Original Article

Is the Most Effective Team Leadership Shared?

The Impact of Shared Leadership, Age Diversity, and Coordination on Team Performance

Julia Elisabeth Hoch,[1] Craig L. Pearce,[2] and Linda Welzel[3]

[1]Human Resources and Labor Relations, Michigan State University, East Lansing, MI, USA,
[2]The Institute for Innovative Leadership, University of Nebraska-Lincoln, Lincoln, NE, USA,
[3]Technical University Dresden, Germany

Abstract. In the present paper we examine the moderating effects of age diversity and team coordination on the relationship between shared leadership and team performance. Using a field sample of 96 individuals in 26 consulting project teams, team members assessed their team's shared leadership and coordination. Six to eight weeks later, supervisors rated their teams' performance. Results indicated that shared leadership predicted team performance and both age diversity and coordination moderated the impact of shared leadership on team performance. Thereby shared leadership was positively related to team performance when age diversity and coordination were low, whereas higher levels of age diversity and coordination appeared to compensate for lower levels of shared leadership effectiveness. In particular strong effects of shared leadership on team performance were evident when both age diversity and coordination were low, whereas shared leadership was not related to team performance when both age diversity and coordination were high.

Keywords: shared leadership, age diversity, coordination, team performance

Today many organizations are faced with uncertainty, fast-changing environments, globalization, and increasingly complex work tasks (Brown & Gioia, 2002; Day, Gronn, & Salas, 2004, 2006; Gronn, 2000, 2002). To adapt to such change, organizations are increasingly reorganizing work using team-based structures (Illgen, Hollenbeck, Johnson, & Jundt, 2005; Kozlowski & Bell, 2003). This has resulted in the challenge regarding how to best manage those team-based work structures (Morgeson, 2005; Morgeson, DeRue, & Karam, 2010; Hoch, in press).

Leadership scholars argued for the importance of leadership being shared among team members (Gibb, 1954; Katz & Kahn, 1978) and those "shared leadership" concepts have gained more interest as reflected in recent literature (Avolio, Sivasubramaniam, Murry, Jung, & Garger, 2003; Carson, Tesluk, & Marrone, 2007; Pearce & Sims, 2002; Seers, 2000). Scholars suggested that the shared leadership approach potentially provides a more suitable solution to team management than the classical, hierarchical, or vertical leadership, as represented by the solo leader approach (Day et al., 2006; Gronn, 2000, 2002; Hoch, 2007). Shared leadership is defined as "an emergent team property that results from the distribution of leadership influence across multiple team members. It represents a condition of mutual influence embedded in the interactions among team members that can significantly improve team and organizational performance" (Carson et al., 2007, p. 1,218). Further, it describes "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), and it is "conceived as a group quality, as a set of functions which must be carried out by the group" (Gibb, 1954, p. 884).

Shared leadership differs from collective decisions, as it also includes the later phases following the decision processes, such as initiating action, taking responsibility for action and responsibility for outcomes, etc. (Hoch, 2007). Shared leadership refers to a collective social influence process shared by team members and aimed toward the achievement of one or more common goals (Hoch, 2007). Shared leadership has been shown to enhance team and organizational performance, above and beyond the so-called "classical" and "hierarchical" vertical leadership (Bowers & Seashore, 1966; Ensley, Hmieleski, & Pearce, 2006; Hoch, 2007; Pearce & Sims, 2002). According to Pearce et al. (2003) shared leadership may comprise of such as transformational, transactive, participative, empowering, and aversive leadership behaviors.

The primary focus of research on shared leadership to date has been on investigating the direct effects of shared

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leadership. However, several scholars suggest the possibility that the relationship between shared leadership and outcomes may be moderated by other variables (Hoch, 2007; Pearce & Conger, 2003). Age diversity and coordination represent two influential team composition and process factors that may affect the shared leadership and team performance relationship, because of their effect on performance. Age diversity has attracted a lot of attention, due to the aging of workforce populations, and wide age variability or range among workers has been reported by researchers to have both positive and negative effects on team performance (Jackson, Joshi, & Erhardt, 2003; van Knippenberg, De Dreu, & Homan, 2004; van Knippenberg & Schippers, 2007; and Williams & O'Reilly, 1998). Next, coordination of team member expertise is a factor that has been found to be related to team performance due to the cognitive, knowledge-based nature of many teams used by organizations today as well as the need to manage team member expertise (Cannon-Bowers, Salas, & Converse, 1993; Faraj & Sproull, 2000; Lewis, 2003).

Therefore, a primary goal of this present investigation was to explore possible moderating effects of these two variables on the shared leadership and team performance relationship. In addition, since research on the shared leadership and performance relationship has been limited to North American samples, a second goal of this study was to test the effects of shared leadership in a less individualistic culture. Toward this end we examined these relationships using a field sample of 96 individuals on 26 teams from a German consulting company.

Integration and Hypotheses

Research on Shared Leadership

Shared leadership describes leadership that is performed collectively within team (Carson et al., 2007; Pearce & Conger, 2003). Since leadership is spread across teams and organizational units, this team leadership by the team members within team has generated increasing interest (Bowers & Seashore, 1966; Day et al., 2006; Gronn, 2000, 2002).

The shared leadership approach has been demonstrated to enhance team and organizational outcomes in a range of different organizational settings and for a variety of types of units (Avolio, Jung, Murry, & Sivasubramaniam, 1996; Carson et al., 2007; Ensley et al., 2006; Pearce, 2008; Pearce, Yoo, & Alavi, 2004). For example, using a sample of 71 change management teams, Pearce and Sims (2002) found shared leadership to increase team effectiveness as perceived by team managers, team members, and customers. With respect to virtual teams, using a sample of 28 teams, Pearce et al. (2004) found shared leadership to be positively related to enhanced team processes. Related to top management, Ensley et al. (2006) reported shared leadership as having a positive effect on new venture performance in a two sample study of 66 and 154 top management teams (Ensley et al., 2006). Carson et al. (2007) found a positive effect of the influence of shared leadership on team performance in a sample of 59 consulting teams (Carson et al., 2007). Similar findings have also been obtained for student populations (Avolio et al., 1996, 2003) or sales representatives (Bowers & Seashore, 1966). Overall, in most settings, the impact of shared leadership has been found to exceed the impact of hierarchical leadership in predicting team and organizational outcomes (Ensley et al., 2006; Pearce & Sims, 2002).

A limitation of shared leadership research has been that all published studies to date have been conducted in North America and therefore the effects of shared leadership have not been investigated in other cultural contexts (Pearce, 2008). While shared leadership represents a collectivistic intra-group phenomenon, North America represents the most individualistic culture (index of 91) based on Hofstede's (1980) analysis and is also low in power distance (40). Consequently, it is reasonable to expect the positive effect of shared leadership on performance to generalize to cultures that are more collectivistic than North America yet similar in power distance. Toward this end, we examined shared leadership in a field setting using a sample of 26 teams from a German (individualism 67; power distance 35) consulting company. Accordingly, we propose the following hypothesis:

Hypothesis 1: Shared leadership will relate positively to team performance.

In spite of the expectation of direct effects between shared leadership and team performance, prior research has found the intensity of the relationship between shared leadership and team outcomes varies. For example, Pearce and Sims (2002) reported a correlation of $r = .17$ and Ensley and colleagues' (2006) results ranged from $r = -.15$–$.27$ with regard to the shared leadership-performance relationship. Consequently, it has been argued that future research should examine the impact of moderating variables in order to identify what factors may affect the direction and/or strength of the relationship (Carson et al., 2007; Cox, Pearce, & Perry, 2003). Toward this end, we investigated the possible moderating role of age diversity and team coordination on the relationship between shared leadership and outcomes.

Age Diversity and Shared Leadership

As another challenge facing organizations in the global economy, diversity in the workplace has received considerable research attention (Jackson et al., 2003; Williams & O'Reilly, 1998). The aging of the workforce has been cited as a growing diversity issue within industrialized economies with Europe and Japan's aging populations as most acute due to their low birth rates (Gunderjahn, 2005; Kronberger, 2004; Schirrmacher, 2004; The Economist, 2006). Consequently, the graying of the workforce has led to increased interest in the topic of age diversity in teams (Kearney, Gebert, & Voelpel, 2009; van Knippenberg et al., 2004; van Knippenberg & Schippers, 2007).

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Cox et al. (2003) argued that (age) diversity is an important predictor variable with regard to shared leadership. Age diversity, or diversity in general, has been called a double-edged sword (Milliken & Martins, 1996), as it has obtained both positive as well as negative effects on team outcomes (Jackson et al., 2003; van Knippenberg & Schippers, 2007; and Williams & O'Reilly, 1998). Positive effects of age diversity have typically been explained via an information processing approach (Kerschreiter, Mojzisch, Schulz-Hardt, Brodbeck, & Frey, 2003). Here, differences in age may relate to a broader range of required knowledge, skills, and abilities, which enhance the quality of elaboration and decision making and thus performance in teams. Negative direct effects have been explained via a social identity paradigm (Tajfel & Turner, 1986), according to which differences may lead to social categorization, conflicts and difficulties in communication, therefore lowering the levels of team effectiveness (Jackson, 1992; Jackson et al., 2003; Jackson, May, & Whitney, 1995; Milliken & Martins, 1996; Steiner, 1972).

Because of the mixed results of age diversity on team performance (Jackson et al., 2003; van Knippenberg & Schippers, 2007; Williams & O'Reilly, 1998), researchers have begun to explore possible moderators of age diversity on team performance including tasks that are cognitive, complex, and interdependent (van Knippenberg et al., 2004; van Knippenberg & Schippers, 2007). Empirical results have shown that age diversity unfolds more likely positive effects on outcomes if the levels of task complexity and interdependence are high, as documented in a recent meta-analysis (Bowers, Pharmer, & Salas, 2000). This moderating role on age diversity has been explained as resulting from higher levels of complexity urging people to go beyond surface level differences and to focus more on the related deep level diversity (e.g., differences in terms of related knowledge, skills, and abilities), which may then enhance the quality of elaboration and thus enhance team performance (Kearney et al., 2009; Kerschreiter et al., 2003). Thus, as age diversity in our sample is characterized by high task complexity, cognitive and interdependent tasks, it is most likely to lead to positive effects, due to the processes of information elaboration and team coordination (van Knippenberg & Schippers, 2007). However, prior results on expertise coordination or elaboration (van Knippenberg & Schippers, 2007) do not inform us regarding how shared leadership, as a collective, within-team leadership function, including behaviors such as transformational, transactional, and/or empowering leadership behaviors (Pearce & Sims, 2002; Pearce & Conger, 2003), might interact with age diversity in predicting team outcomes.

For a theoretical basis, we drew from the "leadership substitutes" theory (Kerr, 1977; Kerr & Jermier, 1978), in order to understand how age diversity might interact with shared leadership in predicting team performance. This theory posits that certain aspects of organizational context, such as task structure, or team member attributes, that is, ability, experience, or expertise might compensate (or buffer, moderate) for low levels of leadership on team outcomes (Kerr, 1977; Kerr & Jermier, 1978). However, so far the effects of leadership substitute approach, which was specified for hierarchical leadership, have not yet been tested with respect to its generalization to shared leadership. Applying the leadership substitute approach to shared leadership, we expect that high levels of age diversity might (function as a leadership substitute, and) compensate for lower levels of shared leadership on team outcomes and, since age diversity compensates for shared leadership effects on team outcomes, under high age diversity, shared leadership might be less strongly related to team performance. In contrast, under lower age diversity, shared leadership might unfold more positive effects. This main expectation is also stated by Cox and colleagues (2003), who argued that in (age) homogeneous teams, members might more likely treat each other similarly and share the lead which would not be the case in more heterogeneous teams (Cox et al., 2003). Taken together, we expect that age diversity will moderate the effects of shared leadership on team performance, in a way that shared leadership will display a positive relationship to team outcomes when age diversity is low, whereas there will be a negative effect when age diversity is high. With regard to the interaction between age diversity and shared leadership we therefore propose the following:

Hypothesis 2: Age diversity will moderate the relationship between shared leadership and team performance in such a way that a) shared leadership in teams will display a positive relationship to team performance when age diversity is low, whereas b) shared leadership will display a negative effect to team performance if age diversity is high.

Team Coordination and Shared Leadership

We also expect team coordination to be an important moderator of shared leadership effectiveness. Team coordination describes "team-situated interactions aimed at managing individual team member expertise [...] via patterned interactions and practices in particular situations" (Faraj & Sproull, 2000, p. 1555). Expertise has to be coordinated. Team coordination, in short, is aimed at coordinating the individual team members' prior work expertise, implicitly, via situated interaction patterns and practices in order to make the individual team members' expertise accessible to the team. Coordination is aimed at the cognitive, and implicit synchronization of the prior expertise of the team members (Faraj & Sproull, 2000). In contrast, shared leadership is described as an explicit leadership process, directed toward the motivation rather than implicit coordination of expertise, through behaviors such as transformational, transactional, directive, and empowering collective leadership.

According to Faraj and Sproull (2000) there are at least two different forms of team coordination: (a) the administrative coordination of routine tasks, (b) and the management of knowledge and skill dependencies, such as recognizing where expertise is located, needed, and accessed. The latter form may be more important in our case, since it relates to teams working on highly nonroutine, complex, cognitive,

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and interdependent, or simply more "intellectual" tasks. However, all forms of team coordination typically exert positive effects on team performance (Ancona & Caldwell, 1992; Kraut & Streeter, 1995; Lewis, 2003; Nidumolu, 1995).

Based on prior research, we expect that team coordination will relate to shared leadership. Similar to age diversity (which may lead to better elaboration of broader range of experience under complex task conditions), coordination facilitates team members' accessibility of the prior work expertise that co-team members possess. Therefore, its effects can be explained via the substitutes for leadership perspective (Kerr & Jermier, 1978). Team members can draw upon this resource when shared leadership is low, in order to enhance team performance. Conversely, shared leadership might interact with coordination, since both draw upon the same kind of resources, that is, cognitive resources of team members. Specifically, if both shared leadership and coordination are present, this might overexceed the cognitive resources of the team members, leading to conflicts regarding where team members should devote their attention and thus lowering team performance. Consequently, shared leadership might be more positively related to team outcomes when coordination is low. Therefore, we propose the following:

Hypothesis 3: Coordination will moderate the relationship between shared leadership and team performance in such a way that a) shared leadership in teams will display a positive relationship to team performance when coordination is low, whereas b) shared leadership will display a negative relationship with team performance, if coordination is high.

Three-Way Interaction: Age Diversity, Team Coordination, and Shared Leadership

Finally we expect that age diversity and coordination will also simultaneously interact with shared leadership in predicting team performance. Based on such as van Knippenberg et al. (2004), forms of diversity, including age diversity, will have positive effects on team outcomes through elaboration. The occurrence of elaboration, that is, the deep level processing of divergent information in teams, is most similar to expertise coordination, that is, the integration of team members' individual expertise, which will most likely have positive effects. Thus, on the basis of categorization-elaboration model (van Knippenberg et al., 2004), we expect that age diversity and coordination will work together in predicting team outcomes and will interact in influencing the shared leadership-team performance relationship.

Specifically, we expect stronger "substituting" effects if teams are simultaneously characterized high with respect to both age diversity and coordination, since the related expertise elaboration then might be enhanced. Under these conditions, teams will possess sufficiently efficient team processes, which may render the needs, or effects for shared leadership redundant and shared leadership will not be positively related to outcomes. In other words, we expect that age diversity-coordination functions as a substitute for leadership, again compensating for lower levels of shared leadership (Kerr & Jermier, 1978). Having both high levels of age diversity and coordination simultaneously should intensify the previously described effects.

Conversely, teams that are low in age diversity and low in coordination might develop a particularly strong "need for shared leadership." In this condition, other processes are necessary to enhance team performance because of the absence of team coordination, or the narrow range of team member expertise due to low age diversity. Teams that are homogeneous in terms of age and that are at the same time low in coordination may create a kind of "leadership vacuum" (Kerr & Jermier, 1978). Therefore, we expect that when teams are simultaneously low in age diversity and team coordination this will foster shared leadership effectiveness. We therefore expect a stronger effect or relationship between shared leadership and team performance when both age diversity and coordination are low. In sum, we therefore propose the following hypothesis:

Hypothesis 4: Age diversity and coordination will interact to moderate the relationship between shared leadership and team performance in such a way that a) shared leadership will not be related to team performance when age diversity and coordination are high, whereas b) shared leadership will display a positive relationship to team performance when age diversity and coordination are low.

Method

Sample

Our field sample consisted of 26 project teams, comprised of 96 individuals plus their respective team leaders from a German consulting company. The teams were responsible for providing consulting services for different companies and providing training to customers. Their tasks were interdependent, cognitive, complex, and knowledge based. Team members worked on their respective projects for about 6 months on average at the time of the survey. The team members' mean age was 32 years (SD = 2.85, range 27–39) and the mean organizational tenure was 2.31 (SD = 1.81); the team leaders' mean age was 36 years (SD = 3.18, range 33–42) and the mean organizational tenure was 4.52 (SD = 2.28). Gender was mostly male for both team members and leaders.

Measures

Team leaders rated their teams' performance and team members rated their teams' shared leadership, and team coordination, their own age and other control variables. The questionnaire was administered in German. Items in English

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language were translated and back-translated by different individuals to ensure content validity across languages (Welch & Piekkari, 2006).

Shared leadership was assessed with the questionnaire by Hoch et al. (2010), which measured both shared leadership (collective leadership, which is performed by team members) and vertical leadership (hierarchical leadership by supervisor) in terms of transformational, transactional, directive, empowering, and aversive leadership behaviors. Each, transformational, transactional, directive, empowerment of teams and empowerment of individuals, and aversive leadership were measured with 4–6 items each. In sum, this short questionnaire contained 26 items each to measure shared leadership and vertical leadership and has demonstrated excellent scale and measurement quality (Hoch, Dulebohn, & Pearce, 2010). Team members answered both items on shared leadership and vertical leadership. The Cronbach alpha of the combined scales was .85 for shared leadership (and .82 for vertical leadership), although in the present analysis we only used the shared leadership items. The full questionnaire is presented in the Appendix.

To pretest the discriminant validity of the instrument, we conducted confirmatory factor analyses to check whether the theoretically expected factor structure (for both vertical leadership and shared leadership) showed a satisfactory fit to the data (Bentler, 1990; Hu & Bentler, 1999). With respect to our measurement model, we obtained satisfactory fit, for both the hierarchical model ($\chi^2/df = 1.10$, CFI = .96, RMSEA = .04) as well as the hierarchical model with aggregated subscales ($\chi^2(46) = 57.79$, *n.s.*, $\chi^2/df = 1.26$, CFI = .91, but RMSEA = .10). Both, and in particular the model with the aggregated subscales, showed a significantly better fit than the single-factor model (one factor: $\chi^2(780) = 2352.78$, $\chi^2/df = 3.02$, CFI = .00, RMSEA = .17, $\Delta\chi^2(734) = 2294.99$, $p < .001$) or the two-factor model (two factors: $\chi^2(740) = 1661.10$, $\chi^2/df = 2.252$, CFI = .41, RMSEA = .14, $\Delta\chi^2(694) = 1603.31$, $p < .001$), thus diminishing concerns about common method variance effects (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). We further calculated the within-team consistencies (of *rwg*s and ICC) (James, 1982; James, Demaree, & Wolf, 1993). With an average *rwg* of .78 (James, 1982; James et al., 1993), as well as an ICC(1) of .32 and an ICC(2) of .70 aggregation of the data was thus justified and we conducted our main analyses at the team level of analysis of the data.

Age Diversity

Following Harrison and Sin (2005) we used the standard deviation (*SD*) to measure age diversity. Specifically, following Harrison and Klein's (2007, p. 1202) discussion, we measured variety rather than separation type of diversity, using the information/decision making perspective than social categorization approach; However, since Harrison and Klein (2007) do not give a continuous equivalent for a measure of variety, and Harrison and Sin (2005) suggested *SD* is best approach in cases like ours, we decided to use this measure (Harrison & Klein, 2007; Harrison & Sin, 2005). Thus, we computed from the *SD* in age of each team member aggregated to the team level, as a measure of age diversity in teams.

Coordination was measured with four items adapted from Lewis (2003). An example of one of the items was: "Our team coordinates its efforts well." The Cronbach alpha was .86. The *rwg* of this variable was .91 suggesting that there exists strong enough agreement among the team respondents, and therefore it is appropriate to aggregate coordination at the team level.

Performance Ratings

The leaders of the teams were asked to rate the performance of their teams 6–8 weeks after the team members responded to questionnaires on age, team coordination, and leadership. Performance ratings were obtained on a scale (0–100%), which was developed following Hoegl and Gemuenden (2001, see: Hoch, 2007), and ratings were comprised of the quantity of performance, quality of performance, and budget performance, as well as the overall performance of the team. The Cronbach alpha was .82.

Control Variable

We included mean organizational tenure of the team members as a control variable. Since there was almost no variance with regard to gender we did not include it as a control variable.

Analysis

We ran moderated two-way and three-way interactions, as described by Cohen and Cohen (1983), and used centered predictor variables (Aiken & West, 1991). In all analyses we controlled for the mean organizational tenure of the team members. Further, we conducted slope tests and slope difference tests (Dawson & Richter, 2006) in order to test our specific hypotheses.

Prior to conducting our main analysis, because of our relatively small sample size, we ran several pre-analyses to examine the quality of the data (Tabachnik & Fidell, 2001, 2006). For small sample sizes, the presence of one or more outliers may skew the results considerably. To test for outliers, we used several different procedures. First, we produced a scatter plot of shared leadership and performance, identifying the positions of the different teams, and drawing on the predicted regression lines. The scatter plots indicated that there were no outliers skewing our results as the positions of the teams were close to the predicted regression line.

Second, we used the SPSS standard procedure to detect outliers with > 3 and 2 and 1 *SD*. Again we found no outliers with > 3 *SD*, and there were no outliers with > 2 *SD*. However, there were three teams that had scores above 1 *SD*, which further supported the natural range and quality of our data. Third, we calculated Cook's distance.

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Table 1. Correlation of study variables (*M* = mean score, *SD* = standard deviation, correlation = pearson correlation coeff.)

	M	*SD*	1	2	3	4	5	6	7
1. Age	31.94	2.85	–						
2. Gender[a]	1.09	.18	−.32	–					
3. Tenure, organization	2.31	1.81	.39*	−.21	–				
4. Shared leadership	3.86	.29	−.13	.38*	.28	–			
5. Age *SD*	4.42	3.27	.72*	−.24	.18	−.17	–		
6. Coordination	4.12	.34	−.12	.50*	.30	.67**	−.30	–	
7. Team performance	91.11	7.27	.19	−.06	.22	.23†	.44*	.09	–

Note. $N = 26$ Teams,
†$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$** (two-tailed), [a]Gender: 1 = male, 2 = female.

The results demonstrated that when calculating the full model, the majority of the team ratings varied between .01 and .65, with only one team's *F* observed (2.92) being above the critical score ($F(9, 17) = 2.49$). When analyzing the model without this one team however,[1] the results remained the same and therefore we decided to keep the larger, original sample size, in order to enhance external validity. Finally, following Tabachnik and Fidell (2006), we tested for auto-correlation of error terms. Here with TOL (tolerance score) being < .1 and variance inflation factor (VIF) not being > 10, we found further support for the quality of our data. Together these analyses indicated that our results were not skewed by outliers.

Results

Means, *SD*s, and correlations are provided in Table 1. We conducted hierarchical regression analyses to test our hypotheses. As can be seen from Table 2, our control variable of mean tenure, which we entered in the first step, was not significantly related to our outcome variables. With regard to hypothesis 1, we found a positive main effect of shared leadership on team performance ($\beta = .45$, $p < .05$). Together with age diversity ($\beta = .35$, $p < .05$), and even though there was no main effect for coordination, shared leadership explained a large amount of the variance in the dependent measure ($R^2 = .35$, *Adj.* $R^2 = .16$) and this was significant above and beyond the control variable ($F = 2.43$, $p < .10$, $\Delta R^2 = .43$, $\Delta Adj.\ R^2 = .21$). So our first hypothesis was supported.

Following, in order to test for hypotheses 2, 3, and 4 we performed moderated two- and three-way regression analyses with centralized predictor variables (Aiken & West, 1991) and computed slopes and slope differences tests (Dawson & Richter, 2006). First, for the third step in the hierarchical regression analysis, in order to test for hypotheses 2 and 3, we added the interaction term between age diversity and shared leadership and the interaction term between coordination and shared leadership (and Age Diversity × Coordination) as predictor variables. The interaction between age diversity and shared leadership ($\beta = -.44$, $p < .05$) and the interaction between coordination and shared leadership ($\beta = -.13$, $p < .05$) predicted team performance. (There was no significant effect for Age Diversity × Coordination.) However, the two interactions with $R^2 = .79$ and *Adj.* $R^2 = .59$ explained a significant amount of the variance in the dependent measure above and beyond the main effects ($F = 5.93$, $p < .05$, $\Delta R^2 = .40$, $\Delta Adj.\ R^2 = .43$).

The simple slope tests demonstrated that, as documented in Figure 1, shared leadership was positively related to team performance when age diversity was low ($b = 7.64$, $SE = .27$, $t = 28.29$, $p < .001$), while shared leadership was negatively related to team performance when age diversity was high ($b = -1.19$, $SE = .32$, $t = 3.74$, $p < .01$). With regard to coordination, as presented in Figure 2, shared leadership was positively related to team performance when coordination was low ($b = 5.87$, $SE = .27$, $t = 21.73$, $p < .001$), whereas it was negatively related when coordination was high ($b = -1.17$, $SE = .32$, $t = 3.68$, $p < .01$). Therefore, hypotheses 2a and b and 3a and b were supported.

In order to test hypothesis 4, we entered the three-way interaction of shared leadership, age diversity, and coordination in predicting team performance in the last step of the moderated hierarchical regression model. Here, with $\beta = .45$ ($p < .05$) we found a significant effect in predicting team performance. The interaction explained a significant amount of the variance in the team performance ($R^2 = .84$, *Adj.* $R^2 = .72$) and this effect was significant above and beyond the previous effects of the control variable, main effects, and two-way interactions ($F = 5.96$, $p < .05$, $\Delta\dot{R} = .09$, $\Delta Adj.\ \dot{R} = .13$).

When conducting simple slope tests, as presented in Figure 3, shared leadership was related positively to team performance when age diversity and coordination were low ($b = 13.77$, $SE = .41$, $t = 33.89$, $p < .001$), and therefore supported H4b, but was negatively related to team performance when age diversity was high and coordination was low ($b = -2.03$, $SE = .44$, $t = 4.56$, $p < .001$), and when age diversity was low and coordination was high ($b = -2.03$, $SE = .38$, $t = 5.32$, $p < .001$). When both,

[1] Results are available from the authors.

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Table 2. Moderation analysis: Shared leadership, age diversity (*SD*), and coordination predicting team performance

	Team performance		
Independent variables	R^2		*SE*
Step 1. Control variable			
Tenure (mean)	.10		3.25
R^2		.10	
Adj. R^2		−.05	
F		.18	
Step 2. Main effects			
Shared leadership	.45*		1.29
Age diversity (*SD*)	.35*		1.17
Coordination	.25†		1.79
R^2		.35	
Adj. R^2		.16	
ΔR^2		.34	
ΔAdj. R^2		.21	
F		2.43†	
Step 3. Two-way interactions			
Shared Leadership × Age Diversity (*SD*)	−.44*		1.52
Shared Leadership × Coordination	−.51*		.93
Age Diversity (*SD*) × Coordination	−.13		2.12
R^2		.75	
Adj. R^2		.59	
ΔR^2		.40	
ΔAdj. R^2		.43	
F		5.93*	
Step 4. Three-way interaction Shared Leadership × Age Diversity (*SD*) × Coordination	.45*		1.48
R^2		.84	
Adj. R^2		.72	
ΔR^2		.09	
ΔAdj. R^2		.13	
F		5.96*	

Note. $N = 26$ teams.
†$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$.

age diversity and coordination were high, shared leadership was not related to team performance ($b = -.32$, $SE = .51$, $t = .62$, n.s.), as expected according to H4a.

Finally, we conducted slope differences tests for the three-way interaction following Dawson and Richter (2006). Here we found, as expected, that the high/high and low/low values of the moderators differed significantly ($b = -14.08$, $SE = .66$, $t = 21.23$, $p < .001$) with regard to their influence on the shared leadership-team performance relationship. Further we found that, in line with our expectations, all the other moderator conditions differed significantly from each other and all were significant at $p < .001$ with the exception of one. The only slope difference, which, as expected, was not significant was between high coordination/ low diversity and low coordination/ high diversity, with $b = .00$, $SE = .78$, $t = .00$, n.s. This added further support to our H4.

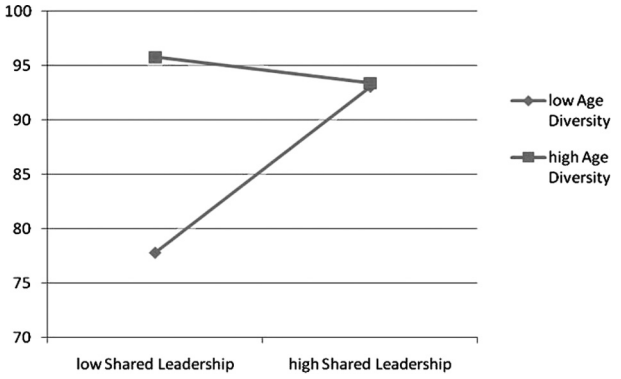


Figure 1. Shared leadership and age diversity predicting team performance.

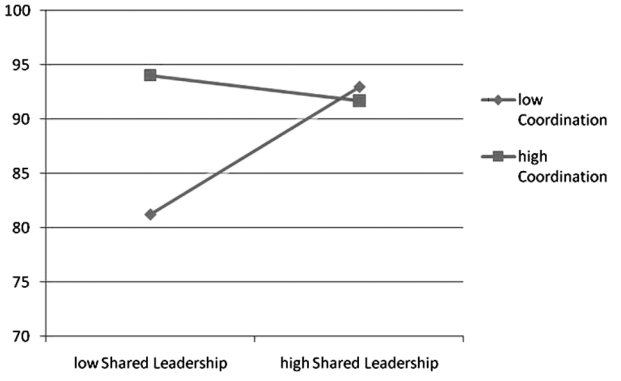


Figure 2. Shared leadership and coordination predicting team performance.

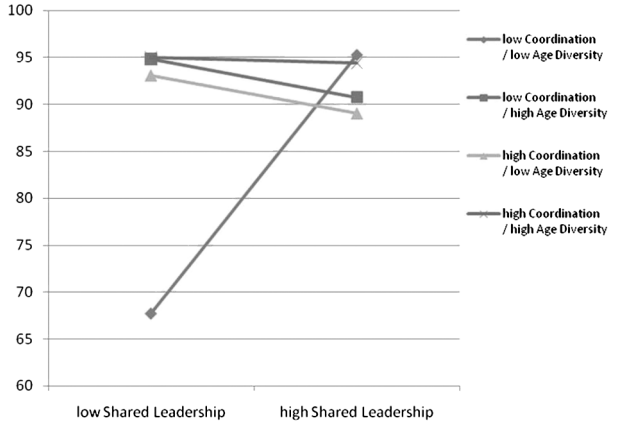


Figure 3. Shared leadership, age diversity, and coordination predicting team performance.

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Discussion

The goal of the present study was to explore the moderators of shared leadership. Specifically, we examined the moderating roles of age diversity and coordination, and their combined influence on the relationship between shared leadership and team performance. Because research has previously neglected the possible interactions of shared leadership, age diversity, and team coordination, we assumed that insight could be gained by jointly examining these three factors. In addition, we investigated the effects of shared leadership in a sample of German work teams.

First, we found that with regard to cross-cultural stability (in addition to the other main effects) shared leadership (with $\Delta R^2 = .34$, $\Delta Adj.R^2 = .21$) explained a significant amount of the variance in the team performance ratings by the team leaders. Thus our results extend prior research by showing that shared leadership enhances team performance in cultures other than the US (Pearce, 2008). This encourages both the facilitation of shared leadership in this other context, highlights the need for training and development of shared leadership in this culture, and also highlights the importance of further intercultural comparison research in this domain.

Second, with regard to extending findings for hierarchical leadership substitutes approach (Kerr, 1977; Kerr & Jermier, 1978) toward shared leadership, we found compensating effects for both age diversity and coordination. Specifically, we found that age diversity appeared to have positive effects on team outcomes when shared leadership was low, whereas when age diversity was low, shared leadership was positively related to team performance. Similarly, with regard to coordination (Lewis, 2003), we found that coordination appeared to have positive effects on team outcomes when shared leadership was low, whereas when coordination was low, shared leadership was positively related to team performance.

Therefore, both, age diversity and coordination appeared to compensate for low levels of shared leadership in predicting team performance (Kerr, 1977; Kerr & Jermier, 1978). Conversely, high age diversity and high coordination interfered with shared leadership effects, and this was expected based on our assumption of limited cognitive resources, or conflicting usage, in those teams. In sum, our findings indicated that age diversity and coordination moderated the shared leadership and team performance relationship, according to what has been expected on the basis of leadership substitutes approach. Consequently, our findings show that shared leadership is influenced in a similar way as the more traditional hierarchical forms of leadership, with respect to the effectiveness of substitutes for leadership (Kerr, 1977; Kerr & Jermier, 1978).

Finally, the study results supported a three-way interaction, where we obtained even stronger positive effects for shared leadership in predicting team performance when both age diversity and team coordination were low; in contrast shared leadership was not related to team performance, when both age diversity and team coordination were high. Consequently, shared leadership had particularly strong effects on team outcomes, in the absence of (lack of) other positive team processes such as elaboration, or team members' prior work expertise being sufficiently coordinated (Faraj & Sproull, 2000; Kearney et al., 2009; and Lewis, 2003). These results suggest that shared leadership filled a particular need for leadership when age diversity and coordination were low, whereas the combined effects of age diversity and coordination compensated for conditions where shared leadership was low. In line with what we had expected shared leadership was not related to team outcomes when both age diversity and coordination were high, whereas there was a negative effect of shared leadership on team outcomes due to limited or conflicting usage of cognitive resources in those teams.

In sum, we thus interpret the presence of shared leadership as filling a "leadership vacuum" in conditions of low age diversity and team coordination. Therefore, shared leadership and age diversity coordination are related, but distinct team processes. In addition, shared leadership was less necessary when a range of coordination and information elaboration processes were present, but it increased in importance in conditions where those other variables were simultaneously low.

Overall, our results show different processes leading to performance gains for the present team sample: First, shared leadership was positively related to team performance *only when* both age diversity and coordination were low thereby showing that there are compensating effects. Further, shared leadership and age diversity based performance gains are independent, each being more effective when the other one is not present. Second, the negative relationship between shared leadership and team performance in case of either high age diversity or high coordination provides evidence that indeed, if both shared leadership and age diversity related expertise coordination are simultaneously present, they are likely to intervene, leading to detrimental and negative effects. Thus this further supports the notion of two independent and distinct processes. Next, the nonsignificant relationship between shared leadership and team outcomes, in case of simultaneously high age diversity and coordination, further supports this, by indicating that shared leadership is rendered "in-necessary" as soon as age diversity and expertise coordination are high (i.e., when age-diverse expertise is coordinated well via more implicit processes). Overall, our results thus add to the literature in supporting the conceptual independence of shared leadership and other kind of team processes (Kozlowski & Bell, 2003; Pearce & Conger, 2003). Since performance gains in teams are an important issue (Hackman, 2009; Steiner, 1972), our research shows that shared leadership is a distinct process that leads to higher levels of team performance, in particular when other team processes are low.

Implications

When it comes to practical implications, based on our intercultural comparisons, our results support the value for strategic shared leadership training in organizations.

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Since shared leadership is also effective in the German cultural context, the importance of generalizing shared leadership training beyond US cultural context should occur. Second, exceeding the cross-cultural comparison, we find effects for more distinct (and proximal) team characteristics. Here for shared leadership to unfold stronger effects on outcomes, homogeneity in teams (with regard to age) is more beneficial than differences. Thus, a general recommendation is that managers should focus on age similarity or managing age variation in forming teams when shared leadership is the objective with respect to team management. Those findings might potentially, but not necessarily, also translate to other forms of demographic characteristics such as different cultural or demographic background.

Future Research

Several suggestions for future research can be derived from our study. First, we suggest that future research should investigate other measures of team performance such as financial performance (Ensley et al., 2006). Second, further research might compare the effects of shared leadership on team outcomes in other cultural settings (Chen, Chen, & Meindl, 1998; Chen, Meindl, & Hunt, 1997; Hofstede, 1980; House, Javidan, Hanges, & Dorfman, 2002; Jackson, Colquitt, Wesson, & Zapata-Phelan, 2006). While we investigated the effects of shared leadership in German speaking cultural surroundings, there are still many other cultures that vary with respect to Hofstede's (1980) cultural dimensions that may lead to other results for shared leadership effects. Third, another main category of variables of interest are affective attitudes that we did not include in this study. Consequently, future research might benefit from adding applicable attitudinal variables such as measures of team identification, cohesion, commitment (Mael & Ashforth, 1992), or effects of self-efficacy and group potency on shared leadership development (Bandura, 1997; Guzzo & Shea, 1992). Inclusion of these variables would be useful in possibly further explaining the effect of shared leadership on team performance that was evident in our sample and analyses.

Limitations

Regarding limitations of this research, several things should be noted. First, this study was based on cross-sectional data and therefore, as with cross-sectional data in general, this precludes a determination of causality. Consequently, we encourage future researchers to conduct longitudinal studies of the relationships examined in this study. Second, our results are based on a sample of 26 consultant project teams, or 96 individuals, which can be considered a relatively small sample size, in particular since we ran analyses on the group level. Despite being similar to a range of other team samples found in the empirical literature, such as Baranski, Thompson, Lichacz, Pastò, and Pigeau (2007) who used 16 teams, comprising 64 adults, Driskell, Salas, and Hughes' (2010) work that included 20 teams, comprising 40 students in two-person teams, and Entin and Serfaty (1999) who organized 59 participants into 12 teams, our sample size is similarly small. Thus, the small sample size could have negative consequences with regard to the generalizability of the results and may limit the external validity of the findings. However, as our sample is similar to that of those and other studies frequently found in the literature and comprises "real-life" field teams, rather than the often used student samples in experimental settings, we feel that confidence can be placed in the findings. Ultimately, criteria for evaluating research results should be the newness and innovativeness of the findings, whether they are theoretically grounded and empirically solid, and whether they make a contribution to the literature. Nevertheless, we encourage future researchers to attempt to use larger samples in field settings when studying teams.

Next, our sample of consultant project teams was somewhat limited with respect to age range, which might limit external validity with respect to different work settings, or more age heterogeneous workplaces since this may have an impact on values and norms, and attitudes, and other organizationally relevant variables. Therefore, future research that samples other populations, which are broader in age range, could extend this study's results with respect to external validity. This also relates to variables other than age, such as gender, or tenure, or cultural background. Finally, our study design included performance ratings, but no "objective" performance measures, such as company growth indicators or revenue sales. Therefore, we encourage researchers to continue the examination of the role of age diversity, coordination, and shared leadership on other organizational relevant outcomes and performance indicators.

Conclusion

In conclusion, this study provides initial evidence that the shared leadership and team performance relationship are more complicated than simply a direct effects relationship. Our investigation of several moderators provides insight into conditions that better explain the relationship. In addition to two-way interactions, the support for a three-way interaction suggests that moderators of the relationship interact to further explain the relationship. The results of this study should encourage researchers to continue investigation on the conditions under which shared leadership operates to positively affect team performance.

References

Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions*. Thousand Oaks, CA: Sage.

Ancona, D. G., & Caldwell, D. F. (1992). Bridging the boundary: External process and performance in organizational teams. *Administrative Science Quarterly, 37*, 634–665.

Avolio, B. J., Jung, D. I., Murry, W., & Sivasubramaniam, N. (1996). Building highly developed teams: Focusing on shared leadership processes, efficacy, trust, and performance.

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Advances in Interdisciplinary Studies of Work Teams, 3, 173–209.

Avolio, B. J., Sivasubramaniam, N., Murry, W. D., Jung, D., & Garger, J. W. (2003). Assessing shared leadership: Development and preliminary validation of a team multifactor leadership questionnaire. In C. L. Pearce & J. A. Conger (Eds.), *Shared leadership: Reframing the how's and why's of leadership* (pp. 143–172). Thousand Oaks, CA: Sage.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York, NY: Freeman.

Baranski, J. V., Thompson, M. M., Lichacz, F. M. J., Pastò, L., & Pigeau, R. A. (2007). Effects of sleep loss on team decision making: Motivational loss or motivational gain? *Human Factors, 49*, 646–660.

Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin, 107*, 238–246.

Bowers, C. A., Pharmer, J. A., & Salas, E. (2000). When member homogeneity is needed in work teams – A meta-analysis. *Small Group Research, 31*, 305–327.

Bowers, D. G., & Seashore, S. E. (1966). Predicting organizational effectiveness with a four-factor theory of leadership. *Administrative Science Quarterly, 11*, 238–263.

Brown, M. E., & Gioia, D. A. (2002). Making things click, distributive leadership in an online division of an offline organization. *The Leadership Quarterly, 13*, 397–419.

Cannon-Bowers, J. A., Salas, E., & Converse, S. A. (1993). Shared mental models in expert team decision making. In N. J. Castellan Jr (Ed.), *Individual and group decision making: Current issues* (pp. 221–246). Hillsdale, NJ: Erlbaum.

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*, 1217–1234.

Chen, C. C., Chen, X. P., & Meindl, J. R. (1998). How can cooperation be fostered? The cultural effects of individualism-collectivism. *Academy of Management Review, 23*, 285–304.

Chen, C. C., Meindl, J. R., & Hunt, R. G. (1997). Testing the effects of vertical and horizontal collectivism: A study of reward allocation preferences in China. *Journal of Cross-Cultural Psychology, 28*, 44–70.

Cohen, J., & Cohen, P. (1983). *Applied multiple regression/correlation analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.

Cox, J. F., Pearce, C. L., & Perry, M. (2003). Toward a model of shared leadership and distributed influence in the innovation process: How shared leadership can enhance new product development team dynamics and effectiveness. In C. L. Pearce & J. A. Conger (Eds.), *Shared leadership: Reframing the Hows and Whys of leadership* (pp. 48–68). Thousand Oaks, CA: Sage.

Dawson, J. F., & Richter, A. W. (2006). Probing three-way interactions: The development and application of a slope difference test. *Journal of Applied Psychology, 91*, 917–926.

Day, D. V., Gronn, P., & Salas, E. (2004). Leadership capacity in teams. *Leadership Quarterly, 15*, 857–880.

Day, D. V., Gronn, P., & Salas, E. (2006). Leadership in team-based organizations: On the threshold of a new era. *Leadership Quarterly, 17*, 211–216.

Driskell, J. E., Salas, E., & Hughes, S. (2010). Collective orientation and team performance: Development of an individual differences measure. *Human Factors, 52*, 316–328.

Ensley, M. D., Hmieleski, K. M., & Pearce, C. L. (2006). The importance of vertical and shared leadership within new venture top management teams: Implications for the performance of startups. *Leadership Quarterly, 17*, 217–231.

Entin, E., & Serfaty, D. (1999). Adaptive team coordination. *Human Factors, 41*, 312–325.

Faraj, S., & Sproull, L. (2000). Coordinating expertise in software development teams. *Management Science, 46*, 1554–1568.

Gibb C. A. (Ed.). (1954). *Leadership* (Vol. 2). Reading, MA: Addison-Wesley.

Gronn, S. (2000). Distributed properties: A new architecture for leadership. *Educational Management and Administration, 28*, 317–338.

Gronn, S. (2002). Distributed leadership as a unit of analysis. *Leadership Quarterly, 13*, 423.

Gunderjahn, T. (2005). *Das globalisierte Altern. Eine kritische Darstellung zu den Ursachen und den Folgen der demographischen Entwicklung* [The globalized aging: A critical reflection on antecedents and consequences of demographic change]. Munich, Germany: Grin-Publishers.

Guzzo, R. A., & Shea, G. P. (1992). *Group performance and intergroup relations in organizations* (Vol 3, 2nd ed.). Palo Alto, CA: Consulting Psychologists Press.

Hackman, J. R. (2009). Why teams don't work. *Harvard Business Review*, 98–105.

Harrison, D. A., & Klein, K. J. (2007). What's the difference? Diversity constructs as separation, variety, or disparity in organizations. *Academy of Management Review, 32*, 1199–1228.

Harrison, D. A., & Sin, H.-S. (Eds.). (2005). *What is diversity and how should it be measured?* London, UK: Sage Publications.

Hoch, J. E. (2007). *Verteilte Führung in virtuellen Teams: Zum Einfluss struktureller, interaktionaler und teambasierter Führungstechniken auf den Teamerfolg* [Distributed leadership in virtual teams: The impact of structural, interactive, and team-based leadership on team success]. Germany: University of Kiel, Unpublished doctorial dissertation. http://eldiss.uni-kiel.de/macau/servlets/MCRFileNodeServlet/dissertation_derivate_00002122/dissertationsschrift_julia_hoch.pdf?hosts.

Hoch, J. E. (in press). Distributed leadership in virtual teams. *Human Resource Management Review*.

Hoch, J. E., Dulebohn, J. H., & Pearce, C. L. (2010). Shared leadership questionnaire (SLQ): Developing a short scale to measure shared and vertical leadership in teams. In *Visual Presentation SIOP 2010*. Atlanta, USA.

Hoegl, M., & Gemuenden, H. G. (2001). Teamwork quality and the success of innovative projects: A theoretical concept and empirical evidence. *Organization Science, 12*, 435–449.

Hofstede, G. (1980). *Culture's consequences: International differences in work-related values*. Beverly Hills, CA: Sage.

House, R., Javidan, M., Hanges, P., & Dorfman, P. (2002). Understanding cultures and implicit leadership theories across the globe: An introduction to project GLOBE. *Journal of World Business, 37*, 3–10.

Hu, L., & Bentler, P. M. (1999). Cutoff criterion for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6*, 1–55.

Illgen, D. R., Hollenbeck, J. R., Johnson, B. T., & Jundt, D. (2005). Teams in organizations: From I-P-O models to IMOI models. *Annual Review of Psychology, 56*, 517–544.

Jackson, S. E. (1992). Team composition in organizational settings: Issues in managing a diverse work force. In S. Worchel, W. Wood & J. Simpson (Eds.), *Group process and productivity* (pp. 138–176). Newbury Park, CA: Sage.

Jackson, C. L., Colquitt, J. A., Wesson, M. J., & Zapata-Phelan, C. P. (2006). Psychological collectivism: A measurement validation and linkage to group member performance. *Journal of Applied Psychology, 91*, 884–899.

Jackson, S. E., Joshi, A., & Erhardt, N. L. (2003). Recent research on team and organizational diversity: SWOT analysis and implications. *Journal of Management, 29*, 801–830.

 © 2010 Hogrefe Publishing

Jackson, S. E., May, K. E., & Whitney, K. (1995). Understanding the dynamics of diversity in decision-making teams. In R. A. Guzzo & E. Salas (Eds.), *Team effectiveness and decision making in organizations* (pp. 204–261). San Francisco, CA: Jossey-Bass.

James, L. R. (1982). Aggregation bias in estimates of perceptual agreement. *Journal of Applied Psychology, 67*, 219–229.

James, L. R., Demaree, R. G., & Wolf, D. (1993). r_{wg}: An assessment of within-group interrater agreement. *Journal of Applied Psychology, 78*, 306–309.

Katz, R., & Kahn, R. L. (1978). *The social psychology of organisations*. New York, NY: Wiley.

Kearney, E., Gebert, D., & Voelpel, S. C. (2009). When and how diversity benefits teams: The importance of team members' need for cognition. *Academy of Management Journal, 52*, 581–598.

Kerr, S. (1977). Substitutes for leadership: Some implications for organizational design. *Organization and Administrative Sciences, 8*, 135–146.

Kerr, S., & Jermier, J. M. (1978). Substitutes for leadership: Their meaning and measurement. *Organizational Behavior and Human Performance, 22*, 375–403.

Kerschreiter, R., Mojzisch, A., Schulz-Hardt, S., Brodbeck, F. C., & Frey, D. (2003). Informationsaustausch bei Entscheidungsfindung in Gruppen: Theorie, Empirie und Implikationen für die Praxis. In S. Stumpf & A. Thomas (Eds.), *Teamarbeit und Teamentwicklung* (pp. 85–118). Göttingen, Germany: Hogrefe.

Kozlowski, S. W. J., & Bell, B. S. (2003). Work groups and teams in organizations. In W. C. Borman, D. R. Ilgen & R. J. Klimoski (Eds.), *Comprehensive handbook of Psychology: Industrial and organizational Psychology* (pp. 333–375). New York, NY: John Wiley.

Kraut, R. E., & Streeter, L. A. (1995). Coordination in software development. *Communications of the ACM, 38*, 69–81.

Kronberger, R. (2004). *Der demographische Wandel und das Wirtschaftssystem* [Demographic change and school systems]. Wien: Arbeitsgemeinschaft für Wirtschaft und Schule.

Lewis, K. (2003). Measuring transactive memory systems in the field: Scale development and validation. *Journal of Applied Psychology, 88*, 587–604.

Mael, F., & Ashforth, B. E. (1992). Alumni and their alma mater: A partial test of the reformulated model of organizational identification. *Journal of Organizational Behavior, 13*, 103–123.

Milliken, F. J., & Martins, L. L. (1996). Searching for common threads: Understanding the multiple effects of diversity in organizational groups. *Academy of Management Review, 21*, 402–433.

Morgeson, F. P. (2005). The external leadership of self-managing teams: Intervening in the context of novel and disruptive events. *Journal of Applied Psychology, 90*, 497–508.

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*, 5–39.

Nidumolu, S. (1995). The effect of coordination and uncertainty on software project performance: Residual performance risk as an intervening variable. *Information Systems Research, 6*, 191–219.

Pearce, C. L. (2008). Follow the leaders. *Wall Street Journal – Eastern Edition, 252*, R8.

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

Pearce, C. L., & Sims, H. P. Jr. (2002). Vertical versus shared leadership as predictors of the effectiveness of change management teams: An examination of aversive, directive, transactional, transformational, and empowering leader behaviors. *Group Dynamics: Theory, Research, and Practice, 6*, 172–197.

Pearce, C. L., Yoo, Y., & Alavi, M. (2004). Leadership, social work and virtual teams: The relative influence of vertical versus shared leadership in the nonprofit sector. In R. E. Riggio, S. Smith-Orr & J. Shakely (Eds.), *Improving leadership in nonprofit organizations* (pp. 180–204). San Francisco, CA: Jossey-Bass.

Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology, 88*, 879–903.

Schirrmacher, F. (2004). *Das Methusalem-Komplott*. München: Blessing.

Seers, A. (2000). *Leadership in self-directed work teams: Toward a role making analysis of leadership emergence*. Paper presented at the SIOP, New Orleans, LA.

Steiner, I. V. (1972). *Group processes and productivity.* San Diego, CA: University Press.

Tabachnik, B. G., & Fidell, L. S. (2001;2006). *Using multivariate statistics*. Boston: Allyn & Bacon.

Tajfel, H., & Turner, J. C. (1986). The social identity theory of intergroup behaviour. In S. Worchel & W. G. Augustin (Eds.), *Psychology of intergroup relation* (pp. 7–24). Chicago, IL: Nelson-Hall.

The Economist (2006). Special report: The aging workforce. February 18, 2006.

van Knippenberg, D., De Dreu, C. K. W., & Homan, A. C. (2004). Work group diversity and group performance: An integrative model and research agenda. *Journal of Applied Psychology, 89*, 1008–1022.

van Knippenberg, D., & Schippers, M. C. (2007). Work group diversity. *Annual Review of Psychology, 58*, 515–541.

Welch, C., & Piekkari, R. (2006). Crossing language boundaries: Qualitative interviewing in international business. *Management International Review, 46*, 417–438.

Williams, K. Y., & O'Reilly, C. A. (1998). Demography and diversity in organizations: A review of 40 years of research. *Research in Organizational Behavior, 20*, 77–140.

Julia Elisabeth Hoch

Michigan State University
Human Resources and Labor Relations
426 South Kedzie
East Lansing
MI 48824
USA
Tel. +1 517 432-7727
Fax +1 517 432-9443
E-mail hochj@msu.edu

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Appendix

Questionnaire items used to measure shared leadership (Hoch et al., 2010).

Label	Transformational leadership
	Vision
TRF1	My team members provide a clear vision of whom and what our team is.
	Idealism
TRF2	My team members are driven by higher purposes or ideals.
	Inspirational communication
TRF3	My team members show enthusiasm for my efforts.
	Intellectual stimulation
TRF4	My team members encourage me to rethink ideas which had never been questioned before.
TRF5	My team members seek a broad range of perspectives when solving problems.
	Performance expectations
TRF6	My team members encourage me to go above and beyond what is normally expected of one (e.g., extra effort).
	Transactional leadership
TRK1	My team members and me have clear agreements and stick to those when we work together.
	Material rewards
TRK2	If I perform well, my team members will recommend more compensation.
	Personal rewards
TRK3	My team members give me positive feedback when I perform well.
TRK4	My team members give me special recognition when my work performance is especially good.
	Directive leadership
	Participative goal setting
PART1	My team members decide on my performance goals together with me.
PART2	My team members and I work together to decide what my performance goals should be.
PART3	My team members and I sit down together and reach agreement on my performance goals.
PART4	My team members work with me to develop my performance goals.
	Empowerment (individual)
	Independent action
EMP-IND-1	My team members encourage me to search for solutions to my problems without supervision.
EMP-IND-2	My team members urge me to assume responsibilities on my own.
	Self-development
EMP-IND-3	My team members encourage me to learn new things.
	Self-reward
EMP-IND-4	My team members encourage me to give myself a pat on the back when I meet a new challenge.
	Empowerment (team)
	Teamwork
EMP-TEA-1	My team members encourage me to work together with other individuals who are part of the team.
EMP-TEA-2	My team members advise me to coordinate my efforts with other individuals who are part of the team.
EMP-TEA-3	My team members urge me to work as a team with other individuals who are part of the team.
EMP-TEA-4	My team members expect that the collaboration with the other members in the team works well.
	Aversive leadership
	Intimidation
AVERS-1	My team members try to influence me through threat and intimidation.
AVERS-2	I feel intimidated by my team members' behavior.
AVERS-4	My team members can be quite intimidating.
	Reprimand
AVERS-3	When my work is not up to par, my team members point it out to me.

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