Evidence for the Dispersed Leadership Theory in Teams: A Policy-Capturing Study

Udo Konradt
Yvonne Garbers
Julia Hoch
Thomas Ellwart
Evidence for the Dispersed Leadership Theory in Teams: A Policy-Capturing Study

Udo Konradt
Yvonne Garbers
Julia Hoch
Thomas Ellwart
Abstract

Based on the Dispersed Leadership Theory in Teams, we examined the simultaneous influence of three factors on team members’ attitudes and behavior: (1) interactional leadership carried out by leaders, (2) team leadership performed by team members, and (3) structural leadership exerted by work and organizational structures. Results from two policy-capturing studies revealed that structural, interactional and team leadership simultaneously affect an individual’s behavior in terms of task behavior, task performance and commitment. Results also indicated that the need for dispersed leadership was particularly high in situations with high task uncertainty and where the learning of new task behavior was required. Results from Study 2 further demonstrated the positive relationship between interactional leadership, team leadership, and structural leadership with team members’ task performance and commitment. Taken together, these findings provide evidence for the Dispersed Leadership Theory in Teams which showed a way to structure and extend future leadership research.

Keywords: Distributed leadership, structural leadership, interactional leadership, team leadership, policy-capturing
Evidence for the Dispersed Leadership Theory in Teams: A Policy-Capturing Study

In leadership research there is a longstanding tradition to conceive leadership as a dyadic and reciprocal process which takes place between superior and subordinate within an organization (Bass & Avolio, 1993; Pearce & Conger, 2003). However this view needs to be re-conceptualized for the following reasons. First, the prevalence of teamwork in today's working environment has directed our attention to team leadership (Kozlowski, Gully, Salas, & Cannon-Bowers, 1996; Zaccaro, Rittman, & Marks, 2001) and different types of vertical and shared leadership (e.g., House & Aditya, 1997; Mohrman, Cohen, & Mohrman, 1995; Pearce, 1997; Pearce & Sims, 2002). Burke, Stagl, Klein, Goodwin, Salas and Halpin (2006) argue that the traditional definitions mainly neglect the mutual influence of team members. Second, new and compelling types of teamwork such as empowered, autonomous and self-managed teams require more extensive models of leadership. Pearce and Manz (2005) describe this as “the silver bullets for the dawn of a new era of leadership” (p. 133). Similarly, Cordery, Morrison, Wright and Wall (2010) suggested that empowered and autonomous teams have been proposed as a possibility to manage uncertain situations. Third, new forms of teamwork are required because there is a high degree of dispersed time and space as well as new forms of communication in the modern work environment (Bell & Kozlowski, 2002). The implementation of virtual teams or other geographically distributed teams have led to distributed forms of work that also require new forms of leadership (e.g., e-leadership; Avolio, Kahai, & Dodge, 2001). Together, these misgivings demonstrate that traditional conceptions of leadership are insufficient and need to be improved.

These gaps are somewhat surprising because the idea of other forms of leadership is not new but has been ignored in favor of the dyadic process (Ensley, Pearson, & Pearce, 2003). Researchers have adopted team-based approaches to leadership (Shamir, 1999) such as shared leadership (Pearce & Conger, 2003), collective leadership (Shamir, 1999), delegated and peer leadership (House & Aditya, 1997), which assume that leadership is performed collectively by members within a team. The concept of distributed leadership (House & Aditya, 1997; Gronn, 2002) also involves the idea that leadership is distributed across different instances or agents within an organization (see Day, Gronn, & Salas, 2004; Carson, Tesluk, & Marrone, 2007, for reviews). However, these concepts do not reflect aspects of leadership which are formed by contextual or situational factors regarding the task and organization. Empirical evidence supported the influence of situational factors on motivation and behavior (see Vroom & Jago, 2007, for an overview). Based on these ideas, we provide
evidence for a theory which assumes a broader understanding of leadership by investigating a three factor model of dispersed leadership.

The purpose of this research is to provide empirical evidence for the Dispersed Leadership Theory in Teams (i.e., DLT, Konradt, 2011) which assumes three styles of leadership which simultaneously influence individual attitudes and behavior: interactional leadership exerted by leaders, team leadership provided by team members, and structural leadership in a work and organizational context (i.e., task, organizational structures, and customers). The DLT integrates different leadership approaches (i.e. shared leadership, Pearce & Conger, 2003; distributed leadership, Gronn, 2002; and team leadership, Hackman & Walton, 1986) and techniques in one theory to determine simultaneous effects of leadership dispersion. In addition, the theory enhances previous leadership theories by adding a further leadership source of influence that is derived from situational leadership theories (Vroom & Jago, 2007). By the combination of different well established styles of leadership (e.g., structural, interactional and team leadership) the DLT is a promising model especially in very task specific situations often found in practice. In this case the reduced leadership influence of one source could be compensated by the other two sources. This paper presents evidence that DLT is beneficial in tasks with high environmental uncertainty and learning (vs. routine) assignments. In Study 1, we examined organizational conditions (i.e. task uncertainty, task behavior, work domain, and work experience) influencing the need for dispersed leadership (i.e. three simultaneously effective styles of leadership. Study 2 examined the main assumption of the DLT, suggesting that each of the three leadership styles explains a unique part of the variance within behavior and attitudes. Figure 1 summarized our research model for both studies. To address these issues, we use a policy-capturing design that allows for causal inferences regarding the hypothesized effects which have been used in various leadership research fields (e.g., Ensari & Murphy, 2003; Nuttall, 2004; Powell, Butterfield, Alves, & Bartol, 2004).
Overview of the Research Model and Variables Included in the Two Studies with the Three Leadership Styles of the Dispersed Leadership Theory as the central variables for both studies.

Notes. In Study 1 the three leadership styles were used as the dependent variables; for Study 2, the three leadership styles were used as independent variables.

Theoretical Background

While there are theoretical advances in leadership theory building, leadership research and theories predominately focus on the processes between leader and follower. Given this theoretical restriction to vertical or interactional leadership, researchers recently proposed forms of horizontal leadership, including team leadership (Hackman & Walton, 1986), shared leadership (Pearce & Conger, 2003; Shamir, 1999; Sivasubramaniam, 2002) and distributed leadership (House & Aditya, 1997; Gronn, 2002). In general, theories on distributed as well as
shared leadership conceptualize leadership as a set of practices that can be enacted by people at all organizational levels. This conceptualization contrasts traditional leadership theories focusing on sets of personal characteristics and attributes possessed by people in top positions (Badaracco, 2001; Kouzes & Posner, 2002). Both distributed and shared leadership focus the leadership of teams. Team leadership is defined as “not concentrated in the hands of a single person or a small group, but divided and performed collectively by many if not all team members simultaneously or sequentially” (Shamir, 1999, p. 50). Therefore theories of team leadership enhanced distributed and shared leadership in respect to how leadership in a team can be shared. In support, Carson et al. (2007) argue that the existing research on team leadership largely neglected the leadership provided by team members (Kozlowski & Bell, 2003).

The DLT (Konradt, 2011) combines aspects of distributed and shared leadership and enhances these theories with structural leadership as a third source of leadership influence. In this context, Konradt (2011) defines leadership in terms of distribution across three styles of leadership as “a pattern of conjoint personal and situational influence of employees which is exerted by the leader, by team members, and by the organizational management. This is intended to guide, structure, and facilitate personal choice, stabilization, and modification of attitudes and behaviors in a working team.” (p. 4). In this definition, the leader, the team and the organization are distinct and equal instances of leadership which use different techniques to influence individuals in teams. Thus, leadership may be distributed across different instances within an organization, such as structural, interactional or team leadership (e.g., distributed leadership; Gronn, 2002; House & Aditya, 1997; Brown & Gioia, 2004), but it might be collectively performed within a team (e.g., shared leadership; Pearce & Conger, 2003; Shamir, 1999).

More in detail, distributed leadership (Gronn, 2002, 2003) focuses on the different instances that constitute leadership. Distributed leadership conceives leadership as being distributed across different instances of leadership including superior based leadership (e.g., managerial leadership, Bowers & Franklin, 1977), and team leadership (Pearce & Conger, 2003; Shamir, 1999; Sivasubramaniam, 2002). Distributed leadership suggests that leadership is performed by different agents at different hierarchies (Gronn, 2002; House & Aditya, 1997) because leadership is needed at different levels within the organization (Brown & Gioia, 2002; McAdam, 2002). Ensley et al. (2006) argue that in top management teams, two potential sources of leadership exist: the vertical leader and the team. The influence of the leader has been studied in different ways (Gerstner & Day, 1997; Schriesheim, Tepper, & Tetrault, 1994) in contrast to the team as a second source of leadership (Burke, Fiore, & Salas, 2003; Gronn, 2003; Pearce & Conger, 2003).
Focusing on the team, the concept of shared leadership has to be considered (see Day, Gronn, & Salas, 2006, for a review). Shared leadership emphasizes a process of upward, downward, and lateral leadership by the team. Thus, team leadership should not be conceptualized as a centralized downward influence on subordinates and an appointed leader (Pearce & Conger, 2003). The concept stresses the importance of leadership being shared among team members. Thus, leadership is collectively performed by many or all members of a team who conjointly undertake leadership functions (Yukl, 1999). There is consistent evidence that shared leadership is positively related to self-reported ratings of effectiveness (Avolio, Jung, Murra, & Sivasubramaniam, 1996) in conventional teams (Ensley, Hmieleski, & Pearce, 2006; Pearce & Sims, 2002) and virtual teams (Pearce, Yoo, & Alavi, 2004).

Though the significance of situational factors and their influence on the impact of shared leadership (Pearce, 2004) were addressed by different theoretical approaches (i.e., contingency model, Fiedler, 1967; path-goal theory, Evans, 1970; House, 1971; House & Dessler, 1974; House & Mitchell, 1974; normative and descriptive models, Vroom, 2000; Vroom & Jago, 1988; Vroom & Yetton, 1973; see Vroom & Jago, 2007, for an overview) this has not been evidenced. Neither shared nor distributed leadership took this recommendation into account. As argued by Hackman and Wageman (2007) and Hersey and Blanchard (1982) leadership research should consider situational factors by adopting a specific leadership style. To contribute to these recommendations, the DLT integrates structural leadership as the third leadership style. According to Kerr and Jermier (1978), leadership substitutes are viewed as special styles of neutralizers that reduce a leader’s ability to influence subordinates’ attitudes, perceptions, and performance, and change a leader’s behavior on their own. Consequently, leadership approaches should attempt to discover situations that determine when leadership makes a difference (cf. Hackman & Wageman, 2007). In addition, leaders and consequences of their behavior may be affected by their environment and therefore situational characteristics shape a leader’s behavior (cf. Vroom & Jago, 2007). One leadership style may be effective in one situation but may be ineffective in another situation.

In their early approach to team leadership, the functional leadership theory, Hackman and Walton (1986) postulate that different techniques of leadership can simultaneously be effective in teams. Thus, one main assumption of the DLT is that leadership is distributed within instances of the organization. Dispersed leadership includes three styles of leadership: (1) Structural leadership as a vertical, downward and indirect form of leadership which entails of set of entities (i.e., reward systems, information and communication tools, and task autonomy) which are implemented by the management in order to exert a positive impact on subordinates’ motivation and behavior; (2) Interactional leadership as a vertical, dyadic and
reciprocal process of interaction between a formalized leader and follower which is exerted on team members by transformational and transactional leadership as well as leader-member exchange and coaching; and (3) Team leadership as a direct but horizontal style of leadership and is collectively performed leadership carried out by the entire group whereby some individuals may contemporaneously enact the same specific leader behaviors.

The theory assumes that the three styles of leadership, as multiple leadership impulses, simultaneously influence team members’ motivation and behavior. Thus, distributed leadership exists when more than one leadership style is simultaneously effective in a given situation. Dispersed leadership can be conceptualized as a consequence of actions of different instances which are separated but directly connected to each other (concertive action, Gronn, 2002). The assumption of the model is that a high amount of dispersed leadership has positive effects on team work because an ineffective leadership styles can be compensated by more leadership effort in the other two sources.

Another assumption of this model is based on the principle of equifinality (Gresov & Drezin, 1997) which refers to a characteristic in system theory (Bertalanffy, 1960) and denotes that the same results can be achieved through different processes and using different resources and methods. More precisely, equifinality assumes that different organizational leadership techniques can be equally effective in achieving high team performance (Fiss, 2007; Galunic & Eisenhardt, 1994; Gresov & Drazin, 1997).

Initial empirical evidence demonstrates the impact of the single styles of leadership on team outcome measures. In a cross-sectional study, Hoch (2007) examined the impact of the three leadership styles on team cohesion and organizational commitment. Results indicate that the model predicts organizational commitment, while structural leadership and team leadership were strong predictors of team cohesion. Therefore, empirical data provides the first encouraging evidence for the basic assumptions proposed by the DLT.

There are two main applications for dispersed leadership in organizational teams. The first application area is leadership in situations with high demands and low in job control, classified as high strain jobs (job demand-control model; Karasek, 1979). Dispersed leadership can reduce the potential stress of leadership responsibilities by distributing leadership from more than one source. Structural leadership techniques in organizations, such as reward systems and communication tools (Kerr, 1977; Kerr & Jermier, 1978; Rynes & Gerhart, 2000; Rynes, Gerhart, & Parks, 2005), are promising leadership techniques.

A second promising area of application is the leadership of virtual teams (Hertel, Geister, & Konradt, 2005; Webster & Staples, 2006), also referred to as e-leadership (Avolio, et al., 2001). Combining different styles of leadership (e.g., structural, interactional and team
leadership) the DLT is a promising model for e-leadership because reduced leadership influence of one source could be compensated by the other two sources.

Task Uncertainty, Task Behavior and Dispersed Leadership

The assumption of equifinality deserves a closer examination regarding the misgiving of empirical models (Fiss, 2007). Gresov and Drazin (1997) proposed that the investigation of equifinality requires the examination of the origin condition. Organizational conditions and leadership change while ambiguity grows (White & Shullman, 2010). To emphasize, Karakas (2009) described these organizational changes as an age of uncertainty. In addition, uncertainty is one of the new challenges that organizations and leaders have to expect and to handle (Heifetz, Grashow, & Linsky, 2009; Lloyd, 2009). As a consequence, Latham and Ernst (2006) argue that single leaders are not enough to motivate employees and therefore leadership will be distributed among people who act in a dynamic process. Although there are many definitions of uncertainty (Spender, 1986; Milliken, 1987; Van der Heijden, 1996; Sutcliffe & Zaheer, 1998) these definitions are similar in relation to the perceived influence, a lack of information and knowledge (Johnston, Gilmore, & Caron, 2008). In detail, people in uncertain environments (Wall, Cordery, & Clegg, 2002) are required to quickly adjust to changing tasks and demands. Environmental uncertainty determines the degree to which tasks, roles and responsibilities are unpredictable (Duncan, 1972). This definition states that a main characteristic of an uncertain environment relates to the task uncertainty and the task behavior.

We define task uncertainty as the uncertainty about how specific goals have to be achieved, which task-related factors can be manipulated, and which actions are appropriate to achieve these goals (Galbraith, 1973; Mintzberg & Quinn, 1991). Task uncertainty is related to complexity, diversity and the predictability of achieving tasks (Gibson, 1999; Lindsley, Brass, & Thomas, 1995; Saavedra, Earley, & Van Dyne, 1993). Previous research demonstrated that task uncertainty has a negative impact on task performance (Daft, 2001; Schoenmaker, 1993) and thus may increase a subordinate’s need for diversity of leadership. In highly uncertain environments, organizational decisions may produce many errors and mistakes, because workers cannot determine or predict which alternative is best in order to resolve a problem (Daft, 2001; Schoenmaker, 1993). In general, task uncertainty influences managerial perceptions of the environment negatively (Jauch & Kraft, 1986; Randolph & Dess, 1984) and may thus also increase the need for additional styles of leadership. Keith, Demirkan, and Goul (2010) examined the influence of task uncertainty on collaborative technology knowledge and advice network structures involving graduate students in working groups. The results indicate that an individual’s technology knowledge leads them to become more central when
Task uncertainty was high. In summary, high task uncertainty should be increased an individual's need for dispersed leadership, indicated by high values for all three leadership styles.

**Hypothesis 1:** Task uncertainty increases a subordinate's need for dispersed leadership.

Aside from task uncertainty, the required task behavior is also an aspect of an uncertain environment. Task behavior has been included in models of workplace performance in order to accurately reflect the demands of changing and uncertain work contexts (Griffin, Neal, & Parker, 2007). Organizational literature suggests that non-routine tasks (i.e., complex problem solving) are highly uncertain, and require flexible and various procedures (Galbraith, 1977; Van de Ven, Delbecq, & Koenig, 1976). For example, Faraj and Yan (2009) found that higher task uncertainty, operationalized by a lack of well-defined operational steps and routines, strengthened the relationship between team boundary work and team performance. In addition, Nidumolu (1995) found that horizontal coordination (i.e. team leadership) is more effective than vertical coordination when uncertainty in task environment is higher. Non-routine tasks are similar to task uncertainty and require adapted forms of leadership, indicated by high values for all three leadership styles.

**Hypothesis 2:** A subordinate's need for dispersed leadership is greater in learning new behavior than in correcting behavior.

The effects of task uncertainty and task behavior should not be influenced by the kind of job they are working on. Workers perceptions of the usefulness and effectiveness of the three styles of leadership should be similar in different working areas (e.g., work domain). The need for all of the three styles should be stable across work domains. Subordinates should perceive structural, interactional and team leadership as effective in order to increase their individual task performance and thus demand a comparably strong need for all three leadership styles.

In contrast to the assumed stability across work domains, a subordinate's need for leadership should vary according to increasing work experience. This assumption can be derived from motivational and learning theories (i.e., self-regulation theory, Bandura, 1991; self-management, Manz & Sims, 1980, self-leadership, Manz, 1986). Moreover, the process of achieving work experience is equal to trainings of self-regulation. Whereas interventions based on self-regulation theories include trainings regarding goal setting, self-regulation (e.g., Latham & Frayne, 1990) and coaching interventions. In detail, knowledge, skills and abilities increase as a consequence of self-monitoring whereby employees collect information about the goal pursuit and their accuracy, consistency, and frequency. In addition, self-evaluation processes lead to improved personal standards that result from comparison with
relevant others, from observational learning, or from direct training (Bandura, 1986). Finally, rewards or punishment in the period of self-reaction lead to an increase of self-efficacy, including the choice of aspiration level, perception of own performance, intensity and duration of effort, and evaluation of performance results (Bandura & Locke, 2003; Vancouver, Thompson, Tischner, & Putka, 2002). As a consequence, employees with more work experience use self-leadership and self-management to achieve or increase their personnel efficacy (Neck & Houghton, 2006). To conclude, employees with more work experience are less constrained to external leadership because of internal self-leadership techniques. In order to generalize the results we assume:

**Hypothesis 3:** A subordinate’s need for dispersed leadership will be stable across different work domains.

**Hypothesis 4:** The relationship between task uncertainty and task behavior with dispersed leadership will be moderated by an individual’s work experience in such a way that the need for dispersed leadership for individuals with more experience will be less.

**Study 1**

**Method**

**Participants**

Participants were 65 German employees. The majority of the participants were male (53.1%). Their age ranged from 19 to 58 and had an average of 30.6 years (SD = 10.0). The average amount of job experience was 9.1 years (SD = 10.1). Participants were students and apprentices (46.8%), clerks (31.2%), 6.5% were company employees 3.9% self-employed, 5.2% part-time workers, and 6.5% were unemployed.

**Materials and Design**

To explore the proposed causal effects and to identify conditions suitable for dispersed leadership, we adopted policy-capturing which is a methodology in which participants are asked to reply to a number of hypothetical scenarios which contain the experimentally manipulated independent variables as cues. Policy-capturing is a simulation-based technique that demonstrates how a person makes decisions or judgments in situations without observing persons face-to-face in a real-life context. Research has generally shown policy-capturing to be an effective method (e.g., Cable & Judge, 1994; Dineen, Noe, & Wang, 2002; Kristof-Brown, Jansen, & Colbert, 2002; Harold & Ployhart, 2008). The method of policy-capturing has already been used in various research areas including job choice (Cable
absenteeism (Martocchio & Judge, 1994), and leadership (Ensari & Murphy, 2003; Nuttall, 2004; Powell et al. 2004).

To develop realistic descriptions of the cues, we used critical incidents technique (Flanagan, 1954) with several employees with academic or professional experience. The short description of a general work situation was manipulated in the dimensions of task uncertainty (high vs. low) and task behavior (learning new behavior vs. correcting behavior). To increase the generalizability of our results and to make answers independent from specific occupational contexts, we set the scenarios in four different work domains (i.e. market research, data processing, sales department, and marketing). Two pilot studies were conducted to determine whether the scenarios were easy to understand and whether the manipulated cue levels generated the expected perceptions of the 16 scenarios (2×2×4). Independent t-tests on the mean level of leadership demonstrated statistically significant differences among the high and low levels of each cue in the expected directions. Table 1 provides an overview of the manipulated variables in the scenarios.

We used a complete crossover design in which subjects responded to all possible scenarios (cf. Graham & Cable, 2001) with the factors ‘task uncertainty’ (high vs. low), ‘task behavior’ (learning vs. correcting), and ‘work domain’ (market research vs. data processing vs. sales department vs. marketing), resulting in 16 scenarios.

Table 1

<table>
<thead>
<tr>
<th>Task Uncertainty</th>
<th>Working Context</th>
<th>Task Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High</strong></td>
<td>Data processing</td>
<td>Your current project is <strong>difficult</strong> to work on and settled in a new working field Till now you were only responsible for ... now you’re going to be responsible for the whole process</td>
</tr>
<tr>
<td>&amp;market research</td>
<td>You are working in a team in the <strong>electronic data processing department</strong> of a large company and are concerned with data acquisition You’re responsible for ... but you failed repeatedly. <strong>Now you were told to increase your output quality</strong></td>
<td></td>
</tr>
</tbody>
</table>

Table 1 provides an overview of the manipulation of variables in the scenarios with the variables ‘Task Uncertainty’ (High vs. Low), ‘Task Behavior’ (Learning vs. Correcting), and ‘Work Domain’ (Market Research vs. Data Processing vs. Sales Department vs. Marketing).
<table>
<thead>
<tr>
<th>Department</th>
<th>Description</th>
<th>Current Project</th>
<th>New Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales department</td>
<td>You are working in a team in order processing and transaction in a large company and are concerned with filling errands and taking orders</td>
<td>Your current project is easy to work on and settled in a well-known area of work</td>
<td>You're responsible for ... but you failed repeatedly. Now you were told to increase your output quality</td>
</tr>
<tr>
<td>Marketing department</td>
<td>You are working in a team in the marketing department of a large company and are concerned with different projects</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data processing</td>
<td>You are working in a team in the electronic data processing department of a large company and are concerned with data acquisition</td>
<td>Till now you were only responsible for ... now you're going to be responsible for the whole process</td>
<td></td>
</tr>
<tr>
<td>Market research</td>
<td>You are working in a team in market research and are concerned with sales orders</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note. Modified words for manipulation of variables are in bold.*
Table A1

*Results of Common Method Bias Analyses in Study 1 and Study 2*

<table>
<thead>
<tr>
<th>Construct</th>
<th>Indicator</th>
<th>R1</th>
<th>R1²</th>
<th>R2</th>
<th>R2²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Uncertainty</td>
<td>.29</td>
<td>.08</td>
<td>.61</td>
<td>.37</td>
</tr>
<tr>
<td></td>
<td>Task Behavior</td>
<td>.29</td>
<td>.08</td>
<td>.61</td>
<td>.37</td>
</tr>
<tr>
<td></td>
<td>Work domain</td>
<td>.29</td>
<td>.08</td>
<td>.27</td>
<td>.07</td>
</tr>
<tr>
<td>Structural</td>
<td>Development</td>
<td>.15</td>
<td>.02</td>
<td>.75</td>
<td>.56</td>
</tr>
<tr>
<td></td>
<td>Reward</td>
<td>.16</td>
<td>.03</td>
<td>.25</td>
<td>.06</td>
</tr>
<tr>
<td>Interactional</td>
<td>Feedback</td>
<td>.18</td>
<td>.03</td>
<td>.76</td>
<td>.58</td>
</tr>
<tr>
<td></td>
<td>Praise</td>
<td>.19</td>
<td>.04</td>
<td>.27</td>
<td>.07</td>
</tr>
<tr>
<td>Team</td>
<td>Decision</td>
<td>.16</td>
<td>.03</td>
<td>.91</td>
<td>.83</td>
</tr>
<tr>
<td></td>
<td>Support</td>
<td>.20</td>
<td>.04</td>
<td>.62</td>
<td>.38</td>
</tr>
<tr>
<td>Average</td>
<td></td>
<td>.21</td>
<td>.05</td>
<td>.62</td>
<td>.37</td>
</tr>
<tr>
<td>Study 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Structural</td>
<td>Reward</td>
<td>.05</td>
<td>.00</td>
<td>.58</td>
<td>.34</td>
</tr>
<tr>
<td></td>
<td>Autonomy</td>
<td>.08</td>
<td>.01</td>
<td>-.14</td>
<td>.02</td>
</tr>
<tr>
<td></td>
<td>Goals</td>
<td>.03</td>
<td>.00</td>
<td>-.42</td>
<td>.18</td>
</tr>
<tr>
<td>Interactional</td>
<td>Trust</td>
<td>.02</td>
<td>.00</td>
<td>-.14</td>
<td>.02</td>
</tr>
<tr>
<td></td>
<td>Praise</td>
<td>.06</td>
<td>.00</td>
<td>.58</td>
<td>.34</td>
</tr>
<tr>
<td></td>
<td>Coaching</td>
<td>.09</td>
<td>.01</td>
<td>-.44</td>
<td>.19</td>
</tr>
<tr>
<td>Team</td>
<td>Communication</td>
<td>.03</td>
<td>.00</td>
<td>.53</td>
<td>.28</td>
</tr>
<tr>
<td></td>
<td>Decision</td>
<td>.08</td>
<td>.01</td>
<td>-.14</td>
<td>.02</td>
</tr>
<tr>
<td></td>
<td>Support</td>
<td>.04</td>
<td>.00</td>
<td>-.41</td>
<td>.17</td>
</tr>
<tr>
<td>Performance</td>
<td>1</td>
<td>.04</td>
<td>.00</td>
<td>.94</td>
<td>.88</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>.04</td>
<td>.00</td>
<td>.94</td>
<td>.88</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>.04</td>
<td>.00</td>
<td>.93</td>
<td>.86</td>
</tr>
<tr>
<td>Commitment</td>
<td>1</td>
<td>.03</td>
<td>.00</td>
<td>.63</td>
<td>.40</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>.03</td>
<td>.00</td>
<td>.64</td>
<td>.41</td>
</tr>
<tr>
<td>Average</td>
<td></td>
<td>.05</td>
<td>.01</td>
<td>.29</td>
<td>.36</td>
</tr>
</tbody>
</table>

Note. $R_1 =$ Method Factor Loading; $R_2 =$ Substantive Factor Loading.

Measures

**Leadership.** We used formative indicators to measure the three leadership styles. The relevance for the behavior was measured with two items for each leadership style:

1. **Structural leadership** was measured using personnel development strategies (“You receive a training, which fits your needs”) and reward systems (“You receive performance-based rewards for successful work”).
(2) **Interactional leadership** was measured using individual feedback discussions (“Your leader speaks with you about possible problems and solutions”), commendation and acknowledgement (“Your leader commends you for your work and acknowledges your job performance”).

(3) **Team leadership** was measured using supporting behavior (“The colleagues of your team support each other during the work”) and shared decision-making in the team (“Your team makes important decisions together”).

After each scenario, the participants responded on a 6-point Likert scale ranging from ‘not important’ (1) to ‘very important’ (6) the importance of each leadership style for their behavior (“To show such a behavior it is important for me that ...”). The dependent variable was dispersed leadership, which was calculated by the mean of the standardized sum scores of the three leadership styles.

**Dispersion of Leadership.** In addition to the separate influence of the three leadership styles as indicators of dispersed leadership, we assess the amount of dispersion of leadership between the three leadership styles using an adaptation of the average deviation score (AD, Burke & Dunlap, 2002; Burke, Finkelstein, & Dusig, 1999). The AD has many advantages compared to other indices for estimating interrater agreement (Burke & Dunlap, 2002). For instance, the same metric allows relating the distribution of leadership with the leadership style (average deviation). The absolute level of distribution of leadership is indicated by the group mean score. The average deviation score is subtracted from the mean score (Ellwart, Biemann, & Rack, 2011; Ellwart & Konradt, 2007). Our measure offers a global measure for dispersion (i.e. of leadership styles) and it also enables researchers to conclude which leadership style is over- or underrepresented. Therefore it provides more information compared to other possible measures of dispersion (e.g., ICC, Shrout & Fleiss, 1979; Gini-coefficient, Gini, 1921). Other statistical measures of homogeneity, concentration or correlation, which were also possible dispersion measures, have the disadvantage of certain distribution requirements and are therefore inappropriate.

**Procedure**

Data was collected from employees from different companies who were acquainted with students of a particular course. All employees were sent a questionnaire packet, which included a cover letter explaining the purpose of the study, a questionnaire, and a postage-paid envelope. The questionnaire included 16 scenarios which were presented in randomized order to control for sequencing effects. Cue order within the scenarios remained constant for all scenarios to simplify understanding. Participants were instructed to read each scenario carefully, to identify with each situation, and report their honest reactions.
Analyses

Data was analyzed by hierarchical linear modeling (HLM; Bryk & Raudenbusch, 1992, 2002). The technique has been advocated for policy-capturing data because it allows a parsimonious examination of within- and between-person variance (Mellor, Paley, & Holzworth, 1999; Morrison & Vancouver, 2000; Judge & Bretz, 1992; Kristof-Brown, Jansen, & Colbert, 2002). In the Level 1 (within-subject) analysis, ordinary least square regression equations were calculated in which the amount of dispersed leadership in work situations with different task uncertainty ($\beta_1$) and work behaviors ($\beta_2$) varied. As a third variable, the work domain ($\beta_3$) was included in the regression equation to test whether the work situation (task uncertainty and work behavior) can explain a unique part of the variance of the dependent variable (dispersed leadership).4

Common method bias. To assess the possible influence of common method bias in our studies, we added an unmeasured latent method factor in both study models (cf. Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). We specified all manifest (indicator) variables of the models to load on the new method factor (in addition to their construct variable). To get an indicator of common method variance, we compared the explained variance of the substantive indicator and the method factor. In both studies, the average substantively explained variance of the common method factor (.05 and .01, respectively) is very much lower than the substantive factor explanation of variance (.37 and .36) (see Appendix). Therefore, common method bias is unlikely to be a concern of our studies.

Results

Descriptive statistics and correlations for the main measures are reported in Table 2.
Table 2

_Means, Standard Deviations and Correlations among Study Variables in Study 1_

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Dispersed leadership&lt;sup&gt;a&lt;/sup&gt;</td>
<td>4.05</td>
<td>0.80</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Structural leadership&lt;sup&gt;a&lt;/sup&gt;</td>
<td>3.69</td>
<td>1.15</td>
<td>.74**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Interactional leadership&lt;sup&gt;a&lt;/sup&gt;</td>
<td>4.26</td>
<td>1.01</td>
<td>.79**</td>
<td>.50**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Team leadership&lt;sup&gt;a&lt;/sup&gt;</td>
<td>4.22</td>
<td>1.16</td>
<td>.65**</td>
<td>.11**</td>
<td>.27**</td>
<td></td>
</tr>
<tr>
<td>5 Task uncertainty&lt;sup&gt;a,c&lt;/sup&gt;</td>
<td>1.50</td>
<td>0.50</td>
<td>.27**</td>
<td>.28**</td>
<td>.17**</td>
<td>.12**</td>
</tr>
<tr>
<td>6 Task behavior&lt;sup&gt;a,c&lt;/sup&gt;</td>
<td>1.50</td>
<td>0.50</td>
<td>–</td>
<td>–</td>
<td>.06</td>
<td>–</td>
</tr>
<tr>
<td>7 Work domain&lt;sup&gt;a,c&lt;/sup&gt;</td>
<td>2.50</td>
<td>1.12</td>
<td>.04</td>
<td>–</td>
<td>–</td>
<td>.05</td>
</tr>
<tr>
<td>8 Age&lt;sup&gt;b&lt;/sup&gt;</td>
<td>30.55</td>
<td>10.08</td>
<td>–13</td>
<td>–02</td>
<td>–10</td>
<td>–16</td>
</tr>
<tr>
<td>9 Gender&lt;sup&gt;b,d&lt;/sup&gt;</td>
<td>1.53</td>
<td>0.50</td>
<td>–13</td>
<td>.01</td>
<td>–09</td>
<td>–10</td>
</tr>
</tbody>
</table>

_Note._<sup>a</sup> N = 1040, <sup>b</sup> N = 65 participants.<sup>c</sup> Because the study utilized a completely crossed design correlations among independent variables are zero by definition and therefore are not shown.<sup>d</sup> 1 = female, 2 = male.<sup>**p < .01 (two-tailed).</sup>

**Level 1 Analysis**

The null model in which the outcome variable was regressed on a unit vector, where no parameters are selected (Hofman, 1997), revealed that 52% of the explainable variance in the dependent variable is due to differences between subjects who indicated that a multilevel analysis is appropriate. Hypothesis 1 predicted that situations with high task uncertainty would lead to higher values of dispersed leadership than in situations with low task uncertainty. The average intercept for dispersed leadership differed significantly from zero (t(64) = 3.48, p < .01). The positive direction of the task uncertainty coefficient (β<sub>1j</sub> = .42; p < .01) indicates that a participants’ need for dispersed leadership significantly increased in situations with high task uncertainty, supporting Hypothesis 1.

Hypothesis 2 predicted that a participants’ need for dispersed leadership would be greater in learning behavior situations than in correcting behavior situations. Again the average intercept differed significantly from zero for dispersed leadership t(64) = 3.48, p < .01. The positive direction of the task behavior coefficient (β<sub>1j</sub> = .09; p < .01) indicates that a
participants’ need for dispersed leadership increased in situations with learning behavior, supporting Hypothesis 2. Results for Level 1 Model variables are summarized in Table 3.

Table 3

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>SE</th>
<th>T</th>
<th>Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept. β_{0j}</td>
<td>3.48**</td>
<td>0.12</td>
<td>29.38</td>
<td>.76**</td>
</tr>
<tr>
<td>Task uncertainty. β_{1}</td>
<td>0.42**</td>
<td>0.04</td>
<td>10.93</td>
<td>.05**</td>
</tr>
<tr>
<td>Task behavior. β_{2}</td>
<td>0.09**</td>
<td>0.04</td>
<td>2.38</td>
<td>.04**</td>
</tr>
<tr>
<td>Work domain. β_{3}</td>
<td>0.03**</td>
<td>0.01</td>
<td>2.11</td>
<td>.01**</td>
</tr>
<tr>
<td>Effect size (%)</td>
<td></td>
<td></td>
<td></td>
<td>31.02</td>
</tr>
</tbody>
</table>

Note. N = 65 subjects. N = 1040 observations.

The impact of task uncertainty and task behavior with the predictor work domain as a control variable (Hypothesis 3) indicates that task uncertainty (7%) as well as task behavior (3%) explains a unique part of the variance of dispersed leadership and are therefore independent of the work domain. Our results also revealed a significant positive coefficient for work domain on dispersed leadership (β_{3j} = .03, p < .05). A comparison of the different work domains revealed that, for market research, dispersed leadership was higher than in the domain of data processing (β = .10, p < .01). Hypothesis 3 is thus partly supported.

To assess the amount of variance explained by the predictors of Level 1 analysis, we computed the $R^2$ value (cf. Hofman, 1997; Raudenbush & Bryk, 2002) which accounted for 31% of the variance of the dependent variable. The model fit of the Level 1 model was significantly better than the fit of the null model ($\chi^2 = 226.71$, df = 9, p < .001).

Level 2 Analyses

We added predictors on Level 2 (i.e. work experience, age and gender), in order to test Hypothesis 4 and determine the possible impact of individual variables on the relationship of task uncertainty or task behavior on dispersed leadership. Analyses revealed a significant result for work experience ($\gamma_{13} = -.01, p < .01$), only for task uncertainty. The negative coefficient indicates that the influence of task uncertainty on dispersed leadership is weaker for people with more work experience. Results are depicted in Table 4. Thus,
Hypothesis 4 is supported for task uncertainty. Overall, 35% of Level 2 variance was explained by the (inter-) individual differences, indicating that the results in Level 1 analyses are influenced by subject variables but were relatively stable across them. The model fit of the Level 2 model was better than the Level 1 model fit ($\chi^2 = 105.15, df = 2, p < .001$).

Table 4

<table>
<thead>
<tr>
<th>Results of Hierarchical Linear Modeling Level 2 Analysis for Work Experience, Age and Gender for Study 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable</td>
</tr>
<tr>
<td>---------------------------------------</td>
</tr>
<tr>
<td>Intercept, $\gamma_{00}$</td>
</tr>
<tr>
<td>Work experience, $\gamma_{13}$</td>
</tr>
<tr>
<td>Age, $\gamma_{23}$</td>
</tr>
<tr>
<td>Gender, $\gamma_{33}$</td>
</tr>
<tr>
<td>Task uncertainty, $\gamma_{10}$</td>
</tr>
<tr>
<td>Work experience, $\gamma_{13}$</td>
</tr>
<tr>
<td>Age, $\gamma_{23}$</td>
</tr>
<tr>
<td>Gender, $\gamma_{33}$</td>
</tr>
<tr>
<td>Task behavior, $\gamma_{20}$</td>
</tr>
<tr>
<td>Work experience, $\gamma_{13}$</td>
</tr>
<tr>
<td>Age, $\gamma_{23}$</td>
</tr>
<tr>
<td>Gender, $\gamma_{33}$</td>
</tr>
</tbody>
</table>

Note. $N = 65$ subjects. $N = 1040$ observations.

$^a$ SE = Average estimated SE of the Level 1 regression coefficients.

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

Dispersion of Leadership Analyses

The results of the additional analysis are presented in Table 5. In support of Hypothesis 1, analyses revealed higher dispersion values for situations with high task uncertainty. Results suggest that leadership is more dispersed or dispersed in situations with high task uncertainty. In contrast to Hypothesis 2, dispersion results showed no higher values in situations regarding learning new behavior than in situations concerning correcting behavior. The dispersion results also support Hypothesis 3 because no systematic variation of the four work domains is revealed. The deviations from the dispersion for the three leadership styles show that, apart from one score, the deviation of structural leadership was positive and is therefore underrepresented compared to interactional and team leadership.
Table 5

Dispersion Index and Deviations from the Index (Index – Index Leadership Style) for each Scenario and each Leadership Style

<table>
<thead>
<tr>
<th>Dispersion Index</th>
<th>Structural</th>
<th>Interactional</th>
<th>Team Task</th>
<th>Task Behavior</th>
<th>Work Domains</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.73</td>
<td>0.46</td>
<td>-0.32</td>
<td>-0.14</td>
<td>low</td>
<td>learning data processing</td>
</tr>
<tr>
<td>2.86</td>
<td>0.53</td>
<td>-0.39</td>
<td>-0.13</td>
<td>low</td>
<td>learning market research</td>
</tr>
<tr>
<td>2.91</td>
<td>0.46</td>
<td>-0.32</td>
<td>-0.14</td>
<td>low</td>
<td>correcting Marketing</td>
</tr>
<tr>
<td>2.94</td>
<td>0.53</td>
<td>-0.39</td>
<td>-0.13</td>
<td>low</td>
<td>learning Marketing</td>
</tr>
<tr>
<td>3.02</td>
<td>0.48</td>
<td>-0.09</td>
<td>-0.39</td>
<td>low</td>
<td>correcting data processing</td>
</tr>
<tr>
<td>3.05</td>
<td>0.69</td>
<td>-0.28</td>
<td>-0.41</td>
<td>low</td>
<td>learning sales department</td>
</tr>
<tr>
<td>3.07</td>
<td>0.53</td>
<td>-0.14</td>
<td>-0.39</td>
<td>low</td>
<td>correcting sales department</td>
</tr>
<tr>
<td>3.14</td>
<td>0.32</td>
<td>-0.41</td>
<td>0.09</td>
<td>low</td>
<td>correcting marketing</td>
</tr>
<tr>
<td>3.19</td>
<td>0.36</td>
<td>-0.13</td>
<td>-0.22</td>
<td>high</td>
<td>correcting market research</td>
</tr>
<tr>
<td>3.23</td>
<td>0.47</td>
<td>-0.17</td>
<td>-0.30</td>
<td>high</td>
<td>learning market research</td>
</tr>
<tr>
<td>3.37</td>
<td>0.29</td>
<td>-0.20</td>
<td>-0.10</td>
<td>high</td>
<td>correcting data processing</td>
</tr>
<tr>
<td>3.39</td>
<td>0.48</td>
<td>-0.25</td>
<td>-0.23</td>
<td>high</td>
<td>learning marketing</td>
</tr>
<tr>
<td>3.47</td>
<td>-0.01</td>
<td>0.04</td>
<td>-0.03</td>
<td>high</td>
<td>learning sales department</td>
</tr>
<tr>
<td>3.53</td>
<td>0.34</td>
<td>-0.29</td>
<td>-0.05</td>
<td>high</td>
<td>learning data processing</td>
</tr>
<tr>
<td>3.56</td>
<td>0.17</td>
<td>-0.21</td>
<td>0.04</td>
<td>high</td>
<td>correcting sales department</td>
</tr>
<tr>
<td>3.75</td>
<td>0.27</td>
<td>-0.02</td>
<td>0.12</td>
<td>high</td>
<td>correcting marketing</td>
</tr>
</tbody>
</table>

Discussion of Study 1

The main purpose of the present study was to demonstrate the simultaneous effect of structural, interactional and team leadership and the influence of task uncertainty and task behavior on dispersed leadership. Consistent with our hypotheses, results indicated that the need for dispersed leadership depends on task uncertainty and task behavior. However, the amount of dispersed leadership was higher in uncertain and learning situations than in situations in which well-known behavior should be corrected. Furthermore, work experience and work domain moderated the relationship between task uncertainty and dispersed leadership. In addition, our results of AD analyses demonstrated the dispersion of leadership. These findings support the proposition of equifinality in the DLT and extended prior studies which mainly focused on separate relationships (Avolio, Sosik, Jung, & Berson, 2003). Our results demonstrate a simultaneous effect and are consistent with the substitute for leadership theory (Kerr & Jermier, 1978) and its empirical validation (Podsakoff et al., 1996).
There are three main limitations of Study 1. First, in respect to the policy-capturing approach we used a cold cognition model (Schwarz, 1998) which neglects affective consequences. Therefore, we used affective commitment in Study 2 as a dependent variable. Second, Study 1 is limited as regards the full crossed factorial and balanced design which misses repeated scenarios to minimize the number of scenarios and the participants’ monotony. As a consequence, we have no information concerning the stability of judgments. In Study 2, we also address this concern by using repeated scenarios to assess the consistency of an individual’s answers. Finally, we used the three leadership styles in Study 1 as dependent variables to reveal a simultaneous effect and organizational conditions increasing the need for dispersed leadership. Therefore, results only reveal the positive effect of the existence or absence of leadership styles. To address this concern, we used the leadership styles as independent variables in Study 2 to examine the combination of the leadership styles and the predictive influence of dispersed leadership on performance and affective commitment. According to our result that the need for dispersed leadership is particular high for employees with lower work experience, we decided to keep the work experience constantly low in Study 2.

Study 2

Dispersed Leadership and Success Criteria

Structural leadership as mentioned above included different aspects of reward systems, information and communication tools in order to positively affect subordinates’ behavior. Validity evidence for positive effects on subordinate task performance and commitment has been found for reward systems (Bartol, 1979; Folger & Konovsky, 1989; Schminke, Cropanzano, & Rupp, 2002) as well as clarity and efficiency of information and communication (Faraj & Sproull, 2000; Kraut & Streeter, 1995; O’Reilly & Roberts, 1978; Postmes, Tanis, & de Wit, 2001).

Interactional leadership as a dynamic and reciprocal process of interaction between leader and follower also has an impact on task performance and commitment. Thereby recent research in organizational psychology has documented that perceptions of fairness and trust (Colquitt, 2001; DeCremer & Van Knippenberg, 2002; Hofman, Gerras, & Morgeson, 2003; Kacmar, Witt, Zivnuska, & Gully, 2003; Kim, Ferrin, Cooper, & Dirks, 2004; Morgan & Hunt, 1994; Scott, 1981), coaching and mentoring (Hackman & Wageman, 2005; Scandura & Williams, 2004; Tansky & Cohen, 2002), and goal-participation and feedback discussions (Hertel, Konradt, & Orlikowski, 2004; Konradt, Hertel, & Schmook, 2003; Meyer, Becker, & Vandenberghe, 2004; Rodgers & Hunter, 1991) are positively related to subordinate task performance and commitment.
Team leadership stresses aspects of task-related exchange as well as mutual support and the sharing of decision latitude within teams (Pearce & Conger, 2003; Taggar, Hackett, & Saha, 1999). In recent psychological research, team-based concepts such as the quality of team-member exchange (Seers, 1989, 1996; Seers, Ford, Wilkerson, & Moorman, 2001; Seers et al., 2003; Seers, Petty, & Cashman, 1995), reciprocal team support (Colquitt, Noe, & Jackson, 2002; Pearce & Herbik, 2004) or shared responsibility (Chen, Webber, Bliese, Mathieu, Payne, Born, & Zaccaro, 2002; DeCremer & Van Knippenberg, 2002) were all positively related to subordinate task performance and commitment. We assume that each of the three leadership styles explains unique variance in task performance and commitment.

Hypothesis 5: Interactional leadership, team leadership, and structural leadership are positively related to follower’s task performance and commitment.

Method

Participants

Participants were 113 employees who studied economic science on a part-time basis at a German business school. The majority of the participants were male (57.1%). Their average age was 18.01 years (SD = 2.37). Participants had an average of 2.2 years (SD = 1.48) and 5.8 months (SD = 8.99) of full-time work experience, covering a wide range of areas including technical, economical, and social occupations.

Materials and Design

The method used in this second study is also a policy-capturing approach which has already been described in Study 1. With regard to the results of the first study, we did not manipulate the work domain and fixed it in the Marketing domain.

A short description of a general work situation and three statements for each structural, interactional and team leadership were generated. Due to the multi-dimensional structure, each leadership style was represented by several variables. Structural leadership consisted of reward systems, communication systems, and subordinate empowerment. Interactional leadership consisted of trustful and fair interaction, superior coaching, and feedback. Team leadership consisted of mutual team support, shared team decisions and a high quality of team task-related exchange. Each statement was given in a positive and a negative form (e.g., “Members in your team support each other …”, and “Members in your team do not support each other...”).

A pilot study was conducted to determine whether the manipulated cue levels generated the expected perceptions of high and low interactional, team, and structural
leadership. Independent t-tests on the mean level of leadership demonstrated statistically significant differences among the high and low levels of each cue in the expected directions.

An orthogonal cue structure was deemed appropriate, because although structural, interactional and team leadership might be interdependent, we were interested in their independent impact on follower performance. We therefore used a complete crossover design with the factors ‘structural leadership’ (high vs. low), ‘interactional leadership’ (high vs. low), and ‘team leadership’ (high vs. low), resulting in 24 scenarios (each leadership style with three variables). A full factorial design was used in which subjects responded to all possible scenarios (Graham & Cable, 2001). Table 6 gives an overview of the manipulation of variables in the scenarios.

Table 6

<table>
<thead>
<tr>
<th>Structural Leadership (high vs. low)</th>
<th>Interational Leadership (high vs. low)</th>
<th>Team Leadership (high vs. low)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reward systems: Your reward systems at work are clear and fair/approachable</td>
<td>Trust, Fairness: Your superior often/seldom trusts you and your competencies</td>
<td>Support: Member in your team don’t/support each other in performing their tasks</td>
</tr>
<tr>
<td>Communication systems: You don’t receive all important information right away</td>
<td>Coaching: Your superior often/seldom talks to you about task related problems</td>
<td>Decisions: Member in your team don’t/shared decision latitude and responsibility</td>
</tr>
<tr>
<td>Autonomy: You have much/less autonomy on how to perform your work</td>
<td>Feedback: Your superior often/seldom gives you reward and praise</td>
<td>Communication: Member in your team don’t/communicate trustfully</td>
</tr>
</tbody>
</table>

Note. Modified words for manipulation of variables are in bold.

Two replicated scenarios were included in order to assess within-rater judgment consistency, resulting in 26 scenarios. Consistency was calculated by taking the square root of the difference between the total variance in an individual’s judgment minus the variability in their evaluation of the repeated scenarios divided by their total variance (cf. Hamond, Stewart, Brehmer, & Steinmann, 1975). Average consistency was high (.53 to .73), suggesting that subjects used stable judgments in their responses to the same scenarios.

To control for sequencing effects, scenarios were presented in two different randomized orders (version A or version B). Cue order within the scenarios remained constant for all scenarios in order to simplify understanding. Independent sample t-tests on
questionnaire versions indicated no differences with regard to dependent variables ($t < 1$, ns.).

As the number of 26 scenarios might produce possible fatigue effects (cf. Aiman-Smith, Scullen, & Barr, 2002; Karren & Barringer, 2002), we compared the variance explained in the first half scenarios with the last half of scenarios by using the method recommended by Judge and Bretz (1992). A substantial decrement in the square multiple correlation for the second set of scenarios would indicate respondent fatigue. The difference in $R^2$ between the two sets of scenarios was .02 for task performance and .10 for satisfaction. Both scores are very small, indicating that an individuals' response to the scenarios is not biased by fatigue.

**Measures**

All items were responded using 6-point Likert scales ranging from ‘don’t agree at all’ (1) to ‘fully agree’ (6).

**Task performance.** Three items from Hoegl and Gemuenden (2001) were used to measure task performance. In the present study, the reliability ($\alpha$) of the scale was .96.

**Commitment.** Commitment was measured with the two-item scale from Semmer (1984). The reliability ($\alpha$) of the measure was .92.

**Procedure**

As school administration and teachers consented to the study, subjects participated during their class hours. Participants received the questionnaire which requested them to provide demographic information and to respond to items pertaining to task performance and commitment. They were told to thoroughly read each scenario, and give their ratings on likely task performance and commitment regarding each scenario. Participants were instructed to take a break if they felt tired. The whole procedure took about a half hour.

**Results**

Descriptive statistics and correlations for main measures are reported in Table 7.
Table 7

Means, Standard Deviations and Correlations among Study Variables in Study 2

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Structural leadership</td>
<td>1.66</td>
<td>0.98</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Interactional leadership</td>
<td>1.66</td>
<td>0.98</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Team leadership</td>
<td>1.65</td>
<td>0.99</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Task performance</td>
<td>4.80</td>
<td>1.29</td>
<td>.25**</td>
<td>.26**</td>
<td>.23**</td>
<td>(.96)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Commitment</td>
<td>3.43</td>
<td>1.60</td>
<td>.35**</td>
<td>.40**</td>
<td>.43**</td>
<td>.61**</td>
<td>(.95)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Age</td>
<td>18.17</td>
<td>1.80</td>
<td>.00</td>
<td>.00</td>
<td>-0.03</td>
<td>-0.03</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 Gender</td>
<td>1.57</td>
<td>0.50</td>
<td>.00</td>
<td>.00</td>
<td>-0.00</td>
<td>-0.12**</td>
<td>-0.01</td>
<td>.32**</td>
<td>-</td>
</tr>
</tbody>
</table>

Note. \( a \) \( N = 113 \) participants. \( b \) \( N = 2938 \) scenarios. 
\( c \) Because the study utilized a completely crossed design, correlations among independent variables are zero by definition and therefore are not shown. 
\( d \) 1 = female, 2 = male. 
** \( p < .01 \) (two-tailed). 
Internal consistencies in parenthesis.

Level 1 Analysis

For Hypothesis 5 which predicted that individual’s task performance and commitment would be influenced by structural, interactional and team leadership, effect size measures indicate that the set of fit predictors averaged across subjects accounted for over 41% of the explainable variance for task performance and 9% for commitment, respectively (see Table 7). The estimates of the average intercepts and slopes across individuals are also reported in Table 7. The average intercept and the average slope coefficients for structural, interactional and team leadership differed significantly from zero with regard to task performance and commitment. Structural leadership (\( \beta = .18; p < .001 \)), interactional leadership (\( \beta = .22; p < .001 \)), and team leadership (\( \beta = .16; p < .001 \)) each had a positive impact on task performance. Also, in support of Hypotheses 4, structural (\( \beta = .23; p < .001 \)), interactional (\( \beta = .39; p < .001 \)), and team leadership (\( \beta = .48; p < .001 \)) each were positively related to commitment. Results are summarized in Table 8.
Table 8

**Level 1 Model of Structural, Interactional and Team Leadership on Task Performance and Commitment**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Task performance</th>
<th></th>
<th>Commitment</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient</td>
<td>SE^a</td>
<td>t</td>
<td>Coefficient</td>
</tr>
<tr>
<td>Intercept. β_0j</td>
<td>3.82***</td>
<td>0.13</td>
<td>29.26</td>
<td>1.62***</td>
</tr>
<tr>
<td>Structural leadership. β_1</td>
<td>0.18***</td>
<td>0.02</td>
<td>8.40</td>
<td>0.11***</td>
</tr>
<tr>
<td>Interactional leadership. β_2</td>
<td>0.22***</td>
<td>0.02</td>
<td>11.32</td>
<td>0.18***</td>
</tr>
<tr>
<td>Team leadership. β_3</td>
<td>0.16***</td>
<td>0.02</td>
<td>9.36</td>
<td>0.14***</td>
</tr>
<tr>
<td>Effect size (%)^c</td>
<td></td>
<td>11.06</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note. N = 113 subjects. N = 2938 observations.*

^a Average estimated SE of the Level 1 regression coefficients.

^b Variance in Level 1 parameter estimates and chi-square test of significance of variance.

^c Percentage of explainable Level 1 variance in the dependent variable accounted for by fit cues.

***p < .001.

Analysis of systematic variance across the slopes of subjects’ regression equations shows significant variance in the slopes for each of the Level 1 predictors, suggesting that individuals’ reaction differed on the three styles of leadership. A residual ICC of 3% with regard to task performance and 4% with regard to commitment indicated that the portion of total variance remaining could be explained by individual differences. These scores are relatively small, but significantly different from zero (for task performance: $\chi^2 = 1446.70$, $df = 104$, $p < .001$, for commitment: $\chi^2 = 245.45$, $df = 104$, $p < .001$, respectively) and the remaining variance was thus modeled by using Level 2 predictors.

**Discussion of Study 2**

Study 2 was designed to improve Study 1 in three ways. Firstly, we examined the impact of the three leadership styles by using the styles of dispersed leadership as independent variables of this study. Secondly, we used commitment in addition to performance as dependent variables representing affective aspects. To address methodological concerns in Study 1, we used repeated scenarios to determine the amount of judgmental consistency.

The main results of Study 2 reveal a positive impact for all three leadership dimensions on task performance and commitment. These findings are consistent to theoretical and empirical approaches on the organizational effectiveness of each leadership style (structural: Faraj & Sproull, 2000; Schminke, Cropanzano, & Rupp, 2002; interactional: DeCremer & Van Knippenberg, 2002; Hackman & Wageman, 2005; team: Pearce & Conger, 2003; Pearce & Herbik, 2004). Moreover, our results suggest that all three styles...
simultaneously have a positive impact on performance and commitment. Therefore, results suggest that dispersed leadership has a predictive and explanatory quality and is also dependant on situational task characteristics (Study 1).

**General Discussion**

The purpose and major contribution of this study was to provide empirical evidence for the DLT. In two policy-capturing studies, we showed that the three styles of dispersed leadership had an impact on peoples’ behavior and attitude towards their work in different contexts. Furthermore, in Study 1, we documented the impact of the three styles of leadership being related to work context and task uncertainty, and that these relationships were stable across work domains. A simultaneous effect of the three leadership styles was demonstrated for the first time. Therefore, we demonstrated that the three leadership styles simultaneously interact and not only act separately. Study 2 explored whether the three predictors structural, interactional and team leadership had a unique impact on task performance and commitment. We demonstrated a corresponding result that was consistent with empirical research on the unique effects of different leadership styles on performance and commitment.

**Theoretical and Practical Implication**

The results of the studies make considerable contributions to the areas of shared leadership (Day et al., 2004; Pearce & Conger, 2003), distributed leadership (Gronn, 2003) and situational leadership (Vroom & Jago, 2007). We further contribute to recent research on situational and task characteristics relating to leadership (Daft, 2001; Gibson, 1999) by demonstrating the negative impact of task uncertainty and uncertain task behavior on all three leadership styles.

The major contribution of our study was to provide evidence of an extended dispersed leadership model. First, our study provides new evidence that supports the assumption that followers’ behaviors are simultaneously influenced by structural, interactional, and team leadership. As suggested by many scholars, the central finding of dispersed leadership demonstrated that the three leadership styles could interact and perhaps have compensatory or neutralizing effects on each other (Kerr & Jermier, 1978; Niehoff, Paul & Turnley, 2000).

Furthermore, our results are consistent with theories that assume special combinations of leadership techniques can have neutralizing (Kerr & Jermier, 1978). Moreover, Stewart and Manz (1995) theoretically argue that a constellation of democratically organizational orientation (structural leadership) and a passive interactional leader could
enhance self-regulatory behavior in teams (team leadership). As far as we know, our study is the first to provide evidence that all three leadership styles have a simultaneous effect.

Secondly, in accordance with recent leadership theories (Gronn, 2002; Pearce & Conger, 2003) and reviews (Day et al., 2006), we expanded shared leadership theory that focuses on personalized leadership and included external structural leadership, which constitute a salient stimulus within the entire leadership process. This synthesis provides not only a theoretical foundation for identifying and categorizing leadership cues, but also a basis for investigating the relative impact of single leadership styles in less structured environments. In addition, leadership research mainly focused on the dyade leader-member and largely neglected depersonalized situational leadership (Vroom & Jago, 2007) and team leadership or treated team related variables only as moderators (Zaccaro et al., 2001). The main advantage of the DLT is that it is possible to combine different leadership theories of situational, interactional and team leadership. As such, the impact of different leadership techniques can be investigated in a conjoint concept and existing theories can be augmented. To clarify, we conceptualized structural and interactional leadership in accordance with vertical leadership and team leadership in accordance to Pearce and Conger (2003), Shamir (1999) and Sivasubramaniam (2002).

Thirdly, our study results contribute to the validity and stability of the DLT. With performance and commitment as success criteria we used two outcome variables which in fact correlate ($r = .20$) but conceptually reflect two central but different domains of successful teamwork (Riketta, 2002). Our results revealed the positive impact of leadership styles for both criteria, which confirmed the external validity of the DLT regarding affective (i.e., commitment) and behavioral (i.e., performance) variables. This therefore augments the validity and significance of the DLT. In addition, we could not demonstrate the influence of the different moderator variables (i.e., work domain and work experience) which also confirms the stability and validity of the DLT.

The results of our studies also have practical implications for the leadership of teams in respect to organizations, leaders and teams. The DLT provides multiple possibilities and instructions of efficient leadership tools, which simultaneously are exchangeable. Moreover, the DLT provides a leadership guideline for leaders, organizations and teams. First, on organizational level, fair reward systems, clear communication systems and empowerment of subordinates are useful structural leadership techniques and have a direct impact on the different success criteria (e.g., Postmes, Tanis, & de Wit, 2001; Schminke, Cropanzano, & Rupp, 2002). Second, in respect to interactional leadership, fairness and trust, goal-participation feedback and coaching had positive impacts on job-related factors. Therefore, leaders could be trained to give administrable feedback and how to coach effectively in order
to augment a teams’ success (e.g., Meyer, Becker, & Vandenberghe, 2004). Finally, useful team leadership functions are shared responsibility, team support and quality of task-exchange. For example, team training and team coaching are effective strategies to enhance team support and the communication quality of teams (e.g., Hackman & Wageman, 2005).

The findings also confirm that organizational teams working on uncertain tasks, with uncertain task behavior (for example complex, diverse and less predictable tasks or goals) and with a majority of team members with minor work experience should be led with different distributed functions of leadership. Alternatively, team leaders in organizations which lack structural leadership should either foster team leadership as an additional source of leadership or should reduce task uncertainty for their team. In addition, leaders should employ more experienced team members for uncertain tasks or tasks that require new behavior when dispersed leadership is not available.

**Strengths, Limitations and Future Research**

Notwithstanding the contributions listed above, our study has certain limitations. First, in regard to policy-capturing methodology, there are limitations to discuss. As participants are asked to read a number of scenarios and to make well-reasoned decisions about the information, in a short period of time, results may lack external validity. Also, policy-capturing is a simulation-based technique which is susceptible to possible fatigue effects (Hamond et al., 1975; Judge & Bretz, 1992). In order to prevent such effects, we used a small number of manipulated cues and scenarios (Study 1: 16 scenarios, Study 2: 26 scenarios) in contrast to the existing policy-capturing studies (e.g., Brannick & Brannick, 1989; Judge & Bretz, 1992) in order to minimize the possibility of participants skimming through the material. Even though participants did not have to execute as many scenarios as in other policy-capturing studies and our results from Study 2 indicate no fatigue effect, the cognitive demands when answering the scenarios were high. We reduced cognitive demands by presenting the cues in paragraph form and by asking the same questions for each scenario. For Study 2, high within-person consistency ratings and the lack of fatigue effects suggest that participants did pay attention to the task during the entire experiment. Nevertheless, results should be replicated using alternative methods of data collection.

Second, inherent to the nature of policy-capturing, the external validity of policy-capturing results might be impaired. The generalizability of the results depends on the quality of the cues and the familiarity of the subjects with similar judgment experiences. We used critical incident technique to develop adequate, realistic and behavioral relevant scenarios. Moreover, pre-tests for each study confirmed the participant's perceived external validity. Nevertheless, we focused mainly on leadership cues while other context variables
(e.g., conflicts, task coordination) and personality variables (e.g., extraversion, agreeableness) were excluded. This limits the conclusions to the interaction of multiple styles of leadership. Another question concerns whether the participants in both studies had sufficient work experience to understand the importance of all three styles of leadership. Subjects had previous work experience within multiple companies in a wide range of functional backgrounds, and in interacting with co-workers or classmates. Particularly in Study 2, participants were very young. The finding that the results were relatively stable across the two studies with two different occupational groups reduces this concern.

Another potential concern refers to the statistical analysis on individual level, which neglected the variation of team characteristics (Avolio et al., 2003). Alternatively, incomplete factorial designs with different scenarios for separate groups of participants (cf. Graham & Cable, 2001) can be applied, though the number of required participants would increase.

Our research also had a number of strengths. First the method allows for measuring participants’ behaviors and attitudes in a simulation-based context therefore it was economically efficient as regards time and costs. The experimental design enables us to draw causal conclusions (cf. Karren & Barringer, 2002) regarding the impact of the three styles of dispersed leadership. By using scenarios of diverse domains, results can also be generalized for specific occupational contexts which improve external validity. As an additional strength, we made several efforts to ensure the internal validity of the study. For Study 2, we used repeated scenarios to check for consistency within subjects' judgments. For both studies, we presented the scenarios in completely randomized order to reduce order effects. Findings of Study 1 supported that the impact of dispersed leadership is stable across work contexts.

As regards the methodological strengths, we used multi-level statistical methods which enable us to analyze and relate individual judgments and the response bias of different participants (Bryk & Raudenbush, 1992, 2002). Moreover, we used an adaptation of the AD to provide evidence for the simultaneous effects of the three leadership styles which enables us to integrate the absolute value of each leadership technique and the equal distribution of the three styles into a single index.

The evidence that multiple styles of leadership simultaneously influence work attitudes indicates the utility of an embedded, contextual understanding of multifaceted dispersed leadership. The next step is to move this research into a natural work environment to assess individuals’ and teams’ perceptions of dispersed leadership in contextually rich and potentially complex circumstances. Clearly, more research is needed to explore how dispersed leadership styles interact to influence work attitudes and behaviors.
Future research could therefore create a specific, “dispersed leadership” situation in order to replicate the present findings. To this end, the effectiveness of all three styles independently and simultaneously could be investigated to clarify relationships among the leadership styles (i.e., additive, conjunctive, and disjunctive) and style of effect or result (i.e., intensifying, reducing, and neutralizing). Alternatively, researchers could further manipulate situational (contextual) factors (i.e. for example team characteristics, individual characteristics and interdependence) and measure the impact on dispersed leadership.

Conclusion

In conclusion, this research provides the first comprehensive investigation on the dispersed leadership theory in teams suggesting that interactional, team and structural leadership simultaneously influences team members’ task performance and work-related attitudes. Results of Study 1 provide evidence that relationships can be generalized to different situational work domains, however, they can be perceived to strongly correspond to situational demands. Specifically, our results provide a first step toward a better model for understanding the effects of dispersed leadership. Moreover, the current findings have important implications not only for theoretical and empirical research on leadership but also for organizations, leaders and teams in real working contexts and therefore enhances the theoretical and practical role of different styles of leadership in an organizational team working context.
References


Footnotes

1 We conceive “team leadership” as a style of leadership whereby leadership functions are executed by multiple team members. This conception is broadened and conceptualized “team leadership” not only as the leading of a team (e.g., Zaccaro, Rittman, & Marks, 2001).

2 The number of scenarios used and the amount of participants in both studies followed theoretical and empirical approaches. Following suggestions by Aiman-Smith et al., 2002, the number of written scenarios should be less than 80, and the minimum ratio of scenarios to factors should be considered to be 5:1 (cf. Cooksey, 1996; Karren & Barringer, 2002) (for Study 1: 3 factors × 5 = 15; for Study 2: 4 factors × 5 = 20). To identify the optimal number of sample sizes compared to the number of scenarios, we analyzed previous empirical studies using policy-capturing approach. The ‘n-to-scenario-ratios’ ranged from 0.52 to 12.94 (Cable & Graham, 2000; Cable & Judge, 1994; Dineen, Noe, & Wang, 2002; Greenhaus & Powell, 2003; Harold & Ployhart, 2008; Judge & Bretz, 1992; Kristof-Brown et al., 2002). Since most of the studies had a ratio below 4, we used this factor as a lower limit for our sample sizes (for Study 1: 16 × 4 = 64; for Study 2: 26 × 4 = 104).

3 Formative indicators are defined as causing the latent variable (leadership styles) rather than being caused by it (MacCallum & Brown, 1993; Bollen & Lennox, 1991). The formative measures formed the dependent variable (Edwards & Bagozzi, 2000). Changing the indicators will change the value of the dependent variable. The formative indicators are theoretical developed and can therefore be uncorrelated because they are independent parts of the dependent variable (Edwards & Bagozzi, 2000).

4 Because the cue levels were experimentally controlled and were the same across subjects, centering would not influence the results (Kristof-Brown, Jansen, & Colbert, 2002;
Hofmann & Gavin, 1998). The Level 2 (between-subject) analysis used a restricted maximum likelihood approach in which the intercept and slope coefficients estimated in the Level 1 model were regressed onto Level 2 predictors (work experience, age, gender). This set of analyses enabled us to test whether the personal variables were associated with variance in regression slopes across individuals, and to determine the moderating impact of personal variables on the relationship between leadership and working situation (task uncertainty and work behavior).
WORKING PAPERS*

Editor: Udo Konradt

2014:14  Udo Konradt, Yvonne Garbers, Julia Hoch & Thomas Ellwart, Evidence for the Dispersed Leadership Theory in Teams: A Policy-Capturing Study,


* A list of papers in this series from earlier years (only available in German) will be sent on request by the institute.