trust refers to one party's willingness to accept vulnerability to another party in the absence of the ability to control or guarantee the other party's actions (Mayer, Davis, & Schoorman, 1995). Increases in shared leadership indicate that group members are willing to share influence and accept each other's influence (Aime et al., 2013), which provides opportunities to build trust (Bergman, Rentsch, Small, Davenport, & Bergman, 2012). Conversely, decreases in shared leadership involve a constriction of influence and control, reducing opportunities to build trust and possibly undermining trust. Trust, in turn, fosters cooperation necessary for collective action (Ferrin, Bligh, & Kohles, 2008). Thus, changes in trust are proposed to be a critical mechanism by which increases in shared leadership lead to increases in performance. However, this mediating mechanism has not been empirically examined in a dynamic model.

The main purpose of this research was to delineate a dynamic model of shared leadership and performance involving the relationship between positive changes in the degree of shared leadership, growth in trust, and performance improvement over time. Drawing on theory regarding the dynamics of emergence, group development (Kozlowski, Chao, Grand, Braun, & Kuljanin, 2013; McGrath, 1991; Morgan, Salas, & Glickman, 1993), and shared leadership dynamics (Aime et al., 2013), we proposed that shared leadership is an emergent property of groups that can either in-

crease or decrease through the groups' interactions and shared experiences. We maintain that when leadership increases over time such that key leadership functions are distributed among group members, individuals both exert influence on each other and are willing to accept each other's influence. Because these acts of mutual influence give group members opportunities to interact, exchange resources, and thereby build trust, increases in shared leadership should be associated with growth in group trust. In turn, group trust should foster higher levels of performance (De Jong & Dirks, 2012).

In addressing the aforementioned gaps, this study makes the following contributions: First, it builds on and integrates theory on the nature of the relationship between shared leadership and performance in a dynamic fashion. Second, it answers the need to examine explanatory mechanisms for the relationship between shared leadership and performance. In doing so, we seek to provide a more complete theoretical account of why shared leadership is beneficial to group effectiveness. In addition, we seek to provide greater precision and clarity to the nature and potential consequences of shared leadership.

### Shared Leadership Defined

The concept of shared leadership is based on the notion that leadership can be enacted by more than one member of the group (Morgeson, DeRue, & Karam, 2010). Pearce and Conger (2003, p. 1) described shared leadership as "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." As an influence process, shared leadership involves interacting with others within the group and is manifested in behaviors such as communicating, influencing, making suggestions, and holding people accountable (Aime et al., 2013). These influence behaviors are an informal means of addressing the core leadership functions typically addressed by formal leaders (Hoch & Kozlowski, 2012). As such, shared leadership involves distributing the functions of leadership among members (Burke et al., 2003; Contractor et al., 2012). Accordingly, we defined *shared leadership* as an emergent property of a group where leadership functions are distributed among group members.

Consistent with this definition and recent approaches to shared leadership (Hoch & Kozlowski, 2012), we focused on the sharing of leadership functions that are presumed to promote effective group processes and outcomes. There are a variety of functions that leaders perform within a group or organization (Klein et al., 2006; Locke, 2003; Morgeson et al., 2010). Four major functions commonly cited by leadership scholars are information search and structuring, information use in problem solving, managing personnel resources, and managing material resources (Burke et al., 2006; Fleishman et al., 1991). Information search and structuring involve the acquisition and evaluation of information and includes boundary spanning as the leader scans the external environment and translates this information to the group. Information use in problem solving involves identifying needs, formulating goals and plans, and communicating them to group members. This function involves setting goals, clarifying expectations, and guiding sense making (Kozlowski & Bell, 2003; Morgeson et al., 2010). Managing personnel resources includes leadership activities directed toward developing and motivating group members, including

coaching and empowering (Klein et al., 2006). Managing material resources entails obtaining, allocating, maintaining, utilizing, and monitoring material resources.

A common approach to conceptualizing shared leadership is to treat shared leadership as a group-level attribute and assess the extent to which traditional leadership behaviors are performed collectively by group members (e.g., Ensley et al., 2006; Hmieleski et al., 2012; Pearce & Sims, 2002). In contrast to this approach, an emphasis on the leadership functions does not assume that all group members act as leaders in the same way but that members of the group adopt various leadership functions (Hoch & Kozlowski, 2012). This is consistent with empirical research on dynamic leadership, which suggests that individuals assume specific and diverse leadership roles as the task demands (Aime et al., 2013; Klein et al., 2006). Thus, while shared leadership is an emergent property of a group (Carson et al., 2007), the structure of shared leadership need not be composition based, wherein the group uniformly engages in the same leader behaviors, but rather compilation based, wherein different members of the group selectively enact different leadership functions as the task demands (Aime et al., 2013).

Shared leadership is similar but distinct from other leadership and team constructs. For example, the leadership functions are similar to the team processes identified in models of team effectiveness such as the action and transition phases described by Marks, Mathieu, and Zaccaro (2001). The functional approach to leadership suggests that, by performing these functions, group leaders are drivers of core team processes (Morgeson et al., 2010). When leadership is shared, these functions are enacted by group members and are the means by which members prompt team processes such as transition and action phase processes (Hoch & Kozlowski, 2012, p. 4).

Another related construct is empowering leadership, which is defined as the “extent to which leaders enhance autonomy, control, self-management, and confidence in their teams” (Chen, Sharma, Edinger, Shapiro, & Farh, 2011, p. 541). Whereas empowering leaders give members control over their *own* tasks and build their confidence, shared leadership involves members having influence over *each other*. Consequently, shared leadership is about accepting one another as leaders as opposed to being self-empowered by a single leader. Thus, a group leader may be very empowering but retain most of the authority and influence (Carson et al., 2007). That said, empowering leadership and shared leadership may mutually influence each other. Empowering leaders, in seeking to enhance the meaningfulness of group members’ roles, may enable them to engage in leadership functions, thereby fostering shared leadership. Similarly, shared leadership may lead to empowerment as group members employ positive influence techniques (e.g., encouraging, giving advice) that build group members’ confidence.

### The Dynamics of Shared Leadership and Trust

Scholars suggest that both shared leadership (Aime et al., 2013) and group trust (De Jong & Elfring, 2010; Mayer et al., 1995) are emergent constructs that evolve over time. As they involve emergent processes, it is instructive to consider the constructs of shared leadership and group trust in the context of group development. Models of group development suggest that over time as groups

gain experience with the task and with each other, they develop processes and structures that facilitate goal accomplishment (Kozlowski, Gully, Nason, & Smith, 1999; McGrath, 1991; Morgan et al., 1993). Early in a group’s life cycle, group members are focused on developing processes and structures that fall broadly into task-related and social skills. The task-related facets of group development involve acquiring and sharing knowledge and skills involved to carry out the group’s task work (Crawford & LePine, 2013; McGrath, 1991). The social facets of group development involve developing the group’s social structure to enable coordination and cooperation. Scholars suggest that teams cycle through developmental phases repeatedly as they acquire increasingly complex skills (Kozlowski et al., 1999).

The development of the social structure of the group includes emergent constructs such as shared leadership (Contractor et al., 2012) and group trust (De Jong & Dirks, 2012). Emergent phenomena have three important features (Kozlowski & Klein, 2000). First, they are multilevel, originating in individual-level characteristics, cognition, and behavior, and ultimately manifesting at the group level. Second, they result from dynamic interactions among individuals within the group. Third, they take time to develop and manifest themselves as emergent constructs. Once formed, emergent phenomena drive processes that subsequently shape the social structure of the group. These principles suggest that shared leadership and group trust develop from interpersonal interactions within the group over time.

Although theory and research have neglected to address the consequences of shared leadership in a dynamic sense, insights from the literature suggest that increases in shared leadership have motivational implications for the group that should lead to performance improvements. One of the proposed benefits of shared leadership is group trust (Bligh et al., 2006; Hoch & Kozlowski, 2012), which is an important predictor of group success (De Jong & Dirks, 2012). At the group level, trust is an attitude that is shared by the group and directed toward the collective (Simons & Peterson, 2000). Empirical research has indicated a positive relationship between shared leadership and trust (Bergman et al., 2012; Wang et al., 2014), but these studies examined static relationships. We maintain that as shared leadership increases—that is, as more members assume more leadership functions—individuals have more opportunities to interact with one another and thereby form trusting bonds that prompt the effort and cooperation necessary for high performance. This proposition suggests that trust is a dynamic attribute of the group that has the potential to develop and grow if leadership is shared.

As shared leadership increases to involve more members of the group, the presence of multiple leaders in a group results in multiple leader–follower relationships (Carson et al., 2007), creating more opportunities for parties to interact. Aime et al. (2013) argued that the exercise of shared leadership creates positive social exchanges between group members. These exchanges involve group members exercising influence and other group members accepting that influence, which can create a shift in the balance of power between group members. To restore balance, the less powerful individual seeks to enhance the value of the exchange relationship by offering valued resources in return (e.g., information, effort), thereby increasing the more powerful member’s dependence. These exchanges not only restore balance, they build trust between group members (Blau, 1972). Thus, in these exchanges,

group members have the opportunity to demonstrate their trustworthiness and, when they accept each other's influence, to signal that they trust each other (Vandewaerde, Voordeckers, Lambrechts, & Bammens, 2011). As more members of the group engage in shared leadership, there are more opportunities for trust-building exchanges to occur. Therefore we hypothesized that we would find the following:

*Hypothesis 1:* Positive change in shared leadership is associated with positive change in group trust.

### Shared Leadership, Group Trust, and Performance

Shared leadership has potential benefits to group functioning that should translate into higher performance. Distributing leadership functions among members can enhance the group's cognitive resources (Burke et al., 2003; Day, Gronn, & Salas, 2004) and its ability to utilize its expertise (Aime et al., 2013; Burke et al., 2003), enabling them to coordinate their efforts more effectively. Additionally, scholars have posited that shared leadership has a positive impact on group members' attitudes (Hoch & Dulebohn, 2013) and relationships (Bergman et al., 2012), which enables them to work more cooperatively and effectively. In short, shared leadership should foster both task-related and social dimensions of group functioning, which in turn should foster group performance. Consistent with this reasoning, in a recent meta-analysis of 42 studies, shared leadership was found to be positively related to group or organizational performance (Wang et al., 2014). Further, some studies have demonstrated that shared leadership adds predictive value beyond traditional hierarchical leadership (Ensley et al., 2006; Pearce & Sims, 2002; Pearce, Yoo, & Alavi, 2004).

These findings and the logic supporting them are based on a static view of shared leadership. As noted earlier, empirical investigations of the consequences of dynamic shared leadership are lacking. However, there is limited evidence to suggest that positive changes in shared leadership are associated with increases in innovation (Aime et al., 2013). Building on this finding and on cross-sectional findings of the positive relationship between shared leadership and performance, we proposed that we would find the following:

*Hypothesis 2:* Positive change in shared leadership is associated with positive change in group performance.

While theory suggests that shared leadership may influence numerous aspects of group functioning, we focused on trust, as it is an important predictor of group effectiveness (e.g., Colquitt, Scott, & LePine, 2007; De Jong & Elfring, 2010; Serva, Fuller, & Mayer, 2005). Trust is likely to increase the overall effort individuals apply to group tasks and the degree to which they cooperate in the pursuit of collective goals (McEvily, Perrone, & Zaheer, 2003). Research indicates that trust is associated with individuals exerting effort beyond formal role requirements to help coworkers and the organization achieve collective goals (Colquitt et al., 2007). Given that trust is essential to accepting the authority and influence of others (Tyler & DeGoey, 1996) and an important factor in group performance (De Jong & Dirks, 2012), it is a potentially critical mechanism in the relationship between shared leadership and group effectiveness. We maintain that, through the development of trust, increases in shared leadership lead to positive changes in group performance.

As trusting bonds develop within the group, more individuals should be willing to engage in extra effort toward helping their trusted colleagues and the group as a whole. As trust spreads through the group, cooperative behavior should proliferate, contributing to increases in performance. Further, individuals who trust one another spend less time monitoring each other (Langfred, 2004), freeing up attention and effort for other work activities (McEvily et al., 2003; Serva et al., 2005). As more individuals take charge and demonstrate their trustworthiness, group members are free to focus on activities that can enhance work processes and improve performance. Consistent with this potential, Aime et al. (2013) found that positive changes in shared leadership led to higher levels of innovation. These arguments suggest that through its influence on trust, growth in shared leadership is positively related to performance improvements. This logic implies a relationship between the expansion of shared leadership and performance improvement. Given that theory suggests that shared leadership may influence an array of factors contributing to the social and task-related functioning of groups, trust is but one facet through which shared leadership may influence performance. We focused on trust because it is critical to cooperation and performance within groups (Colquitt et al., 2007; De Jong & Dirks, 2012) and has a strong theoretical and empirical link to shared leadership (Bergman et al., 2012; Bligh et al., 2006). That is, we posited that trust is an important but not exclusive mediator of the relationship between growth in shared leadership and performance improvement. Therefore, we expected to find the following:

*Hypothesis 3:* Positive change in group trust partially mediates the relationship between positive change in shared leadership and positive change in group performance, such that positive change in shared leadership is associated with positive change in group trust, and positive change in group trust is associated with positive change in group performance.

## Method

### Research Setting

The aim of this investigation was to examine how changes in shared leadership are related to changes in trust and performance, which requires the collection of multiple observations of each of these variables in a longitudinal format. Given that data collected from research participants are subject to reactivity and instrumentation in longitudinal designs, nonreactive and unobtrusive data are a desirable alternative to self-report measures. For this study, we collected the nonreactive trace data in the context of an online strategy simulation game. The use of computer simulations is common in studies of group dynamics and effectiveness (Chen, Kanfer, DeShon, Mathieu, & Kozlowski, 2009; Dimotakis, Davison, & Hollenbeck, 2012). The simulation game employed in this study involves a highly engaging, complex, and interdependent task running for roughly 12 months. Thus, it had a higher degree of psychological fidelity for social dynamics than most laboratory simulation tasks. Despite these advantages, using this setting posed a tradeoff between measurement rigor and generalizing to a specific context. However, the focus of this investigation was on basic group phenomena (leadership, trust, and performance in groups), and past research suggests that relationships between basic group



processes and performance are robust across research settings (LePine, Piccolo, Jackson, Mathieu, & Saul, 2008).

The data used in this study are part of a larger research program on collaboration (Gallenkamp et al., 2011; Tumasjan & Strobel, 2012; Wigand et al., 2012). We collected our data in the context of a psychologically rich simulation game called *Travian* (www.travian.com), a commercial online strategy game. Versions of this simulation game run continuously in more than 50 countries worldwide. Groups compete in a race to accrue sufficient material, financial, and human resources to create and finish a major landmark and thus win the game. Resources are acquired by investments in the production of raw materials and by raiding the stores of other participants in the simulation game. Thus, participants must also ensure that their resources are adequately secured and defended. The scale of resources required to create a landmark is beyond the capabilities of an individual participant. Thus, participants must form groups to pool, protect, and grow their resources.

A group is formed by one participant who has achieved a certain threshold of resources and who then invites others to join. Each group is equipped with a private discussion forum, a chat room, an in-game messaging system, and a regularly updated, common news list showing all groups' and participants' performance statistics. They also have a group profile page that includes a list of group members, mission and policy statements, and other information the group deems relevant for outsiders to see. Groups within this simulation game correspond to common conceptualizations of groups. For example, Cohen and Bailey (1997, p. 241) defined groups as three or more people who are a "collection of individuals who are interdependent in their tasks, who share responsibility for outcomes, who see themselves and who are seen by others as an intact social entity embedded in one or more larger social systems." Groups in the current investigation meet this definition. As described previously, their tasks and activities are interdependent in that they share, trade, and protect one another's resources. They share responsibilities for outcomes in that they collectively work toward the goal of building a major landmark. They see themselves and are seen as a group, as evidenced by their group profile pages. They are embedded within a broader social system of other groups and participants. They also control the boundaries between their group and the broader system in that they control the membership of their group and maintain private means communicating within the group.

## Sample and Procedure

Data collection was conducted in cooperation with *Travian*, a commercial provider of the simulation game. The simulation was not conducted specifically for the purposes of this research but is a form of commercial entertainment. Thus, participants chose to join the simulation game for their own intrinsic reasons (i.e., to be part of an online community, to engage in competitive play; Klimmt, Schmid, & Orthmann, 2009). The provider conducts rounds of the simulation game in various regions throughout the world. The round used for this study was a version localized in Austria, Germany, and Switzerland. The study makes use of two types of data: log-file data and online survey data. We know from the survey that, on average, participants were 30.3 years old and had 4.0 years of higher education; 62%, were employed, and 23% were female.

Trace data were collected over a 4-month period. We began data collection 2 months after the simulation game started so as to allow for a sufficient number of groups to be established. It takes time for groups to form, as participants join the simulation game individually and must accrue a certain amount of resources before forming a group and inviting other members to join. Therefore, we began data collection at the point when a majority (i.e., 50%) of the groups that ultimately came into existence had been established with at least three members. Trace measures were obtained at three times, with each observation separated by 8 weeks. Measures of shared leadership, trusting behavior, and performance were each lagged by 2 weeks in respective order. Using log file data to ascertain group membership, we identified 142 groups comprising 3,289 individuals at Time 1. On average, groups consisted of 23 individuals, and group size ranged from three to 60.

At the last measurement of trace data, we administered the survey to obtain demographic data and a trust measure to validate the trusting behavior measure. Participation in the survey was voluntary. Participants were entered into a lottery in exchange for participation in the survey in which they could win game currency worth about \$2.50 USD. We included groups for which at least three participants responded to the survey. This resulted in a survey sample of 86 groups comprising 849 individuals.

## Measures

**Shared leadership.** We conceptualized shared leadership as the distribution of leadership functions among group members (Contractor et al., 2012; Hoch & Kozlowski, 2012). This view is consistent with research on dynamic shared leadership, which suggests a compilation-based construct in which individuals assume specific and diverse leadership roles as the task demands (Aime et al., 2013; Klein et al., 2006). This sort of construct is comparable to pooled unconstrained emergence (Kozlowski & Klein, 2000) wherein the elemental (i.e., individual-level) contributions to the group-level construct can vary widely (i.e., some individuals may assume no leadership functions, and some individuals may assume all leadership functions). For such constructs, there is no restriction for within-group variability on the individual-level construct, and summative or mean measures are appropriate. In the simulation game, founders of groups have the ability to ascribe leadership responsibilities to other members of the group, namely, the ability to admit and dismiss members, send mass instant messages, post messages on the group forum, manage the group forum, alter the group profile page, and empower members with any of the previously described leadership responsibilities. Thus, group founders and subsequently empowered group members can share leadership functions by empowering group members with some or all of these responsibilities (Burke et al., 2003; Fleishman et al., 1991). We measured shared leadership as the total number of responsibilities granted within the group using trace data.

These responsibilities represent three of the four functions of group leadership described earlier (Fleishman et al., 1991). The ability to negotiate agreements and alter the group profile page corresponds to the *information search and structuring* function. The ability to send mass instant messages, post on the group forum, and manage the group forum are facets of the *information use in problem solving* function of leadership. The ability to admit

and dismiss group members and the ability to empower other group members correspond to the *managing human resources function*. Thus, while not a comprehensive list of all leadership functions (none of these responsibilities directly pertain to managing material resources), these responsibilities are representative of the important functions of leadership that are also highly relevant to this particular setting.

**Group-trusting behavior.** Trust is typically conceptualized as a psychological state involving the willingness to make oneself vulnerable to another party (Mayer et al., 1995). Because we measured our variables with trace data, we could not directly assess the psychological state; however, the data provided an indicator of trusting behavior. Trusting behavior involves risk taking within the relationship (Mayer et al., 1995), such as the choice to delegate an important task (Colquitt et al., 2007). The trace data tracked a particularly important form of delegation within the simulation game. The simulation game runs 24 hr a day, 7 days a week for roughly 1 year. Participants are not required to be continuously present in the simulation game, but they must regularly log in to maintain and protect their resources. There are occasions when participants are not actively engaged for an extended period of time. During such absences, participants can delegate control of their account to another member of the group. At any point in time, participants may delegate up to two other participants to take care of their account. The assigned persons have full access to the participant's account and may act on his or her behalf. We operationalized group-trusting behavior as the actual number of assignments divided by the possible number of assignments across all members of the group.

We validated the group-trusting behavior measure with a perceptual measure of group trust obtained from an online survey. We adapted Robinson's (1996) seven-item scale for group trust to the present context. Sample items are "My alliance is open and upfront with me," and "I am not sure I fully trust my alliance" (note that in the Travian game, groups are called *alliances*). The participants rated group trust on a 5-point Likert-type scale (from 1 = *strongly disagree* to 5 = *strongly agree*;  $\alpha = .77$ ). Individual ratings were aggregated to the group level. Intraclass correlation values of ICC(1) = .44 and ICC(2) = .88,  $F = 8.65$ ,  $p < .001$ , and interrater agreement,  $r_{wg(j)} = .79$ , justified aggregation to the group level (LeBreton & Senter, 2008). We correlated this survey measure of trust with the trusting behavior measure obtained at each of the three time periods. The survey measure of group trust was significantly correlated with trusting behavior at each time of measurement (Time 1:  $r = .37$ ,  $p < .01$ ; Time 2:  $r = .43$ ,  $p < .001$ ; Time 3:  $r = .42$ ,  $p < .001$ ). These findings are consistent with the overall correlation between trust and trusting behavior reported in a recent meta-analysis ( $r_c = .42$ ; Colquitt et al., 2007).

**Group performance.** As noted earlier, groups within the simulation game compete to acquire resources in a race to build a major landmark. These resources include raw materials used to build infrastructure and food to grow a simulated population. The size of the simulated population, in turn, determines the rate at which infrastructure can be built, and further resources can be procured. Thus, the size of the groups' simulated population is a measure of productivity and constitutes a primary indicator of the groups' potential in competing with other groups and, ultimately, winning. In fact, this is the means by which participants track their

own performance, and these scores are available to all participants in the simulation game.

**Control variables.** Research suggests that the size of the group may affect group processes such as social loafing (Liden, Wayne, Jaworski, & Bennett, 2004) and outcomes such as attachment to the group (Joshi, Lazarova, & Liao, 2009). Larger groups may be perceived as being more powerful and better able to protect themselves. We therefore controlled for the size of the group. Given that the stage of the group's lifecycle also may influence group outcomes (Carson et al., 2007; Morgeson et al., 2010), we also controlled for group age, measured in days.

## Analysis

All variables and relationships were conceptualized and measured at the group level. The hypotheses involved testing the relationships between changes in variables over time. We tested our hypothesized relationships following an approach developed by Chen, Ployhart, Thomas, Anderson, and Bliese (2011). This analytical approach involves two steps: estimating change over time in each variable and then assessing the relationships between change estimates.

Our first step was to assess whether there was a linear time trend in each of the variables. We estimated the within-group effect of time on each of the hypothesized variables—shared leadership, trusting behavior, and performance—using mixed effect growth modeling (i.e., random coefficient modeling/hierarchical linear modeling) following the model specification outlined by Chen, Ployhart, et al. (2011, p. 168). For a given variable (e.g., shared leadership), these analyses produced a slope for each group, which represented the change over time in that variable for the respective group. The results indicated a significant time effect for trusting behavior ( $B = -.04$ ,  $SE = .01$ ,  $p < .001$ ) and performance ( $B = 1230.54$ ,  $SE = 82.89$ ,  $p < .001$ ), indicating an average negative and positive change in each variable over time, but not for shared leadership ( $B = -.13$ ,  $SE = .39$ ,  $p > .05$ ). We then estimated the degree to which there was between-group variation in the rate of change (Bliese & Ployhart, 2002) and found significant differences for all three variables (shared leadership: likelihood ratio = 20.87,  $df = 2$ ,  $p < .001$ ; trusting behavior: likelihood ratio = 24.15,  $df = 2$ ,  $p < .001$ ; performance: likelihood ratio = 525.16,  $df = 2$ ,  $p < .001$ ). This finding justifies examining between group differences in growth trends. Prior to producing slope estimates, we also tested all variables for correlated and heteroscedastic error structures (Bliese & Ployhart, 2002). We found no evidence for autocorrelation, but there was evidence of significant heteroscedasticity for shared leadership and performance. Therefore, when estimating shared leadership and performance, we controlled for heteroscedasticity.

In the second step, we used ordinary least square regression to test the hypothesized dynamic relationships. Following Chen, Ployhart, et al. (2011), we regressed changes in the dependent variable as represented by within-group slopes on changes in the independent variable as represented by within-group slopes, controlling for the initial value of the dependent variable (Time 1) and the average value of the independent variable over time (Times 1 to 3). As a check on the robustness of this method, we conducted a second set of analyses. The final value of the dependent variable (Time 3) was regressed on change in the independent variable

controlling for the initial value of the dependent variable and the average value of the independent variable over time. All models controlled for initial group size and group age.

We tested for mediation using a resampling procedure (Preacher & Hayes, 2004). We report bias-corrected at 95% confidence intervals based on 10,000 resamples (MacKinnon, Lockwood, & Williams, 2004). All models and tests were estimated with the statistical software R (R Core Team, 2013).

## Results

Descriptive statistics and correlations for all variables are provided in Table 1. Results of the hypotheses tests are reported in Tables 2 and 3. All regression weights are standardized. The upper portions of Tables 2 and 3 show the results with the change variable (i.e., within-group slope) as criterion, and the lower portion lists the results with the Time 3 variable as criterion.

Hypothesis 1 predicted that positive changes in shared leadership would be related to positive changes in group-trusting behavior. The results from both analytical approaches reported in Table 2, Model 2, support the hypothesis. Positive shared leadership change was significantly related to positive change in group-trusting behavior ( $\beta = .14$ ,  $SE = .05$ ,  $p < .01$ ) and group-trusting behavior at Time 3 ( $\beta = .21$ ,  $SE = .06$ ,  $p < .01$ ). The findings support Hypothesis 1.

Hypothesis 2 predicted that positive change in shared leadership would be associated with positive change in group performance. The results are reported in Model 2 of Table 3. Both approaches to assessing this relationship supported the hypothesis. The regression weight for the relationship between positive change in shared leadership and positive change in performance was positive and significant ( $\beta = .10$ ,  $SE = .04$ ,  $p < .05$ ). In addition, regressing performance at Time 3 on positive change in shared leadership yielded a significant relationship ( $\beta = .10$ ,  $SE = .04$ ,  $p < .05$ ). These results support Hypothesis 2.

Finally, Hypothesis 3 predicted that positive change in group-trusting behavior would mediate the relationship between positive changes in shared leadership and group performance. As reported, the test of Hypothesis 1 provided support for the first link in the mediated relationship such that positive change in shared leadership was associated with positive change in trusting behavior and trusting behavior at Time 3. As indicated in Table 3, Model 3, the second link in the mediated relationship was supported by a significant relationship between positive change in trusting behavior with positive change in performance ( $\beta = .10$ ,  $SE = .05$ ,  $p < .05$ ) as well as with performance at Time 3 ( $\beta = .14$ ,  $SE = .05$ ,  $p < .05$ ). We used bootstrapping for testing the indirect relationship between positive change in shared leadership and positive change in performance and performance at Time 3 via positive change in trusting behavior, which yielded significance using both estimation procedures (performance change:  $\beta = .015$ , 95% CI [.0001, .0311]; performance at Time 3:  $\beta = .030$ , 95% CI [.0044, .0550]). Finally, Model 3 in Table 3 shows that after adding trusting behavior change in the equation predicting performance, the regression weights of positive change in shared leadership on positive change in performance ( $\beta = .08$ ,  $SE = .04$ ,  $p > .05$ ) and the regression weights of positive change in shared leadership on performance at Time 3 ( $\beta = .07$ ,  $SE = .04$ ,  $p > .05$ ) were nonsignificant. Note that as indicated in the findings for Hypothesis 2, without changes in trusting behavior in the equation, changes in shared leadership were significantly related to changes in performance. These finding suggests full mediation (Mathieu & Taylor, 2006) and generally support Hypothesis 3.

## Discussion

Recent research suggests that leadership in groups is dynamically shared such that different members of the group may take the lead at different times depending on the resources required (Aime et al., 2013; Klein et al., 2006). However, insight into how the

Table 1  
Means, Standard Deviations, and Correlations

Variable	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Shared leadership Time 1	16.54	9.97																
2. Shared leadership Time 2	18.39	10.83	.76															
3. Shared leadership Time 3	16.29	12.02	.53	.68														
4. Trusting behavior Time 1	0.24	0.18	.25	.28	.28													
5. Trusting behavior Time 2	0.22	0.17	.15	.19	.28	.83												
6. Trusting behavior Time 3	0.17	0.15	.14	.22	.35	.67	.74											
7. Performance Time 1	930.13	705.14	.30	.26	.30	.73	.67	.60										
8. Performance Time 2	2151.78	1904.90	.26	.25	.33	.72	.68	.65	.95									
9. Performance Time 3	3391.22	3276.39	.23	.26	.36	.67	.64	.67	.85	.92								
10. Average shared leadership	17.08	9.59	.85	.92	.86	.31	.24	.28	.33	.32	.33							
11. Average trusting behavior	0.21	0.15	.20	.25	.33	.92	.94	.87	.74	.75	.72	.30						
12. Shared leadership change	0.28	2.49	-.36	.15	.58	.08	.16	.25	.03	.11	.17	.17	.18					
13. Trusting behavior change	-0.04	0.03	-.22	-.21	-.12	-.85	-.61	-.19	-.55	-.50	-.42	-.20	-.63	.06				
14. Performance change	1221.80	1248.46	.22	.24	.33	.68	.66	.65	.88	.99	.92	.30	.73	.14	-.45			
15. Group size Time 1	23.16	15.29	.32	.19	.14	.44	.40	.31	.53	.51	.40	.24	.42	-.16	-.36	.47		
16. Group age	41.20	21.73	.31	.16	.19	.44	.31	.34	.56	.47	.39	.25	.40	-.11	-.34	.40	.52	
17. Group trust <sup>a</sup>	3.91	0.32	.08	.06	.18	.37	.43	.42	.33	.31	.34	.13	.45	.10	-.20	.29	-.01	.17

Note. Table reports bivariate correlations.  $N = 142$  groups, if not indicated otherwise. Correlations with absolute values greater than .16 are significant at  $p < .05$ .

<sup>a</sup>  $N = 86$  groups. The measure was obtained from an online survey. Correlations with absolute values greater than .21 are significant at  $p < .05$ .



Table 2  
*Results From Linear Regression for Trusting Behavior*

Variable/Model	Model 1				Model 2					
	$\beta$	<i>SE</i>	$R^2$	<i>F</i> ( <i>df</i> )	$\beta$	<i>SE</i>	$R^2$	<i>F</i> ( <i>df</i> )	$\Delta R^2$	<i>F</i> ( <i>df</i> ) for $\Delta R^2$
Trusting behavior change			0.73	92.93*** (4, 137)			0.75	81.38*** (5, 136)	0.02	10.20** (1, 136)
Group age	.04	.05			.06	.05				
Group size Time 1	-.01	.05			.02	.05				
Trusting behavior Time 1	-.88***	.05			-.91***	.05				
Average shared leadership	.06	.05			.03	.05				
Shared leadership change					.14**	.05				
Trusting behavior Time 3			0.46	29.43*** (4, 137)			0.50	27.52*** (5, 136)	0.04	11.16*** (1, 136)
Group age	.04	.08			.06	.07				
Group size Time 1	.00	.08			.05	.08				
Trusting behavior Time 1	.64***	.07			.60***	.07				
Average shared leadership	.08	.07			.03	.07				
Shared leadership change					.21**	.06				

*Note.*  $N = 142$  groups. Table reports standardized effect sizes.  
\*\* $p < .01$ . \*\*\* $p < .001$ .

practice of sharing leadership spreads through a group and the consequences of its growth is limited. Further, little is known about what leadership behaviors or activities group members should or do share (Aime et al., 2013; Locke, 2003). Building on recent thinking on dynamic leadership and adopting a functional view of leadership (McGrath, 1991), in the current investigation, we examined consequences of changes in sharing leadership functions. The findings point to two related conclusions. First, as groups increasingly distribute leadership functions among group members, trust grows. Second, through trust, the expansion of shared leadership is associated with increased performance.

Drawing on the functional approach to leadership, we conceptualized shared leadership in terms of the degree to which group members assumed certain core functions of leaders, namely: information search and structuring, information use in problem solving, and managing personnel resources (Burke et al., 2006; Fleishman et al., 1991). The findings supported the proposition that positive change in shared leadership is associated with positive change in performance and that this relationship is mediated by positive change in trusting behavior within the group. Surprisingly, we found evidence of full mediation, emphasizing the critical role of trust building in the relationship between positive changes in shared leadership and positive changes in performance. These findings support prior research on the relationship between shared leadership and group performance (Wang et al., 2014) and provide novel insights into the role of trusting behavior.

**Theoretical Implications**

The results of this investigation are consistent with theory on the emergence of shared leadership, indicating that leadership functions can indeed proliferate among group members over time, presumably as group members become more experienced with the task and develop an understanding of each other's expertise and resources. It is interesting to note, however, that not all groups demonstrated growth in shared leadership: in some cases, the leadership structure remained stable, and in still others, leadership became restricted over time. Groups that tended toward restriction did so to their own detriment, as levels of trust and performance in these groups suffered. This finding is consistent with the threat-

rigidity response wherein leaders constrict control and information in response to perceived threats, thereby undermining the group or organization's ability to effectively respond to threats (Staw et al., 1981).

The findings are also consistent with assertions by scholars of the pivotal role of trust to realizing the benefits of shared leadership (Bligh et al., 2006). Trust is an important aspect of the social functioning of groups, which is necessary for group effectiveness. Scholars have suggested that shared leadership may enhance trust: as group members influence one another and are influenced by one another, they engage in positive social exchanges that build trust (Aime et al., 2013). Our longitudinal findings are consistent with this logic and suggest that as groups evolve and shared leadership emerges, the resulting process of mutual influence begets further emergent characteristics such as group trust. These findings have broader implications for understanding how one emergent process (e.g., growth in shared leadership) may trigger another emergent process (e.g., group trust building).

The findings also provide interesting insight into what it means to share leadership. Research suggests that not all members share the same responsibilities or engage in the same behaviors (e.g., Klein et al., 2006). Instead, theory suggests that group members engage in leadership behaviors that reflect their skills and resources. The distribution of leadership in our data suggests that often, multiple group members shared the same leadership function, but individual group members seldom assumed all of these functions. This suggests that the structure of shared leadership need not involve distributing all responsibilities to all group members but rather involve a specialization of leadership functions among subsets of group members.

**Practical Implications**

There are several lessons learned that could be passed along to practitioners, leaders, managers, and organizers of groups. This investigation adds to a growing body of evidence of the value of shared leadership. Our dynamic analysis underscores the need for organizations to recognize and leverage the emergence of shared leadership. Organizations must realize that changes in leadership are likely to occur throughout the life of the group and enable

Table 3  
Results From Linear Regression for Performance

Variable/Model	Model 1					Model 2					Model 3				
	$\beta$	SE	R <sup>2</sup>	F (df)		$\beta$	SE	R <sup>2</sup>	F (df)	$\Delta R^2$	$F (df)$	R <sup>2</sup>	$\Delta R^2$	$F (df)$	$F (df)$ for $\Delta R^2$
Performance change			0.81	113.52***	(5, 136)			0.82	98.79***	(6, 135)			0.82	87.49***	(7, 134)
Group age	-.15**	.05				-.14**	.05								
Group size Time 1	.05	.05				.07	.05								
Performance Time 1	.82***	.06				.83***	.06								
Average trusting behavior	.16**	.06				.12*	.06								
Average shared leadership	.01	.04				.00	.04								
Trusting behavior change															
Shared leadership change						.10*	.04								
Performance Time 3			0.76	86.36***	(5, 136)			0.77	74.69***	(6, 135)			0.78	67.68***	(7, 134)
Group age	-.12*	.05				-.11*	.05								
Group size Time 1	-.04	.05				-.02	.05								
Performance Time 1	.78***	.07				.78***	.07								
Average trusting behavior	.20**	.06				.17**	.06								
Average shared leadership	.05	.04				.03	.05								
Trusting behavior change															
Shared leadership change						.10*	.04								

Note. N = 142 groups. Table reports standardized effect sizes.  
\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

groups to achieve an optimum level of mutual influence. When designing, building, and managing groups, those doing so must also realize that with shared leadership, group members have more opportunities to engage in essential and much sought-after trust-building interactions that are critical for functional and successful groups (De Jong & Dirks, 2012). Organizations can take steps to assure that leadership is shared by providing group members adequate opportunity to interact and learn of each other's capabilities. For example, team training on mental models may trigger or accelerate the expansion of shared leadership. However, its efficacy is contingent on team members perceiving the exercise of influence as legitimate (Aime et al., 2013). Thus, organizations should promote a climate where group members feel comfortable taking charge as well as deferring to fellow group members. Further, in this setting, groups predominantly interacted virtually. The findings suggest that shared leadership is beneficial to managing virtual groups by building trust. Indeed, scholars have argued that shared leadership helps to overcome challenges posed by interacting virtually (Hoch & Kozlowski, 2012). Interestingly, research indicates that shared leadership is positively related to performance in both virtual and co-located teams (Hoch & Kozlowski, 2012).

Limitations and Future Directions

Our focus in this study was on contributing to general theory on leadership and trust in groups. The context of a computer simulation has often been used to isolate and examine such fundamental relationships in groups (e.g., Chen et al., 2009; Colquitt, Hollenbeck, Ilgen, LePine, & Sheppard, 2002; Dimotakis et al., 2012). The simulation game context of this study provides clear advantages for examining dynamic processes without the risk of reactivity. Moreover, a recent meta-analysis suggests that research setting does not qualify relationships among fundamental group processes, emergent states, and performance (LePine et al., 2008). However, the generalizability of the observed relationships to specific contexts remains in question. For example, O'Toole et al. (2003) argued that in larger organizations, the effectiveness of shared leadership may depend on additional factors such as the means of selecting leaders and the complementarity of skills. A related concern is the sample, which self-selected to participate in the simulation. The demographic profile suggests that although the sample was disproportionately male, the participants were not unlike the general population of young adults (average age of 30.3 years) who are either employed or enrolled in higher education.

We derived our measures from trace data, which are unobtrusive, nonreactive, and objective. Thus, the findings were not distorted by perceptual bias, a limitation that is common to research on shared leadership (Carson et al., 2007). However, our measures were limited in breadth and richness. For example, the assessment of leadership functions was limited to those activities that could be ascribed by the group founder. These were eight activities that roughly corresponded to three group leadership functions and thus do not encompass all leadership functions. Moreover, we did not assess the degree to which group members actually performed these functions. Additional research is needed on an expanded view of shared leadership functions and on how group members effectively enact them. Moreover, there are other manifestations of trust (e.g., revealing information; contributing resources to a com-

mon good) that were not available to us in this simulation but are worthy of investigation. That said, our measure of trusting behavior was significantly correlated with self-reported group trust.

Another potential limitation is the relatively large size of the groups, which averaged 23 participants. While groups as large as those in our sample are unusual, they are not unprecedented in the shared leadership literature, with some studies averaging group sizes in the mid to upper teens (Avolio, Sivasubramaniam, Murry, Jung, & Garger, 2003; Shamir & Lapidot, 2003). Other studies on shared leadership have been conducted at the organizational level of analysis (Hmieleski et al., 2012; O'Toole et al., 2003). Moreover, research suggests that size is less of a constraint in groups that utilize computer and information technology such as used by our research participants (Lipnack & Stamps, 1997). Indeed, Staats, Milkman, and Fox (2012) examined decision making in distributed software development groups as large as 151 members. That said, group size may impact the findings: a recent meta-analysis (Stewart, 2006) indicated a small positive relationship between group size and performance. Given that group size was correlated with many of our variables, we controlled for group size when testing our hypotheses.

Another concern is the relatively small effect sizes for the relationships among shared leadership, trust, and performance. One reason for the relatively small relationships might be the setting. In a controlled environment of this simulation, "game-changing" innovations that can dramatically influence the performance are not possible. This is reflected in the strong relationship between performance at Time 1 with performance change and with performance at Time 3. However, even small effect sizes can have large practical consequences. For example, Harter, Schmidt, and Hayes (2002) found that employee satisfaction accounted for only 1%–2% of the variance of business-unit outcomes. Still, they showed that changes in the independent variable would produce considerable improvements in sales and productivity and reduce turnover. In the current study, a comparison of groups in the upper and lower quartiles of growth in shared leadership suggests a similar practical consequence. While groups started with relatively equal levels of performance, groups in the upper quartile of shared leadership growth averaged a substantially greater percentage improvement in performance (150%) compared with groups in the lower quartile of shared leadership growth (100%). Therefore, even though the effect sizes were relatively small, such relationships may have strong practical importance in the long run (Abelson, 1985).

Although the use of longitudinal and lagged data substantially reduces the plausibility of alternative explanations, strong causal inferences are not warranted. For example, it is not clear what triggered the initial sharing of leadership. Thus, a fruitful avenue for further research would be to examine what determines the expansion and constriction of shared leadership in groups, as our findings indicated that some groups increased while other groups decreased shared leadership. Research on conditions that influence the development and decline of shared leadership is therefore needed (Carson et al., 2007). Another promising direction for future research is to examine when shared leadership is more or less critical to group functioning. This may vary by function. Some leadership functions, such as personnel decisions, that are difficult to coordinate if distributed too widely within a group may be better enacted by the formal leader (Locke, 2003). It may be that partic-

ular events or stages make sharing certain functions more or less critical (Morgeson et al., 2010). For example, if the environment becomes more threatening or competitive, it may be more appropriate for leadership to be more concentrated (Hollenbeck, Ellis, Humphrey, Garza, & Ilgen, 2011).

Further, trust appears to be a critical mechanism by which shared leadership predicts performance. Our findings suggested full mediation, in that there was no relationship between change in shared leadership and performance when change in trusting behavior was included in the model (see Table 3, Model 3). However, this result should be interpreted with caution. Because this condition for mediation (finding a nonsignificant direct relationship) is based on obtaining a null finding, it is particularly sensitive to the statistical power (Mathieu & Taylor, 2006). Indeed, we found that the relationship between leadership and performance approached significance ( $p < .06$ ). This finding raises the question of whether the relationship is *fully* mediated by trust. Theory suggests that trust is but one facet of the social functioning of the group. It is likely that other facets related to social functioning, such as group potency, may also play an important role. Further research is needed on these facets as well as factors related to the task-related functioning of the group (e.g., group cognition; Bligh et al., 2006; Burke et al., 2003) as potential mediating mechanisms.

## Conclusion

Organizations are increasingly turning to group-based work arrangements, and with the application of such structures, research is needed to examine alternative models of leadership (Stewart & Manz, 1995). The intent of this investigation was to add to a growing literature extolling the benefits of shared leadership for group processes and outcomes (Denis et al., 2012). In doing so, we sought to establish a link between shared leadership and mechanisms critical to group performance. While the relationships observed in this investigation require further research and validation, our findings hold promise for providing understanding of the dynamic nature of shared leadership.

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