A FUNCTIONAL DIVIDE:

SUBGROUPS AS A STIMULUS FOR TEAM LEARNING BEHAVIOR

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Abstract
This paper examines the relationship between subgroups and team learning behavior, a set of complementary actions that teams engage in to improve their outcomes. We propose that the presence of subgroups within a team may stimulate learning behavior. Moreover, we argue 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, dependent on the salience of the subgroups within them. Models using data on 156 teams in five pharmaceutical and medical products firms demonstrated that the existence of demographic subgroups in teams fostered learning behavior, provided that these subgroups were not too salient. In addition, the results indicated that both very homogeneous and very heterogeneous teams were more inclined to engage in learning behavior, yet this result was only revealed if the concurrent effect of subgroup salience was controlled for. Finally, subgroup salience moderated the impact of organizational design features on team learning behavior. Overall, this study highlights the importance of subgroups for understanding team behavior.
Most people who have worked in teams have experienced the phenomenon of subgroups – when certain individuals within the team share a common background, which causes them to cohere and share opinions and ideas more often with each other than with others. This may lead to irritation among members, or 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 the potential for increased conflict between subgroups can result in performance losses in teams (e.g., Lau & Murnighan, 1998). In this paper, we explore the somewhat counter intuitive idea that subgroups within teams may have a positive impact on team behavior. We focus in particular on team learning behavior; the acquiring, sharing, and combining of knowledge by a team (Argote, 1999; Edmonson, 1999).

In multiple research traditions, teams are thought to play a pivotal role in issues such as organizational learning, adaptation, and innovation. Socio-technical 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) have all argued for the importance of teams in creating and acquiring knowledge. Teams are expected to enable organizations to exercise complex tasks while remaining flexible enough to cope with unforeseen circumstances. In practice, over the last decade, we have also witnessed an increasing emphasis in organizations on the use of teams; many organizations have adopted flat, decentralized structures in which teams are expected to enable flexibility and innovation (Guzzo, 1995; Mohrman, Cohen, and Mohrman, 1995). Many have argued that teams are the most efficient vehicles for creating knowledge in modern organizations (Argyris, 1993; Nonaka and Takeuchi, 1995). Some have even argued that “unless teams can learn, the organization cannot learn” (Senge, 1990: 10). However, we actually know very little about what stimulates a team to pursue, acquire, and apply new knowledge. Not every team may automatically engage in these activities (Edmonson, 1999). Research on the micro underpinnings of organizational learning, for
instance, has indicated 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). Internal composition differences in these teams, as well as design differences between the organizations in which they are embedded, may underlie these differences in behavior. In this paper, we examine when teams are inclined to engage in learning behavior, and focus our attention on the issue of subgroups within a team.

Teams comprised of members with different backgrounds display different processes than teams that consist of members with similar backgrounds. Ample research has been conducted on the effects of team composition in terms of demographic attributes such as age, sex, ethnicity, group tenure, and functional area; the bulk of this research has focused on the heterogeneity that results from differences between members on these attributes (for a review, see Argote, 1999). Although most researchers have examined the direct relationship between demographic heterogeneity and team effectiveness (Lawrence, 1997), social psychology and group process literatures have also indicated that team composition 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 of which are related to learning behavior. Moreover, recent studies have begun to examine different types of diversity and different intervening variables, such as integration, communication, and conflict (Ancona and Caldwell, 1992; Smith et al., 1994; Jehn, Northcraft, and Neale, 1999; Pelled, Eisenhardt, and Xin, 1999). It has been argued that the communication that occurs among diverse team members and their combined cognitive capacity will lead to more creativity, better information-processing, and higher quality decision making (e.g., McGrath, 1984; Jackson, 1992). But, at the same time, a diversity of backgrounds and viewpoints may hamper communication and social integration (e.g., Katz, 1982; O’Reilly, Caldwell, and Barnett,
1989; Zenger and Lawrence, 1989). Since the empirical research has not led to consistent conclusions (for reviews see Bettenhausen, 1991; Williams and O’Reilly, 1998), much remains unclear about the influence of demographic differences between team members on team behavior and effectiveness. We argue that to understand truly the influence of team heterogeneity on team behavior, demographic differences need to be examined in concert with subgroup salience; ignoring the possible existence of subgroups within a team obscures the insights into the effects of heterogeneity. We apply these ideas regarding team composition to examine team learning behavior.

The composition of a team, however, may not be the only impetus for a team to engage in learning behavior. Edmondson (1999), for instance, showed that a stimulating and safety-enhancing context can trigger processes within teams that enable them to improve their functioning and performance. Team design theory (Gladstein, 1984) and socio-technical systems theory (for reviews, see Goodman, Devadas, and Hughson, 1988; Beekun, 1989) have identified different organizational design factors that should improve team effectiveness. However, it is not self-evident that such organizational design features will have the same influence on different teams. Therefore, in order to complement and extend design-focused research, we examine to what extent a team’s demographic composition moderates the influence of organizational context.

In summary, the aim of this study is to explore the role that subgroups play in teams, specifically team learning behavior. Demographic differences between members in a team result in heterogeneity, but may also lead to subgroups. We contribute to the team design literature by demonstrating that acknowledging subgroups enables a more complete understanding of the influence of member differences on a team’s behavior and effectiveness. Moreover, the present study contributes to both the literatures on team composition and organizational design by providing conceptual and empirical evidence on how they are related. We show that the
influence of organizational design features is dependent on the salience of the subgroups within a team. Below, we first define our outcome of interest – team learning behavior – and then develop specific hypotheses regarding the impact of subgroup salience on this behavior.

TEAM LEARNING BEHAVIOR

Team learning behavior refers to the combined set of activities that a team engages in to process data that allow it to adapt and improve (Edmondson, 1999). In this research, we focus on the process of learning, i.e., the actions that lead to improvement, rather than its outcome. Learning behavior generates solutions for non-routine issues. It consists of multiple, interdependent activities, because these solutions have to be searched for, chosen, and implemented. This notion of a series of sequential actions has led several authors to describe learning as a cycle of activities (Argyris and Schön, 1978; Kolb, 1984; Edmondson, 1999; Gibson, 2001). First, a team has to generate ideas on how to improve its work. This can be referred to as exploration or the stage of 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 belief structure regarding the proposed solution. When teams have engaged in experimentation, different members may have developed different mental schemas concerning the experience. To come to a consensus, a “negotiated belief structure” must be developed (Walsh, Henderson, and Deighton, 1988: 194), which this can only be accomplished through communication. Communication allows members to transfer and combine insights (Jelinek, 1979; Zenger and Lawrence, 1989), and enables them to reflect on a potential solution (Argyris and Schön, 1978). Finally, the negotiated belief structure needs to be translated into concrete, generalized concepts, decisions, or action items (Argyris and Schön, 1978; Kolb, 1984). From the shared experience, a workable outcome needs to be developed. Research has indicated that teams frequently think they have agreed on a shared understanding, which subsequently falls apart when they start to execute it (Mohrman, Cohen, and Mohrman, 1995). This emphasizes the need for codification, the process through
which tacit knowledge becomes explicit (Polanyi, 1962). 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). This cycle of experimentation, reflective communication, and codification constitutes team learning behavior.

**SUBGROUP SALIENCE**

Team learning behavior requires that members feel secure enough to develop and express their individual opinions, in order to engage in constructive debate and develop innovative solutions (Edmondson, 1999). At the same time, they must retain the ability to harmonize and converge on an implementable solution. Research in social cognition has shown that people prefer a situation in which assimilation into a group is combined with the possibility of self-expression of potentially divergent views (Brewer, 1991; 1993). In such a group, members can simultaneously derive a social identity from the group and also feel secure enough to maintain a personal identity. Similarity in backgrounds breeds a safe and open atmosphere that spurs exploration and debate, yet differences in backgrounds provides a richer array of information and viewpoints (Schein, 1985; Bantel and Jackson, 1989; Wiersema and Bantel, 1992).

Subgroups may facilitate the balancing of these two apparently opposing forces within a team, provided they are not too salient. Sex, for instance, may divide a mixed-sex team into male and female subgroups. These subgroups become more salient when, for instance, all of the women are under 30 years old and all of the men are over 50 (Lau and Murnighan, 1998). We argue that the formation of moderately salient subgroups may create a climate of psychological safety and efficacy, which is necessary for learning behavior (Edmondson, 1999). For instance, in a team in which all the men are over 50, a woman in her twenties may feel more secure to introduce a new idea or express a differing viewpoint if there is another woman under 30 present in the team.
Such a fellow subgroup member can provide the psychological support necessary for a person to express and pursue actively his or her opinion (Brewer, 1991; Crott and Werner, 1994). Experiments show that, in such a team, people are assured that they have a fellow team member who usually shares their point of view or, at least, is supportive and understanding of it (Crott and Werner, 1994). Such a ‘back-up’ may not always entirely agree but is unlikely to ridicule or embarrass the person and is likely to be supportive when other members pose a threat (Asch, 1952; Azzi, 1993). 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). Moreover, research in small groups indicates that views held by only one person are often ignored, and information that is held by only one member is usually omitted from a discussion (Stasser, Taylor, and Hanna, 1989; Azzi, 1993). Hence, even if a ‘stand-alone’ team member expresses his or her opinion, he or she might not be able to enact the suggestion without the support of other team members. In sum, subgroups of demographically similar members provide natural sources of support (Lau and Murnighan, 1998). Therefore, subgroups may be expected to have a positive effect on a team’s inclination to engage in learning behavior, because information held by more than one member is more likely to be shared and taken into account.

If subgroups are moderately salient, open communication, adaptation, and convergence of opinions are possible (Brewer, 1991; Roccas and Schwartz, 1993), and the different subgroups do not experience each other as threatening (Wilder and Shapiro, 1991; Crott and Werner, 1994). When subgroups become highly distinct, however, they become counterproductive. When they are sharply defined – for instance when all the women in the team are not only under 30 but also have a finance background and are white, while all the men are over 50 with a production background and Asian – members start to identify with the subgroup rather than with the team as a whole (Tajfel and Turner, 1986). Subgroup members tend to follow the opinions of their
counterparts thoughtlessly (Abrams et al., 1990; Mullen, 1991), and 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). Team members perceive members of other subgroups as negative and inordinately favoring their own subgroup (Tajfel and Turner, 1986; Roccas and Schwartz, 1993). As a result, exploration suffers, interaction between team members is hampered, and deadlocks prevent conflicts from being resolved (Lau and Murnighan, 1998). Research indicates that when subgroups become salient, a convergence of opinions is inhibited (Abrams et al., 1990). Moreover, polarized groups have been shown to be myopic in the information they consider, 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). Hence, moderately salient subgroups are expected to have a beneficial effect on team learning behavior, but extreme subgroup salience leads to prejudice and rigidity and, as a result, affects learning behavior in a negative way:

**Hypothesis 1:** The relationship between subgroup salience and team learning behavior will be curvilinear (inverted U-shaped), such that moderate subgroup salience will be associated with high team learning behavior, and very weak or very salient subgroups with low team learning behavior.

**HETEROGENEITY IN BACKGROUNDS**

Differences and similarities in the demographic backgrounds of the members of a team may lead to subgroups, but they will also result in a certain level of heterogeneity in a team (Lau and Murnighan, 1998). ‘Subgroup salience’ indicates to what extent differences between team members align, while ‘heterogeneity’ indicates how extensive are the differences between members. If all the members’ demographic backgrounds are identical, a team is considered
homogeneous; if members are different in many respects a team is heterogeneous. It is in the case of moderate heterogeneity, i.e. when team members have some characteristics in common but differ on others, that subgroup formation is possible (Lau and Murnighan, 1998). Subgroups are only likely to be present if there is demographic overlap between certain members that is not shared by others. Consider Table 1, where two teams are displayed with an equal level of heterogeneity but with very different levels of subgroup salience. We argue not only that subgroup salience and heterogeneity are two distinct characteristics of team composition, but also that their respective influences on team learning behavior differ.

----- Please insert Table 1 about here ----- 

We propose that homogeneous teams are prone to engage in the cycle of activities that constitutes learning behavior. Homogeneity of individual backgrounds in a team creates a feeling of cohesion that minimizes the fear that can inhibit cooperation (Kramer, 1990). Members of a homogeneous team share a common language and a common understanding (Schein, 1985). Members are apt to express individual ideas and collaborate (Ancona and Caldwell, 1992) because they are likely to be understood and acknowledged. In addition, homogeneous teams have high levels of group efficacy (Zarnoth and Sniezek, 1997; Gibson, 1999); that is, a strong belief in their ability to bring about effective change. Empirical research has indicated that in a team in which members share a similar background in terms of age, sex, ethnicity, tenure, and functional area, communication and social integration are likely to be of high quality (e.g., Katz, 1982; O'Reilly, Caldwell, and Barnett, 1989; Zenger and Lawrence, 1989; Smith et al., 1994).

As diversity within a team increases, group integration suffers, and communication and convergence become increasingly difficult, which inhibits learning behavior. Moderately heterogeneous teams seek more information from their environment (Ancona and Caldwell, 1992), and carry the potential of functional task-related conflict, which can lead to higher-quality
solutions (e.g., Jehn, Chadwick, and Thatcher, 1997; Jehn, Northcraft, and Neale, 1999), but research has also suggested that the lack of supportive communication and cohesion may impede the realization of many of these potential benefits (Ancona and Caldwell, 1992). Thus, although moderately heterogeneous teams potentially have a richer array of information available, 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). Assessments become shallow, true debate is avoided, and solutions fail to get implemented due to disagreement (Ancona and Caldwell, 1992; Sutcliffe, 1994; Miller, Burke, and Glick, 1998). Hence, moderate heterogeneity discourages a team to engage in learning behavior.

When a team's demographic heterogeneity is extreme, however, a different pattern emerges. In a qualitative field study, Earley and Mosakowski (2000) observed that in a highly diverse team, members become very much aware of their differences. As a result, they tend to be very open and try to understand the different viewpoints that exist within the team. This result may be explained by experimental research indicating that group members become increasingly considerate of each other's needs as the uncertainty about their relationships increases (Clark, Dubash, and Mills, 1998). Hence, when heterogeneity in terms of background is very high, group members become motivated to honor and incorporate each other’s opinions (Brewer, 1993) and to converge on a solution that is acceptable to everyone. To facilitate this, teams develop 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). Despite the considerable individual differences between members, then, members identify with the team as a whole (Tajfel and Turner, 1986; Brewer, 1993): the group is a group because everybody is different. Very heterogeneous teams have a unity similar to homogeneous teams, though it is a unity in variety, which should foster learning behavior. Thus, both very homogeneous and very heterogeneous teams should foster learning behavior:
**Hypothesis 2:** 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.

**ORGANIZATIONAL DESIGN**

In addition to a team’s internal composition, design features of the organization in which the team is embedded 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). However, it is not obvious that teams with very different compositions will react the same to organizational context characteristics. For instance, certain stimuli from the organizational context may only be effective if a team has a specific composition in terms of subgroups. In contrast, teams that already have an impetus to engage in the learning behavior cycle due to their subgroup constellation may find the same external stimuli aggravating. Previous research has not yet examined how features of the organizational context interact with team composition. We extend both research that investigates organizational design and research that investigates team composition by delineating how specific factors in the organizational context may be more or less effective at provoking a team to engage in learning behavior, depending on the salience of subgroups within the team. Based on team design and learning literatures (Hackman, 1987; Argote, 1999; Edmondson, 1999) we examine the influence of performance management by an external leader, team empowerment, and the availability of knowledge management systems on team learning behavior and explore how these relationships are moderated by the salience of the subgroups in a 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 the behavior of a team (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 the process of 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. Indeed, 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). Thus, 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).

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. However, for a team that already has an impetus to engage in learning behavior such a ‘performance management push’ by its external leader may be superfluous. Teams that consist of moderately salient subgroups have such an impetus. Therefore, the interference of the external leader may simply be unnecessary, since the team is already carrying out the desired activities. Perhaps, if extreme, the team may even experience the involvement of the external leader as disruptive. Performance management by a team’s external leader is likely to be more potent when the impetus to experiment and generate ideas isn't resident within the team itself, such as is the case with teams that have either weak or highly salient subgroups. Here, the external leader can provide the stimulus which provokes these teams to engage in the search and implementation of new solutions. Therefore, we expect that performance management by an external leader only stimulates team learning behavior under conditions of weak or highly salient subgroups.
**Hypothesis 3:** Subgroup salience will moderate the influence of an external leader’s performance management on team learning behavior, such that the effect of performance management is strongest for teams with weak or highly salient subgroups, rather than for teams with moderately salient subgroups.

**Team Empowerment**

Organizations differ in the extent to which they empower their teams. By empowerment, we refer to the amount of autonomy a team experiences (Hackman, 1987), in terms of determining their own actions, planning and scheduling work, and control over 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 recent attention (e.g., Cohen and Ledford, 1994; Kirkman and Shapiro, 1997). In general, empowerment can be expected to stimulate team learning behavior. For teams to engage in learning behavior, it is important that they have the latitude and ability to explore and implement potential improvements as they see fit. 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 that they seek continuous improvement, revise work processes, and seek innovative solutions to work problems (Hyatt and Ruddy, 1997; Kirkman and Rosen, 1999). 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).

Although empowerment may give a team the latitude to engage in learning behavior, not all teams may be inclined to take advantage of this. Teams with weak or no subgroups, for instance, lack an impetus to alter known behavior, as they are less inclined to question existing routines.
regardless of empowerment. In such teams there is relatively little debate and information sharing to stimulate learning behavior. Likewise, teams with highly salient subgroups may also take little advantage of empowerment; lack of cohesion and trust make them unable to bridge their dividing lines, blocking their ability to develop collectively and converge upon new solutions. In contrast, empowerment can be expected to have a positive effect on teams with moderate subgroups, who are already inclined to engage in learning behavior. The perception of independence and discretion that a team with moderately salient subgroups experiences will further encourage it to use this autonomy to seek and try out new solutions. Hence, we expect that teams with moderately salient subgroups 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 salient subgroups will remain entrenched in habitual behavior, in spite of the autonomy provided. Indeed research has indicated that team members need to experience trust and cohesiveness in their team in order to benefit from empowerment (Kirkman & Rosen, 1999). When team members are inclined to withhold effort, sabotage, or communicate negative feelings to fellow coworkers, empowerment has been shown to be less potent (Kirkman and Shapiro, 2001).

**Hypothesis 4:** Subgroup salience will moderate the influence of team empowerment on team learning behavior, such that the effect of empowerment is strongest for teams with moderately salient subgroups, rather than for teams with weak or highly salient subgroups.

**Knowledge Management Systems**

Learning behavior is about creating and obtaining knowledge. Whereas leaders may engage in performance management that encourages such behavior, and empowerment may give a team the leeway to enact the process, other aspects in the organization’s context may serve as tools to facilitate learning. One such element is a knowledge management system. A knowledge management system is 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 a 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 aids the codification of knowledge, and consequently the storage, retrieval, and revision of what has been learned (Walsh and Ungson, 1991). Furthermore, it facilitates the transfer of knowledge (Argote and Ingram, 2000). By using the 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 learning.

To what extent a team will actually use these opportunities for learning, however, may depend on the team’s inclination and motivation to engage in learning behavior in the first place. Teams with very low or extremely high subgroup salience, for instance, engage little in learning behavior and, as a result, will have little new knowledge to store. Furthermore, teams with weak or no subgroups display little learning behavior because of a relatively low level of information sharing and adoption within the team. Hence, in these teams, external information made available through a knowledge management system may not get disseminated and acknowledged. Likewise teams with extreme subgroup salience with entrenched subgroups may find it impossible to reach agreement about norms for use of the system. As a result, they benefit little from the availability of a knowledge management system. In contrast, teams with moderately salient subgroups may find considerable use for the system. They can codify and store information on experiments and newly developed practices, while the availability of knowledge from other parts of the organization may further stimulate creativity and debate within the team. Therefore, we expect

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that teams with weak or highly salient subgroups will find relatively little use for knowledge management systems, while these systems will further stimulate learning behavior in teams that are characterized by moderately salient subgroups.

**Hypothesis 5:** Subgroup salience will moderate the influence of knowledge management systems on team learning behavior, such that the effect of knowledge management systems is strongest for teams with moderately salient subgroups, rather than for teams with weak or highly salient subgroups.

We investigate these hypotheses regarding subgroups, heterogeneity, and organizational design in a comprehensive field study of team learning behavior, described below.

**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 and organizational levels.

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. In-depth personal interviews were performed with respondents from all five organizations in each of the four geographic areas, for a total of twenty-four 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. The interviews were conducted in the native language of the interviewees, with the assistance of a team of bilingual interviewers.

We used a combination of the results of the interviews and preexisting standardized scales to derive the measures used in this study. A team of fifteen translators was used in an extensive translation-back-translation procedure to foster cultural equivalence among the items. A number of items in the survey were altered in response to this process. Next, the survey was extensively pilot tested. A bilingual pilot study was performed 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, a multiple constituency test was conducted 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, the final set of survey scales was administered on site in each location. Respondents reported as a team at a pre-set time and location to fill out the survey. 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% were female; the average tenure on the team was 3.4 years.
Independent Variables

Subgroup salience. Our measure of subgroup salience was based on five demographic variables included in the survey: sex, ethnic background, functional background, 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 regarding 113 teams. Our theory emphasizes the relevance of common backgrounds of members in a team. Subgroups exist when some members share overlap in terms of demographic background, which is not shared with others. Hence, for subgroup salience we developed a measure computing the overlap between different team members. First, we computed the overlap between each pair of members in a team for each of the five demographic characteristics (i.e., sex, ethnic background, functional background, age, and team tenure). Then the five scores were summed for each pair of members, indicating the total overlap per pair. Because demographic subgroups are very salient when there are pairs with a lot of overlap in a team and pairs with very little overlap, subgroup salience was calculated as the standard deviation of the total overlap per pair. This calculation is illustrated in right-hand side of Table 1. Team 1 has a high standard deviation on overlap between members, which indicates salient subgroups, because some team members have a lot in common, while other members share very little. In contrast, Team 2 has a low standard deviation, which indicates low subgroup salience, because all members have some things in common but, at the same time, differ on other traits. As a consequence of this calculation, in teams where no one has anything in common, or in teams where all members are alike, subgroups are absent. See the Appendix for more details.

Heterogeneity. Separate measures of heterogeneity were computed for each of the demographic characteristics. The categorical variables heterogeneity in ethnic background (6 categories) and heterogeneity in functional background (8 categories) were each measured through Blau's (1977) index \(1-\sum p_i^2\), 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, where 50 percent represents 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. In addition, we constructed a composite measure of total team heterogeneity, following the same calculations as for our variable subgroup salience. This measure was calculated as the average overlap between the members in the team on the five demographic characteristics, by dividing the team's total overlap by the number of pairs in the team. The more overlap there is between a team’s members, the more homogeneous the group. The inverse was taken to arrive at a measure for heterogeneity. See Table 1 and the Appendix for more details.

To assess convergent validity (Venkatraman and Grant, 1986) of the measure of subgroup salience, as well as the measure for 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 instructed two independent coders to read the transcripts for each team and arrive at a score for subgroup salience using a three-point scale: 1=no/little evidence of subgroups; 2=moderate evidence of subgroups; 3=dramatic evidence of 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 was high: .76 (p<.0001) for subgroup salience 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 salience and heterogeneity obtained through the survey. The correlation between the measure for demographic subgroups and the measure of the interviewees’ perceptions of
subgroup behavior within their team was very high: .83 (p<.0001). This indicates that
demographic subgroups within teams are closely associated with the existence of subgroup
behavior within teams. Likewise, the correlation between demographic heterogeneity and
perceptions of heterogeneity was .66 (p<.0001).

**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;" "Our leader encourages us to be aware of our level of performance." Team-level
indices were obtained by averaging and standardizing the individual-level responses. Cronbach's
alpha was .83. In addition, we computed the intraclass correlation (ICC) (one-way analysis of
variance) to indicate consistency between raters (Bartko, 1966; Shrout and Fleiss, 1979). The ICC
was .77 and highly significant (p<.0001). One-way ICC can be interpreted as a correlation, hence,
.77 is very reasonable.

**Empowerment.** Team members also completed a team empowerment scale comprising three
items drawn from research on self-managed and autonomous work groups (Gulowsen, 1972;
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?" Each item was again measured on a 7-point Likert scale.
Cronbach's alpha was .82. The ICC was 0.74 (p<.0001).

**Knowledge management system.** Team members completed a three-item scale 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;" "This organization has a formal system to share good ideas with other teams." Cronbach's alpha was .87. Moreover, the ICC of 0.86 (p<.0001) indicated that the different team members agreed to a large extent on this attribute.

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 (chi-square = 30.33 with 23 degrees of freedom, goodness of fit index = .96, and root mean square residual = .042).

**Control variables.** Several control variables were included 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, 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). 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.

**Dependent Variable**

Earlier, we described team learning behavior as a cycle of experimentation, reflective communication, and knowledge codification. These are different actions that complement each other and, together, constitute learning behavior. Therefore, 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;" "This team is frequently the source of ideas that are copied by other teams" (Cronbach’s alpha=.74; ICC=.66, p<.0001). Communication was measured through three items: "There is open communication in this team;" "Everyone has a chance to express their opinion;" "Team members maintain a high level of idea exchange" (Cronbach’s alpha=.89; ICC=.85, p<.0001). 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). Confirmatory factor analysis using maximum likelihood estimates clearly replicated the three-variable structure (chi-square = 36.23 at 21 degrees of freedom, goodness of fit index = .95, and root mean square residual = .039). Next, we compute the composite variable learning behavior by multiplying these three measures. We multiplied the measures because the theory suggests that the elements relate to each other in a multiplicative rather than an additive way, since the different elements cannot substitute for one another. For example, a lack of experimentation cannot be compensated for by means of more internal communication or codification. Hence, an additive measure would be inappropriate. Consequently, a team scores highly 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 pre-existing 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 results are displayed in Table 2. The models indicate that learning behavior is positively related to team effectiveness, as assessed by both members and external leaders. Learning behavior explained 7.9 percent of the variance in self-assessed effectiveness and 4.8 percent of the variance in leader-assessed effectiveness.

--- Please insert Table 2 about here ----- 

Because learning can be expected to be less relevant for teams with a more routine task (Argyris and Schön, 1978; Mohrman, Cohen, and Mohrman, 1995), we created an interaction between task routinization and team learning behavior. As shown in Table 2, the estimates are negative, as expected, indicating that the relationship between team learning behavior and effectiveness is smaller for teams with a more routine task.

Finally, discriminant validity (Venkatraman and Grant, 1986) was established through factor analysis, both confirmatory and exploratory, to verify the distinctiveness of our constructs. The items used to measure the three variables concerning organizational design – 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 (chi-square = 171.41 with 114 degrees of freedom, goodness of fit = .89, and root mean square residual = .052). In addition, we performed a series of exploratory factor analyses, i.e., principal component analyses with varimax rotation. The nine items used to measure the different elements of learning behavior were entered into a factor analysis together with the three items of performance management, likewise for the items making up empowerment and the items used to measure knowledge management. Finally, an exploratory factor analysis was conducted including all of the scales. All these analyses replicated the intended factor structure and none of the items
used to measure team learning behavior loaded on a factor concerning organizational design.
Exploratory factor analyses (with and without rotation) did not reveal a single or a general factor that would suggest the presence of common method variance (Harman, 1960; Brewer, Campbell, and Crano, 1970) or social desirability variance (Thomas and Kilmann, 1975).

RESULTS

Table 3 reports descriptive statistics and a correlation matrix. Table 4 presents the results of the OLS regression analyses used to test the hypotheses.

----- Please insert Tables 3 and 4 about here -----

Subgroup Salience, Heterogeneity and Learning Behavior

Hypothesis 1 predicted that the relationship between subgroup salience and team learning behavior would be inverted U-shaped, such that moderate subgroups are associated with high learning behavior, while weak or highly salient subgroups demonstrate low levels of learning behavior. The models in Table 4 show that the estimates of the variable subgroup salience and its square are significant as hypothesized. As depicted in Figure 1, which is based on the estimates of model 4, the peak of the relationship is well within the range of the data, supporting the predicted inverted U-shape. Comparison of models 3 and 4 indicates that subgroups explain 12 percent of the variance in team learning behavior.

----- Please insert Figure 1 about here -----

Hypothesis 2 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 exhibit high levels of team learning behavior, as compared to moderately
heterogeneous teams. As an initial test, model 2 in Table 4 includes the separate measures for each indicator of demographic heterogeneity. Squares of all variables are added to allow for curvilinear relationships. Although together the variables do explain 5.2 percent of the variance in model 2, none of the individual variables is significant. Therefore, in model 3, we replaced the separate measures for heterogeneity with the composite measure. The heterogeneity variable and its square have the predicted sign but are insignificant. However, when subgroup salience is controlled for in model 4, the linear and quadratic terms become highly significant, demonstrating a curvilinear relationship as hypothesized. As depicted in Figure 2, which is based on model 4, the bottom of the resulting U-shape is about halfway in the observed data-range, supporting the predicted U-shape in Hypothesis 2. The heterogeneity variables explain 5.3 percent of the variance in team learning behavior, as compared to model 1.

----- Please insert Figure 2 about here ----- 

Models 1-4 show that cumulative team heterogeneity and learning behavior display the predicted curvilinear (U-shaped) relationship only when corrected for the salience of subgroups. If the existence of subgroups is ignored, it masks the negative influence of moderate demographic heterogeneity. If subgroup salience is measured directly, this relationship becomes visible. Hence, conjointly, the results regarding subgroup salience and team heterogeneity display an interesting relationship; both are caused by differences and similarities between team members, but have very different effects, dependent on whether the differences cumulate within the same members, or are dispersed across different people. Moreover, they clearly indicate that subgroup salience and heterogeneity have to be considered simultaneously, rather than in isolation.

Organizational Design, Subgroup Salience and Learning Behavior
Hypothesis 3 predicted that subgroup salience would interact with performance management by the team’s external leader to influence team learning behavior, such that the external leader’s effort has a bigger impact on teams with weak or highly salient subgroups than on teams with moderately salient subgroups. Model 5 shows that the interaction between subgroup salience 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 controlled for interactions between team heterogeneity and performance management by the team’s external leader, and when controlled for interactions between subgroup salience squared and performance management by the team’s external leader. To gain insight into the exact shape of the relationships among subgroup salience, 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 either weak or very salient 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.

----- Please insert Figure 3 about here -----
actually have a negative impact on team learning behavior in teams in which subgroups are either absent or highly salient, although these relationships should be interpreted with some care, since they are partly the result of extrapolation of the estimates at the extreme ends of the observed data range. These results were even robust with the inclusion of an additional control for the interaction between empowerment and team heterogeneity.

----- Please insert Figure 4 about here -----

Hypothesis 5 predicted that subgroup salience would interact with the availability of knowledge management systems to influence team learning behavior, such that teams with moderately salient subgroups benefit more from knowledge management systems than teams with weak or highly salient subgroups. Model 5 includes the interaction between knowledge management systems and subgroup salience, which is negative and significant, suggesting that the positive influence of the availability of knowledge management systems decreases for teams with salient 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 salient. 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 highly salient subgroups.

----- Please insert Figure 5 about here -----

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; the variables regarding subgroups salience explained 12% of the variance in team learning behavior in our sample. Moreover, this influence was not only a direct effect, subgroups 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 behavior by a team’s external leader, the empowerment of a team, and the availability of facilities such as knowledge management systems, appears to be conditioned by the composition of the team in terms of its subgroups. Hence, different contextual elements have different influences on team learning behavior, dependent on the salience of the subgroups within the team. Together, these findings indicate that the salience of the subgroups within teams is an important and influential characteristic of teams and, as a consequence, is crucial to our understanding of team behavior.

Contributions and Extensions to Extant Theory

Our theoretical and empirical findings enable us to make several contributions to the literature on team composition and their context design. Our research contributes to the scarce literature on subgroups (Lau and Murnighan, 1998). First, we provide evidence that demographic subgroups within teams are closely associated with the actual existence of subgroup behavior, as perceived by the team’s members, addressing Lawrence's (1997) concern that demographic variables do not necessarily equate with subjective or psychological processes in explaining organizational outcomes. Second, the prevailing idea in the literature to date regarding the effect of subgroups is that they cause dysfunctional divides to occur in teams (Lau and Murnighan, 1998). Yet our research indicates that moderately salient subgroups may actually have a positive influence on learning behavior. Drawing, among others, from social psychology literatures, such as social identity theory (e.g., Platow, McClintock, and Liebrand, 1990), belief congruence theory (e.g., Tajfel and Turner, 1986), and optimal distinctiveness theory (Brewer, 1991; 1993), we argued
that moderately salient subgroups enable individuals to bring their unique viewpoints to the table and be heard, without disrupting their belonging to the team. It is only when subgroups become very distinct that communication and interaction within teams become rigid and counterproductive (Earley and Mosakowski, 2000), and learning behavior is hampered.

Our focus on subgroups as an element of team composition enables us to make a fresh contribution to the large body of literature that addresses another element of team composition: team heterogeneity. Previous research has emphasized two effects regarding intra-team heterogeneity (e.g., Miller, Burke, and Glick, 1998): a positive effect, associated with a richer diversity of information and perspectives, and a negative effect due to less cohesion and mutual understanding. Empirical research, however, has not led to consistent conclusions (for reviews see Bettenhausen, 1991; Williams and O’Reilly, 1998). Our models suggest that it is important to take into account the effect of subgroups when examining the influence of team heterogeneity; the impact of heterogeneity was only uncovered if subgroup salience was controlled for. This is understandable, since subgroups only tend to occur in teams with a certain level of heterogeneity (i.e. moderate). In support of assertions made by Bettenhausen (1991) and Williams and O’Reilly (1998), we found that teams with moderate levels of heterogeneity are less apt to engage in learning behavior. The positive effects of having members with different backgrounds in a team are unleashed, however, if the heterogeneity results in the formation of moderately salient subgroups. When differences in backgrounds between team members coincided in moderate subgroups, the teams in our sample did display a high level of learning behavior, so that the subgroups compensated for the negative effects of moderate heterogeneity.

We also extend research on the relevance of a team’s organizational context for learning behavior (Edmondson, 1999). Socio-technical systems theorists (e.g. Trist, 1981; Beekun, 1989), for instance, 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. Our research, however, indicates that the impact of different design factors depends on the composition of the teams. External leaders, for instance, may have to behave differently towards teams depending on their composition in terms of subgroups. As Figure 3 indicates, teams with weak or extreme subgroups are on average less inclined to engage in learning behavior. However, interestingly, active performance management by the team’s external leader is able to compensate for this lack of intrinsic impetus; at high levels of leader performance management teams in our sample with weak or highly salient subgroups engaged in learning behavior just as much as teams with moderate subgroups.

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. However, as our results indicate, teams that lack an intrinsic impetus to engage in this type of behavior, due to either the absence or the extreme presence of subgroups, do not make use of these opportunities; only teams that had moderately salient subgroups increased their level of learning behavior in response to empowerment and the availability of a knowledge management system.

Together, the three contextual variables, performance management by the external leader, empowerment, and knowledge management systems, appear highly influential, stimulating team learning behavior. For instance, in model 4 they explained 24.9 percent of the variance. Hence, when an organization is trying to stimulate learning behavior, designing the right organizational context for teams is of the utmost importance. 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. Hence, the contextual elements appear to be complementary and work best when implemented concurrently, rather than in isolation.

**Limitations and Directions for Future Research**

The choices made in this research also lead to some clear study limitations. In focusing on the relationship between learning behavior, on the one hand, and the demographic characteristics of a team and the organizational context in which it is embedded, on the other hand, we omitted a number of possible intermediating or even moderating variables. Prior research has, for instance, indicated the relevance for team effectiveness of attributes such as cohesion, social integration, affection, trust, and emotional and task conflict (e.g., Smith et al., 1994; Amason, 1996; Jehn, Northcraft, and Neale, 1999; Pelled, Eisenhardt, and Xin, 1999). Our research did not provide direct insight into such relationships between members. Likewise, team beliefs about efficacy and safety can be expected to be shaped by the explanatory variables we examined and, in turn, shape learning behavior (Edmondson, 1999; Gibson, 1999). For example, research on how such beliefs are influenced by team composition would clearly complement the findings of our study. In a similar vein, examining the belief structures of individuals and teams more directly (Sutcliffe, 1994) would enable us to see how heterogeneity in perceptions, rather than heterogeneity in terms of background, influences the kind of solutions that teams search for and implement. It may also give us more insight into the functioning of subgroups. In this study, we have examined how the clustering of demographic traits results in different team behaviors. Although in our subsample these demographic subgroups explained 83% 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. 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 intra-team beliefs and relationships.
The study also has a methodological limitation, in that we largely rely on data collected through surveys. Observing teams and their actions would allow for a more direct assessment of learning behavior than relying on the perceptions of the team’s members. The issue is whether teams indeed do what they believe they are doing. The same issue arises regarding perceptions of an organization’s context. We have measured the extent to which teams perceive they are encouraged by their leader, have been empowered, and whether there is a knowledge management system available. Comparing these measures with other indicators of these attributes might be a valuable addition to our research. Furthermore, direct observations of organizations, teams, and their behavior would allow for examination of the solutions that are explored and implemented by teams. Our study examined the process of learning; assessments of the outcomes of learning, in terms of the changes that get implemented, would add to our research and lead to a more complete understanding of learning in teams.

Finally, our findings examined learning behavior across various types of teams from a number of countries. While as a result we are confident that our findings are generalizable across different settings, we acknowledge that learning behavior and its stimulants may differ across diverse cultures, tasks, and situations (Gibson and Zellmer-Bruhn, 2001). For example, a top management team facing a radical change in its institutional environment may differ from a work team that is expected to improve its work methods continuously (e.g., Hackman, 1987; Milliken, 1990; Hambrick, Cho, and Chen, 1996; Jehn, Northcraft, and Neale, 1999). Team learning behavior may be more or less relevant, and more or less effective, under different circumstances. Future research that examines the relationship between learning behavior and effectiveness, taking into account different conditions – for instance, timing and urgency (Eisenhardt, 1989; Gersick, 1994; Hambrick, Cho, and Chen, 1996; Waller, 1999) – would complement the insights from our study.
Conclusion

By addressing the crucial role of subgroups within teams our research advances our understanding of the inclination of teams to engage in learning behavior. We provide evidence that subgroups are influential, be it not necessarily in a negative way, as commonly assumed (Lau and Murnighan, 1998). Our research also extends and sheds light on the findings of several other streams of literature. The research on team heterogeneity, for instance, has generated many seemingly inconsistent findings. Our research suggests that the inclusion of the construct of subgroups in theory advances our understanding of the effects of heterogeneity. Moreover, attention to team differences in terms of subgroup constellation fine-tunes findings from the team design literature, by moving beyond simple propositions about what organizational design is effective or not, to an acknowledgement that the effectiveness of a certain design will depend on the specific constellation of the team. As a result, our research provides a link between the distinct literatures on team composition and organizational design.

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. In this paper, we analyzed the role of team composition and context design in stimulating teams to engage in learning behavior. Our study was designed to help inform the team design literature (Gladstein, 1984; Hackman, 1987; Ancona and Caldwell, 1992) and, hence, examined variables that can be managed to influence team behavior. We proposed and tested a theory which emphasizes the crucial role that is played by a team’s subgroups. Sorting out how these characteristics 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, informing both theory and practice.
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**Zenger, T.R., and B.S. Lawrence**
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<td>sales</td>
<td>production</td>
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<td>0</td>
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<td>0.185</td>
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<td>member C</td>
<td>member D</td>
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<td>overlap pair AC</td>
<td>overlap pair AD</td>
<td>overlap pair BC</td>
<td>overlap pair BD</td>
<td>overlap pair CD</td>
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<td>5</td>
<td>27</td>
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1. Homogeneity is calculated as the average total overlap per pair: \( \sum \text{total overlap pair ij} / P \), where \( P \) is the number of pairs on the team. Heterogeneity is the inverse.
2. Subgroup salience is calculated as the standard deviation of total overlap per pair.
Table 2

**OLS Regression Results: Equations with Team Effectiveness as Dependent Variable**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Model</th>
<th>member assessed</th>
<th>member assessed</th>
<th>leader assessed</th>
<th>leader assessed</th>
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</tr>
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<tr>
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<td>-.049**</td>
<td>.045</td>
<td>.045</td>
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<td>78</td>
</tr>
</tbody>
</table>

†p<.10; *p<.05; **p<.01; ***p<.001

1. Team heterogeneity and subgroup salience are employed as control variables, since they can also be expected to influence team performance in ways other than through learning behavior (e.g., Lau and Murnighan, 1998; Jehn, Northcraft, and Neale, 1999).
2. Value * 10³
### Table 3
**Means, Standard Deviations, and Correlation Coefficients of the Dependent and Independent Variables**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>S.D.</th>
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<td>1. Team learning behavior</td>
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<td>.105</td>
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<td>4. Ethnic heterogeneity</td>
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<td>5. Functional heterogeneity</td>
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<td>6. Sex heterogeneity</td>
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<td>8. Subgroup salience</td>
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<tr>
<td>10. Team empowerment</td>
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<tr>
<td>11. Knowledge management system</td>
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<td>1</td>
</tr>
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<td>12. Routine task</td>
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</table>

* N=156. Correlations with absolute value greater than .17 are significant at the .05 level
### Table 4

**OLS Regression Results: Equations with Team Learning Behavior as Dependent Variable**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
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<td><strong>Predictors</strong></td>
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† p<.10; * p<.05; ** p<.01; *** p<.001

1. Value*10^3
Figure 1. Observed relationship between heterogeneity and team learning behavior

Figure 2. Observed relationship between subgroup salience and team learning behavior
Figure 3. Observed relationships among subgroup salience, performance management by the team’s external leader, and team learning behavior
Figure 4. Observed relationships among subgroup salience, team empowerment, and team learning behavior
Figure 5. Observed relationships among subgroup salience, knowledge management system, and team learning behavior.
APPENDIX: Computation of Team Heterogeneity and Subgroup Salience

Total team heterogeneity is computed as follows: First, the overlap for member pair $ij$ is computed on each of the attributes (i.e., sex, ethnic background, etc.) 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 considered to be 0.

Overlap in continuous measures is a proportion, where 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. Likewise for a pair of 20 and 25. A similar computation applies to overlap in age. This variable, however, is corrected for the notion that members have a minimum age when they join a team, as well as a maximum, pensionable age (see below). Following, the overlap on the different attributes is summed to arrive at the total overlap of pair $ij$. Total team homogeneity is computed by summing the overlap of the different pairs and dividing it by the number of pairs on the team. Subgroup salience is computed by taking the standard deviation across the different pairs on a team. Formally:

Team heterogeneity = \[
\frac{1}{P \sum_{i \neq j} \sum_{k} \text{overlap} X_{k,ij}}^{-1}
\]

Subgroup salience = \[S.D. \sum_{k} \text{overlap} X_{k,ij}\]

where,
P = number of pairs = $(n-1)+(n-2)+\ldots+(n-(n-1))$, where $n =$ number of people on the team
S.D. = standard deviation
i = $i$th member on the team; j = $j$th member on the team
k = number of demographic characteristics included in the measure

In this study,
$X_1 =$ if $\text{sex}_i = \text{sex}_j$, then 1, else 0
$X_2 =$ if $\text{ethnic}_i = \text{ethnic}_j$, then 1, else 0
$X_3 =$ if $\text{function}_i = \text{function}_j$, then 1, else 0
$X_4 =$ \[\min(\text{tenure}_i, \text{tenure}_j) / \max(\text{tenure}_i, \text{tenure}_j)\]
$X_5 =$ \[\min(\text{age}_i, \text{age}_j) / \max(\text{age}_i, \text{age}_j) - (\frac{19}{65} \times \frac{1 - (\min(\text{age}_i, \text{age}_j) / \max(\text{age}_i, \text{age}_j))}{1 - \frac{19}{65}})\], where 19 is the minimum age of a team member in the sample, 65 the maximum