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Distributed leadership in teams: The network of leadership perceptions and team performance

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Abstract

This study uses social network analysis to examine distributed leadership in work teams. We used sociometric data from 28 field-based sales teams to investigate how the overall network structure of leadership perceptions considered at the team level of analysis was related to team performance. We failed to find support for the idea that the more leadership is distributed across the members of a team the better the team's performance: Decentralization of the leadership network (across three different operationalizations of network decentralization) was not significantly related to superior team performance. But we did find support for the idea that certain kinds of decentralized leadership structures are associated with better team performance than others. Our study suggests that distributed leadership structures can differ with regard to important structural characteristics, and these differences can have important implications for team performance.
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What enables certain teams to outperform others?[4] A longstanding approach to this question has focused on the effects of leaders on team performance. This is because team leaders play a pivotal role in shaping collective norms, helping teams cope with their environments, and coordinating collective action. This leader-centered perspective has provided valuable insights into the relationship between leadership and team performance (for a review, see Guzzo & Dickson, 1996). But the leader-centered perspective may be limited because it assumes that there is only one leader in a group, and because it views leadership as an exclusively top-down process between the leader and subordinates (Yukl, 1998: 459). Leadership research has been preoccupied with understanding how the style, personality, and other characteristics of the leader influence team dynamics and performance. Relatively little is known about what happens

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[4] We recognize that the terms "teams" and "groups" may be distinguishable. However, in this paper we follow Guzzo & Dickson's (1996) example and use the two terms interchangeably.

when teams have more than one leader (some important exceptions are Day, Gronn, & Salas, 2004; Gronn, 2002; Pearce & Conger, 2003).

This is an unfortunate state of affairs because organizational teams, like human groups more generally, seldom have only one leader. Even when there is a formally assigned team leader, other, informal, leaders can emerge. Team members, like the wirebonders examined in the classic Hawthorne Studies, often choose leaders of their own, leaders who are "…different from the supervisors given them by the company" (Homans, 1950: 148; Wheelan & Johnston, 1996; cf. Whyte, 1943/1993: 255–276). Leaders, like the wirebonder Taylor, may lack formal power, yet they can mobilize both considerable support and considerable opposition. Indeed, emergent leaders can literally tear an organization apart (e.g., Burt & Ronchi, 1990).

In this paper, we join a small but growing number of researchers who take seriously the possibility of leadership in teams as a shared, distributed phenomenon in which there can be several (formally appointed and/or emergent) leaders within a group. In re-conceptualizing leadership as a team-level construct, our focus is on the emergent network of leadership perceptions within work teams. We strive to make two contributions. First, we attempt to extend recent theoretical work on distributed leadership at the network level of analysis (Mayo, Meindl, & Pastor, 2003; Seibert, Sparrowe, & Liden, 2003) by conceptually distinguishing between three prototypic structural forms that the network of leadership perceptions within a team can take, and by providing a rationale for how these different network structures are related to both objective (e.g., team sales) and attitudinal (e.g., team satisfaction) measures of team performance. Second, our field-based study adds to the sparse empirical evidence on this topic. We collected sociometric data from a sample of 28 field-based sales teams to investigate how the overall network structure of leadership perceptions considered at the team level of analysis is related to team sales and team satisfaction.

1. Theory and hypotheses

The idea that leadership can be distributed across a number of individuals, rather than being focused in a single leader, is at least fifty years old (Gibb, 1954; also see Bowers & Seashore, 1966). Although it was largely ignored in the ensuing decades (notable exceptions are Brown, 1989; Brown & Hosking, 1986), the idea of distributed leadership has begun to receive increasing attention in recent years (for reviews, see Bennett, Harvey, Wise, & Woods, 2003; Gronn, 2002; Pearce & Conger, 2003). In this more recent line of work, distributed leadership is being conceptualized (and operationalized) in a number of different ways (see Day et al., 2004: 873–875), but there appears to be broad consensus on two issues: (1) leadership is not just a top-down process between the formal leader and team members; and (2) there can be multiple leaders within a group.

2. Social networks and distributed leadership

There is a long history of research that uses social network techniques to understand distributed leadership in team settings. Indeed, one could argue that social network analysis was born when Jacob Levy Moreno, a psychiatrist, in collaboration with Helen Jennings, a psychologist, collected systematic sociometric data at Sing Sing prison and at the Hudson School for Girls and used network diagrams to identify patterns of leadership within groups (Jennings, 1943; Moreno, 1932; see Freeman, 2004: 31–32 on the birth of network analysis). Other classics in this line of work can be found in the experimental work conducted at The Research Center for Group Dynamics at MIT in the 1940s and 1950s, which focused on such questions as how position in communication networks was related to the distribution of leadership perceptions within laboratory-based communication groups (e.g., Bavelas, 1950; Shaw, 1964). This research program "succeeded in producing a huge amount of important theory and data," but it fell apart as key contributors left MIT to work elsewhere (see Freeman, 2005: 74).

One of the goals of our study is to reinvigorate this classic line of work by extending some of its key insights to the study of distributed leadership in teams. Social network analysis is especially well suited to the study of distributed leadership because it is an inherently relational approach that allows for the possibility that there can be multiple leaders within a group, and because it provides methods for modeling both vertical (i.e., between formal leader and subordinates) and lateral (among subordinates) leadership relations within a team. Another strength of the social network approach is that relative to alternatives that aggregate team members' perceptions about how much influence the team members have over leadership (e.g., Pearce & Sims, 2002) it better preserves information about the actual pattern of leadership distribution within teams (Brass & Krackhardt, 1998; Mayo et al., 2003: 193–194; for a rich
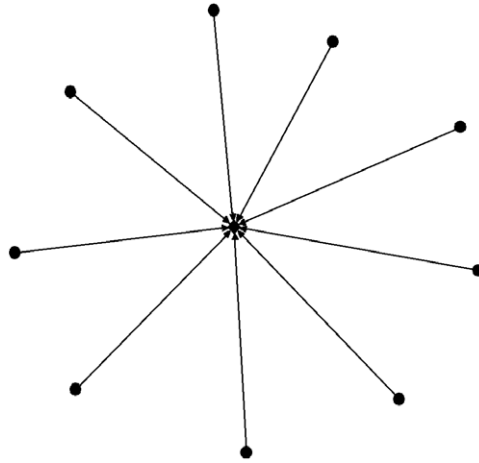
Fig. 1. Traditional leader-centered team leadership structure. Note: The diamond-shaped node at the center of the figure represents the formally appointed team leader; all other nodes are (subordinate) team members. A line from one node to another means that the person represented by the first node perceived the second as a leader.

conceptual discussion of the potential synergy between social network analysis and leadership research see Balkundi & Kilduff, 2005).

3. Hypotheses

We tested two hypotheses in this paper. Our first hypothesis is the baseline prediction of the distributed leadership approach: Distributed leadership will be a better predictor of team performance than the traditional leader-centered model of leadership. In the leader-centered model (see Fig. 1), a single individual (usually the formal leader, if the team has one) is at the center of the network of leadership perceptions within the team. By contrast, in the distributed leadership model (see Fig. 2), leadership is dispersed widely across team members. The theoretical rationale behind the prediction that distributed leadership structures are related to superior team performance is that when there are many leaders within a group this enhances participation and information sharing among team members, which, in turn, enhances team performance. Although proponents of distributed leadership have interpreted the available empirical results as suggesting that shared leadership is "strongly associated with more effective teams" (Perry, Pearce, & Sims, 1999: 36–37), the evidence for this hypothesis is in fact somewhat mixed. A few studies have found support for this
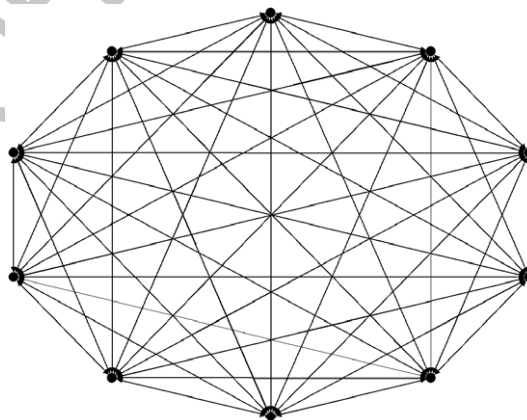

Fig. 2. Distributed team leadership structure. Note: The diamond-shaped node (at 6 o'clock) represents the formally appointed team leader; all other nodes are (subordinate) team members. A line from one node to another means that the person represented by the first node perceived the second as a leader.
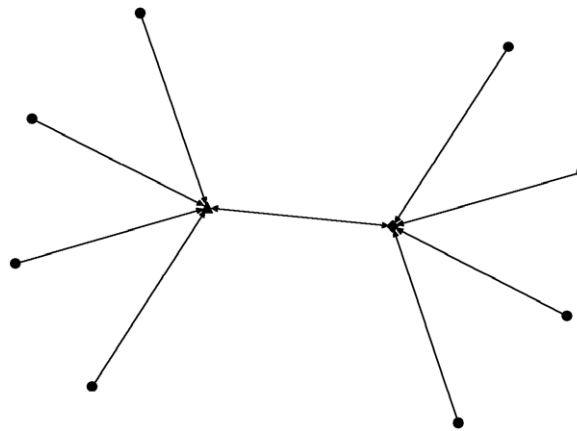
Fig. 3. Distributed-coordinated team leadership structure. Note: The diamond-shaped node (at right) represents the formally appointed team leader. The triangular node (at left) represents an emergent leader. Circular nodes represent other team members. A line from one node to another means that the person represented by the first node perceived the second as a leader.

prediction (e.g., Avolio, Jung, Murry, & Sivasubramaniam, 1996; Pearce & Sims, 2002), but others have not (e.g., Berkowitz, 1953; Neubert, 1999). Because the baseline prediction that "shared leadership is a more useful predictor of team effectiveness… than vertical leadership" (Pearce & Sims, 2002: 183) seems to be at the heart of the surge of recent interest in distributed forms of leadership (Pearce & Conger, 2003: 297), and because the evidence for this hypothesis has been sparse and mixed, we tested the hypothesis that teams with distributed leadership structures will tend to exhibit better team performance than teams with traditional leader-focused leadership structures:[5]

Hypothesis 1. Teams with "distributed" leadership structures will tend to outperform teams with a "traditional leader-centered" structures.

Our second hypothesis derives from an unbundling of the distributed leadership construct. Although the distributed leadership structure depicted in Fig. 2, in which every person is equally a leader and a follower, may be a valid theoretical ideal, evidence on leader emergence from both the field (e.g., Jennings, 1943; Whyte, 1943/1993) and the laboratory (see Shaw, 1964) suggests that leadership tends to be relatively centralized in human groups: Only a very small percentage of group members actually emerge as leaders within a group at any point in time (see Guetzkow & Simon, 1955; Krackhardt, 1994; Simon, 1981).[6]

In work groups with a formally appointed leader, informal leaders can emerge for a variety of reasons (for a recent review, see Judge, Bono, Ilies, & Gerhardt, 2002). However, what may be most important from the perspective of group performance is whether the formal and emergent leaders are able to coordinate effectively. When formal and emergent leaders do not recognize one another's leadership, the group can literally be torn apart. By contrast, when formal and emergent leaders recognize one another as leaders, they should be better able to synchronize their leadership efforts so that decision making and action are more effectively channeled within the group. The kind of distributed and coordinated leadership we are describing is similar to what Gronn has described elsewhere (2002: 431–432) as "conjoint agency," in which a few individuals emerge as leaders within a group and are able to synchronize their actions through reciprocal influence.[7]

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[5] The construct of team performance has been conceptualized in a number of different ways in the literature (see Levine & Moreland, 1990, for a review). In this study, we examine team performance in terms of both objective (i.e., dollar sales) and attitudinal (i.e., satisfaction) outcomes. Those championing distributed leadership have suggested that distributed leadership will be associated with superior team outcomes irrespective of whether the team outcomes are objective or attitudinal (e.g., Aviolo et al., 1996; Shamir & Lapidot, 2003; see the discussion in Pearce & Conger, 2003: 296).

[6] We do not, however, want to overstate this tendency towards centralization. There are counterexamples, such as Hutchins' (1995: 1–6) account of how seamen aboard the U.S.S. Palau dealt with a potentially catastrophic loss of navigational control without any apparent centralization of leadership. We thank an anonymous reviewer for making this point.

[7] For vivid description of a "distributed-coordinated" leadership structure, see Kidder's (1981) Pulitzer prize winning novel describing how Tom West and Carl Alsing led their team to victory in the race to build the 32-bit computer (especially see pp. 86–110).

Fig. 4. Distributed-fragmented team leadership structure. Note: The diamond-shaped node (at right) represents the formally appointed team leader. The triangular node (at left) represents an emergent leader. Circles represent other team members. A line from one node to another means that the person represented by the first node perceived the second as a leader.

We believe that the distinction between these two forms of distributed leadership (that we label "distributed- 114
coordinated" and "distributed-fragmented"—see Figs. 3 and 4 for prototypic representations) is an important one for 115
understanding the relationship between distributed leadership and group performance. We predict that teams that 116
exhibit a "distributed-coordinated" leadership network structure will outperform both teams with a "traditional leader- 117
centered" leadership network structure and teams with a "distributed-fragmented" leadership network structure. 118

Hypothesis 2. Teams with "distributed-coordinated" leadership structures will tend to outperform both teams with 119
"traditional leader-centered" leadership structures and teams with "distributed-fragmented" leadership structures. 120

4. Methods 121

4.1. Site 122

Our study focused on sales teams from the sales division of a large financial services firm headquartered in the 123
midwestern United States. The firm had a total of 88 field-based sales teams each headed by a single sales manager who 124
served as the (sole) formal leader of the team. 125

To be able to test our hypotheses, we had to collect the full network of leadership perceptions from within each team. 126
The "whole-network" approach we used samples all the individuals in a bounded network (Wellman, 1988: 26). It is 127
resource intensive and "quite burdensome" on respondents (Conger & Pearce, 2003: 298). Although it would have 128
been ideal to collect whole-network data from all 88 sales teams, we were forced to work with a more manageable size 129
of 28 randomly selected teams. 130

Each sales team was a formally defined entity. Sales managers from each team reported directly to members of 131
the firm's top-sales-management-team at the company's headquarters. Sales teams worked independently of other 132
sales teams; they were each assigned a unique, non-overlapping territory by the company. Exploratory interviews 133
indicated that members of sales teams tended to meet relatively frequently (ranging from weekly to monthly). 134
Contact between members of different sales groups, on the other hand, was rare, with the exception of sales 135
managers who had opportunities to connect with managers of other sales groups at periodic company-sponsored 136
seminars and meetings. 137

Sales teams were not competing for the same customers. Sales representatives within each team sold a variety of 138
financial products, such as mutual funds, annuities, life, automobile, and property insurance. Sales representatives 139
identified potential customers through referrals, seminars, and "cold-calls." 140

Sales representatives were paid on a commission basis: compensation was tied to the new accounts they 141
generated and the old accounts they retained. They also received a "full" benefit package (covering such things as 142
health and disability insurance, and a retirement plan). Sales team leaders were responsible for the recruitment and 143
professional development of their sales representatives: They counseled representatives on sales techniques, helped 144
with the identification of market opportunities and threats, offered advice on existing and new products, and 145
promoted idea-sharing and interaction among their sales representatives. Team leaders received commissions based 146

on the business generated and serviced by their sales team, a full benefits package, as well as periodic bonuses for   147
attaining specific goals (e.g., target sales, employee retention) set by top management.   148

4.2. Data   149

We collected whole-network data on leadership ties within each of 28 randomly selected field-based sales teams at   150
the firm. The 28 sales teams ranged in size from 6 to 22 members (M=13.4, S.D.=3.3). The average within-group   151
response rate was 90%. We ran all analyses with and without three groups that had response rates below 85%. Because   152
the pattern of results was unchanged, we retained all 28 groups for hypothesis testing. The number of sales   153
representatives who participated in the study was 336.   154

4.3. Measures   155

4.3.1. Leadership networks   156
We used the roster method to collect data on leadership networks within each of the 28 sales teams (Wellman, 1988:   157
26). In each team, respondents were provided an alphabetical list of the names of all members (including the formal   158
leader) in their group and asked to check the names of the people they perceived to be a leader. Respondents were free   159
to nominate as many or as few leaders as they deemed appropriate. This operationalization is consistent with the classic   160
sociometric work on leadership in teams (e.g., Stogdill, 1948; see Shaw, 1964), and it is also consistent with our   161
theoretical conception of leadership as a phenomenological construct: A leader is someone who is perceived as such by   162
others (Calder, 1977; Meindl, 1993; Pfeffer, 1977). The questionnaire did not specify what we meant by the term   163
"leader" because we were interested in capturing respondents' native theories of leadership (cf. Lord & Maher, 1991:   164
11). The focus of our research was on emergent leadership; we therefore specified on the questionnaire that individuals   165
perceived as leaders "may or may not be officially designated as leaders" by the firm's management.[8]   166
Data from the questionnaire were arranged in a binary matrix, where each cell X_{ij} corresponded to i's relation to j as   167
reported by i. If i reported j as a leader, then the cell X_{ij} was coded as 1; otherwise, the cell X_{ij} was coded as 0. The   168
leadership data from the 28 groups were each coded in a separate matrix.   169

4.4. Independent variable   170

4.4.1. The structure of a team's leadership network   171
The topological structure of leadership networks, like those of other complex networks, can be characterized using a   172
range of different metrics (e.g., Wellman & Berkowitz, 1988). Our goal was to come up with a classification system that   173
would allow us to reliably code the extent to which the emergent leadership network in a team best fit the ideal   174
structures shown in Figs. 1–4.   175

4.4.2. Visual analysis of network diagrams   176
We generated visual representations of the networks and used them as a guide to how the structure of each network   177
should be coded. Visual analysis has long (e.g., Moreno, 1932; see Freeman, 2004 for a historical account) been used to   178
reliably identify central nodes in networks (especially when centrality is viewed in terms of the number of nominations   179
received, as is the case here) and to clarify overall network topology (see Freeman, 2005). We used Version 1.48 of the   180
program Netdraw (Borgatti, 2002) to generate high resolution images of each of the 28 leadership networks. Visual   181
inspection of the network diagrams revealed that in every one of the 28 groups there were only a few individuals who   182
received the overwhelming majority of leadership nominations. This result was confirmed by examining the   183
distributions of leadership nominations received by each person within a group. There were obvious cut-offs in these   184
distributions separating the emergent leaders from non-leaders. A few individuals received most of the nominations in   185
any given group.   186
Armed with visual representations of the 28 leadership networks, three independent coders first sorted the 28 groups   187
into those that exhibited a "traditional leader-centered" structure and those that displayed a "distributed" leadership   188

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[8] As one anonymous reviewer noted, a potential drawback of this operationalization of leadership is that it does not give respondents the chance to identify sources of leadership that were not anchored in specific persons.

structure. A structure was considered distributed if there was at least one individual within the team other than the formal leader who received sufficient nominations to be coded as an emergent leader. Using Cohen's (1987) kappa, the average inter-rater agreement across the three coders was over 90%. Discrepancies were resolved by examining the relative number of leadership nominations received by each individual within the group. On average, individuals coded as emergent leaders received almost 60% more leadership nominations than the person who was next closest to them in terms of leadership nominations received but was not coded as an emergent leader.

The next step was to examine whether distributed leadership structures should be classified as "distributed-coordinated" or as "distributed-fragmented." Our method for doing this was straightforward: We coded a team as exhibiting a "distributed-coordinated" structure only if the individuals who had emerged as leaders perceived one another other as leaders. That is, the ties between them in the leadership network had to be reciprocated. Otherwise, we coded the structure as "distributed-fractured."

Of the 28 teams in our sample, 12 were coded as exhibiting the "traditional leader-centered" structure depicted in Fig. 1. In these teams, the formal leader, on average, received over 40% of all leadership nominations within the group. Moreover, no other single individual received sufficient nominations to be considered an emergent leader.

Of the remaining 16 teams, 7 teams had 2 leaders (the formal leader and one emergent leader), 7 had 3 leaders (the formal leader and two emergent leaders), and 2 had 4 leaders (the formal leader and three emergent leaders). 11 of the 16 teams exhibited the "distributed-coordinated" leadership structure (Fig. 3). In these teams, the emergent leader(s) and the formal leader all recognized each other as leaders. The remaining 5 teams exhibited a distributed-fragmented leadership structure (Fig. 4). In these 5 teams, the emergent leader(s) and the formal leader did not perceive each other as leaders.

4.5. Dependent variables

Team performance has been measured in the literature in a number of different ways: As Guzzo and Dickson have noted, "there is no singular, uniform measure of performance effectiveness in groups" (1996: 309). We therefore employed two common measures of team performance: team sales, and team satisfaction.

4.5.1. Team sales

This was the total dollar amount of sales generated by a given sales team for the current financial quarter was used as an objective measure of team performance. To derive a group level measure that controlled for team size, we divided the total sales figure by the number of sales representatives within the team. To preserve company anonymity, we then divided this figure by an arbitrary constant.

4.5.2. Team satisfaction

This attitudinal measure was collected using a 5-item scale adapted from a 12-item scale used for measuring salesperson satisfaction (Churchill, Neil, & Walker, 1974). We used a 5-point Likert scale for each item. The scores of the 5-item measure were then averaged to arrive at a measure of average satisfaction for the individual team member. These scores were then summed for each member of the team and divided by the number of team members to arrive at a measure for average satisfaction of the team. Cronbach's alpha for the 5-item scale was 0.89.

4.6. Control variables

4.6.1. Sales territory

To control for the effect of a favorable sales territory on team performance, we used a measure of sales growth in a given territory as determined by top managers at headquarter. The variable was coded 1 if the overall market characteristics of a sales territory–such as the general socioeconomic conditions and the level of prior company advertising in the region–created conditions likely to enhance the ability of the sales group to achieve a high level of sales; the variable was coded 0 otherwise. Data for this variable came directly from a four-member panel of senior veterans located at company headquarters who had broad oversight over the company's various sales territories.

We checked to see if our results were influenced by the inclusion of several other potential control variables. We found that the length of time the formal leader had been in charge of the group, the average tenure of the members within the group, the gender composition of the group, and the gender of the group leaders (only 4 were women) were

not related to either our independent variable or to either of the two dependent variables. Inclusion of these non- 235
significant controls did not change the pattern of results reported in the paper. Given our modest sample size, we 236
dropped these variables from further consideration. 237

5. Analysis and results 238

For each of the dependent variables, we performed separate analysis of covariance (ANCOVA). The measure of 239
leadership structure was treated as a between subjects factor. The measure of sales territory was entered as a covariate. 240
Table 1 presents means, standard deviations and zero-order correlations. Teams assigned to more favorable 241
territories tended to achieve significantly higher sales ($r=0.42$, $p<0.05$), but sales territory was unrelated to team 242
satisfaction ($r=0.01$, ns). 243

Hypotheses 1 predicts that "distributed" leadership structures will be associated with better performance than the 244
"traditional leader-centered" structure. The ANCOVA results reported in Table 2 show that leadership structure did not 245
have a significant main effect on team sales or team satisfaction. The lower part of Table 2 shows that the adjusted 246
means for team sales and team satisfaction were not significantly higher among teams with a "traditional leader- 247
centered" leadership structure than among those with a "distributed" leadership structure. 248

We checked to see if these results were an artifact of the method of visual analysis we used to classify the type of 249
leadership structure exhibited by a team by computing two other measures that have been used in previous research. 250
First, following Neubert (1999), we computed an alternate measure of leadership dispersion by dividing the number of 251
individuals who had received at least one leadership nomination within a team by the total number of people within that 252
team, expressed as a percentage. The second alternate measure we computed was the measure of network 253
decentralization proposed by Mayo et al. (2003) (see p. 204 for the formula) as a potential operationalization of 254
distributed leadership. The pattern of results in both cases was the same as the one we obtained using our measure of 255
visual analysis, with one exception: When we operationalized distributed leadership using the network decentralization 256
measure recommended by Mayo et al. (2003), this measure was *negatively* related to team satisfaction ($b=-0.50$, 257
$p<0.01$). Hypotheses 1, therefore, received no support across three different operationalizations of team leadership 258
structure. 259

Our second hypothesis predicted that teams with "distributed-coordinated" leadership structures would exhibit 260
higher performance levels than both teams with "traditional leader-centered" leadership structures and teams with 261
"distributed-fragmented" leadership structures. As reported in Table 3, the ANCOVA results indicate a main effect of 262
leadership structure on both team sales and team satisfaction ($F=4.20$, $p=0.03$ for team sales; $F=5.49$, $p=0.01$ for 263
team satisfaction). The partial eta-squared value for each univariate test indicates large main effects (partial η^2 values 264
≥ 0.14) for both measures of team performance. 265

T-tests of the adjusted means shown in the lower half of Table 3 show that teams with "distributed-coordinated" 266
leadership structures achieved significantly higher sales (adjusted mean=40.29, S.D.=2.93) than (a) the teams that had 267
"traditional leader-centered" structures (adjusted mean=30.82; S.D.=2.90); and (b) the teams that had "distributed- 268

Table 1
Means, standard deviations, and correlations

Variables	Mean	S.D.	n	1	2	3	4
(1) Sales territory[a]	0.39	0.50	28				
(2) Network diagram analysis:[b] (leader-centered vs. distributed)	0.57	0.50	28	0.40*			
(3) Network diagram analysis:[c] (distributed-fragmented vs. distributed-coordinated vs. leader-centered)	2.21	0.74	28	0.07	0.26		
(4) Team sales	33.90	11.49	28	0.42*	0.37[†]	0.48*	
(5) Team satisfaction	26.25	1.15	28	0.01	−0.21	0.44*	−0.08

n/a=correlation cannot be computed; one of the variables is constant.
[a] Sales territory=0 if non high-growth potential; 1 if high-growth potential.
[b] Leadership structure=0 if leader-centered; 1 if distributed.
[c] Leadership structure=1 if distributed-fragmented; 2 if leader-centered; and 3 if distributed-coordinated.
* $p<0.05$ (two-tailed tests).
[†] $p<0.10$ (two-tailed tests).

t2.1 Table 2
t2.2 Results of analysis of covariance for team sales and team satisfaction comparing "traditional leader-centered" leadership structures with "distributed" structures

t2.3 (a) Overall results for team sales and team satisfaction

t2.4 Source of variation	Sum of squares	df	Mean squares	F	p	η^2
t2.5 *Team sales*						
t2.6 Leadership structure [a]	17.86	1	17.86	1.61	0.22	0.06
t2.7 Sales territory	30.21	1	30.21	2.73	0.11	0.10
t2.8 Error	276.63	25	11.06			
t2.9						
t2.10 *Team satisfaction*						
t2.11 Leadership structure [a]	1.86	1	1.86	1.38	0.25	0.05
t2.12 Sales territory	0.27	1	0.27	0.20	0.66	0.01
t2.13 Error	33.79	25	1.35			

t2.14

t2.15 (b) Adjusted means across two leadership structures

	Team sales		Team satisfaction	
t2.17 Leadership structure [b]	Mean	S.D.	Mean	S.D.
t2.18 Leader-centered	31.50	11.25	26.53	1.06
t2.19 Distributed	37.07	10.57	26.04	1.20

t2.20 [a] Leadership structure=0 if leader-centered; 1 if distributed.
t2.21 [b] Leader-centered, *n*=12; distributed, *n*=16.

269 fragmented" structures (adjusted mean=27.24; S.D.=4.34) . These results provide partial support for Hypothesis 2
270 when sales were used as a measure of team performance.
271 *T*-tests of the adjusted means reported in Table 3 show a slightly different pattern of results when the dependent
272 variable was team satisfaction. The adjusted mean satisfaction scores were higher in the teams with a "distributed-
273 coordinated" leadership structure (adjusted mean=26.52; S.D.=0.31) than in teams with a "distributed-fragmented"
274 leadership structure (adjusted mean=24.87; S.D.=0.46). However, the adjusted mean for the "distributed-coordinated"
275 leadership structure was not significantly different from the adjusted mean for the "traditional leader-centered"

t3.1 Table 3
t3.2 Results of analysis of covariance for team performance and team satisfaction comparing three types of leadership structures: "traditional leader-centered," "distributed-coordinated," and "distributed-fragmented"

t3.3 (a) Overall results

t3.4 Source of variation	Sum of squares	df	Mean squares	F	p	η^2
t3.5 *Team sales*						
t3.6 Leadership structure [a]	76.31	2	38.16	4.20	0.03	0.26
t3.7 Sales territory	33.85	1	33.86	3.72	0.07	0.13
t3.8 Error	218.18	24	9.09			
t3.9						
t3.10 *Team satisfaction*						
t3.11 Leadership structure [a]	11.19	2	5.59	5.49	0.01	0.31
t3.12 Sales territory	0.42	1	0.42	0.41	0.53	0.02
t3.13 Error	24.46	24	1.02			

t3.14

t3.15 (b) Adjusted means across three leadership structures

	Team sales		Team satisfaction	
t3.17 Leadership structure	Mean	S.D.	Mean	S.D.
t3.18 Leader-centered (*N*=12)	30.82[b]	2.90	26.59 [a]	0.31
t3.19 Distributed-coordinated (*N*=11)	40.29 [a,b]	2.93	26.52[b]	0.31
t3.20 Distributed-fragmented (*N*=5)	27.24 [a]	4.34	24.87 [a,b]	0.46

t3.21 Means in the same column that share an exponent are significantly different from each other (at *p*<0.05).
t3.22 [a] Leadership structure=1 if distributed-fragmented; 2 if leader-centered; and 3 if distributed-coordinated.

leadership structure. These results provide partial support for Hypothesis 2 when team performance is operationalized   276
as average team satisfaction.   277

6. Discussion   278

The study of leadership and its relation to team performance has been dominated by a view of leadership as focused   279
around a single leader (Gronn, 2002: 423). This commitment to a single leader as the unit of analysis has drawn   280
attention away from the reality to be found in many if not most work groups: Leadership in work teams is often   281
distributed across a number of different individuals rather than residing solely in one person. Building on this insight,   282
and drawing from both recent (e.g., Mayo et al., 2003) and classic work (e.g., Moreno, 1932) in social network   283
analysis, our paper used sociometric data on the emergent network of leadership perceptions within teams to explain   284
differential group performance. Our findings show that distributed leadership networks are not necessarily associated   285
with higher team performance. However, leadership networks that show a "distributed-coordinated" structure are   286
associated with higher team performance than "traditional leader-centered" leadership networks and "distributed-   287
fragmented" leadership networks. Team performance is not simply a matter of having more leaders. It also matters   288
whether or not the leaders see each other as leaders.   289

Our study makes at least two contributions. First, it suggests that theories of distributed leadership need to make   290
more fine-grained distinctions between different types of distributed leadership if they are to explain meaningful   291
variance in measures of team performance. One such distinction is the one proposed in this paper between "distributed-   292
coordinated" structures and "distributed-fragmented" structures. In both these structures, leadership is distributed over   293
multiple team members. However, our findings indicate that the two structures are differently related to team   294
performance. Our study suggests that it is important to recognize and model different structural patterns of distributed   295
leadership within teams rather than merely assessing the extent to which distributed leadership is present. Different   296
forms of distributed leadership can have different consequences for team performance.   297

Second, by testing the relationship between different team-level leadership structures and team performance, our   298
study adds to the sparse empirical literature on this topic. Our findings provide initial field-based support for the idea   299
that some forms of distributed leadership structures in teams may be associated with higher levels of both objective and   300
attitudinal measures of team performance than traditional leader-centered leadership structures.   301

6.1. Future research   302

A fundamental question raised by our study is: What explains why different teams have different leadership network   303
structures?[9] There are, of course, several possible responses to this question (see Pearce & Conger, 2003: 287–294),   304
but a few appear particularly promising: 305

It seems likely that the composition of groups (in terms of personality and other individual differences) will play a   306
role in the emergence of different patterns of distributed leadership in teams. The compositional heterogeneity of team   307
members (where heterogeneity can be broadly conceived as a mix of personalities, demographic attributes such as race   308
or gender, and/or attitudes) is likely to play a potent role in influencing the structure of leadership networks within   309
teams because heterogeneity in member characteristics can produce cleavages in patterns of identification and   310
interaction within groups (e.g., Kanter, 1977; Mehra, Kilduff, & Brass, 1988); and these structural "faultlines" (e.g.,   311
Lau & Murnighan, 2005) are likely, in turn, to be related to the distribution of leadership perceptions within a team (but   312
see Whyte, 1951, for potentially countervailing evidence).   313

A more cognitive response to this question might–building on the work of Lord & Maher (1991) on implicit   314
leadership theories–focus on the match between the content of followers' leadership schemas and leader   315
characteristics, such as their behavioral style and their demographic attributes. According to this approach, peoples'   316
leadership schemas, which consist of beliefs about leader behaviors and traits, influence the process whereby   317
individuals come to attribute leadership to certain others. Thus, this approach to answering the question of why teams   318
come to develop certain patterns of leadership perceptions would focus on team members' implicit theories about   319

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[9] This question is increasingly being raised in network research more generally because little is know about the origins of networks (for critical discussions, see Emirbayer & Goodwin, 1994; Kilduff & Tsai, 2003: 87–110).

leadership, and the manner in which certain individuals come to display the attributes that cause others to see them as leaders.

A third, more structural, response to the question of why different teams have different patterns of distributed leadership might focus on factors such as team size. The reason that size may influence the structure of leadership networks is that as team size increases interpersonal coordination becomes more difficult, and the likelihood that the team will fracture into coalitions tends to increase (see Simmel, 1908/1950: 87–99 for a classic discussion). In supplementary analyses (not reported here), we found no significant relationship between team size and the structure of the team's leadership network. However, it is possible that we may have simply lacked the statistical power to detect the relationship. Studies are needed that employ larger samples and a wider range of team sizes to provide more sensitive tests of the relationship between team size and the structure of leadership networks in teams.

Related to the question of the origins of leadership networks is the question of how networks change over time. Research that investigates how leadership networks evolve in teams over time will, we believe, pay handsome dividends. Not only would such research contribute to our ability to understand and potentially harness distributed leadership in teams, it would help address fundamental questions that are being raised about the processes of change and transition in networks (e.g., Monge & Contractor, 2003; Watts, 1999). Given the difficulty of collecting whole-network data on field-based groups, especially over time, researchers may want to follow the lead of the classic work conducted at MIT in the 1950s (see Shaw, 1964) and create experimental groups within laboratory settings. This experimental approach would allow researchers to design a range of different leadership structures and examine how they evolve over time in a controlled setting. A different possibility is to make use of the availability of cheap computing power and increasingly sophisticated simulation techniques to model the linkages between leadership networks and group outcomes. Network simulation allows researchers to overcome the difficulty of collecting sociometric data from a large number of field-based teams, and it offers a practical tool for systematically varying the different factors that are likely to influence the structure of leadership networks in teams (see Newman, 2003, for a review of generalized models of network growth and change; and see Gibbons, 2004, for a recent application of this methodological approach in organizational studies). Irrespective of whether researchers use field-based, laboratory-based, or simulation techniques, we urge future research to borrow freely from the extensive work that has already been done on different social network structures (see Carrington, Scott, & Wasserman, 2005; Wasserman & Faust, 1994). This literature could provide useful insights for those interested in translating the ideas behind distributed leadership into a more precise, mathematical language. The conceptual and operational vocabulary of graph theory could accelerate the pace of empirical work in the area of distributed leadership.

A final potential topic for future research that deserves to be mentioned has to do with understanding how various substitutes for leadership (e.g., Kerr & Jermier, 1978) may influence the link between the structure of leadership networks within a team and the team's performance. For example, when task routinization and member expertise are high, differences in team leadership networks may be unrelated to team performance (cf. Gronn, 1999: 58). Research on this topic may yield important clues about the boundary conditions of the theory linking distributed forms of leadership with team performance.

6.2. Limitations

Our study is limited in several respects. An obvious limitation is that our data are cross-sectional and we cannot therefore make any definitive claims about causality. Leadership networks may influence group performance, but group performance may also influence the leadership networks that emerge in teams (e.g., Larson, Lingle, & Scerbo, 1984; Sherif & Sherif, 1953). Carefully designed longitudinal studies are needed to unravel these complex structural dynamics.

Another potential limitation is our modest sample of 28 teams. Although we found significant results despite the small sample size, future research with larger numbers of teams is needed to bolster confidence in our results. In addition to using larger sample sizes, it will be important for future studies to examine different types of work teams, especially teams that face different task characteristics. By focusing exclusively on sales teams within one division of a firm, our study design effectively controlled for variation in task characteristics and organizational policies. The downside is that the results of our study can only be generalized with great caution.

In this paper, we have identified and distinguished between only three structural forms of the network of leadership   370
perceptions within a team. We have focused on these forms because they seem to most closely match our theoretical   371
arguments. Clearly, however, a range of other forms of distributed leadership are possible, such as couples and dyads,   372
triads, and temporary collaborative structures and processes (cf. Gronn, 1999: 58). Our study, therefore, is best seen as a 373
modest starting point for further analyses of the various forms that distributed leadership can take in human groups, and 374
the consequences that these structures can have for group outcomes.   375

Finally, the structural approach we have adopted in our study offers little insight into what it was actually like to   376
work in teams with different leadership networks. Did, for example, team members in distributed-fragmented network   377
structures experience higher levels of role conflict than the members of teams with distributed-collaborative network   378
structures? Was there constant jockeying for power among the formal and emergent leaders in distributed-fragmented   379
structures, and did this create highly politicized work environment for team members? Answering the question of, as   380
one reviewer put it, what it actually felt like to work in teams with these different leadership structures will probably 381
require researchers to supplement the traditional tools of structural analysis with more qualitative techniques.   382
Interestingly, although many classic studies in the sociometric tradition employed exactly this dual methodological   383
approach (e.g., Roethlisberger & Dickson, 1939; Sampson, 1968), much contemporary network research relies   384
exclusively on quantitative structural methods (for a recent exception, see White & Johansen, 2005). We can only   385
speculate about the reasons for this state of affairs, but we think it would be valuable for future research to supplement 386
network analyses by zooming in for more fine-grained, up-close observation of what day-to-day existence in teams   387
with different leadership networks is actually like (see Ibarra, Kilduff, & Tsai, 2005, for a more general argument about 388
the potential benefits of "zooming back and forth" between individual and collective levels of analysis in network   389
research).   390

6.3. Practical implications   391

Although the results of our study are clearly tentative, we believe they offer some practical implications for   392
managers and policy makers. First, the mapping of networks of leadership perceptions in teams could be used as an   393
important diagnostic tool in team settings. In our own work with firms, we have found that team leaders' perceptions of 394
what the network of leadership perceptions looks like are often different from what they in fact look like. Bringing   395
these discrepancies to the surface can serve to raise consciousness about biases and errors in perceptions that require 396
correctional work (Balkundi & Kilduff, 2005; Krackhardt, 1987, 1990).   397

Second, understanding what the network of leadership perceptions looks like within a team could provide   398
valuable information for the design of interventions. The nature of interventions could vary from encouraging   399
formal team leaders to find ways of sharing leadership with trusted lieutenants to changing the allocation of   400
resources and decision rights within a team (for a more detailed discussion of these techniques, see Cross & Parker,   401
2004, especially pages 116–126 and Appendix B; and see their Appendix A for detailed tips on how to collect   402
sociometric data in teams).   403

7. Conclusion   404

Social network analysis offers, we believe, rich conceptual and methodological possibilities for extending research   405
on distributed leadership in teams. Our study used social network analysis to help flesh out the concept of distributed 406
leadership and examine its relationship with team performance. Our findings show that certain forms of distributed   407
leadership may be associated with superior team performance relative to traditional leader-centered   408
structures. Our study also suggests that claims that distributed leadership is necessarily superior to traditional   409
leadership structures need to be moderated and qualified. Distributed leadership structures can differ with regard to   410
important structural characteristics, and these differences can have important implications for team performance.   411

8. Uncited references   412

Beyerlein et al.,   413
Borgatti et al., 2002   414
Harkins and Szymanski, 1987   415

Holland and Leinhardt, 1973 416
Nadel, 1957 417
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