A Healthy Divide: Subgroups as a Stimulus for Team Learning Behavior

Cristina Gibson
University of California, Irvine
Freek Vermeulen
London Business School

This paper examines the relationship between subgroups and team learning behavior, defined as a cycle of experimentation, reflective communication, and codification. We develop the construct of "subgroup strength," defined as the degree of overlap across multiple demographic characteristics among a subset of team members. Contrary to conventional wisdom, we propose that the presence of subgroups within a team may stimulate learning behavior and that organizational design features, such as performance management by an external leader, team empowerment, and the availability of a knowledge management system, may have different effects on teams, depending on subgroup strength. Data on 156 teams in five pharmaceutical and medical products firms confirmed that moderately strong demographic subgroups in teams fostered learning behavior. In addition, both very homogeneous and very heterogeneous teams were more inclined to engage in learning behavior, but only if we controlled for the concurrent effect of subgroup strength. Finally, subgroup strength moderated the impact of organizational design features on team learning. Overall, this study contributes to the literature on team composition, design, and learning by highlighting the importance of subgroups for understanding team behavior.●

Ample research has been conducted on how the composition of work teams influences team behavior and effectiveness. The bulk of this research has focused on the heterogeneity that results from differences between members on demographic attributes such as age, sex, ethnicity, group tenure, and functional area (for reviews, see Jackson, May, and Whitney, 1995; Williams and O'Reilly, 1998; Earley and Gibson, 2002). Some researchers have argued for a positive influence of the differences between team members on team behavior, suggesting that they result in a higher combined cognitive capacity, which leads to more creativity, richer information processing, and higher quality decision making (e.g., McGrath, 1984; Jackson, 1992; Lovelace, Shapiro, and Weingart, 2001). Yet, at the same time, others have suggested that the influence of differences in background is negative, arguing that a diversity of viewpoints hampers communication and social integration (e.g., Katz, 1982; O'Reilly, Caldwell, and Barnett, 1989; Zenger and Lawrence, 1989). Thus far, empirical research examining the impact of heterogeneity on team performance has been inconclusive (for reviews, see Bettenhausen, 1991; Williams and O'Reilly, 1998).

What the literature on team composition has largely ignored, however, is that differences and similarities between team members not only create a certain level of heterogeneity, they may also result in subgroups, depending on the nature of the overlap of characteristics among the members (Lau and Murnighan, 1998). For example, based on conventional heterogeneity indices (e.g., Blau, 1977; Allison, 1978), a four-person team that consists of a man and woman under 30 years of age and a man and woman over 50 is equally as heterogeneous as a team that consists of two women under 30 and two men over 50, yet these two teams are different in an important way. In the first team, there is no overlap of

0001-8392/03/4802-0202/$3.00.

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This research was made possible with funding provided by the National Science Foundation Grant #SBR 96-31748. We thank Pamela Haunschild, Madan Pillutla, and the three anonymous reviewers for helpful comments, and Mary Zellmer-Bruhn for assistance in data collection.

multiple demographic characteristics. In the second team, sex and age overlap (i.e., the two members that are of the same sex are also of the same age). As a result, they likely share common backgrounds and similar perspectives and thus create two subgroups (Walsh, 1988; Lau and Murnighan, 1998). This will be even more germane if both women have a background in finance and are white, while the two men are from marketing and are Asian, which would create two strong subgroups. To capture this important nuance, we build on the work of Lau and Murnighan (1998) to develop the concept of subgroup strength, defined as the degree of overlap across multiple demographic characteristics among a subset of members in a team that is not shared with other members of the team.

Admittedly, the overlap in backgrounds among the members of a subgroup may cause them to cohere and share opinions more often within the subgroup than with others, which may lead to irritation in the team and disputes between the different factions. As a consequence, it may threaten team unity, sometimes to an extent that it disenfranchises certain members altogether. Therefore, scholars and practitioners alike have commonly assumed that subgroups are a negative phenomenon, suggesting that they lead to increased conflict and result in performance losses in teams (e.g., Lau and Murnighan, 1998). But there is also reason to believe that subgroups within teams may actually have a positive impact because they can function as supportive "cohorts" within a team (Asch, 1952, 1956). A cohort is a group of people who share a similar background and have a similar perspective on things (Walsh, 1988). Within cohorts in a team, there is likely a richer exchange of information and constructive debate than between more different members. Without cohorts, different perspectives will not be incorporated into the team's decision making and behavior. For example, experimental research has demonstrated that team members are more inclined and able to express their individual opinions if they experience a subgroup of like-minded people within their team (Asch, 1952). Without such a cohort, unique insights do not surface or are not taken into account by the rest of the team (Azzi, 1993; Stasser, 1999). Therefore, in this paper, we examine team heterogeneity and subgroups as two separate constructs, examining the effect of one while controlling for the other. We argue that the negative influences of differences between team members identified in the literature (e.g., toilsome communication and integration) may be associated with heterogeneity in the absence of subgroups, while the positive effects (e.g., a richer array of perspectives) may materialize through subgroups. Thus, subgroups may enable a team to reap the benefits of diversity. Ignoring the possible existence of subgroups may obscure insights into the effects of demographic differences.

We applied these ideas regarding team composition to investigate team learning behavior in a sample of 156 work teams, defined as groups of workers who are interdependent, mutually accountable for a common objective, and who recognize themselves as a team (Cohen and Bailey, 1997). We focused on team learning behavior, including the exploration of knowl-

edge through experimentation, the combination of insights through reflective communication, and the explication and specification of what has been learned through codification (Argote, 1999; Edmonson, 1999), because subgroups within teams likely facilitate many of these behaviors. Further, in multiple research traditions, teams are thought to play a pivotal role in processes such as organizational learning, adaptation, and innovation. Sociotechnical systems theory (Trist and Bamforth, 1951; Hackman and Oldham, 1980; Trist, 1981), team design theory (Gladstein, 1984; Hackman, 1987), and organizational learning theory (Argyris and Schön, 1978; Argote, 1999; Edmonson, 2002) have all argued for the importance of teams in creating and acquiring knowledge. Some have even argued that "unless teams can learn, the organization cannot learn" (Senge, 1990: 10). Therefore, learning is a key task for teams and is likely to be influenced by team composition, in terms of subgroups and heterogeneity.

SUBGROUPS AND TEAM LEARNING BEHAVIOR

To illustrate that subgroup strength and heterogeneity are two distinct characteristics of team composition, table 1 depicts the demographic composition of two teams. If we were to look at conventional indices of overall team demographic composition (e.g., Blau, 1977; Allison, 1978), Teams 1 and 2 would be considered equally heterogeneous, and the effects of diversity would be assumed to be the same in each team. Team 1, however, has two strong subgroups: members A and B constitute one subgroup; members C and D constitute a second subgroup. Members A and B are of the same sex and similar age and have similar ethnic and functional background and team tenure; members C and D are similar on all but one characteristic. These multiple sources of shared identity are likely to draw members A and B together and away from members C and D (Lau and Murnighan, 1998). In contrast, Team 2 has weak subgroups because for each possible pairing of members, there are both similarities and differences in demographic characteristics. Because multiple characteristics do not overlap within any pair, members are likely to share a few common aspects of their identity but also have different experiences that stem from their different demographic characteristics. For example, members A and B in Team 2 are similar in age but are of different sex, ethnicity, tenure, and functional background. Members B and C are both female, but very different in age, ethnicity, and function. Consequently, subgroups in Team 2 are weak. As this example demonstrates, subgroup strength (i.e., the degree of overlap in demographic characteristics) is a meaningful differentiator between teams.

When a subset of team members overlap on several observed background characteristics, subgroups are moderately strong. When most demographic characteristics overlap, subgroups are particularly strong, and members are likely to identify with the subgroup rather than with the team as a whole, perceive themselves to be part of that subgroup, and behave in ways that are consistent with in-group/out-group dynamics (Tajfel and Turner, 1986; Lau and Murnighan, 1998). Overall subgroup strength is a team-level attribute because it

Table 1

Example of Subgroup Strength and Team Heterogeneity*

Team 1	Team composition				Measure of subgroup strength and heterogeneity					
	Member				Pair overlap					
	A	B	C	D	AB	AC	AD	BC	BD	CD
Age	26	27	52	54	0.947	0.286	0.259	0.313	0.286	0.947
Sex	Male	Male	Female	Female	1	0	0	0	0	1
Ethnicity	Asian	Asian	White	White	1	0	0	0	0	1
Function	Finance	Finance	Sales	Production	1	0	0	0	0	0
Team tenure	2	3	11	13	0.667	0.182	0.154	0.273	0.231	0.846
Total overlap					4.614	0.468	0.413	0.586	0.517	3.793
									Homogeneity =	1.732
									Heterogeneity =	0.577
									Subgroup strength =	1.764

Team 2	Team composition				Measure of subgroup strength and heterogeneity					
	Member				Pair overlap					
	A	B	C	D	AB	AC	AD	BC	BD	CD
Age	26	27	52	54	0.947	0.286	0.259	0.313	0.286	0.947
Sex	Male	Female	Male	Female	0	1	0	0	1	0
Ethnicity	Asian	White	White	Asian	0	0	1	1	0	0
Function	Finance	Sales	Production	Finance	0	0	1	0	0	0
Team tenure	2	11	3	13	0.182	0.667	0.154	0.273	0.846	0.231
Total overlap					1.129	1.953	2.413	1.586	2.132	1.178
									Homogeneity =	1.732
									Heterogeneity =	0.577
									Subgroup strength =	0.477

* Homogeneity is calculated as the average total overlap per pair: Σ total overlap pair ij / P, where P is the number of pairs on the team. Heterogeneity is the inverse of homogeneity. Subgroup strength is calculated as the standard deviation of total overlap per pair.

can influence the functioning of the team as a whole. Among other outcomes, subgroups will likely influence team learning behavior, since in order to learn new ways of doing things, members of a team have to come up with ideas but also have to interact with each other to share and combine insights and reach agreement on the implementation of a particular solution.

Learning Behavior

The process of learning consists of multiple, interdependent team actions, because solutions have to be searched for, chosen, and implemented. This notion has led several authors to describe it as a cycle of activities that a team engages in to process knowledge that allows it to adapt and improve (Argyris and Schön, 1978; Kolb, 1984; Edmondson, 1999; Gibson, 2001). First, a team has to generate ideas on how to improve its work through exploration or experimentation (Argyris, 1976; Levitt and March, 1988; March, 1991), in which team members search for potential improvements. Second, a team must arrive at a common understanding about the proposed solution. When teams have engaged in experimentation, different members may have developed different mental schemas concerning the experience. To come to a common understanding of what the experience or information means, members transfer and combine insights

through a process of reflective communication (Jelinek, 1979; Walsh, Henderson, and Deighton, 1988; Zenger and Lawrence, 1989), which enables them to arrive at potential solutions (Argyris and Schön, 1978). Finally, the knowledge needs to be translated into concrete, generalized concepts, decisions, or action items (Argyris and Schön, 1978; Kolb, 1984) through a process of codification, in which tacit knowledge becomes explicit (Polanyi, 1962), so that a workable outcome can be developed. Codification entails recording what has been discussed (e.g., putting it on paper, entering it into meeting minutes, adding it to a database) and, thus, decreases ambiguity. It enables a team to put knowledge and ideas into practice and reflect and build on what has been learned (Cohendet and Steinmueller, 2000).

Experimentation, reflective communication, and knowledge codification are different actions that complement each other and, together, constitute learning behavior. Insights from team information processing and collective cognition literatures (e.g., Hinsz, Tindale, and Vollrath, 1997; Gibson, 2001) suggest that these processes may be iterative rather than sequential but that they each are necessary for team learning to occur. Hence, the three elements of team learning behavior are non-substitutable, that is, one cannot compensate for the other. For example, a lack of experimentation cannot be compensated for by means of more reflective communication or codification (Gersick and Hackman, 1990), because there will be no new insights or experiences to discuss. Likewise, insights gained from experimentation can only be put to use when they are shared and discussed among team members (Stasser, 1999; Lovelace, Shapiro, and Weingart, 2001). Research has also indicated that teams frequently think they have agreed on a shared understanding, but that it falls apart when they start to make it explicit (Mohrman, Cohen, and Mohrman, 1995). Hence, even if teams engage in experimentation and reflective communication, they may fail to learn and improve if they do not converge on an explicit, implementable solution (Edmondson, 2002) through the process of codification. A team will exhibit optimal learning only if all three elements of the learning cycle—experimentation, reflective communication and codification—are present.

Not every team will automatically engage in learning behavior. Research on the micro underpinnings of organizational learning, for instance, indicates that while some groups are able to break routines and generate new solutions that enhance their effectiveness, other teams get stuck in previously adopted behaviors, unable to develop and change their conduct in fundamentally different ways (Argyris and Schön, 1978; Hedberg, 1981; Argote, 1999; Edmonson, 1999, 2002). The composition of the team, in terms of its level of heterogeneity and subgroup strength, as well as the organizational context in which it is embedded, including the behavior of the team's external leader, the team's level of empowerment, and the availability of knowledge management systems, may create the impetus for a team to engage in learning behavior.

Effects of Heterogeneity

Differences and similarities between team members' backgrounds may lead to subgroups, but they will also create a certain level of heterogeneity in a team. Notwithstanding the effect of subgroups, demographic heterogeneity in terms of the diversity in age, sex, ethnicity, tenure, and functional background may influence the extent to which a team engages in learning behavior. The social psychology and group process literatures indicate that heterogeneity influences trust (Brewer, 1981), attitudes toward experimentation (Jackson, May, and Whitney, 1995), creativity (Murnighan and Conlon, 1991), interaction between members (Jehn, Chadwick, and Thatcher, 1997), and consensus forming (Knight et al., 1999). All these effects can be expected to influence team learning behavior, since learning requires creativity in exploring new solutions to non-routines issues, expressing and sharing ideas during the communication phase of the learning cycle, and reaching agreement to codify what has been decided.

Learning behavior is likely to be stimulated when a team develops a cohort. Research prompted by the Asch studies (1952, 1956) demonstrated support for a cohort effect: a team member's opinion is more likely to be expressed and taken into account when it is supported by at least one other person on the team (Azzi, 1993; Wittenbaum and Stasser, 1996). Having other people on the team who are likely to share the viewpoint or at least are understanding of it makes it "psychologically safer" for the individual to express it (Asch, 1952; Edmondson, 1999). A team in which all members have similar demographic backgrounds provides such a cohort effect. It does not necessarily imply that everybody thinks exactly the same way, which would result in the extreme situation of groupthink (Janis, 1982), but it creates a situation in which members are able to understand each other's viewpoints and reflect on them. For instance, members of a homogenous team are apt to express individual ideas and collaborate during the communication phase (Ancona and Caldwell, 1992; Williams and O'Reilly, 1998) because they are more likely to be understood and acknowledged in such an environment. The homogeneity of individual backgrounds creates a feeling of cohesion that minimizes the fear that can inhibit expression and cooperation (Kramer, 1990). Empirical research has demonstrated that in teams in which members have a similar demographic background, people are more likely to share a common language and a common understanding, thus increasing the quality of communication and integration (e.g., Katz, 1982; Schein, 1985; O'Reilly, Caldwell, and Barnett, 1989; Zenger and Lawrence, 1989; Smith et al., 1994). In addition, homogeneous teams are more likely to have high levels of group efficacy (Zarnoth and Sniezek, 1997; Early and Gibson, 2002). Thus, homogeneity across the demographic backgrounds of team members should foster learning behavior.

This scenario played out in a process improvement team the first author worked with for several years. This team consisted of four members, all of whom were female, Asian, and similar in age and tenure. In preliminary interviews conducted

prior to participating in the research described here, one member of the team commented, "We are all Asian, so we would tend to clump together with each other. And then, I think it's a natural thing to just open up to anyone on the team. It is very clannish. In our team, you work together and you communicate very quickly." The homogeneity of the team made it easy for them to experiment, communicate about the outcomes of the experiments, and quickly converge and implement alternate solutions.

When heterogeneity is moderate, however, group integration suffers, and communication and convergence become increasingly difficult, which inhibits learning behavior. The team no longer functions as a cohort and, unless subgroups are formed, will likely suffer. That is, although moderately heterogeneous teams are likely to seek more information from their environment (Ancona and Caldwell, 1992) and have the potential for productive task-related conflict (e.g., Jehn, Chadwick, and Thatcher, 1997; Jehn, Northcraft, and Neale, 1999), research has suggested that the lack of supportive communication and cohesion may impede the realization of many of these benefits (Ancona and Caldwell, 1992). Individual-level characteristics shown to contribute to team learning, such as ability to work with others, willingness to deal with new and ambiguous situations, and confidence in offering solutions (Edmondson, Bohmer, and Pisano, 2001), are less likely to be invoked in this environment. Thus, although more heterogeneous teams potentially have a richer array of information available to incorporate during the different phases of the learning cycle, empirical evidence indicates that information that is not shared by other members does not get discussed within a team (for a review, see Wittenbaum and Stasser, 1996). As a result, assessments in the team become shallow, true in-depth debate is avoided, and solutions fail to be implemented due to disagreements and lack of clarity about where each member stands on the issues (Ancona and Caldwell, 1992; Sutcliffe, 1994; Miller, Burke, and Glick, 1998). Moderate heterogeneity thus hampers the learning cycle: reflective communication about new insights is more toilsome, and convergence of opinions during the codification phase is impeded. Teams of moderate heterogeneity potentially have a richer diversity of perspectives to draw from, but the lack of a cohort effect makes it unlikely that these potential benefits will be realized. Consequently, moderate heterogeneity is likely to discourage a team from engaging in learning behavior.

When a team's demographic heterogeneity is very high, a different pattern emerges. Everybody is different, and everybody has a unique viewpoint to offer. As a result, the team may again serve as one cohort. Qualitative evidence has suggested that in highly heterogeneous teams, members become very much aware of their differences, are very open to the different opinions within the team, and actively try to understand each other (Earley and Mosakowski, 2000). Hence, members of a highly diverse team may anticipate and be better prepared for the different viewpoints within their team. For instance, the team may be more tolerant toward experimentation by individual members, even if members

don't fully understand its purpose. Further, research suggests that to facilitate the incorporation of diverse opinions during communication, heterogeneous teams are often adept at developing explicit rules and procedures that guide their interaction, resolve disputes, and assure that everyone has an opportunity to have his or her say (Azzi, 1993; Earley and Mosakowski, 2000). These structures also facilitate codification. In support of this view, research by Clark, Dubash, and Mills (1998) indicated that team members become increasingly considerate of each other's needs as the uncertainty about their relationships increases. As a result, despite considerable individual differences, members identify with the team as a whole (Tajfel and Turner, 1986; Brewer, 1993): the team is a team because *everybody* is different. A divergent opinion is less likely to be ignored because there is no cohesive group of other members who share a different perspective and collectively oppose it (Asch, 1952). Consequently, very heterogeneous teams have a unity similar to homogeneous teams, though it is a unity in variety, and the conditions necessary for team learning are in place. Thus, we predict that both very homogeneous and very heterogeneous teams will engage in learning behavior more than moderately heterogeneous teams:

Hypothesis 1: The relationship between a team's demographic heterogeneity and team learning behavior will be curvilinear (U-shaped), such that both homogeneous and highly heterogeneous teams will exhibit high levels of team learning behavior.

Effects of Subgroup Strength

A cohort does not necessarily have to involve the entire team; it can also be provided by a subgroup of the team's members. Findings by Asch (1952, 1956) and Stasser and colleagues (Stasser, Taylor, and Hanna, 1989; Wittenbaum and Stasser, 1996) demonstrated that the presence of one other person on a team who is understanding or shares a given viewpoint is sufficient for an individual to express his or her opinion and for it to be taken into account in the team's decision making. People with similar demographic backgrounds often share a similar viewpoint (e.g., Walsh, 1988), and people often support each other based on common attitudes toward issues (Murnighan and Brass, 1991). Eisenhardt and Bourgeois (1988), for instance, showed that coalitions within a management team revolved around similarities in demographic backgrounds, including age, similarity of titles, or prior experience together. Hence, in a moderately heterogeneous team, the demographic overlap that creates subgroups may help develop cohorts within a team.

These subgroups may stimulate team learning behavior during experimentation, reflective communication, and codification. For instance, in a team in which all the men have a production background, a woman from finance may feel more inclined to explore a new and different idea if there is another woman on the team who also is from finance. Having such a fellow subgroup member who shares common sources of identity (such as sex and functional background) may make her feel more secure about her own ideas. Research in small groups indicates that the presence of a person who shares a

similar background may stimulate an individual to explore and express his or her viewpoint. Moreover, a group takes a divergent opinion or countervailing information into account only if it is held by multiple people (Stasser, Taylor, and Hanna, 1989; Azzi, 1993). Even though a majority may still disagree with the idea, a team will be receptive as long as there is more than one person who supports it. Therefore, even if a lone team member expresses his or her opinion, he or she is more able to enact and implement the suggestion if he or she is part of a subgroup.

Within a subgroup, people are assured that they have a fellow team member who is likely to share their point of view or at least is supportive and understanding of it (Crott and Werner, 1994). Such a supportive member may not always entirely agree but is unlikely to ridicule or embarrass the person and may even be supportive when other members pose a threat (Asch, 1952; Azzi, 1993). Thus, it may also provide the psychological support necessary for a person to express and pursue actively his or her point of view (Brewer, 1991; Crott and Werner, 1994). This relates to what some scholars have observed as "neutralizing the fear of embarrassment" that is necessary to achieve "robust back-and-forth communication among members" required for team learning (Edmondson, Bohmer, and Pisano, 2001: 11). Thus, subgroups also strengthen members' self-efficacy (Bandura, 1997), which not only stimulates them to act upon and express their opinion but is also known to enhance the accuracy and quality of their input (Zarnoth and Sniezek, 1997). Hence, the presence of subgroups may restore a moderately heterogeneous team's inclination and ability to engage in learning behavior. This seems to have happened in a team we worked with, which we will refer to as the logistics team. This team was responsible for warehousing and distribution operations across several regions in Latin America and South America. It consisted of five members: three from service and two from production. The two from production were also the last to join the team. Team members were aware of two subgroups and that they held different perspectives, but because these perspectives were held by multiple people within the subgroups, they were taken into account by the remainder of the team. During preliminary interviews prior to participating in the research described here, one member commented, "There are tenure differences in this team that are related to how well people accept change. A couple of us have lived all over the place, changed jobs two or three times in ten years, but for the most part, folks in this team, they just stick to one spot. So I guess maybe they have a different view." Not all members in the team subscribed to the same perspective, but they were considerate of each other's opinions because it was not just one odd individual expressing different ideas.

The subgroups in this team were only moderately strong, because age and sex differed within them, and thus they were not highly divisive. Members also shared ties across subgroups—age and sex were bonds of commonality that served to link the two subgroups, preventing them from becoming entrenched. As a result, the subgroups were able

to converge and operate as a team. One team member commented, "We all come together as one team entity when we need to represent the world-wide business segment. Everyone comes together to make this thing tick." The logistics team, with its two moderately strong subgroups, exhibited very high learning behavior. Members frequently came up with new ideas about how their work should be done (experimentation), described their process as an open sharing of opinions (communication), and actively documented and recorded knowledge generated (codification). As one team member said, "I think the team is extremely effective at learning . . . we come out of our discussions with a list of action items and we get them done. Nobody's afraid to say anything about anything, and everybody takes criticism really well. The communication on the team is very good."

Extremely strong subgroups, in contrast, imply that no commonalities exist between any of the members across subgroups in terms of shared demographic backgrounds, and subgroups are likely to be counterproductive. Members of one subgroup are unlikely to relate to members of other subgroups, causing them to be highly divisive. Having backup from *within* their own subgroup, team members are less open to new ideas expressed *outside* the subgroup. As a result, they are more likely to follow the opinions of their fellow subgroup members thoughtlessly (Abrams et al., 1990; Mullen, 1991). Disputes may unfold along known dividing lines, representing the different factions within the team (Earley and Mosakowski, 2000). This entrenchment causes subgroups to polarize (Mullen, 1991; Bornstein and Ben-Yossef, 1994; Baron et al., 1996). Polarized groups have been shown to be myopic in the information they consider and to develop distorted perceptions of reality and biased opinions of themselves and other groups (Tajfel, 1982; Turner, 1987; Platow, McClintock, and Liebrand, 1990; Schaller, 1991). Members of a given subgroup may begin to hold negative out-group stereotypes of the other subgroup and favor their own subgroup inequitably (Tajfel and Turner, 1986; Roccas and Schwartz, 1993). As a result, exploration suffers, interaction between subgroups is reduced, deadlocks prevent conflicts from being resolved (Lau and Murnighan, 1998), and a convergence of opinions is inhibited (Abrams et al., 1990). Thus, if subgroups become very strong, they hamper team learning behavior.

An information systems integration team that we worked with in a medical products firm had two very strong subgroups. The first subgroup consisted of two women, who each had been on the team for 10 years and shared a background in service. The second subgroup consisted of four men who came from human resources and had relatively recently joined the team. In preliminary interviews, one member stated, "I think that there is a gender—I don't want to call it a problem, but issue. Sometimes you are very aware of your gender when you are speaking to certain people on this team. I think that is an issue, and it can definitely affect how people relate when they have to work collectively. In this team, my perception of a few members is that they are threatened by strong women who are good at what they do.

The communication is very poor. I don't want to say sneaky, but it seems like people will do things and then not tell us about it, and I think they have an issue in this area." Gender separated the team into subgroups, and the different members were unable to bridge their different viewpoints because there were no commonalities between the subgroups that might have enabled them to share experimentation, reflect on each other's perspectives, and agree on a solution. The highly distinct subgroups in this team impeded learning behavior. As one team member said, "People know the team exists, it's an authority to give information and to receive information. But in another sense, it's not enough. There isn't a lot of change, or enough actions implemented. We are what you might call . . . sleeping, or too quiet . . . we miss the possibility of many new technologies."

Subgroups provide members with a cohort within their team, which fosters bringing out a rich variety of ideas and viewpoints. If these subgroups are moderately strong, instead of highly divisive, knowledge can flow across subgroups, and reflection on each other's perspectives is possible. The absence of subgroups in moderately heterogeneous teams may lead to acquiescence, inhibiting the benefits of heterogeneity, while extremely strong subgroups may lead to prejudice and rigidity, affecting learning behavior in a negative way. In contrast, moderately strong subgroups do not experience each other as threatening (Wilder and Shapiro, 1991; Crott and Werner, 1994), and open communication, adaptation, and convergence of opinions between subgroups is possible (Brewer, 1991; Roccas and Schwartz, 1993). Hence, we predict that moderately strong subgroups will have a beneficial effect on team learning behavior:

Hypothesis 2: The relationship between subgroup strength and team learning behavior will be curvilinear (inverted U-shaped), such that moderately strong subgroups will be associated with high team learning behavior, and very weak or very strong subgroups with low team learning behavior.

Effects of Organizational Design

In addition to a team's internal composition, design features of the team's organization may also stimulate or impede learning behavior. Organizational support in general has been shown to create an atmosphere of psychological safety and efficacy that fosters team learning behavior (Edmondson, 1999). Three features of organizational design that are likely to be relevant to team learning are performance management by an external leader, team empowerment, and the availability of knowledge management systems. Although there may be other factors in a team's context that could influence learning behavior, initial evidence from the intersection of the team design and learning literatures (Hackman, 1987; Argote, 1999; Edmondson, 1999) suggests that these three elements, clearly external to the team, can be expected to have a profound impact on how members obtain, create, and use knowledge (Mohrman, Cohen, and Mohrman, 1995). But teams with very different compositions may not react the same way to these organizational context characteristics. In general, factors that provide a team with an opportunity to

improve its learning behavior (e.g., team empowerment and a knowledge management system) will be more effective for teams that have an intrinsic motivation to use this opportunity, as teams with moderate subgroup strength do. Factors that are designed to provide a stimulus for learning behavior, rather than an opportunity (e.g., performance management), will be more effective for teams that, because of their composition, do not have an impetus to learn. This is the case for teams with weak or very strong subgroups. Thus, certain factors in the organizational context may be more or less effective at encouraging a team to engage in learning behavior, depending on the strength of subgroups within the team.

Performance management by an external leader. A team's external leader, or the manager to whom the team reports, can have a considerable influence on a team's behavior (Hackman, 1987; Edmondson, 1999). Mohrman, Cohen, and Mohrman (1995) argued that an important role of an external leader is to engage a team in performance management, assisting them in clearly defining, developing, and reviewing performance. The external leader is often involved at arm's length; he or she does not interfere directly but actively stimulates teams to take responsibility for their own actions by encouraging planning and self-monitoring of performance. Manz and Sims (1987) demonstrated that external leaders' most important behaviors are those that facilitate team self-observation, self-evaluation, and self-reinforcement. Further, teams that feel their external leader is interested and involved in their work show favorable intragroup processes, such as open communication, supportiveness, and discussion of strategy (Gladstein, 1984). Leaders set the stage for psychological safety by helping the team feel comfortable admitting mistakes and openly discussing errors and concerns without fear of punishment (Edmondson, Bohmer, and Pisano, 2001). Research by Tagger (2002) suggested that performance management provokes interaction between team members, stimulating intrateam processes such as coordination, communication, and motivation, which results in improved group creativity.

Performance management is likely to have a positive influence on team learning behavior because it stimulates a team to determine what constitutes its effectiveness and, as a result, to develop and implement new activities that improve performance (Hackman, 1987; Manz and Sims, 1987; Zaccaro and Marks, 1999). This was illustrated in a comment from an external leader of a team in our sample during preliminary interviews: "In this project, I've encouraged them to go across businesses, looking at everybody and everybody's different needs. They are just going through an assessment right now of interviewing managers and seeing what their needs are. I think it's been a great exercise itself. It has been very, very helpful for me to have them actually do something, and finally see a product, a deliverable."

By engaging the team in performance management, the external leader can make a team aware of its performance and encourage it to review and reassess its work methods collectively, thus facilitating experimentation and reflective communication (Mohrman, Mohrman, and Lawler, 1992;

Kaplan and Norton, 1996; Koslowski et al., 1996). Not every team, however, may need this external stimulus. The team in the example above, for instance, had weak subgroups and did not automatically engage in learning behavior; it needed the impetus by its external leader. For a team that already has an impetus to engage in learning behavior, a performance management push by its external leader may be superfluous. Teams that consist of moderately strong subgroups have this impetus and are already carrying out the desired activities, so the external leader's interference may be unnecessary. If the performance management push is extreme, the team may even experience the external leader's involvement as disruptive, since members have already developed characteristics such as cohesion and intrinsic motivation (Tagger, 2002) that, in effect, substitute for leadership (Podsakoff et al., 1993; Podsakoff, MacKenzie, and Bommer, 1996; Williams, 1997; Trevelyan, 2001). Thus, performance management by a team's external leader is likely to be more potent when the team does not have the impetus to experiment and implement new ways of doing things, as is the case with teams that have either weak or very strong subgroups. Here, the external leader can provide the stimulus that provokes these teams to engage in learning behavior:

Hypothesis 3: Subgroup strength will moderate the influence of an external leader's performance management on team learning behavior, such that the effect of performance management is stronger for teams with weak or very strong subgroups than for teams with moderately strong subgroups.

Team empowerment. Organizations differ in the extent to which they empower their teams, giving them autonomy (Hackman, 1987) in terms of determining their own actions, planning and scheduling work, and controlling work-related decisions and job assignments. Empowerment stems from the traditional concept of worker democracy (Cherns, 1976; Trist, Susman, and Brown, 1977) and has received much attention over the last decade, with research demonstrating that in general, empowerment stimulates learning-related activities (e.g., Cohen and Ledford, 1994; Kirkman and Shapiro, 1997). For teams to engage in learning behavior, it is important that they have the latitude and ability to experiment and implement potential improvements as they see fit. This requires external leaders to give up authority for the planning and organization of work (Edmondson, Bohmer, and Pisano, 2001). A lack of substantial freedom may push a team into known and fixed behavior (Argyris, 1976).

Moreover, empowerment potentially reduces insecurity and defensiveness in a team; research has indicated that with empowerment, teams are more proactive in seeking continuous improvement, revising work processes, and seeking innovative solutions to work problems (Hyatt and Ruddy, 1997; Kirkman and Rosen, 1999). Lack of empowerment will inhibit information seeking and collective reflection on alternative courses of action (Edmondson, 2002), while empowered teams have frequently been found to take action on problems and improve the quality of their work by initiating changes in the way work is carried out (Wellins, Byham, and Wilson, 1991). Empirical research has also suggested, however, that

empowerment may not always be equally potent across teams. For instance, empowerment has been shown to be less effective when team members perceive a lack of trust within the team (Kirkman and Rosen, 1999) or when they are inclined to withhold effort or communicate negative feelings toward fellow coworkers (Kirkman and Shapiro, 2001).

Empowerment represents an opportunity for a team to engage in learning behavior but also, to some extent, may be a necessary condition. Without empowerment, teams will not have the leeway to experiment and to discuss and implement alternative courses of action. But although it represents an opportunity, empowerment in itself does not include a stimulus to use this leeway and engage in such behavior. Moderately heterogeneous teams with weak or no subgroups, for example, lack an intrinsic impetus to alter known behavior and question existing routines, as they are not inclined to experiment and collectively reflect on potential alternatives (Earley and Mosakowski, 2000). As a result, they may actually be overwhelmed with the freedom given through empowerment and struggle to put it to productive use. For example, in one company we worked with from our sample, a member of a moderately heterogeneous team with very weak subgroups explained during preliminary interviews, "Some have been with the company over fifteen years, so they're used to 'I have a supervisor and my supervisor tells me, move this box, do this, do that.' Now their boss is in Miami and they have to make those decisions. I think they're struggling with the transition from the old system into this team concept system where they share the group leadership and team members will be coming to each other for direction or coordination of work load if they have a problem. Yet, we all have different views of this." If such a team does not have a natural inclination to engage in learning behavior (due to the absence of subgroups) empowerment may prove useless. Likewise, teams with very strong subgroups may also take little advantage of empowerment. A lack of cohesion and trust between subgroups hampers task conflict (Jehn, Chadwick, and Thatcher, 1997; Jehn, Northcraft, and Neale, 1999; Simons and Peterson, 2000) and makes a team unable to bridge its dividing lines, blocking its ability to develop and codify new solutions and hence its ability to engage in learning behavior.

In contrast, empowerment can be expected to have a positive effect on teams that are already inclined to engage in learning behavior, such as teams with moderate subgroup strength. For such a team, the perception of independence and the discretion that they experience will further encourage them to use this autonomy to seek and try out new ways of doing things. For them, the opportunity offered by empowerment will trigger experimentation and reflection on work methods. Actually, a lack of empowerment may hamper doing what comes naturally to them: experimenting, debating, and implementing new solutions. In support of this view, DeDreu and West (2001) found that minority dissent stimulated team creativity and divergent thought, but only when there was a high degree of participation in decision making. Hence, we expect that teams with moderately strong sub-

groups will be particularly receptive to empowerment, since they already have a natural impetus to explore and debate new activities, while teams with weak or extremely strong subgroups will remain entrenched in habitual behavior, in spite of the autonomy provided:

Hypothesis 4: Subgroup strength will moderate the influence of team empowerment on team learning behavior, such that the effect of empowerment is stronger for teams with moderately strong subgroups than for teams with weak or very strong subgroups.

Knowledge management systems. Learning behavior is about obtaining and sharing knowledge and making use of it, and a team's organizational context may contain elements that serve as tools to facilitate this behavior. One such element is a knowledge management system, a set of formal procedures and mechanisms that capture information on innovations and best practices throughout the organization (Nonaka and Takeuchi, 1995). Many organizations have some form of central database through which new products or services, work methods, and marketing knowledge are collected and transferred among members (Moore and Birkinshaw, 1998). In general, the extent to which a knowledge management system is available to a team can be expected to have a positive effect on its willingness and ability to engage in learning behavior. A knowledge management system facilitates the transfer of knowledge (Argote and Ingram, 2000) that can be used during experimentation or for reflection on a team's practices. It helps a team to understand, extend, and codify the ideas of individuals in the team. This was the case in the logistics team we mentioned earlier, which had moderately strong subgroups. One team member commented, "We have a system for capturing those ideas . . . and the situations where the team has suggested something new and it hasn't been right are very few. For example, Claudio has got a million ideas. I'm surprised. I think in a previous life he was an inventor. You know, he always has a plan. And now he's less bashful to discuss it. I'll be walking around looking, and he'll say, 'Hey, you know what? I've thought about this.' And 90 percent of the stuff the team suggests we end up recording and doing." A knowledge management system aids the codification of knowledge and, consequently, the storage, retrieval, and revision of what has been learned (Walsh and Ungson, 1991). This increases the potential for coordination with other parts of the organization, which has been shown to be beneficial to team learning (Edmondson, 2002). By using a knowledge management system, teams have access to knowledge in other (perhaps comparable) parts of the organization, from which they may be able to adopt other practices, adapt them to their own specific setting, or combine them with elements from their existing repertoire (Kogut and Zander, 1992; Argote, 1999). Hence, a knowledge management system creates opportunities for a team to engage in and improve its learning behavior.

The extent to which a team will use these opportunities for learning, however, will depend on its inclination and motivation to engage in learning behavior in the first place. Like empowerment, a knowledge management system represents an opportunity to engage in learning behavior, rather

than a direct stimulus. Teams without subgroups engage in little experimentation and will have little new knowledge to be stored in the knowledge management system. In teams with very strong subgroups, there is a relatively low level of information sharing and adoption, hence, external information made available through a knowledge management system may not be disseminated or even acknowledged. Teams with entrenched subgroups may find it impossible to reach agreement about norms for the use of communication through the system or about what to codify and enter into the database. As a result, teams that do not have an inclination to engage in learning behavior in the first place, such as teams with weak or very strong subgroups, may benefit little from the availability of a knowledge management system.

In contrast, teams with moderately strong subgroups may find considerable use for the system. It facilitates the exchange and expression of ideas, in which they are naturally inclined to engage. The availability of knowledge from other parts of the organization may further stimulate creativity during experimentation and debate during communication, and the team can use the system to codify and store information on experiments and newly developed practices. The team already has an intrinsic motivation to engage in learning and sees the potential to engage in this behavior enhanced by the availability of the system. Therefore, teams with weak or very strong subgroups should find relatively little use for knowledge management systems, while these systems will further stimulate learning behavior in teams that are characterized by moderately strong subgroups:

Hypothesis 5: Subgroup strength will moderate the influence of knowledge management systems on team learning behavior, such that the effect of knowledge management systems is stronger for teams with moderately strong subgroups than for teams with weak or very strong subgroups.

METHODS

Sample and Procedure

Five companies from the pharmaceutical and medical products industry served as research sites for this study. Each of the organizations had facilities in at least four geographic areas (U.S., Latin America, Southeast Asia, and Western Europe) and used teams across a number of functional areas, including human resources, sales, marketing, manufacturing, and research. All of these functional areas in each organization in each geographic area were involved in the research. Human resource professionals in each organization were asked to select randomly teams for interviews and surveys across a variety of team types.

To facilitate the survey development, we first interviewed a total of 107 individuals, representing 52 teams. Between one and five individuals were interviewed from each team. We conducted in-depth personal interviews with respondents from all five organizations in each of the four geographic areas, for a total of 24 sites. Four types of teams were included: on-going work teams, responsible for producing goods and services; project teams, which are time-limited

and used for a one-time output such as a new product or service; parallel teams, which exist in parallel to the formal structure, encompassing people from many different work units; and management teams, responsible for the overall performance of a business unit (Cohen and Bailey, 1997). We posed a series of questions pertaining to concepts such as learning processes, developing and sharing knowledge, motivation, leadership, receiving feedback, and overall team effectiveness. We conducted the interviews in the native language of the interviewees, with the assistance of a team of bilingual interviewers.

To assure that the instrument was valid across cultures (Gibson and Zellmer-Bruhn, 2001), we used a combination of the results of the interviews and preexisting standardized scales to derive the measures used in this study (see Gibson, Zellmer-Bruhn, and Schwab, 2003, for a detailed description). We used a team of fifteen translators in an extensive translation-back-translation procedure to foster cultural equivalence among the items and altered a number of items as a result. Next, the survey was extensively pilot tested. We did a bilingual pilot study in 11 teams to examine further the validity of the items across the different translated versions; bilingual respondents in the teams were asked to fill out the survey in two different languages. This also led to a small number of alterations. Finally, we conducted a multiple constituency test to examine the reliability of the scales at the team level of analysis. As a result, some items were dropped; others were subjected again to the translation-back-translation procedure.

To test the hypotheses, we administered the final set of survey scales on site in each location. Respondents reported as a team at a pre-set time and location to fill out the survey. No respondent participated on more than one team in the sample. In the cover letter and on the survey, the specific name of the team on which the respondent should focus was clearly indicated. In addition, we had respondents complete the survey alongside their team members in the same room to heighten their focus on that specific team. The final sample consisted of survey data obtained for 156 teams representing 724 individual team members. The average age of the respondents was 39; 26 percent were female; the average tenure on the team was 3.4 years.

Independent Variables

Heterogeneity. Our measure of heterogeneity was based on five demographic variables included in the survey: sex, ethnic background (six categories), functional background (eight categories), team tenure, and age (e.g., Pelled, Eisenhardt, and Xin, 1999). Unfortunately, a number of people failed to complete all of the demographic questions. As a result, we were only able to obtain complete demographic data for 113 teams.

To construct a composite measure of total team heterogeneity, we computed the overlap for each pair of members on each of the attributes (i.e., sex, ethnic background, functional background, age, and team tenure). Overlap in categorical measures was simply zero or one. For example, if a pair consists of two Asians, the overlap in terms of ethnicity is 1. If a

pair consists of an Asian and an African American, the overlap in ethnicity is 0. Overlap in continuous measures is a proportion, such that the smallest observed value in the pair is represented as a proportion of the largest value. For instance, overlap in team tenure is represented by the years shared together on the team as a proportion of the longest tenured person. Hence, a pair of 4 and 5 years has an overlap of 0.8, as does a pair of 20 and 25. We used a similar computation for overlap in age, but corrected to account for the fact that members have a minimum age when they join a team, as well as a maximum, pensionable age (see below). Then the five scores on the different attributes were summed for each pair of members, indicating the total overlap per pair. Hence, for each pair of team members, the categorical variables take on a value of 0 or 1, while the continuous variables have a proportion between 0 and 1. Because we subsequently aggregated to team-level variables, however, these extremes leveled out. We assigned equal weights to each of the demographic variables because we had no evidence that across all teams one variable was more influential than another. We therefore computed total team homogeneity by summing the overlap of the different pairs and dividing it by the number of pairs on the team. The more overlap there is between a team's members, the more homogeneous the team. Team heterogeneity was computed as the inverse. Formally:

$$\text{Team heterogeneity} = \left(\frac{1}{P} \sum_{i \neq j} \sum_{k} \text{overlap} X_{k,ij} \right)^{-1}$$

where, P = the number of pairs = (n – 1) + (n – 2) + . . . + [n – (n – 1)], where n = the number of people on the team; i = the *i*th member on the team; j = the *j*th member on the team, and k = the number of demographic characteristics included in the measure; X_1 = 1 if sex_i = sex_j, else 0; X_2 = 1 if $ethnic_i$ = $ethnic_j$, else 0; X_3 = 1 if $function_i$ = $function_j$, else 0; X_4 = min($tenure_i$, $tenure_j$) / max($tenure_i$, $tenure_j$); X_5 = min(age_i, age_j) / max(age_i, age_j) – [19/65 * (1 – min(age_i, age_j) / max(age_i, age_j) / (1 – 19/65)], where 19 is the minimum age of a team member in the sample, 65 the maximum.

Subgroup strength. Demographic subgroups exist when some members share an overlap in terms of demographic background that is not shared with others. Demographic subgroups are very strong when there are pairs with a lot of overlap in a team *and* pairs with very little overlap. We computed subgroup strength by taking the standard deviation in overlap across the different pairs on a team. Formally:

$$\text{Subgroup strength} = \text{Standard Deviation} \sum_{k} \text{overlap} X_{k,ij}$$

Subgroup strength is therefore a continuous variable, and each team in our sample received one score representing the overall strength of its subgroups. In table 1, above, the joint calculation of heterogeneity and subgroup strength were illustrated in the right-hand side of the table. Although both teams in the table had the same heterogeneity score, Team 1 had a high standard deviation on overlap between members,

which indicates strong subgroups, because some team members have a lot in common while they share very little with others. In contrast, Team 2 had a low standard deviation, which indicates low subgroup strength, because all members have some things in common but, at the same time, differ on other traits. As a consequence, in teams in which no one has anything in common, or in teams in which all members are alike, subgroups are absent.

To assess the convergent validity (Venkatraman and Grant, 1986) of the measures of subgroup strength and heterogeneity, we analyzed interview data for a subset of 28 teams for which we had interviewed at least three team members. In the text data for these teams, we first highlighted segments of text that contained the following word: member(s), difference(s), and (sub)group(s) to facilitate the coding process. Next, we gave instructions to two independent coders, who were blind to our hypotheses, as to what constitutes weak, moderate, and strong subgroups given our definition and gave examples of each from our work with teams. We then asked them to read the transcripts for each team and arrive at a score for subgroup strength using a three-point scale: 1 = no/little evidence of subgroups; 2 = evidence of moderate subgroups; 3 = dramatic evidence of strong subgroups. We used the same process to rate heterogeneity. Coders first rated each individual team member's interview, then computed an average across team members to arrive at a single score for the entire team. Correlations between the two raters were high: .76 ($p < .0001$) for subgroup strength and .80 ($p < .0001$) for heterogeneity. Next, the two raters discussed any teams for which there was disagreement, reviewed the rating scheme, and arrived at a single score for each team. We then correlated these interview-based scores with the measures of demographic subgroup strength and heterogeneity obtained through the survey. The correlation between the measure for strength of demographic subgroups and the measure of the interviewees' perceptions of subgroup behavior within their team was very high (.83, $p < .0001$). This indicates that the strength of demographic subgroups within teams is closely associated with the existence of subgroup behavior within teams. Likewise, the correlation between demographic heterogeneity and perceptions of heterogeneity was .66 ($p < .0001$).

Furthermore, we assessed convergent validity of our overlap measure of heterogeneity by relating it to traditional measures of demographic heterogeneity. As a first step, we computed separate measures of heterogeneity for each of the demographic characteristics. The categorical variables heterogeneity in ethnic background and heterogeneity in functional background were each measured through Blau's (1977) index ($1 - \Sigma pi^2$), where p is the proportion of group members in a category, and i is the number of different categories represented in the team. Sex heterogeneity was measured as the percentage of the smallest representation on the team, with 50 percent representing the maximum heterogeneity. Following Allison (1978), we used the coefficient of variation (standard deviation divided by the mean) to measure the numeric variables age heterogeneity and tenure heterogeneity. Then

we standardized each of the variables and added them to arrive at a composite measure of demographic heterogeneity. The correlation of this measure with our overlap-based measure of heterogeneity was .66. Substituting our indicator of heterogeneity for this more traditional measure in our models yielded results similar to the ones reported below, be it at somewhat lower levels of statistical significance. Entered into the model as separate measures, all five variables were insignificant, although together they explained 5.2 percent of the variance. When used in conjunction with our measure of subgroup strength, our measure of demographic heterogeneity can be expected to have better properties than the more traditional variables, since subgroup strength and heterogeneity capture separate aspects of team composition, which is mirrored in our measures, i.e., the average overlap in terms of backgrounds in a team versus the variance in overlap within a team.

Performance management by the team's external leader. Using 7-point Likert scales, team members rated the degree of performance management exhibited by the leader to whom they report using three items adopted from Manz and Sims (1987): "Our leader encourages us to go over an activity before we attempt it"; "Our leader encourages us to set goals for our team performance"; and "Our leader encourages us to be aware of our level of performance." Cronbach's alpha for this scale was .83. In addition, the intraclass correlation coefficient (ICC) using one-way analysis of variance (Bartko, 1966; Shrout and Fleiss, 1979) was .77 and highly significant ($p < .0001$). One-way ICC can be interpreted as a correlation, hence, .77 indicates high interrater reliability. Interrater reliability represents "the degree to which the ratings of different judges are proportional when expressed as deviations from their means" (Tinsley and Weiss, 1975: 359), where the judges are the different team members and the subject is the team. Since for aggregation purposes the absolute value of the ratings are also relevant, we also calculated the $R_{wg(j)}$ following James, Demaree, and Wolf (1984, 1993). $R_{wg(j)}$ ranges between 0 and 1 and is an indication of interrater agreement, or "the extent to which the different judges tend to make exactly the same judgments about the rated subject" (Tinsley and Weiss, 1975: 359). The average $R_{wg(j)}$ across the different teams for this scale was .78, which is above the usual rule of thumb of .70, and hence indicates that aggregation is justifiable (Cohen, Doveh, and Eick, 2001). Based on these analyses, team-level indices were obtained by averaging and standardizing the individual-level responses.

Empowerment. Team members also completed a team empowerment measure using 7-point Likert scales comprising three items drawn from research on self-managed and autonomous work groups (Gulowsen, 1972; Cordery, Mueller, and Smith, 1991; Cohen, Ledford, and Spreitzer, 1996): "How much input does the team have in how the team develops skills and abilities?"; "How much input does the team have in planning and scheduling of work?"; and "How much input does the team have in planning and determining goals?" Cronbach's alpha was .82, and the ICC was 0.74 ($p < .0001$), indicating reliability. Moreover, an average $R_{wg(j)}$ of .76

showed that the different members agreed on their assessment of empowerment.

Knowledge management system. Team members completed a three-item measure using 7-point Likert scales assessing the perceived availability of an organizational knowledge system. This scale was created through the interviews and pilot testing: "This organization attempts to centrally collect best practices"; "This organization has a formal system to capture good ideas made by teams"; and "This organization has a formal system to share good ideas with other teams." Cronbach's alpha was .87, the ICC was 0.86 ($p < .0001$), and the average $R_{wg(j)}$ was .80, indicating interrater reliability and agreement about this attribute and justifying aggregation.

Finally, a confirmatory factor analysis using maximum likelihood estimates on all of the above nine items was used to assess discriminant validity (Venkatraman and Grant, 1986). Results clearly fitted the three-variable structure for the organization design variables, i.e., all the items loaded on the performance management, empowerment, and knowledge management systems variables as expected (chi square = 30.33 with 23 degrees of freedom, goodness of fit index = .96, and root mean square residual = .042).

Dependent Variable

Earlier, we described team learning behavior as a cycle of experimentation, reflective communication, and knowledge codification. Since each are different actions that complement each other, we first measured the three activities separately. *Experimentation* was measured using three 7-point items: "This team comes up with many new ideas about how work should be done"; "If a new way of doing work is introduced, it often comes from within the team"; and "This team is frequently the source of ideas that are copied by other teams" (Cronbach's alpha = .74; ICC = .66, $p < .0001$; average $R_{wg(j)} = .81$). *Communication* was measured through three items: "There is open communication in this team"; "Everyone has a chance to express their opinion"; and "Team members maintain a high level of idea exchange" (Cronbach's alpha = .89; ICC = .85, $p < .0001$; average $R_{wg(j)} = .86$). Finally, *codification* was measured using the following items: "This team carefully documents how we do our work"; "This team has a formal system to capture our good ideas"; and "This team attempts to record our best practices" (Cronbach's alpha = .93; ICC = .80, $p < .0001$; average $R_{wg(j)} = .79$). Confirmatory factor analysis using maximum likelihood estimates clearly replicated the three-variable structure (chi square = 36.23 with 21 degrees of freedom, goodness of fit index = .95, and root mean square residual = .039). Next, we computed the composite variable *learning behavior* by multiplying scores on these three measures. We multiplied the scores because our theory suggests that the different elements cannot substitute for one another, and thus they relate to each other in a multiplicative rather than an additive way. Consequently, a team scores high on this measure for learning behavior only if all three elements of the learning cycle are present.

We performed several analyses to verify the construct validity of the team-learning-behavior variable. Edmondson (1999) showed that teams that engage in learning behavior are more effective. Therefore, to test for nomological validity (Venkatraman and Grant, 1986), we asked teams to rate their effectiveness on a multi-item scale based on both preexisting scales (Hackman, 1987) and data from our interview process. In addition, the team's external leader—identified as the person to whom the team has to report and who can be expected to be knowledgeable about the team's output—was asked to respond to the effectiveness items. We were able to obtain 78 team leader responses. We used regression analysis to verify the relationship between team learning behavior and team effectiveness. The estimates, indicating the relation between learning behavior and team effectiveness, were positive and significant, as assessed by both members ($p < .001$) and external leaders ($p < .05$).

Further, we established discriminant validity (Venkatraman and Grant, 1986) through confirmatory and exploratory factor analysis to verify the distinctiveness of our constructs. The items used to measure the three organizational design variables—performance management by the external leader, empowerment, and knowledge management system—were entered into a confirmatory factor analysis together with the items used to measure the three variables that make up team learning behavior. The analysis clearly supported the six-variable structure, with separate factors for each of the organizational design variables and each of the components of the team-learning-behavior variable (chi square = 171.41 with 114 degrees of freedom, goodness of fit = .89, and root mean square residual = .052). Next, we conducted an exploratory factor analysis including all items on all scales. The analysis replicated the intended factor structure, and none of the items used to measure team learning behavior loaded on an organizational design factor.

Finally, although the variables were derived from the same respondents, the risk of common method bias in our hypotheses tests seems low because our main independent variables, subgroup strength and heterogeneity, were entirely based on demographic data (i.e., team members' age, sex, tenure, demographic and ethnic background) and hence are unlikely to be subject to any perception biases. The only potential source of common method bias may stem from the measurements of the organizational context variables (i.e., performance measurement, empowerment, and knowledge management systems), although this risk is also fairly low, since all variables were aggregated to the team level rather than used at the individual level, and all tests included the variables in interaction with other variables, rather than as direct predictors. Nevertheless, we explored the possible presence of common method variance through factor analysis (with and without rotation) (Brewer, Campbell, and Crano, 1970; Thomas and Kilmann, 1975), with the intent to control for a common method factor subsequently in a structural equations model if one was detected, following recommendations by Podsakoff and

Organ (1986). But we were unable to find a factor in any of the analyses we performed that might suggest the presence of common method bias.

Control Variables

We included several control variables in the analyses. We controlled for task routinization because learning behavior may be less of an issue for teams with routine tasks (Mohrman, Cohen, and Mohrman, 1995). The variable was measured using three items adopted from Withey, Daft, and Cooper (1983): "Our work is routine"; "People in this team do about the same job in the same way most of the time"; and "Team members perform repetitive activities in doing their jobs" (Cronbach's alpha = .83; ICC = .53, $p < .0001$; average $R_{wg(j)} = .73$). We controlled for team size because larger teams have more potential for heterogeneity (Pelled, Eisenhardt, and Xin, 1999). Furthermore, to avoid heteroscedasticity, we included dummy variables to control for company, country, and team type.

RESULTS

Table 2 reports descriptive statistics and a correlation matrix. The descriptive statistics show that there is substantial variance for all our variables, indicating that our sample contains teams with a broad range of compositions. The correlation between subgroup strength and heterogeneity is .42, which is about what one would expect given that subgroups cannot be present when there is full homogeneity or heterogeneity, but only when there is moderate heterogeneity. As expected, the correlations between our dependent variable, team learning behavior, and the three organization design variables (performance measurement, empowerment, and knowledge management systems) are also fairly high, which suggests that all three design features stimulate learning behavior. Table 3 presents the results of the OLS regression analyses used to test the hypotheses that subgroup strength and heterogeneity are separate predictors of team learning behavior and that the direct influence of the organization context variables on team learning behavior is moderated by subgroup strength.

Table 2

Means, Standard Deviations, and Correlation Coefficients of the Dependent and Independent Variables (N = 156)*

Variable	Mean	S.D.	Min.	Max.	1	2	3	4	5	6	7
1. Team learning behavior	38.7	27.3	1	136							
2. Team heterogeneity	.291	.058	.207	.547	–.06						
3. Subgroup strength	.564	.245	.021	1.23	–.01	.42					
4. Leader performance management	0	1	–3.73	2.25	.63	–.07	.10				
5. Team empowerment	0	1	–4.57	2.06	.51	.01	.04	.40			
6. Knowledge management system	0	1	–3.16	2.72	.60	–.21	–.03	.53	.44		
7. Routine task	0	1	–3.06	1.84	.56	–.11	.06	.60	.45	.65	
8. Team size	4.64	3.2	1	19	.15	.02	.21	.14	.02	.12	.13

* Correlations with absolute value greater than .17 are significant at the .05 level.

Table 3

OLS Regression Results with Team Learning Behavior as Dependent Variable

	Model			
Variable	1	2	3	4
Predictors				
Team heterogeneity*	–.113		–1.72•••	–1.28••
Team heterogeneity squared	.173		2.82•••	2.09••
Subgroup strength*		.071••	.094•••	.065••
Subgroup strength squared		–.067•••	–.077•••	–.054••
Leader performance management	6.69••	7.75•••	8.07•••	16.9•••
Team empowerment	7.18•••	8.78•••	7.68•••	–.460
Knowledge management system	11.4•••	10.9•••	12.4•••	22.2•••
Leader performance management x subgroup strength				–16.7••
Team empowerment x subgroup strength				14.2•
Knowledge management system x subgroup strength				–17.8•
Control variables				
Routine task	1.36	2.05	2.95	2.78
Team size	.029	–.348	–.276	–.172
Control dummies				
Company 1	4.58	8.05	4.54	3.61
Company 2	–.523	1.60	–1.33	–.752
Company 3	–9.32	–3.85	–6.99	–8.54
Company 4	7.68	7.61	7.16	6.00
Country 1	–12.0	–7.29	–6.88	–6.82
Country 2	1.02	.067	–2.61	–2.75
Country 3	–.088	7.17	6.75	2.46
Project team	.916	–1.47	–2.17	–4.41
Parallel team	–4.18	–6.42	–9.33•	–8.02•
Management team	11.1	3.26	7.09	7.49
Intercept	61.5•	27.9•	278•••	222•••
R-squared	.62	.69	.74	.77

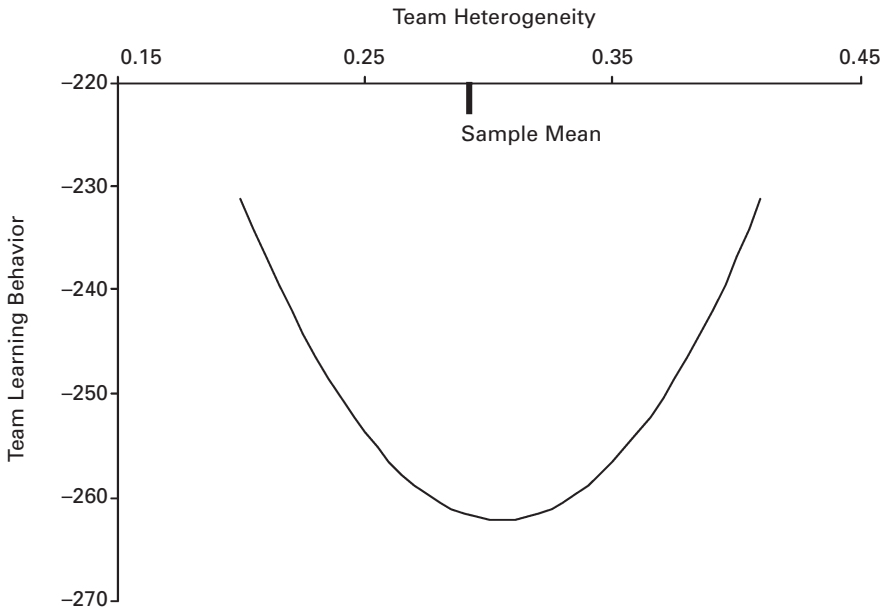
• $p < .05$; •• $p < .01$; ••• $p < .001$.
* Value * 10^3.

Heterogeneity, Subgroup Strength, and Learning Behavior

Hypothesis 1 predicted that the relationship between a team's demographic heterogeneity and team learning behavior would be U-shaped, such that both homogeneous and highly heterogeneous teams would exhibit higher levels of team learning behavior than moderately heterogeneous teams. In model 1, the heterogeneity variable and its square are insignificant. When subgroup strength is controlled for in model 3, however, the linear and quadratic terms for heterogeneity become highly significant, demonstrating a curvilinear relationship as hypothesized. As depicted in figure 1, which is based on model 3, the bottom of the resulting U-shape is about halfway in the observed data range, supporting hypothesis 1.

Hypothesis 2 predicted that the relationship between subgroup strength and team learning behavior would be an inverted U-shape, such that moderate subgroups would be associated with high learning behavior, while weak or very strong subgroups would demonstrate low levels of learning behavior. The models in table 3 show that the estimates of subgroup strength and its square are significant as hypothesized. As depicted in figure 2, which is based on the estimates of model 3, the peak of the relationship is well within the range of the data, supporting the predicted inverted U-

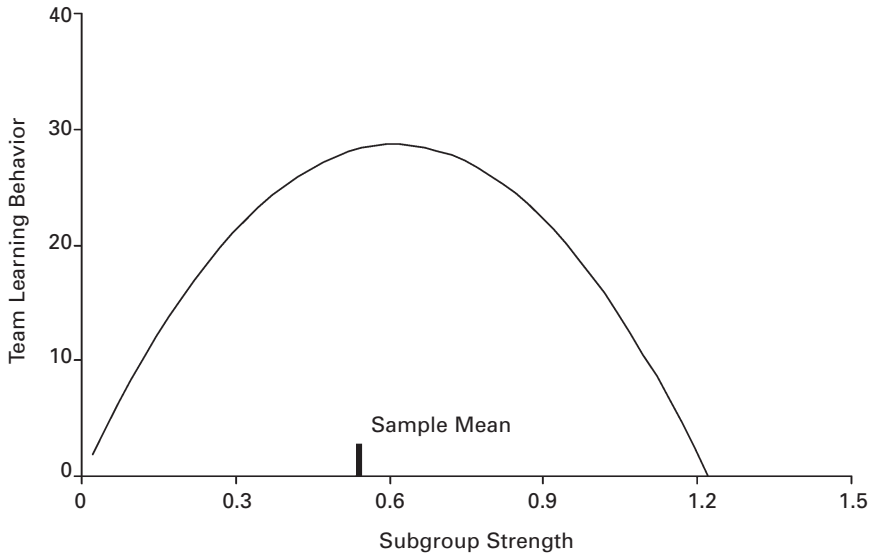
Figure 1. Observed relationship between heterogeneity and team learning behavior.



shape. Teams that engaged most in learning behavior are those characterized by a moderate level of subgroup strength. The maximum of the relationship, just above .6, represents a team with subgroups that overlap on about half of their demographic characteristics.

Models 1–3 show that cumulative team heterogeneity and learning behavior display the predicted curvilinear (U-shaped) relationship *only* when corrected for the strength of subgroups. This makes sense, because heterogeneity and subgroup strength are correlated (they are both the result of differences and similarities within teams), as evidenced by our correlation matrix, yet were proposed to have opposite effects. Hence, when one of the two is omitted from a

Figure 2. Observed relationship between subgroup strength and team learning behavior.

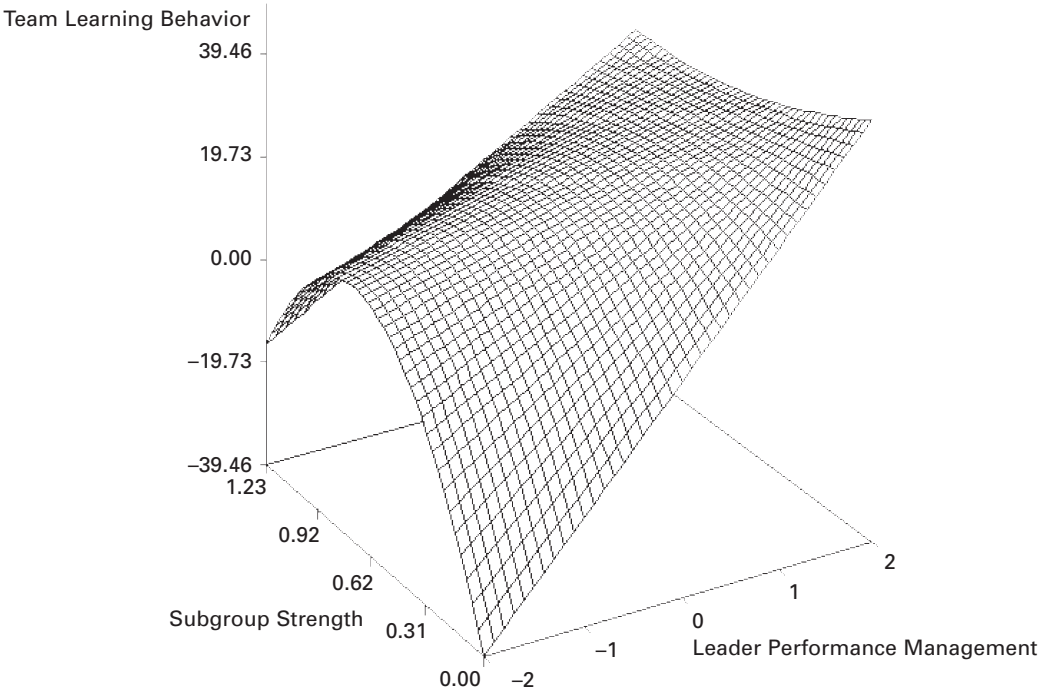


model, the effect of the other will be obscured. For instance, if the existence of subgroups is ignored, it masks the negative influence of moderate demographic heterogeneity. If subgroup strength is included in the model, this relationship becomes visible. Hence, the results clearly testify that subgroup strength and heterogeneity have to be considered simultaneously, rather than in isolation.

Organizational Design, Subgroup Strength, and Learning Behavior

Hypothesis 3 predicted that subgroup strength would interact with performance management by the team's external leader to influence team learning behavior, such that the external leader's effort would have a bigger impact on teams with weak or very strong subgroups than on teams with moderately strong subgroups. Model 4 shows that the interaction between subgroup strength and performance management by the external leader is negative and significant, indicating that the existence of subgroups decreases the influence of the external leader. These effects were similar when we controlled for interactions between team heterogeneity and performance management by the team's external leader and when we controlled for interactions between subgroup strength squared and performance management by the team's external leader. To gain insight into the exact shape of the relationships among subgroup strength, performance management by the external leader, and team learning behavior, we plotted this relationship in a three-dimensional graph. Figure 3 shows that the relationship is in the direction predicted in hypothesis 3. The influence of external leaders' performance management efforts is strongest for teams with

Figure 3. Observed relationships among subgroup strength, performance management by the team's external leader, and team learning behavior.



either weak or very strong subgroups. Teams with moderate subgroups display a high level of learning behavior to start with and increase this behavior much less as a result of performance management actions.

Hypothesis 4 predicted that subgroup strength would interact with team empowerment to influence team learning behavior, such that teams with moderately strong subgroups would benefit more from team empowerment than teams with weak or very strong subgroups. Again, model 4 indicates the significant effect of the interaction term. Figure 4 shows the estimated relationships among the three variables, including squared terms. The graph displays the relationship as predicted in hypothesis 4, such that empowerment only has a positive influence on learning behavior for teams with moderate subgroups. In fact, the graph suggests that empowerment may actually have a negative impact on team learning behavior in teams in which subgroups are either absent or very strong, although these relationships should be interpreted with some care, since they are partly the result of extrapolating the estimates at the extreme ends of the observed data range. These results were robust with the inclusion of an additional control for the interaction between empowerment and team heterogeneity.

Hypothesis 5 predicted that subgroup strength would interact with the availability of knowledge management systems to influence team learning behavior, such that teams with moderately strong subgroups would benefit more from knowledge management systems than teams with weak or very strong subgroups. Model 4 includes the interaction between knowledge management systems and subgroup strength, which is negative and significant, suggesting that the positive influence of the availability of knowledge management sys-

Figure 4. Observed relationships among subgroup strength, team empowerment, and team learning behavior.

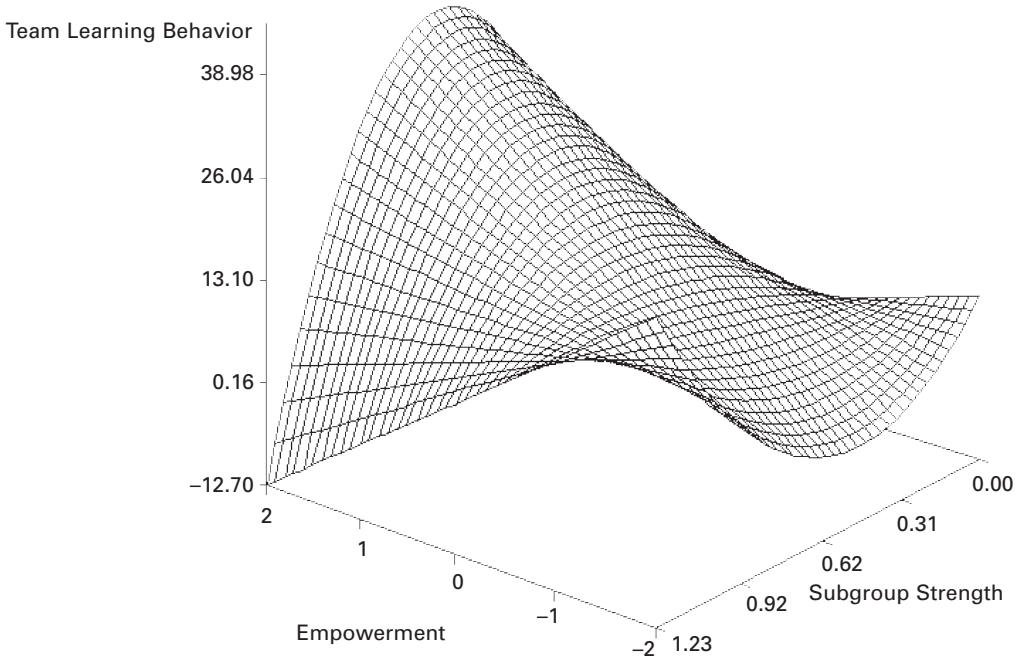
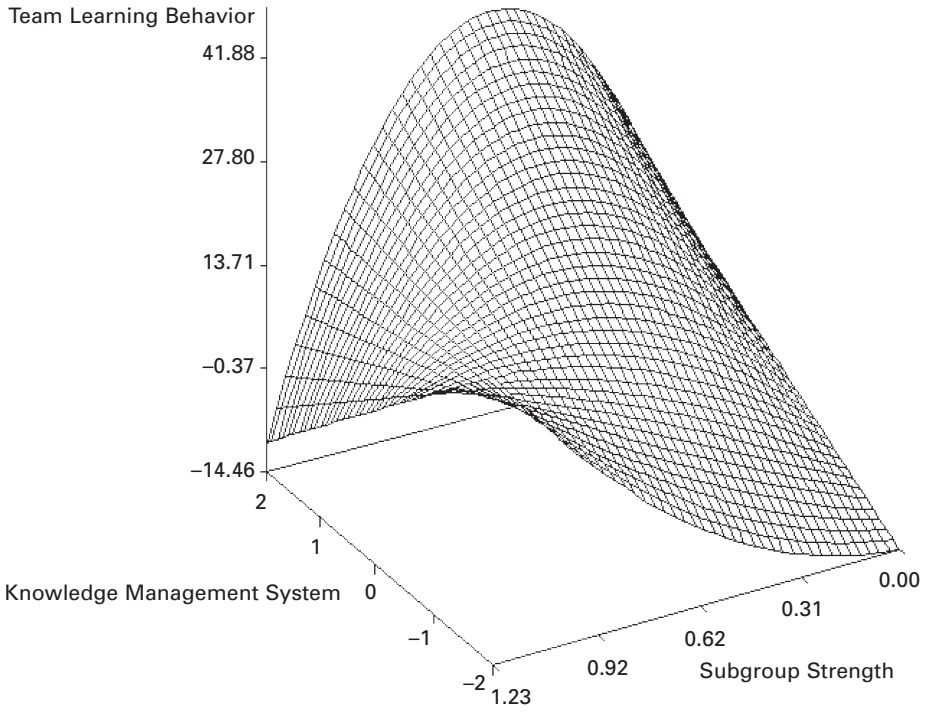


Figure 5. Observed relationships among subgroup strength, knowledge management system, and team learning behavior.



tems decreases for teams with very strong subgroups. The graph of the estimated relationships including squared terms shows why: the beneficial influence of knowledge management systems on team learning behavior is very high for teams with moderate subgroups, as hypothesized, but decreases rapidly if the subgroups in the team become very strong. Again, the relationships at the extreme ends of the graph have to be interpreted with some care, but it is clear from the estimates that knowledge management systems do not promote learning behavior for teams with very strong subgroups. Results were equally robust with the inclusion of an additional control for the interaction between knowledge management systems and team heterogeneity.

Together, in model 4, the three contextual variables (performance management by the external leader, empowerment, and knowledge management systems) explained 24.9 percent of the variance. Interestingly, further analysis including a three-way interaction among the three context variables (not shown in the table) suggested that their presence is most influential when they exist concurrently. The three-way interaction (Jaccard, Turrisi, and Choi, 1990; Aiken and West, 1991) was positive and significant, explaining an additional 6.0 percent of variance.

DISCUSSION

The purpose of this research was to examine the role of subgroups in teams, specifically their influence on a team's inclination to engage in learning behavior. Our models demonstrated that not only does the existence of demographic subgroups in teams have a direct influence on learning

behavior, this influence is quite substantial: subgroup strength explained 12 percent of the variance in team learning behavior in our sample. Moreover, this influence not only had a direct effect, subgroup strength also significantly moderated the effect that a number of elements in the organizational context have on a team's propensity to engage in learning behavior. The influence of elements such as performance management by a team's external leader, the empowerment of a team, and the availability of facilities such as knowledge management systems is different based on the composition of the team in terms of the strength of its subgroups. Hence, different contextual elements have different influences on team learning behavior, depending on the strength of the subgroups within the team. Together, these findings indicate that the strength of the subgroups is an important and influential characteristic of teams and, as a consequence, is crucial to our understanding of team behavior.

We argued that subgroups may benefit a team because they provide for a cohort: a group of people who share a similar perspective (Asch, 1956). Such a cohort enables individuals to bring their unique viewpoints to the table and be heard (Wittenbaum and Stasser, 1996). In extant theory, scholars have argued for the beneficial effect of similarities between team members (namely, ease of communication and integration) as well as for the beneficial effects of differences between team members (namely, a richer array of viewpoints and information) (e.g., Miller, Burke, and Glick, 1998). Our theory and evidence imply that for optimal learning behavior to occur, both differences and similarities need to be present in a team. Similarities *within* subgroups (i.e., cohorts) enable information and insights to surface, while differences *across* subgroups ensure that a diversity of insights is considered. Hence, teams only benefit from differences between team members if there are also similarities present in the form of subgroups. In our sample, as predicted, the teams that engaged in learning behavior the least were teams of moderate heterogeneity that had no subgroups. In contrast, the teams most proficient at learning were those with a relatively high level of heterogeneity and moderate subgroups.

Contributions to Extant Theory

Our theoretical and empirical findings enable us to make several contributions to the literature on team composition. First, our research contributes to the scarce literature on subgroups. Lau and Murnighan (1998: 329) introduced the concept of "group faultlines," hypothetical dividing lines based on demography that "provide the opportunity for groups to physically crack" under external forces. Rather than focus on the dividing lines between subgroups and the risk that they may "crack," we examined subgroups in their own right, to argue that they will shape team behavior on an ongoing basis. We added the notion of subgroup strength and provided a theoretical rationale for why subgroups of moderate strength may have a healthy influence on teams, in contrast to previous research, which has assumed them to be dysfunctional (Lau and Murnighan, 1998; Earley and Mosakowski, 2000). Additionally, we created and defined a way of capturing the strength of subgroups. We provided evidence that

demographic overlap within teams is closely associated with perceptions of subgroup behavior, as captured in interviews with team members, addressing Lawrence's (1997) concern that demographic variables do not necessarily equate with subjective or psychological processes in explaining organizational outcomes.

Our focus on subgroups as an element of team composition also enables us to make a fresh contribution to the large body of literature that addresses team heterogeneity. Empirical research on the influence of heterogeneity on team behavior has not led to many consistent conclusions (for reviews, see Bettenhausen, 1991; Williams and O'Reilly, 1998). Our models may help explain why: in our study, the impact of heterogeneity was only uncovered if subgroup strength was controlled for. This is understandable, since heterogeneity and subgroup strength are distinct features of a team, as evidenced by this study, yet they both result from the same differences and similarities between members. Therefore, it is important to take into account the effect of subgroups when examining the influence of team heterogeneity. In combination, the results provide further insight into what it is about teams that may stimulate learning that does not happen with individual contributors; the presence of moderate subgroups in a team enables it to incorporate and integrate a diversity of insights, beyond the knowledge held by the individuals in the team, while retaining the team's ability to converge on an implementable solution. In support of assertions made by Bettenhausen (1991) and Williams and O'Reilly (1998), we found that teams with moderate levels of heterogeneity, and no subgroups, are less apt to engage in learning behavior.

A third contribution this paper makes is to the literature on team learning behavior (Edmondson, 1999). Edmondson (2002) argued that organizational learning inherently occurs at the team level because it focuses on bounded tasks and opportunities and takes place through conversations among a limited number of interdependent people. These interactions are necessary for collective learning to occur because they enable individuals to combine different insights and institutionalize knowledge beyond that held by a single member (Argyris, 1993; Nonaka and Takeuchi, 1995). Similarly, empirical research by Tagger (2002) suggested that team-level processes are needed to put individual creativity to use; without favorable group interactions, individuals' insights and efforts may be carried out in vain, without resulting in organizational benefits. Our paper shows that the group interactions that constitute learning behavior are stimulated by the composition of the team itself, in terms of subgroups and heterogeneity. In that way, our findings help to open up the "black box" that exists in the relationship between team demography and effectiveness (Lawrence, 1997). We show that team composition is associated with an important antecedent of effectiveness: team learning behavior. Moreover, our findings demonstrate that the effectiveness of certain elements of a team's organizational context thought to stimulate learning (performance management by the external

leader, empowerment, and knowledge management systems) depends on the composition of the team.

This also enables us to make a fourth contribution, to the literature on organizational design (Ancona and Caldwell, 1992). Sociotechnical systems theorists (e.g., Trist, 1981; Beekun, 1989) have long argued for the use of teams as building blocks of flexible and creative organizations and have described and experimented with different organizational designs to optimize the effectiveness of these teams. In our research, the three contextual variables, performance management by the external leader, empowerment, and knowledge management systems, appeared highly influential, especially when implemented concurrently. Hence, when an organization is trying to stimulate learning behavior, designing the right organizational context for teams is of the utmost importance. Our research, however, also indicates that the impact of different design factors depends on the composition of the teams. The implication is that leaders may have to behave differently toward the teams they manage depending on their composition in terms of subgroup strength. Teams with weak or extreme subgroups are on average less inclined to engage in learning behavior. As our results show, active performance management by the team's external leader can compensate for this lack of intrinsic impetus: at high levels of leader performance management, teams in our sample with weak or very strong subgroups engaged in learning behavior just as much as teams with moderate subgroups. Thus, if a team has weak or strong subgroups, external leaders can stimulate learning by engaging in performance management. Likewise, the effect of empowerment and knowledge management systems depended on the composition of the team. Both empowerment and knowledge management systems offer opportunities for teams to engage in learning behavior. As our results indicate, however, teams that lack an intrinsic impetus to engage in this type of behavior, due to either the absence of subgroups or the extreme presence of strong subgroups, do not make use of these opportunities; only teams that had moderate subgroups increased their level of learning behavior in response to empowerment and the availability of a knowledge management system. Thus, managers may be able to stimulate learning by empowering a team and providing it with opportunities to manage knowledge, but this only works if the team has moderate subgroups.

Limitations and Future Research

The choices made in this research also contribute to some clear limitations. In focusing on the relationship between learning behavior, the demographic characteristics of a team, and the organizational context in which it is embedded, we omitted a number of possible mediating or moderating variables. Prior research, for instance, has indicated the relevance for team learning and effectiveness of attributes such as cohesion, social integration, affection, trust, emotional and task conflict, team efficacy, and psychological safety (e.g., Smith et al., 1994; Amason, 1996; Edmondson, 1999; Gibson, 1999; Jehn, Northcraft, and Neale, 1999; Pelled, Eisenhardt, and Xin, 1999; Simons and Peterson, 2000; Jehn and Mannix, 2001). Our research did not provide direct insight

into such beliefs and relationships between members. For example, direct observation of interaction patterns between members may enable a better understanding of the influence of subgroups on intrateam communication (Katz, 1982; Zenger and Lawrence, 1989; Lovelace, Shapiro, and Weingart, 2001). Such research may also increase our understanding of the relative importance of each of the different variables. Thus, our study design enabled us to establish a link between team design characteristics and the learning behavior that ensues from it, but it provides a much less direct view of what goes on inside the team. We welcome research that directly examines intrateam beliefs and their relationships with subgroups and team learning.

We also did not examine the influence of time. Different demographic traits may contribute to subgroup behavior in different ways, and to a different extent, over the course of a team's life together (Early and Mosakowski, 2000; Chatman and Flynn, 2001). Furthermore, shared tenure could lead to improved learning but possibly also to groupthink and myopia (Janis, 1982). Preliminary analysis of our data regressing team learning behavior on shared tenure (not shown in the paper) revealed that tenure may lead to enhanced learning behavior, but only for homogeneous teams. This additional control did not decrease significance for the hypothesized effects. Future research using more sophisticated theory, variables, and models pertaining to how teams and subgroups develop over time and how they are affected by team turnover may shed more light on this issue.

Our choices of variables to include in this study also have led us to exclude some others. For instance, we have examined how the clustering of demographic traits results in different team behaviors. Studying the belief structures of individuals and teams more directly (Sutcliffe, 1994) would enable us to see how heterogeneity and subgroups in terms of perceptions, rather than backgrounds, influence team behavior. Although in our subsample these demographic subgroups explained 83 percent of the variance in team members' perceptions of the existence of subgroups within their team, it is possible that under different circumstances, different levels of subgroup behavior may result from the same demographic composition. Another choice we made was to study the process of learning, since it is behavior that is influenced by team design and hence represents a point of leverage for organizations (King and Rowe, 1999). But assessments of the outcomes of learning, in terms of the changes that are implemented, would complement our research and lead to a more complete understanding of learning in teams. Furthermore, while we chose to study leaders' performance management, empowerment, and knowledge management systems, studying other organizational design factors than the ones we considered, such as integration systems or reward systems, would lead to a more complete view of the influence of organizational design.

Another limitation of our study pertains to the way we conceptualized demographic subgroups. Based on a lack of clear empirical precedent, we treated all traits alike. It is possible that certain characteristics weigh more heavily in the forma-

tion of subgroups than others. Likewise, different combinations of characteristics may have different effects on group processes and outcomes (Jehn, Northcraft, and Neale, 1999; Pelled, Eisenhardt, and Xin, 1999). For example, an interesting extension of our research would be to examine what it means if a subgroup aligns on sex and ethnicity versus when it aligns on tenure and function. Furthermore, it is important to note that when subgroup strength is moderate, individual team members will have more characteristics in common with members of their subgroup than with the remaining members of the team, but they may also share some characteristics across subgroups. It may be those characteristics, or those people, that are shared across subgroups that enable communication between the subgroups and prevent entrenchment. Future research that examines the processes that occur within teams and within subgroups, for instance, through experimental designs in which team composition is deliberately manipulated, could focus in more depth on the role of these bridges between subgroups.

Finally, we chose to examine subgroups and learning behavior across various types of teams from a number of countries and organizations. Given the extensive cross-cultural and cross-firm design of our study, we are confident that our findings are generalizable across different settings. Nevertheless, previous research has demonstrated that different preferences for teaming practices correlate with cultural values and dimensions (Gibson and Zellmer-Bruhn, 2001). It may be that certain contextual features, such as cultural orientation, magnify or mitigate the perception and functioning of subgroups. It may also be that subgroups align around different demographic characteristics in different cultures. Examining the relationships between cultural context and heterogeneity, subgroups, and team learning behavior would be a valuable extension of our findings.

Teams are implemented in organizations because they are thought to be an effective way to cope with the uncertainty created by the environment (Guzzo, 1995). Some argue that strategic change and continuous organizational adaptation emerge from an organization at the team level, especially in fast-changing environments (e.g., Burgelman, 1994; Brown and Eisenhardt, 1997). Consequently, it is of critical importance to understand how novel ideas come to light in teams and organizations and what fosters their creation. Our study was designed to help inform the team design literature, in terms of team composition and context (Gladstein, 1984; Hackman, 1987; Ancona and Caldwell, 1992), since these are variables that can be managed to influence team behavior. We uncovered evidence that teams with moderate subgroups engage in more learning than teams without them, which points to the importance of having both differences (between subgroups) and similarities (across subgroups) in organizations. Thus, subgroups are influential, though not necessarily in the negative way commonly assumed (Lau and Murnighan, 1998). Further, in teams with moderate subgroups, learning is enhanced by empowerment and knowledge management; in teams with weak or strong subgroups, learning is stimulated by performance management. Sorting

out how demographic characteristics create subgroups and drive learning behavior not only advances our understanding of the behavior of teams but also gives us direct leads on how to improve the use of teams in organizations.

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