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So many teams, so little time: Time allocation matters in geographically dispersed teams

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Summary Geographically dispersed teams whose members do not allocate all of their time to a single team increasingly carry out knowledge-intensive work in multinational organizations. Taking an attention-based view of team design, we investigate the antecedents and consequences of member time allocation in a multi-level study of 2055 members of 285 teams in a large global corporation, using member survey data and independent executive ratings of team performance. We focus on two distinct dimensions of time allocation: the proportion of members' time that is allocated to the focal team and the number of other teams to which the members allocate time concurrently. At the individual level, we find that time allocation is influenced by members' levels of experience, rank, education, and leader role on the team, as predicted. At the team level, performance is higher for teams whose members allocate a greater proportion of their time to the focal team, but surprisingly, performance is also higher for teams whose members allocate time to a greater number of other teams concurrently. Furthermore, the effects of member time allocation on team performance are contingent on geographic dispersion: the advantages of allocating more time to the focal team are greater for more dispersed teams, whereas the advantages of allocating time to more other teams are greater for less dispersed teams. We discuss the implications for future research on new forms of teams as well as managerial practice, including how to manage geographically dispersed teams with the effects of member time allocation in mind. Copyright © 2011 John Wiley & Sons, Ltd.

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Introduction

Multinational organizations operate in fast-changing global environments that demand flexibility and require the use of sophisticated communication technologies. As a result, it is increasingly difficult to find teams whose members all work together face-to-face for the entire duration of a project. Rather, it is much more common to find teams whose members are spread across geographies and participate in their projects as needed, balancing the goals of a particular project with other responsibilities. Greater variation in how members allocate their time to teams is driven in part by the increasing prevalence of knowledge-intensive work, which relies on the expertise and experience of team members regardless of where they are located in the organization (Argote, McEvily, & Reagans, 2003; Kozlowski & Ilgen, 2006). Knowledge-intensive teams bring together members to undertake projects that are too complex, uncertain, and non-routine to be managed by a single person alone (Cross, Ehrlich, Dawson, & Helferich, 2008; Rulke & Galaskiewicz, 2000). By bringing together members with different skill sets, background experience, and functional expertise, these teams are expressly designed to tackle the challenges of knowledge-intensive work (Bunderson, 2003; Dahlin, Weingart, & Hinds, 2005).

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Unlike the stable, bounded entities of traditional team research, where team members work together face-to-face over an extended period to solve problems, make decisions, and accomplish their task objectives (Cohen & Bailey, 1997; Hackman, 1987; McGrath, 1984; Steiner, 1972), knowledge-intensive teams are less likely to work together full-time on a single team in the same location (Barkema, Baum, & Mannix, 2002). Instead, they are increasingly likely to spend only part of their time on the focal team, work on other teams concurrently, and span a variety of geographic locations (O'Leary, Mortensen, & Woolley, 2011). Now that the challenges and opportunities of globalization are an unavoidable reality for organizations large and small, an important question for the design of knowledge-intensive teams is how to effectively allocate the time of members across teams, especially when these members are geographically dispersed (Boh, Ren, Kiesler, & Bussjaeger, 2007; Faraj & Sproull, 2000; Sole & Edmondson, 2002).

To address this question, we take an attention-based view of team design that starts from the premise that attention is a valuable but scarce resource in organizations (March & Simon, 1958; Simon, 1947). In knowledge-intensive work contexts, demands on attention are particularly acute because new problems of information overload have displaced the old problems of information scarcity (Davenport & Beck, 2002; Hansen & Haas, 2001). As the demands on their attention multiply, team members increasingly experience "time famine"—the feeling that they have too much to do and not enough time to do it (Perlow, 1997). According to the attention-based view of the firm, organizational structures and systems manage these demands by channeling the attention of members toward some activities and away from others (Ocasio, 1997). We extend this attention-based view to teams by suggesting that time allocation is a structural feature of team design that fundamentally shapes the extent to which the attention of team members is concentrated on the focal team or diffused across other teams.

We identify two key dimensions of member time allocation that channel the attention of team members toward the focal team or away from it. First, members who allocate a higher proportion of their time to the focal team can concentrate more of their attention on the team's work. Second, members who allocate time to a greater number of other teams concurrently experience more attention diffusion across teams. Some prior studies have noted the importance of the proportion of members' time allocated to a focal team (e.g., Campion, Medsker, & Higgs, 1993; Clark & Wheelwright, 1992). Others have considered the number of teams to which team members are assigned simultaneously (e.g., Leroy & Sproull, 2004; O'Leary et al., 2011). However, these studies have not examined the two separate dimensions of member time allocation together or investigated them systematically in the field. As the capacity to focus attention on a team's work depends on both the proportion of time allocated to the focal team and on the number of other teams to which time is allocated concurrently, in this study, we consider both dimensions of member time allocation and examine their antecedents and consequences both theoretically and empirically.

Building on the argument that time allocation structures the attention of team members, we take a multi-level approach to studying member time allocation in knowledge-intensive teams. First, we examine the individual-level antecedents of team member time allocation. Because of the complexity, uncertainty, and non-routine nature of the work undertaken by knowledge-intensive teams, the attention of individuals who have extensive experience, occupy senior ranks, or are highly educated is particularly valued (cf. Blackler, 1995; Starbuck, 1992). Such individuals can offer benefits to a team that include technical expertise (e.g., Faraj & Sproull, 2000), network contacts (e.g., Hansen & Lovas, 2004), and access to scarce resources (e.g. Finkelstein, 1992). This suggests that the attention of individuals with greater experience, higher rank, and more education will be in greater demand; thus, individuals with these characteristics will allocate a lower proportion of their time to the focal team and will allocate time to a larger number of other teams concurrently. Additionally, we propose that members who hold a formal team leader role will allocate a higher proportion of their time to the focal team and will allocate time to a smaller number of other teams concurrently because of the responsibilities that require their attention on the focal team as well as their expertise, networks, and resources.

Second, we examine the team-level consequences of team member time allocation. Recent research on attention highlights the cognitive, motivational, and behavioral costs resulting, for example, from managing high workloads (e.g., Schmidt & Dolis, 2009), switching between tasks (e.g., Altmann & Gray, 2008; Leroy, 2009; Rubinstein,

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Meyer, & Evans, 2001), or interruptions and distractions (e.g., Jett & George, 2003; Mark, Gonzalez, & Harris, 2005; Okhuysen & Eisenhardt, 2002). Drawing on this research, we expect that teams whose members allocate a higher proportion of their time to the focal team will perform more effectively, because these members can concentrate their attention more fully on their work. In contrast, we expect that teams whose members allocate time to more teams concurrently will perform less effectively, because the attention of the members is more diffused.

Furthermore, we examine the moderating effects of geographic dispersion on the relationship between member time allocation and team performance. Consistent with prior research (e.g., Allen, 1977; Hinds & Kiesler, 2002; Espinosa, Cummings, Wilson, & Pearce, 2003), we conceptualize geographic dispersion as increasing with greater levels of physical separation among team members (i.e., different rooms, hallways, floors, buildings, cities, countries). In knowledge-intensive teams that are more geographically dispersed, team member time allocation patterns can be expected to look different from those found in traditional teams. Specifically, members of more geographically dispersed teams can be expected to allocate a lower proportion of their time to the focal team and to allocate time to a greater number of other teams concurrently. Yet, the benefits of team members concentrating attention on the focal team, as well as the costs of diffusing attention across other teams, can be expected to be greater when the members are more geographically dispersed, because of the increased needs for coordination and information about each others' priorities, constraints, and contexts across locations (e.g., Herbsleb, Mockus, Finholt, & Grinter, 2000; Massey, Montoya-Weiss, & Hung, 2003; Olson & Olson, 2000). Accordingly, we argue that more dispersed teams will benefit more from having members who allocate a greater proportion of their time to the focal team but suffer more from having members who allocate time concurrently to a greater number of other teams.

We test hypotheses derived from our multi-level theory with a sample of 2055 members from 285 teams engaged in knowledge-intensive work in a multinational organization. We conclude with a discussion of the theoretical and managerial implications of our findings.

Antecedents and Consequences of Team Member Time Allocation

The divergence of knowledge-intensive teams from the bounded, stable entities of traditional team research (e.g., Cohen & Bailey, 1997; Hackman, 1987) has created a need for new theorizing about member time allocation in teams. By exploring the individual-level antecedents and team-level consequences of member time allocation, we aim to extend traditional theories of team effectiveness to new forms of work teams. Our multi-level model is summarized in Figure 1.

Individual-level antecedents of time allocation

Because knowledge-intensive work can be facilitated by technical expertise, network contacts, and access to scarce resources, the attention of individuals who can provide such benefits is in demand. In the succeeding paragraphs, we consider four characteristics of individuals that prior research suggests can offer such benefits for knowledge-intensive teams: (i) company experience, acquired through years spent in the firm; (ii) organizational rank, achieved by reaching a level of seniority in the hierarchy, for example as a manager who supervises employees; (iii) educational attainment, gained through degrees earned at academic institutions; and (iv) leader role, involving formally assigned responsibility for the team. These characteristics suggest that in the same amount of time, some people can be expected to provide higher quality attention—and thus more benefits for their teams—than others. Thus, these characteristics can influence the patterns of members' time allocation, both to the focal team and to other teams concurrently.

First, company experience helps individuals develop firm-specific knowledge and skills that are potentially valuable for teams in that organization. More company experience is generally associated with better performance, especially when the experience is relevant to the task (Quinones, Ford, & Teachout, 1995). In particular, during

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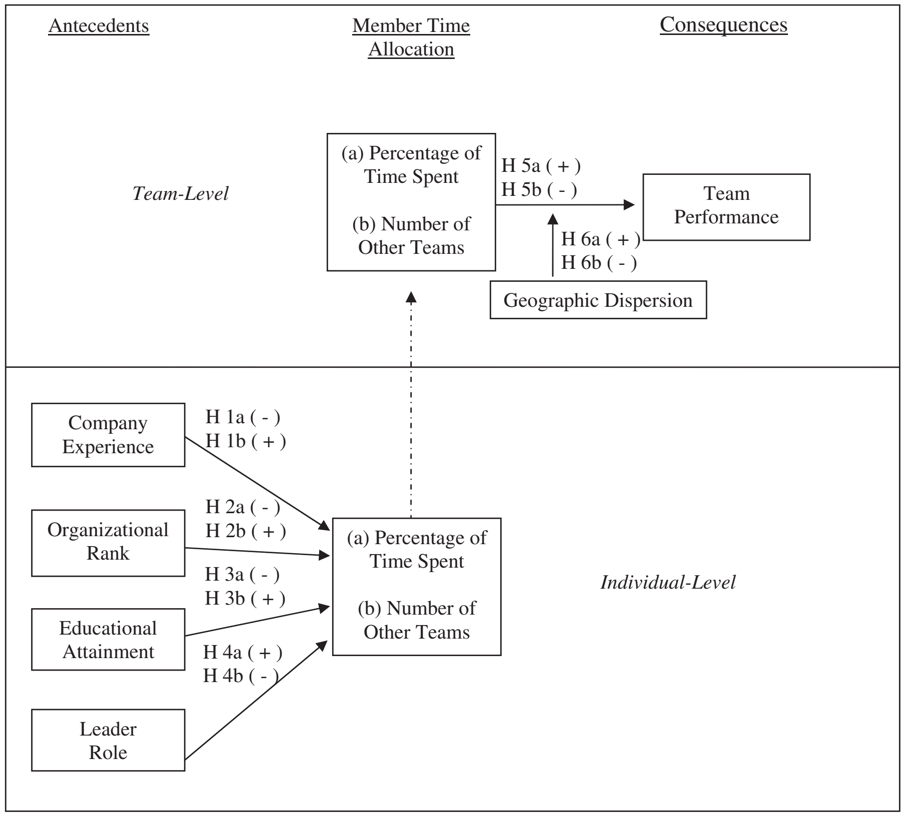

Figure 1. A multi-level model of the antecedents and consequences of member time allocation in geographically dispersed teams. *Note*: Solid lines denote formally proposed and tested hypotheses. Dashed line represents an aggregation of the individual-level concept into a parallel team-level concept

their years with the company, individuals accumulate extensive explicit and tacit knowledge that is deeply grounded in the specific context of their jobs (Schmidt, Hunter, & Outerbridge, 1986). Additionally, individuals develop insight into the often complex processes through which work actually gets done in the organization over time, as well as where to go for information and advice (Levin & Cross, 2004). Understanding the network structures that connect people in the organization, as well as the distribution of power, can also be useful for accessing and securing critical resources, such as additional funding for a project or senior executives' support for a high-risk initiative (Krackhardt, 1990). Together, their accumulated job-related knowledge and understanding of the organization's processes, networks, and power structure makes the attention of individuals with greater experience in the company highly valued. The increased demands on individuals with greater company experience impact time allocation in two ways. First, these individuals will tend to have less time available to allocate to a focal team. Second, these individuals will tend to be asked to allocate time to a greater number of teams simultaneously, thus controlling for the number of other teams on which a team member works concurrently:

Hypothesis 1a: At the individual level, company experience is negatively associated with the percentage of time a member spends on the focal team.

And controlling for the percentage of time that the team member spends on the focal team:

Hypothesis 1b: At the individual level, company experience is positively associated with the number of other teams on which a member works concurrently.

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Second, organizational rank also offers potential benefits to teams through the firm-specific knowledge and skills that individuals who occupy higher positions in the formal hierarchy can provide. As a function of their position in the organization, individuals who are higher in organizational rank typically have contact with a greater variety of people and information (Lincoln & Miller, 1979). They often have access to and control over more important resources, including the allocation of financial resources through the formal budget process (Finkelstein, 1992). Because of their greater authority and decision-making rights, individuals who are higher in the formal hierarchy also are usually more involved in company decision processes (Bunderson, 2003). The combination of their diverse networks contacts, access to critical information and resources, and decision involvement makes the attention of individuals who are higher in the organizational hierarchy potentially important for their teams. The resulting demands on their attention mean they are likely to have less time available to allocate to a given team. These demands also reduce their capacity to devote time to any particular team. Consequently, controlling for the number of other teams on which a team member works concurrently:

Hypothesis 2a: At the individual level, organizational rank is negatively associated with the percentage of time a member spends on the focal team.

Moreover, controlling for the percentage of time the team member spends on the focal team:

Hypothesis 2b: At the individual level, organizational rank is positively associated with the number of other teams on which a member works concurrently.

Third, individuals with high levels of educational attainment are valuable to their teams because formal education builds general knowledge and skills. The higher the education level, the more likely a team member can interpret and make sense of ambiguous task information (Dahlin, Weingart, & Hinds, 2005). In the context of knowledge-intensive work, where team members often have to figure out what comes next as they make progress on a task, a higher level of education increases their information processing ability in the face of uncertainty (Tushman, 1979). A higher level of education also makes it easier for members to communicate technical or complicated ideas to other members, given that differences in education level can be a barrier to language compatibility (Tsui & O'Reilly, 1989). Formal education thus enables individuals to develop a set of general skills that are potentially valuable across many situations (Becker, 1993). Because their interpretation skills, information processing abilities, and communication proficiency suggests that the attention of individuals with higher levels of education can be particularly valuable for teams, their time is likely to be in greater demand. Accordingly, such individuals are likely to spend less time on a particular team, and furthermore, they are more likely to work on multiple teams concurrently. Thus, controlling for the number of other teams on which a team member works concurrently:

Hypothesis 3a: At the individual level, educational attainment is negatively associated with the percentage of time a member spends on the focal team.

In addition, controlling for the percentage of time a member spends on the focal team:

Hypothesis 3b: At the individual level, educational attainment is positively associated with the number of other teams on which a member works concurrently.

Finally, team leaders are also valued for their technical expertise, network contacts, and access to scarce resources. However, their formal responsibilities on the team should lead them to spend more time, rather than less time, on the focal team. Moreover, they are likely to serve on fewer, rather than more, other teams concurrently, because of their heightened responsibilities to the focal team. For example, team leaders have formally assigned administrative duties such as coordinating project resources, guiding team members, and regulating team tasks. They are responsible for taking care of the needs required for accomplishing a task, such as ensuring that members have the knowledge and skills necessary for success (Hackman & Walton, 1986). They are also charged with organizing activities and

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directing work teams towards goals, which includes managing relationships and facilitating outside feedback on progress (Wageman, 2001). Furthermore, team leaders have the authority to use a variety of resources to facilitate task completion, such as budget and personnel provided by upper management (House, 1971). Given their administrative duties, responsibilities, and authority to ensure necessary expertise, networks, and resources, members in a leader role are likely to be in more demand. As a result, they are more likely to spend time on the focal team. They are also more likely to work on fewer other teams concurrently than other members of the team. Hence, controlling for the number of other teams on which a team member works concurrently:

Hypothesis 4a: At the individual level, leader role is positively associated with the percentage of time a member spends on the focal team.

And controlling for the percentage of time a member spends on the focal team:

Hypothesis 4b: At the individual level, leader role is negatively associated with the number of other teams on which a member works concurrently.

Team-level consequences of time allocation

In addressing the effects of member time allocation on team-level performance, our attention-based view of team design suggests that teams whose members allocate more time to the team and work on fewer other teams concurrently will perform more effectively, because they are less likely to suffer from the cognitive, motivational, and behavioral costs of attention diffusion. Put differently, controlling for the quality of the attention available to a team (as represented by members' company experience, organizational rank, educational attainment, and leader roles), we expect the quantity of attention available to the team to be positively related to team performance.

Time allocation and team performance

An attention-based view of team design suggests that team performance can be harmed if members allocate a lower proportion of their time to the focal team. Social psychology research on attention suggests that limited time leads team members to narrow their attention to a smaller set of cues and to become more concerned with reaching consensus or making a decision quickly and less concerned with other goals, such as improving the quality of the team's decision or systematically evaluating alternatives (Karau & Kelly, 1992; Kelly & Loving, 2004; Parks & Cowlin, 1995). On tasks that are complex, uncertain, or non-routine, like those that characterize knowledge-intensive work, these information processing and interaction strategies can produce less creative or well-reasoned decisions (Kelly & Karau, 1999). The implication is that team members who can devote only a low proportion of their time to completing their work for a focal team may contribute less to that team as a result.

Independent of the problems arising from having a lower proportion of member time allocated to the focal team, there are also potential costs created by having member time allocated to more other teams concurrently because each additional assignment increases the cognitive load on the team members (Sweller, 1988). The cumulative demands created by multiple competing goals may exceed team members' perceptions of their capabilities and lead them to partially or completely abandon some of their goals in order to assure the attainment of others (Schmidt & Dolis, 2009). Team members may also incur switching costs when they transfer their attention across teams, and the more teams they must switch across, the greater these costs. There is considerable empirical evidence that task switching is costly because cognitive interference from a previous task reduces effectiveness on a current task (e.g., Altman & Gray, 2008; Rubinstein et al., 2001). This interference has been found to be particularly problematic when the previous task is not yet completed (Leroy, 2009), which is the case when team members allocate time to multiple teams concurrently.

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Beyond these cognitive effects of time allocation, there may also be motivational and behavioral implications of allocating less time to the focal team and time to more other teams concurrently. Team members who only allocate a relatively small amount of time to a focal team may not be motivated to engage fully with the team's task even in the time assigned to that team (Clark & Wheelwright, 1992). They may also identify less with the focal team, which could further reduce their level of engagement and beliefs that they can be effective (Campion, Medsker, & Higgs, 1993). These motivational risks also arise from working on more other teams concurrently, as engagement is likely to be more difficult to sustain in the face of more simultaneous demands from other teams as well as multiple competing team identities (O'Leary et al., 2011).

Finally, the behavioral risk of interruptions and distractions is greater both when team members allocate a lower proportion of their time to the focal team and when they allocate time to more teams concurrently. Interruptions can sometimes be useful for teams and introduce valuable information for their work (e.g., Jett & George, 2003; Okhusyen & Eisenhardt, 2002; Zellmer-Bruhn, 2003). However, interruptions can also reduce productivity by distracting attention from the focal project (Perlow, 1999), and resuming work on a focal project has been shown to be more difficult when interruptions are longer and more demanding (Altmann & Trafton, 2002; Monk, Trafton, & Boehm-Davis, 2008). Allocating a lower proportion of time to the focal team and allocating time to a greater number of other teams concurrently can impose attention costs on teams due to pressures for completion, competing goals, task switching, reduced engagement, and interruptions. Hence, we predict, controlling for the number of other teams on which members work concurrently:

Hypothesis 5a: At the team level, the percentage of time the members spend on the focal team is positively associated with team performance.

And controlling for the percentage of time the members spend on the focal team:

Hypothesis 5b: At the team level, the number of other teams on which the members work concurrently is negatively associated with team performance

Moderating role of geographic dispersion

Teams engaged in knowledge-intensive work often draw members from multiple geographic locations, as this work frequently requires more expertise than is available in a single location (for a review, see Hinds & Kiesler, 2002). The members of geographically dispersed teams may be separated by boundaries that represent increasing levels of physical separation ranging from different rooms to different hallways to different floors to different buildings to different cities to different countries (Espinosa et al., 2003). Because crossing such boundaries and dealing with competing pressures from their local work environments increases the demands on team members' attention, we expect that geographic dispersion will influence the relationship between time allocation and team performance.

Prior research has shown that overcoming physical separation requires team members to devote extra attention to coordination and communication across the boundaries that separate them (Cramton, 2001). For team members who are located in different rooms, hallways, or floors in a building, even these low levels of geographic dispersion create difficulties of coordination and communication that increase the demands on their attention. For example, although such team members have relatively low barriers to scheduling face-to-face meetings, each increasing level of physical separation nevertheless increases the barriers to informal interactions and spontaneous communication between them, reducing their awareness of each others' activities and perspectives (Allen, 1977; Van den Bulte & Moenaert, 1998, Zahn, 1991).

For members who are dispersed across buildings, the demands on their attention are increased because not only are informal interactions and spontaneous communication less likely, but scheduled face-to-face meetings become more difficult as well. As a result, team members must rely more heavily on communication technologies, despite the increased interpretation challenges that can accompany the lower richness of e-mail, phone, or other substitute communication media (Daft & Lengel, 1984; Sosa, Eppinger, Pich, McKendrick, & Stout, 2002).

Along with the coordination and communication difficulties arising from dispersion, team members who are located in different cities have the demands on their attention further compounded by the proximity of local colleagues, whose attempts to pull their attention toward other tasks and away from the focal team can be hard to resist (Armstrong & Cole, 1995). For team members who are located in different countries, finally, the demands on their attention are compounded even further by the greater differences encountered across countries as well as by the need to manage pressures from local colleagues. In particular, such team members must not only overcome physical distance and often time zone differences, but cultural differences too (Hansen & Lovas, 2004; Jarvenpaa & Leidner, 1999; Maznevski & Chudoba, 2000).

Because of the increasing demands on team members' attention due to greater geographic dispersion, the cognitive, motivational, and behavioral benefits of attention focus created by spending a higher proportion of time on the focal team are more valuable for teams with greater dispersion. For example, members who spend more time focused on a dispersed team are more likely to be aware of the needs of other members, more likely to be motivated to help out in critical situations, and more likely to override local distractions and interruptions. In contrast, the cognitive, motivational, and behavioral costs of attention diffusion that arise from working on a greater number of other teams concurrently are likely to be more harmful for teams with greater dispersion. For instance, dispersed team members who are also on more other teams are less likely to engage fully with issues raised by other members, less likely to be driven to solve time-consuming problems, and less likely to deal effectively with competing demands made by local colleagues. Thus, there are increasing benefits of attention focus and increasing costs of attention diffusion as teams become more geographically dispersed. Given these arguments, we expect that, controlling for the number of other teams on which members work concurrently:

Hypothesis 6a: At the team level, the percentage of time members spend on the focal team is more positively associated with team performance when geographic dispersion is greater.

Moreover, controlling for the percentage of time members spend on the focal team:

Hypothesis 6b: At the team level, the number of other teams on which members work concurrently is more negatively associated with team performance when geographic dispersion is greater.

Methods

Teams in this study worked in a large multinational company that employs more than 100 000 people in over 50 countries worldwide. The company is engaged in diversified operations in the food industry. In terms of company experience, educational attainment, organizational rank, and leader role for the study participants, 42 percent had more than 10 years of experience working for the company, 86 percent had at least a bachelor's degree, 58 percent had at least one company employee who reported to them, and 21 percent had occupied a formal team leader role.

Sample

At any given time, the company had thousands of teams, most of which were temporary project teams that were time limited, produced one-time outputs, and disbanded after the task was complete. The standard practice in the company was for a local manager to secure funding for a particular team, to recruit individuals in the organization to work on the team, and to assign one or more of the members as formal leaders of the team. As a result of the

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company's emphasis on using teams to work on non-routine, complex tasks in an uncertain environment, the teams can be characterized as highly knowledge-intensive.

The teams that participated in this study included all teams nominated by their local managers for a company-wide recognition program. The only explicit criterion for nomination was that teams had to have completed their tasks; thus, we do not have teams in our sample that had not finished their tasks or that had stopped working on their tasks prematurely. Because managers around the world differed in their reasons for nominating a team (e.g., some managers nominated teams for simply finishing their task, some nominated teams to recognize hard work, and some nominated teams for what they viewed as a successful task output), the teams in the sample varied in their performance.

Each team was classified by the local nominating manager according to one of three task types: (i) customer service (e.g., task could have an impact on customers' cost, profit, or revenue or focuses on maximizing long term customer relationships); (ii) operational improvement (e.g., task could result in significant improvement, a sustainable return, or internal growth, or there is a clear relationship between the results of the team's performance and the goals of the business unit); or (iii) product innovation (e.g., task could be a unique and useful breakthrough for the industry, provides the company with a major competitive advantage, or is difficult to replicate or imitate). Tasks lasted a little over 1 year, on average, and addressed a range of problems, which are illustrated in Table 1, together with descriptive data on their member time allocations.

Initially, a corporate vice-president sent an e-mail message to all 2701 members of the 365 teams that participated in the program, inviting them to contribute to this study, followed by two reminders. A total of 2179 team members responded to the survey, for a response rate of 81 percent. The survey was written in English as this was the common language among the participants. In the beginning of the survey, each respondent was provided with the team name (which usually described the project) as well as the first and last names of members on the team. To verify team membership, we asked survey respondents to indicate if they thought they were officially on the team and only included those respondents who confirmed being on the team in our study (96 percent of respondents confirmed; the primary reason given by the other 4 percent was minimal participation on the team, such as providing input only once or twice). Furthermore, we only used data from teams that had at least four confirmed team members and at least a 50 percent response rate to our survey. Our final sample included 2055 members of 285 teams (76 percent of all team members and 78 percent of all teams surveyed). As we were able to gather background data on company experience, education level, organizational rank, and leader role from respondents only, we do not know how these characteristics differ for non-respondents. However, we do know that the final sample of teams did not differ significantly on these characteristics when compared with the teams that were excluded from the analysis because of the criteria outlined above (i.e., at least four confirmed members with at least a 50 percent response rate). Several months following completion of the survey, independent panels of senior executives rated team performance.

Measures

Company experience

Respondents indicated their levels of experience in the company (1: 0–4 years, 2: 5–10 years, 3: 11–15 years, 4: 16–20 years, 5: 21–25 years, 6: >25 years). At the team level, we computed the average years of company experience for members on each team.

Organizational rank

We measured the rank of respondents within the company with a categorical variable where 1 = employee (no direct reports), 2 = manager (direct employee reports), and 3 = senior manager (direct manager reports). At the team level, we computed the average rank for members on each team.

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Table 1. Examples of knowledge-intensive work by time allocation and type of task in the sample of N=285 teams.

Percentage of time on focal team	Number of other teams	Type of task	Examples of knowledge-intensive work
63 (high)	5.0 (high)	Customer service	Used operations, R&D, and sales knowledge to create a system for integrating food products into the store distribution channels of an important customer
56 (high)	4.5 (high)	Operational improvement	Used finance, management, operations, quality, R&D, and sales knowledge to refine a business strategy for extending product lines of existing food products sold to retailers
53 (high)	3.4 (high)	Product innovation	Used engineering, operations, product support, quality, R&D, and sales knowledge to develop a new food product that extends an existing process
10 (low)	7.6 (high)	Customer service	Used engineering, operations, R&D, and sales knowledge to deliver an ingredient as a way to improve productivity and functionality for a key customer
13 (low)	7.2 (high)	Operational improvement	Used engineering, operations, quality, and R&D knowledge to turn ingredient optimization processes into a single comprehensive program
9 (low)	7.5 (high)	Product innovation	Used marketing and R&D knowledge to make advances in nutrition, including the creation of a new nutrient used during critical stages of food development
60 (high)	1.3 (low)	Customer service	Used marketing, product support, quality, R&D, and sales knowledge to streamline offering of an ingredient to meet customer needs
88 (high)	1.3 (low)	Operational improvement	Used engineering and operations knowledge to re-design a manufacturing plant and port used for special production and delivery through transportation
64 (high)	2.0 (low)	Product Innovation	Used engineering and operations knowledge to build a non-proprietary control system and database with new capabilities to replace obsolete systems across the company
6 (low)	1.3 (low)	Customer service	Used operations, trading, and transportation knowledge to secure a new relationship with a top customer by solving a problem they had with the quality of available options
4 (low)	1.7 (low)	Operational improvement	Used accounting, finance, and IT knowledge to improve productivity and reduce costs through introducing a standardized paperless system for responding to customer requests
19 (low)	2.0 (low)	Product innovation	Used accounting, engineering, management, sales, and trading knowledge to introduce the production of new ingredients inside of an existing food production facility

Educational attainment

Respondents reported their education on a scale where 1=high school, 2=some college, 3=bachelor's degree, 4=master's degree, 5=professional degree, and 6=doctorate. At the team level, we computed the average education level for members on each team.

Leader role

We asked each member to indicate whether or not they were a formal leader on the team (1=yes, 0=no). At the team level, we created a variable that captured whether a team had multiple formal leaders (1=yes, 0=no). Just over 40 percent of our sample had two or more formal leaders, indicating that the practice was quite common in these knowledge-intensive teams.

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Percentage of time spent

Respondents reported the percentage of time they spent on the focal team: 1=1–10 percent of average work week, 2=11–20 percent, 3=21–30 percent, 4=31–40 percent, 5=41–50 percent, 6=51–60 percent, 7=61–70 percent, 8=71–80 percent, 9=81–90 percent, 10=91–100 percent. At the team level, we computed the average percentage of time spent for members on each team (ICC1=0.33, $p<0.001$; ICC2=0.80, $p<.001$, indicating that it is appropriate to aggregate this measure to the team level).

Number of other teams

Respondents also reported the number of other teams they were on at the same time as the focal team: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10+. At the team level, we computed the average number of other teams for members on each team (ICC1=0.18, $p<.001$; ICC2=0.63, $p<.001$, indicating that it is appropriate to aggregate this measure to the team level).

Geographic dispersion

We measured geographic dispersion with a seven-point scale that captures increasing levels of physical separation (1=same room, 2=different room on the same hallway, 3=different hallway, 4=different floor, 5=different building, 6=different city, 7=different country; Allen, 1977; Olson & Olson, 1999; Sosa et al., 2002; Levin & Cross, 2004). Team members indicated the extent to which they were physically separated from every other member of the team. At the team level, we computed the average physical separation among members to determine the extent to which the team was geographically dispersed. In our sample, the average team member had 15 percent of other members in the same room, 11 percent of other members in a different room on the same hallway, 5 percent of other members in a different hallway, 9 percent of other members in a different floor, 14 percent of other members in a different building, 30 percent of other members in a different city, and 15 percent of other members in a different country.[1]

Team performance

We used independent evaluations generated by panels of senior executives who were not previously familiar with the teams in the study to measure team performance. These panels judged the work of the teams on the dimensions of uniqueness, usefulness, customer engagement, value delivery, goal alignment, and tangible results. To avoid potential conflicts of interest, no senior executives were members of any of the teams, had team members as direct reports, or were nominating managers. We judged within the task categories of customer service, operational improvement, and product innovation, ensuring that they were only judged against other teams with the same type of task.

For each task category, there were three rounds of judging, and a different panel of senior executives who were identified as experts in that category judged each round (the first round panels had four senior executives, the second round panels had four senior executives, and the third round panels had three senior executives). To reinforce that all types of tasks were valued equally by the company, the number of teams advancing in each round was proportional to the number of teams in each of the three task categories. The panels reached their decisions by consensus and did not report raw scores or other metrics behind their judgments. Of the 285 teams in our sample, 217 teams made it as far as the first round only (76 percent), 45 teams made it as far as the second round (16 percent), and 23 teams made it as far as the third and final round (8 percent). Thus, we used an ordinal variable to capture whether teams ended up

[1]We also computed several alternative measures of geographic dispersion following O'Leary and Cummings (2007), including (i) physical distance based on the average number of miles separating pairs of members, (ii) temporal distance based on the average number of time zones separating pairs of members, and (iii) locational configuration based on the number of cities or countries on the team. Additionally, following Hofstede (1991), we computed (iv) the cultural distance separating team members based on the four categories of low versus high power distance, individualism versus collectivism, masculinity versus. femininity, and uncertainty avoidance. In exploratory analyses, we did not find any significant main effects of these alternative measures or any moderating effects on the relationship between time allocation and team performance. In models that included these alternative measures, the results of our analyses using the seven-point geographic dispersion variable were unchanged.

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in the first, second, or final round of judging, coded 1=low performance, 2=medium performance, and 3=high performance.

Though we did not have access to data that would allow us to compute the percent agreement among judges within a panel, reliability was built into the overall evaluation process. For example, teams reaching the final round were judged by three separate panels, so high performing teams had agreement across panels that they were the best within their task category. Moreover, panels did not have any of the survey data described above (including member time allocation) when making judgments about team performance. Rather, they relied on a variety of inputs such as reported results, customer satisfaction, and project impact, which were provided in the form of written documents, powerpoint slides, and spreadsheets included in the judging materials. It is important to note that not all types of outcome information were available for all teams, so the panels had to synthesize and integrate the different sources to make an overall judgment about performance. Finally, teams learned about which round they reached (i.e., first, second, or final) only well after the study was over, which was important for ensuring that member survey responses were not influenced by executive ratings of team performance.

We also included several control variables in the models. At the individual level of analysis, we control for the *knowledge area* of each team member. Though our attention-based view of team design does not provide a theoretical reason to expect particular knowledge areas to be more influential than others, there may be variation in how time is allocated for different kinds of expertise. Team members were asked to select a primary area of expertise that they contributed to the team (accounting, engineering, finance, IT, management, marketing, operations, product support, quality, R&D, sales, trading, transportation, other; 0=no, 1=yes). At the team level of analysis, we controlled for *size of the team, length of the project* (in months), *type of task* (categorized as product innovation (0=no, 1=yes), operational improvement (0=no, 1=yes), or customer service (0=no, 1=yes)), and *number of knowledge areas* (unique number of areas indicated by individuals on the team).

Statistical approach

At the individual level of analysis, we used hierarchical linear modeling (or HLM, sometimes referred to as multi-level modeling or random coefficient modeling) to examine the antecedents of member time allocation (Bryk and Raudenbush, 1992; Singer and Willett, 2003). As we are testing associations between independent and dependent variables within teams, HLM is preferred over ordinary least squares (OLS) because the data represent a hierarchically nested structure (i.e., individuals nested within teams). Specifically, HLM takes into account the non-independence of observations when two or more people are interdependent, such as members of a team. To evaluate the appropriateness of using HLM, we first ran a NULL model that included the dependent variables and no predictor variables. This model indicated that there was significant between-team variation for both percentage of time spent (intercept=3.39, $t(284)=28.34$, $p<.001$) and number of other teams (intercept=5.27, $t(284)=46.81$, $p<.001$), indicating that using HLM was appropriate. Consistent with established practice (e.g., Hofmann & Gavin, 1998; Klein, Lim, Saltz, & Mayer, 2004), we also team-mean centered the predictor variables so that the coefficients reflect the effects of members relative to other members on the same team (rather than relative to other members in the entire sample, as grand-mean centering would reflect). Team-mean centering is particularly important in knowledge-intensive teams because factors like aggregate time requirements for the task overall are taken into account when designing the team; thus, members are interdependent in terms of their time allocation.

At the team level of analysis, we used ordinal logit regression to assess the relationship between team-level time allocation and team performance. Ordinal logit is preferred over OLS as our measure of team performance is categorical and ordered (i.e., low, medium, and high levels of performance) rather than continuous. Positive coefficients indicate the likelihood that a team reaches a later round of judging. We conducted likelihood-ratio tests to compare the fit of each model with the preceding one (i.e., whether the model fit is significantly improved when additional variables are added to the analyses).

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Results

Table 2 presents descriptive statistics and correlations for the individual-level variables. This table shows that percentage of time spent on the focal team and number of other teams are significantly negatively associated with each other, as we would expect ($r = -.39$, $p < .001$). Cross-tabulation of these two components of time allocation (not shown) indicated that a small proportion of the team members were high on both components (e.g., 2 percent of members spent more than 50 percent of their time on the focal team and worked on more than five other teams concurrently), whereas somewhat higher proportions were high on one component and low on the other (e.g., 11 percent spent more than 50 percent of their time on the focal team and worked on no more than one other team concurrently; 16 percent spent less than 10 percent of their time on the focal team and worked on more than 5 other teams concurrently). The remainder had a mix of low, moderate, and high values.

The descriptive statistics and correlations for the team-level variables are presented in Table 3. These show that teams that were more geographically dispersed had members who allocated less time to the focal team ($r = -.23$, $p < .001$) and were on more other teams concurrently ($r = .29$, $p < .001$), as we anticipated.

Individual-level models

Table 4 shows results from the HLM analyses predicting member time allocation. The baseline model predicting percentage of time spent with control variables only shows that team members with expertise in engineering, IT, and R&D allocated a higher percentage of their time to the focal team (Model 1: $B = .68$, $p < .05$; $B = 1.52$, $p < .001$; $B = 1.05$, $p < .001$). Models 2–5 introduce each independent variable separately, and Model 6 tests hypotheses 1a, 2a, 3a, and 4a together. There is support for hypothesis 1a, as we find a significant negative relationship between individual-level company experience and percentage of time spent (Model 6: $B = -.11$, $p < .01$). Support is provided for hypothesis 2a, as there is a significant negative relationship between individual-level organizational rank and percentage of time spent (Model 6: $B = -.59$, $p < .001$). Hypothesis 3a is not supported, as the relationship between individual-level educational attainment and percentage of time spent is not significant (Model 6: $B = -.09$, $p < .01$). Finally, hypothesis 4a is supported, as we find a significant positive relationship between team leader role and percentage of time spent (Model 6: $B = .99$, $p < .001$). The results show that greater experience and higher rank each were associated with a significantly lower percentage of time allocated to a focal team, and leader role was associated with a significantly higher percentage of time allocated to a focal team.

Turning to number of other teams, Model 1 in Table 5 includes the baseline model with control variables only; this model shows that team members with expertise in IT worked on a greater number of other teams concurrently (Model 1: $B = .90$, $p < .01$). Models 2–5 show each independent variable separately, and Model 6 tests hypotheses 1b, 2b, 3b, and 4b together. We find support for hypothesis 1b, as there is a significant positive relationship between company experience and number of other teams (Model 6: $B = .13$, $p < .01$). Hypothesis 2b is supported, as there is a significant positive relationship between organizational rank and number of other teams (Model 6: $B = .80$, $p < .001$). Hypothesis 3b is supported, as there is a significant positive relationship between educational attainment and number of other teams (Model 6: $B = .21$, $p < .001$). However, hypothesis 4b is not supported: there is a significant positive, rather than negative, relationship between leader role and number of other teams when this variable is entered separately (Model 5: $B = .56$, $p < .001$), and this finding is no longer significant in the full model (Model 6: $B = .25$, $p > .10$). Thus, greater experience, higher rank, and more education each were significantly associated with a greater likelihood that members worked on a greater number of other teams concurrently.

Team-level models

The models in Table 6 predict team performance. Model 1 includes control variables only and shows that teams with longer project duration, members with higher rank, and more educated members perform significantly better (Model

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Table 2. Descriptive statistics for individual-level study variables (N=2055 members).

#	Variable	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
	Knowledge area																					
1	Accounting	0.06	0.24																			
2	Engineering	0.07	0.25	−.07																		
3	Finance	0.08	0.27	−.08	−.08																	
4	IT	0.14	0.35	−.10	−.11	−.12																
5	Management	0.07	0.26	−.07	−.08	−.08	−.11															
6	Marketing	0.07	0.25	−.07	−.07	−.08	−.11	−.08														
7	Operations	0.07	0.26	−.07	−.08	−.08	−.11	−.08	−.08													
8	Product support	0.06	0.24	−.07	−.07	−.08	−.10	−.07	−.07	−.07												
9	Quality	0.07	0.25	−.07	−.07	−.08	−.11	−.08	−.07	−.08	−.07											
10	R&D	0.08	0.26	−.07	−.08	−.08	−.12	−.08	−.08	−.08	−.07	−.08										
11	Sales	0.05	0.22	−.06	−.06	−.07	−.09	−.07	−.06	−.07	−.06	−.06	−.07									
12	Trading	0.06	0.25	−.07	−.07	−.08	−.11	−.07	−.07	−.07	−.07	−.07	−.07	−.06								
13	Transportation	0.04	0.20	−.05	−.06	−.06	−.08	−.06	−.06	−.06	−.05	−.06	−.06	−.05	−.06							
14	Other	0.07	0.26	−.07	−.08	−.08	−.11	−.08	−.07	−.08	−.07	−.07	−.08	−.06	−.07	−.06						
15	Company experience	2.63	1.51	−.02	−.06	−.06	−.03	.03	.07	.02	.03	−.02	−.07	−.01	.14	.01	.00					
16	Organizational rank	1.67	.64	.06	.01	−.08	−.23	.15	.09	.05	.00	−.02	−.06	.04	.19	.01	−.07	.28				
17	Educational attainment	3.43	1.13	−.04	.04	.20	−.11	.00	−.04	−.14	−.03	.01	.18	−.06	.03	.01	−.03	−.16	.09			
18	Leader role	0.21	0.41	.02	.03	.00	.00	.01	.01	−.05	.00	−.03	.00	.02	.07	.01	−.07	.09	.20	.04		
19	Percentage of time spent	3.49	3.05	−.01	.01	.01	.14	−.06	.01	.03	−.06	−.05	.05	.00	−.06	−.04	−.03	−.13	−.16	−.07	.09	
20	Number of other teams	5.28	3.41	−.06	.00	.07	.02	−.04	.03	−.06	−.02	.01	.07	−.01	−.01	−.05	.02	.11	.20	.11	.02	−.39

Note: $|r| > .07$, $p < .001$.

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Table 3. Descriptive statistics for team-level study variables (N=285 teams).

#	Variable	*M*	*SD*	1	2	3	4	5	6	7	8	9	10	11	12	13
1	Team size	8.76	3.20													
2	Project length	16.78	11.93	.05												
3	Innovation task	0.30	0.46	−.10	−.04											
4	Operational task	0.45	0.50	.12	−.08	−.58										
5	Customer task	0.26	0.44	−.03	.13	−.38	−.53									
6	Number of knowledge areas	3.92	1.72	.47	.03	−.07	−.07	.16								
7	Company experience	2.64	0.78	.01	.15	−.08	.00	.05	.07							
8	Organizational rank	1.68	0.34	−.06	.16	−.12	.01	.12	.20	.40						
9	Educational attainment	3.42	0.64	.10	.17	.15	−.10	−.05	.08	−.15	.06					
10	Multiple leader roles	0.46	0.50	.33	.06	.03	−.05	.04	.15	.07	.06	.00				
11	Geographic dispersion	4.42	1.32	.18	.07	.05	−.07	.03	.17	.16	.24	.05	.08			
12	Percentage of time spent	3.38	2.00	.14	.05	−.10	.22	−.15	−.04	−.20	−.07	−.09	.06	−.23		
13	Number of other teams	5.25	1.92	.06	.11	.13	−.16	.05	.07	.13	.18	.14	−.01	.29	−.51	
14	Team performance	1.32	0.62	.12	.22	−.05	.05	.00	.13	.09	.18	.16	.14	.02	.15	.11

Note: $|r| > .18$, $p < .001$.

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Table 4. Main effects for hierarchical linear models predicting member time allocation (N=2055 team members).

Member predictors	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Intercept	3.01***(.23)	3.01***(.23)	2.9***(.23)	3.0***(.23)	2.92***(.23)	2.78***(.23)
Accounting	.00(.31)	−.01(.31)	.16(.31)	−.01(.31)	−.12(.31)	.01(.30)
Engineering	.71*(.30)	.68*(.30)	.82*(.30)	.72*(.30)	.56(.30)	.62*(.30)
Finance	.50(.30)	.47(.30)	.55(.30)	.55(.30)	.39(.30)	.45(.30)
IT	1.56***(.28)	1.52***(.28)	1.52***(.28)	1.56***(.28)	1.48***(.28)	1.4***(.27)
Management	−.42(.30)	−.41(.30)	−.17(.30)	−.41(.30)	−.53(.30)	−.26(.30)
Marketing	.37(.30)	.39(.30)	.54(.30)	.36(.30)	.27(.29)	.45(.29)
Operations	.57(.30)	.58*(.30)	.73*(.30)	.55(.30)	.53(.30)	.68*(.30)
Product support	−.26(.32)	−.26(.32)	−.19(.32)	−.28(.32)	−.38(.32)	−.33(.31)
Quality	.20(.30)	.17(.30)	.28(.30)	.21(.30)	.16(.30)	.22(.30)
R&D	1.09***(.30)	1.05***(.30)	1.13***(.30)	1.13***(.30)	1.01***(.30)	1.05***(.29)
Sales	.31(.33)	.30(.32)	.50(.33)	.30(.33)	.18(.32)	.32(.32)
Trading	−.47(.31)	−.39(.31)	−.15(.31)	−.46(.31)	−.65*(.30)	−.24(.30)
Transportation	−.26(.35)	−.26(.35)	−.13(.35)	−.26(.35)	−.38(.35)	−.25(.34)
Percentage of time spent						
Number of other teams	−.26***(.02)	−.25***(.02)	−.23***(.02)	−.25***(.02)	−.26***(.02)	−.23***(.02)
Company experience		−.13***(.04)				−.11**(.04)
Organizational rank			−.52***(.10)			−.59***(.10)
Educational attainment				−.08(.05)		−.09(.05)
Leader role					.80***(.13)	.99***(.13)
Pseudo R-square	.14	.15	.15	.14	.16	.18
Fit statistic (deviance)	9681	9671	9639	9679	9642	9576
Model comparison		1–2	1–3	1–4	1–5	1–6
X^2 (Δ deviance)		10**	42***	2	39***	105***

***$p<.001$; **$p<.01$; *$p<.05$.
Note. Dependent variable=percentage of time spent. Unstandardized coefficients from full maximum likelihood estimation. Individual-level predictors are team-mean centered. Standard errors are in parentheses below the estimates.

1: B=.03, $p<.05$; B=.1.08, $p<.05$; B=.57, $p<.05$). Model 2 adds the two member time allocation variables. In support of hypothesis 5a, the coefficient estimate of percentage of time spent is positive and significant when predicting performance (B=.36, $p<.001$). However, contrary to our prediction of a negative effect for hypothesis 5b, the coefficient estimate for number of other teams is also positive and significant when predicting performance (B=.28, $p<.01$).

Model 3 includes the main effect of geographic dispersion (our moderating variable), and Models 4 and 5 show the interaction effects between dispersion and the two time allocation variables. In support of hypothesis 6a, the interaction between percentage of time spent and geographic dispersion in predicting performance is positive and significant (B=.13, $p<.05$). The plot in Figure 2(a) shows team performance on the y-axis with separate lines for less dispersed teams (i.e., below the mean level of dispersion, corresponding to teams with members in different rooms, hallways, or floors) and more dispersed teams (i.e., above the mean level of dispersion, corresponding to teams with members in different buildings, cities, or countries) as a function of percentage of time spent on the x-axis. The slope of the more dispersed (dotted) line is significantly greater than the slope of the less dispersed (solid) line ($p<.01$). Moreover, a simple slope analysis revealed that the more dispersed teams benefited from having members who spent more time on the team (steeper sloping line is significantly greater than zero, $p<.001$), whereas less dispersed teams did not (flatter line is not significantly greater than zero).

Finally, in support of hypothesis 6b, the interaction between number of other teams and geographic dispersion in predicting performance was negative and significant (B=−.15, $p<.05$). The plot in Figure 2(b) shows team

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Table 5. Main effects for hierarchical linear models predicting member time allocation (N=2055 team members).

Member predictors	Model 1	Model 2	Model3	Model 4	Model 5	Model 6
Intercept	5.26***(.27)	5.25***(.27)	5.46***(.27)	5.27***(.27)	5.19***(.27)	5.41***(.27)
Accounting	−.75*(.38)	−.72(.38)	−1.01**(.38)	−.72(.38)	−.83*(.38)	−.96**(.38)
Engineering	−.09(.38)	−.05(.37)	−.26(.37)	−.11(.37)	−.18(.38)	−.25(.37)
Finance	.62(.37)	.64(.37)	.49(.36)	.49(.37)	.54(.37)	.38(.36)
IT	.87**(.34)	.90**(.34)	.86**(.34)	.85**(.34)	.83*(.34)	.85**(.34)
Management	−.48(.37)	−.48(.37)	−.91**(.37)	−.50(.37)	−.56(.37)	−.89*(.37)
Marketing	.27(.37)	.24(.37)	−.06(.37)	.30(.37)	.21(.37)	−.03(.36)
Operations	−.59(.37)	−.60(.37)	−.87*(.37)	−.52(.37)	−.60(.37)	−.78*(.37)
Product support	−.45(.39)	−.45(.39)	−.56(.39)	−.41(.39)	−.53(.39)	−.54(.39)
Quality	.02(.37)	.06(.37)	−.12(.37)	−.01(.37)	−.01(.37)	−.11(.37)
R&D	.77*(.37)	.81(.37)	.63(.37)	.65(.37)	.73*(.37)	.55(.37)
Sales	−.43(.40)	−.41(.40)	−.70(.40)	−.38(.40)	−.51(.40)	−.63(.40)
Trading	−.40(.38)	−.51(.38)	−.93**(.38)	−.44(.38)	−.53(.38)	−1.01**(.38)
Transportation	−.77(.43)	−.76(.43)	−.99*(.43)	−.77(.43)	−.85*(.43)	−.98*(.43)
Percentage of time spent	−.41***(.03)	−.40***(.03)	−.37***(.03)	−.41***(.03)	−.42***(.03)	−.37***(.03)
Number of other teams						
Company experience		.19***(.05)				.13**(.05)
Organizational rank			.96***(.12)			.80***(.13)
Educational attainment				.23***(.07)		.21***(.07)
Leader role					.56***(.16)	.24(.16)
Pseudo R-square	.12	.13	.15	.13	.13	.16
Fit statistic (deviance)	10505	19488	10426	10494	10493	10409
Model comparison		7–8	7–9	7–10	7–11	7–12
X^2 (Δ deviance)		17***	79***	11***	12***	96***

***$p<.001$; **$p<.01$; *$p<.05$.

Note. Dependent variable=number of other teams. Unstandardized coefficients from full maximum likelihood estimation. Individual-level predictors are team-mean centered. Standard errors are in parentheses below the estimates.

performance on the y-axis with separate lines for less dispersed and more dispersed teams as a function of number of other teams on the x-axis. In this plot, the slope of the less dispersed (solid) line is significantly greater than the slope of more dispersed (dotted) line ($p<.01$). Furthermore, when conducting a simple slope analysis on the lines in the plot, we found that less dispersed teams benefited from having members on more other teams concurrently (steeper sloping line is significantly greater than zero, $p<.001$), whereas more dispersed teams did not (flatter line is not significantly greater than zero). We should note that when both interaction effects are included in the same model, neither one is statistically significant, which reflects multicollinearity in the models.

Further exploratory analyses

In exploratory analyses not reported in the tables, we examined the interaction of the percentage of time that team members allocated to the focal team and the number of other teams to which they allocated time concurrently, as both were positive and significant predictors of team performance. The combination of spending a high proportion of time on the focal team and working on a high number of other teams concurrently fell short of being statistically significant (B=.03, p=.13). We also examined curvilinear effects of percentage of time spent and number of other teams in the models predicting team performance. The findings indicated non-significant squared terms for both percentage of time spent ($p>.8$) and number of other teams ($p>.6$), suggesting that in this dataset at least, there was no

Table 6. Team-level ordinal logit regression models predicting team performance (N=285 teams).

Team predictors	Model 1	Model 2	Model 3	Model 4	Model 5
Intercept (3)	−2.83***(.45)	−3.28***(.50)	−3.27***(.50)	−3.18**(.50)	−3.13***(.50)
Intercept (2)	−1.44***(.42)	−1.80***(.46)	−1.80*(.46)	−1.68(.46)	−1.62(.46)
Team size	.04(.06)	−.02(.06)	−.02(.06)	.00(.06)	−.02(.06)
Project length	.03*(.01)	.02(.01)	.02(.01)	.02(.01)	.02(.01)
Innovation task	−.57(.36)	−.56(.38)	−.55(.38)	−.51(.38)	−.62(.39)
Customer task	−.77*(.38)	−.65(.40)	−.65(.40)	−.60(.40)	−.62(.40)
Number of knowledge areas	.11(.10)	.17(.10)	.17(.10)	.14(.11)	.15(.11)
Company experience	.11(.22)	.31(.23)	.31(.23)	.33(.23)	.33(.23)
Organizational rank	1.08*(.50)	.66(.52)	.72(.26)	.84(.53)	.62(.53)
Educational attainment	.57*(.24)	.72**(.26)	.72**(.26)	.84**(.27)	.88**(.27)
Multiple leader roles	.44(.31)	.56(.32)	.56(.32)	.48(.32)	.58(.32)
Percentage of time spent		.36***(.10)	.36***(.10)	.40***(.10)	.40***(.10)
Number of other teams		.28**(.10)	.29**(.10)	.30**(.10)	.33**(.10)
Geographic dispersion			−.04(.13)	−.18(.13)	−.08(.13)
Geographic dispersion × percent time				.13*(.05)	
Geographic dispersion × other teams					−.15*(.06)
Pseudo R-square	.12	.16	.16	.18	.18
−2 Log likelihood	365	350	349	343	343
Model comparison		1–2	2–3	3–4	3–5
Likelihood-ratio (LR) chi-square		15***	16***	7**	7**

***$p < .001$; **$p < .01$; *$p < .05$.

Note. Unstandardized coefficients. Team-level predictors are grand-mean centered. Standard errors are in parentheses below the estimates.

evidence of a tipping point at which allocating more time to the focal team or allocating time to more teams concurrently started to hurt performance. Finally, we explored experience, rank, education, and leader role as moderators of the relationship between time allocation and team performance, but did not find any significant moderating effects.

For our moderating variable of geographic dispersion, we examined the influence of each level of physical separation between team members on the relationship between time allocation and team performance. Specifically, we constructed separate variables for the proportion of team members who worked in the same versus different rooms, hallways, floors, buildings, cities, and countries. We found that, in our sample, the pattern of moderating effects of geographic dispersion held up across each level of physical separation. As reported in footnote 1, we also conducted extensive analyses using alternative measures of geographic dispersion, including the miles, time zones, cities, countries, and cultural distance between team members. We found that these alternative measures had no effects in our sample, regardless of whether they were included in the models alone or along with other measures of dispersion. The insignificant effects of these measures may be due to the fact that 85 percent of the team member pairs in our study worked in the same country, which substantially constrained the team-level variance for measures that reflect the extent of dispersion across countries.

Finally, to explore the potential influence of particularly "high quality" individuals, we constructed a dichotomous variable to identify members who were high on multiple background characteristics that can be beneficial for knowledge-intensive teams (specifically, on at least two of company experience, organizational rank, and educational attainment). In extensive exploratory analyses, we found no evidence that such individuals had significantly different patterns of time allocation or significantly different influences on team performance above and beyond the effects of the continuous experience, rank, and education variables. When only the dichotomous variable was included in the models (in place of the continuous variables rather than in addition to them), this variable predicted time allocations, as we would expect, but still had no significant effect on team performance. Furthermore, having one or more "high

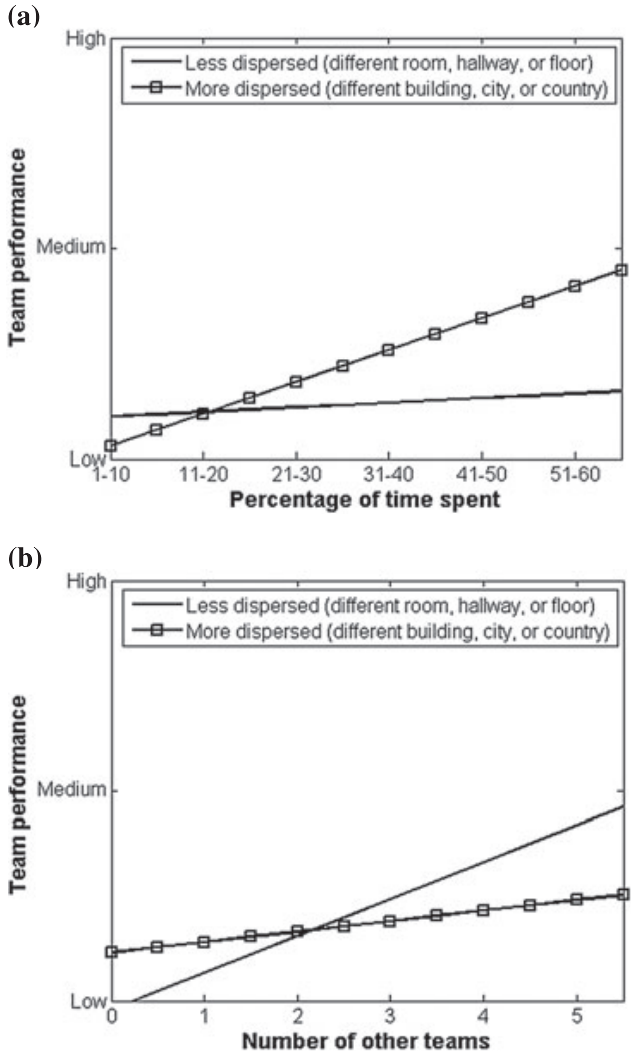

Figure 2. Team-level interaction plot of (a) percentage of time spent and geographic dispersion predicting team performance and (b) number of other teams and geographic dispersion predicting team performance (N=285 teams)

quality" individuals on the team did not moderate the relationship between time allocation and team performance. Thus, we found no evidence that "high quality" individuals helped their teams perform more effectively despite spending less time with their teams on average or that the time they did spend was more valuable for their teams. These results were robust when accounting for leader role as well as when varying the thresholds that determined high quality (e.g., company experience of more than 15 versus more than 20 years, organizational rank of manager versus senior manager, educational attainment of bachelor's degree versus advanced degree).

Discussion

The global nature of work in organizations today, in which knowledge-intensive teams are fluid and dynamic, challenges what we know about the design of work teams. The organization we studied provides one illustration of how stable, bounded teams might be a relic of the past: not a single team in our dataset had all members allocate 100

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percent of their time to the team. This feature of the changing ecology of teams, where members are often drawn onto projects for brief periods to provide their expertise, suggests that members' time allocation within and across teams is increasingly critical for understanding team performance.

Taking an attention-based view of team design, we extend theory and research on these new forms of work teams at two levels of analysis. At the individual level, we examine the antecedents of time allocation within and across teams by exploring the influence of member characteristics on time allocated to the focal team and on the number of other teams to which time is allocated concurrently. At the team level, we examine the consequences of these two dimensions of time allocation for team performance. Additionally, we examine how another common feature of knowledge-intensive teams—geographic dispersion—influences the relationship between member time allocation and team performance. Thus, through our attention-based view of team design at the individual and team levels of analysis, we develop a multi-level theory of member time allocation in teams.

At the individual level, we found general support for our hypotheses that experience, rank, education, and leader role are related to time allocation. Specifically, we found that company experience and organizational rank were significantly negatively related to percentage of time spent on the focal team, and team leader role was significantly positively related to percentage of time spent on the focal team. We also found that company experience, organizational rank, and educational attainment were significantly positively related to the number of other teams on which the member participated concurrently.

At the team level, we found support for our hypothesis linking percentage of time that members allocate to the focal team with the performance of that team. That is, teams with members who spent more time on the team were better performers, on average. We also found that geographic dispersion moderated the positive relationship between percentage of time allocated and team performance, such that the performance advantages of allocating more time to the focal team increased for teams with greater geographic dispersion.

However, we did not find support for our team-level hypothesis linking number of other teams to which team members allocated time concurrently with performance of the focal team. Surprisingly, we found a positive main effect of working on a greater number of teams instead of the negative effect predicted, indicating that having members who participated on more teams at the same time was beneficial rather than detrimental for the focal team's performance. We also found that geographic dispersion moderated the positive relationship between number of other teams and team performance, such that the unexpected performance advantages of having members who allocated time to more other teams were greater for less dispersed teams. This suggests that teams whose members spent time on other teams reached a point where the attention costs incurred through having members spread across locations outweighed the benefits gained from having such these valuable members on the team.

Theoretical and managerial implications

By applying an attention-based view to team design, our study builds on a wide-ranging literature on attention than spans individuals, teams, and organizations (e.g., Altmann & Gray, 2008; Karau & Kelly, 1992; March & Simon, 1958; Yu, Engleman, & Van de Ven, 2005). In particular, we identify two dimensions of member time allocation—proportion of time spent on the focal team and number of other teams on which time is spent concurrently—that both channel the attention of team members, but have not previously been considered together. Although researchers have examined the importance of managerial attention more generally in organizations, including the processes of sensemaking and mindfulness (Weick, 1995) as well as how organizational structures and systems channel attention (e.g., Ocasio, 1997), we focus specifically on the design of teams to highlight how time allocation decisions can have consequences for team performance.

To further understand the nature of the benefits that arise from having members who spend more time on the focal team, as well as having members who participate in a greater number of other teams concurrently, we revisit the knowledge-intensive nature of the teams' work. The two dimensions of member time allocation studied here not only channel the attention of team members toward or away from the focal team but in doing

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so each also has specific implications for two key processes of knowledge-intensive work: knowledge integration and knowledge acquisition. Members who contribute a greater proportion of their time to the focal team are likely to more effectively integrate the knowledge that is relevant to this team's work, given that this process takes time, energy, and effort (e.g., Reagans & McEvily, 2003). Thus, consistent with our earlier argument, members who spend more time on the team can focus greater attention on integrating relevant knowledge within the team, which should improve team performance. Members who are on multiple teams at the same time may incur costs of attention diffusion, as we have argued, but simultaneously, they also may acquire knowledge from these other teams that is beneficial for the focal team (e.g., Ancona & Caldwell, 1992). Counter to the argument that being on more teams should hurt team performance because attention to the focal team is reduced, members who work on multiple teams may be in a position to bring knowledge acquired from those teams to the focal team. This possibility could explain our finding that teams with members who worked on more other teams actually performed better rather than worse.

Follow-up studies on the intersection of knowledge integration/acquisition and time allocation could shed further light on how knowledge sharing is shaped by allocating member time to the focal team and other teams. For example, teams whose members spend time on several teams simultaneously may find some kinds of knowledge easier to integrate and acquire than others. Explicit knowledge, which can be codified and shared through documents and materials, may be more amenable to integration and acquisition by such teams than tacit knowledge, which is more difficult to articulate and share. The complexity of the work, especially when it is conducted across geographies, is also likely to affect the extent to which knowledge is effectively integrated and acquired. In the case of less complex work, members may be able to effectively share knowledge even when working at a distance on multiple teams. In the case of more complex work, however, it may be difficult to effectively share knowledge remotely, necessitating travel to spend time face-to-face with other members.

Our study also has implications for the growing literature on the importance of time and timing in organizations (e.g., Ancona, Goodman, Lawrence, & Tushman, 2001; Orlikowski & Yates, 2002). Although our results highlight the importance of time allocation within and across teams, this is likely to be further complicated by issues related to the timing and synchronicity of organizational work life. For example, as organizations continue to globalize and their members work at different times of day and night around the world, the design of teams must take into account not only how time is allocated for particular members but also the extent to which members have overlapping time (Jarvenpaa & Leidner, 1999). In fact, even two members in the same location may not overlap if one member works primarily in the morning and another works primarily in the evening. Thus, the timing and synchronicity of members' work patterns might matter for how effectively time is allocated to the team.

There are several managerial implications of our results for knowledge-intensive teams, which highlight the potentially unintended effects that managers can encounter when they design such teams. First, managers may be interested in the question of whether it is better for teams to have members who contribute a large proportion of their time to a focal team or to have members who contribute a smaller proportion of their time to many teams. Our findings suggest that there are advantages to having members who spend a greater proportion of time on a focal team, as would be expected, but that there are also unexpected benefits of having members who work on a greater number of other teams concurrently, possibly because of their ability to acquire knowledge that is useful to the focal team.

However, this does not mean that managers should have all team members work on as many teams as possible, as the benefits of members working on many teams concurrently are likely to depend on a number of factors. For example, if too many team members work on other teams, there will not be a critical mass of members dedicated to the focal task. Thus, there may be an optimal level of multiple team membership, depending on the individuals and their tasks. The nature of the work performed by the team members on other teams is also likely to influence the value of multiple team memberships. If their work on other teams is complementary, yet distinct, then these team members may be able to more readily import valuable insights and learning from those other teams to the focal team. Additionally, the benefits of having members participate on multiple other teams is likely to depend on the workflow, pacing and deadlines of the simultaneous tasks, and which commitment takes priority at a given point in time.

Finally, for managers confronting changes such as workforce globalization and the spread of advanced information and communication technologies that allow employees to work across space and time, our results have additional implications. Because the relationship between time allocation and team performance is contingent on the level of team dispersion, managers of knowledge-intensive teams should recognize that the benefits of securing the attention of members who are on multiple teams must be traded off against the increased difficulties of managing multiple team assignments when members are in different locations. However, team members may benefit from training that can help them work effectively on multiple teams that are geographically dispersed. For example, members could focus on developing skills to facilitate remote teamwork, attention allocation, and task switching. Ultimately, organizations that develop a culture that supports members who work on multiple teams across geographies will be better positioned to take advantage of the capabilities available from these kinds of teams.

Limitations and future directions

Although our field study of member time allocation in knowledge-intensive teams draws on different data sources (i.e., team member surveys and independent executive ratings of team performance) to offer insight into important and increasingly widespread new forms of team design that have received little empirical attention to date, the data are limited in several ways. First, although we know the percentage of time spent on the focal team and the number of other teams on which each member served, we do not know what percentage of time each member spent on every other team. Understanding how member time is allocated across other teams could help us better understand the benefits and costs that members can gain from participating in multiple teams (e.g., through knowledge acquisition).

Second, although our independent and dependent variables were measured using data from different informants at different points in time, the possibility of at least some reverse causality may still exist. It is possible, for example, that worse team performance led to changes in member time allocation. However, this concern is mitigated by the fact that the executive ratings of team performance were not available until several months after the survey, so that the team members could not have known how their team was performing relative to others in the study at the time the work was conducted.

Third, teams in our sample were relatively similar to each other in their focus on knowledge-intensive work (see Table 1 again for examples). Our data provide a useful way to understand the effects of time allocation on the performance of knowledge-intensive teams, but simultaneously limit our ability to address teams engaged in work that is not knowledge-intensive. For example, we did not have any teams in our sample that worked on manufacturing assembly lines, processed paperwork all day, or performed maintenance tasks.

Fourth, we did not have fine-grained information on how members spent their time on any given day. Our knowledge of the organization and its team member assignment practices indicated that a team member's overall time allocation to that project was a conscious design decision by team leaders, staffing coordinators, and the team members themselves. That is, there was a clear expectation of how much time the individual would contribute to the project overall, as part of their utilization profile across projects. However, within this overall time allocation, individual choices may well have governed their day-to-day time allocations to specific projects. In future research, it would be interesting to explore the conditions under which the impact of time allocation varies as a function of team design versus individual choice. For example, are the effects of time allocation even stronger when individuals have more control over how much time they commit to a given team and the number of other teams on which they work concurrently?

Despite these limitations, one notable feature of our study is its use of original field data. Although much prior research on attention has been conducted in highly controlled laboratory settings in which important features of the context are held constant, our study builds on the less extensive but increasingly active body of research that suggests that studying teams in the field is useful for developing insight into how well members attend to their work and the extent to which distractions, interruptions, and demands on their time impact how they work. Future research could build on these foundations by studying how members of the same team make use of the time they spend with

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the focal team or other teams throughout the day, for example by examining their modes of communication. To facilitate such studies, researchers could use diaries or other electronic data collection methods (Amabile, Barsade, Mueller, & Staw, 2005) to assess the extent to which members' contributions to the team vary in terms of effort, knowledge and skills, and use of performance strategies (Hackman, 1987). Additionally, our understanding of the effects of time allocation could be further advanced by analyzing more detailed survey and project data on potentially important factors such as where teams are in their work cycle, previous experience with the team's task, and the number of people who share the work load for that task.

Researchers could also take a longitudinal approach that analyzes team member time allocation in a more dynamic way, by examining how members engage and disengage with particular teams over time. A longitudinal analysis could also help to establish causality by confirming that the patterns of time allocation in previous periods influence subsequent team performance and offer insight into the connections between timing and time allocation. Additionally, our study did not examine how specific intra-team processes and learning environments might mediate the effects of time allocation on team performance. Understanding the role played by factors such as transactive memory systems or mental models (e.g. Klimoski & Mohammed, 1994; Lewis, 2004) could shed useful light on the mechanisms through which time allocations affect team performance. Lastly, we have emphasized that understanding the relationship between member time allocation and team performance requires careful consideration of moderating factors such as geographic dispersion. Examining additional contingencies, across levels of analysis, will allow for a better understanding of how and when member time allocation impacts team performance.

Conclusion

In knowledge-intensive work settings, individuals are increasingly spending only part of their time on a given team, working on other teams concurrently, and spanning a variety of geographic locations. In this changing ecology of teams, time allocation is an increasingly important issue for teams and their members. Our multi-level model draws on an attention-based view of team design to explore the antecedents of time allocation at the individual level as well as the consequences of time allocation at the team level. We hope these ideas will contribute to the further development of useful theory and research on time allocation in knowledge-intensive teams.

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