Team Microdynamics:

Toward an Organizing Approach to Teamwork

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ABSTRACT

Team researchers in the field of organizational behavior (OB) seem to be increasingly aware of the need to embrace the organizing nature of teams. In this article, we outline the limitations of the prevailing static collectivist explanations in team research and suggest how an increased emphasis on a microdynamics-oriented approach that takes into account the essentially relational and organizing nature of teams can provide new insights to our understanding of teamwork. We argue that a multilevel, multi-theoretical, and multi-period framework may help enhance our understanding of teams. To show the advancements of the field in this sense, we review the OB literature on teams and highlight exemplars of research that have started to emphasize the microdynamic nature of teams consistent with this general framework, and their contributions to our understanding of team phenomena. We

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conclude by outlining the opportunities and needs for a microdynamic insight into team and teamwork, providing guidance for scholars who are interested in adding a microdynamic perspective into their models of teamwork.

Over the last 40 years, the field of organizational behavior (OB) has increasingly placed many phenomena of interest at the group or team level of analysis. Cascio and Aguinis (2008) indicate that it is amongst the most studied topics within OB and, according to Morrison (2010), and almost 25% of the OB submissions to the *Academy of Management Journal* include the keyword "groups" or "teams". However, despite decades of broad research attention to teams and workgroups, fundamental questions about their mechanisms and outcomes persist. We argue in this paper that many of the limitations in our study of teams emerge from a highly static explanatory collectivism, privileging aggregated inputs and structures over dynamic interactions and organizing events.

In particular, our review of the literature shows a scarcity of research searching below the surface of the collective into the ways in which individuals relate to each other in teams, interact, and organize to carry out personal, social, and organizational goals. Although individuals, individual differences, their interactions, and social relationships are usually mentioned in team research, we observe that research focus is ultimately placed on aggregate constructs and theorizing. One limitation of the explanatory collectivism is that it rests on the assumption of individual homogeneity (Dansereau, Yammarino, & Kohles, 1999; Henderson & Cockburn, 1994; Klein & House, 1995) which makes the individual level, the relational level, and the potential dynamic organizing mechanisms across those levels fundamentally extraneous to the study of teams.

The vast majority of empirical designs studying teamwork have become almost exclusively focused on either accounting for and synthesizing knowledge about two major inputs to effective teams: (a) member or individual inputs (e.g. personality, diversity, and competencies) and (b) team context inputs (e.g. task requirements, technology, and training), or about a variety of mechanisms, processes, or emergent states (Crawford & LePine, 2013; Ilgen, Hollenbeck, Johnson, & Jundt, 2005; Mathieu, Maynard, Rapp, & Gilson, 2008). Interestingly, because these research approaches tend to assume individual homogeneity, concern with these inputs and mediating mechanisms or states tends to drive many (even most) theoretical developments to rely on aggregated theories of individual behavior.

For example, research based on personality still continues to focus on representing personality at the team level (Bell, 2007); team conflict research does not acknowledge the dyadic and time-dependent nature of conflict (Pondy, 1967) in favor of collective conflict constructs, team empowerment theorizing (see Maynard, Mathieu, Gilson, O'Boyle, & Cigularou, 2012) is derived from

individual-level structural models (Spreitzer, 1996) or individual-level perceptual models (Bandura, 1977), with the assumption that it is isomorphic to the team level (Kirkman & Rosen, 1999), and team trust is a collective representation of individual theory (see De Jong, Van der Vegt, & Molleman, 2007). However, arguing that individuals are homogeneous directly conflicts with theorizing about individual differences and dyadic processes from which these arguments emerge. Although arguments can be made for the collectives and numerous important insights about teams have accumulated from these approaches, an additional insight may result from multilevel approaches, the incorporation of social psychological theories that may inform the team level of analysis and more importantly from adopting multilevel, multi-theoretical, and multi-period approaches that may link the individual, dyadic, situational, and team levels to inform our team research. Whether or not our outcomes are placed at the level of the team, our *explanans*, the explanatory variables and mechanisms that we use in our designs and our theories, may benefit from an expansion into other levels of analysis—such as the dyad, the individual, or the situation—that may help explain what affects organizing and therefore how workgroups and their participants work toward their goals.

Consider the structure of a high-performance team: a surgical team often involves two surgeons, two nurses, and an anesthesiologist. In this team, we would expect the two surgeons to have operating room skills, but also a shared team mental model (TMM) of how to perform the surgery itself—it is obviously necessary that they need to be in sync while performing their critical tasks. Each surgeon typically has a dedicated nurse working with him/her, who may have first-hand working experience with the surgeon—thus developing a shorthand for communicating, allowing the nurse to anticipate the surgeon's needs. The nurses themselves, on the other hand, need relatively little working knowledge about each other, as they often require little interaction during the surgery itself. Finally, the anesthesiologist is usually regarded as someone who should be "neither seen nor heard", except in the case of unexpected events. That is, anesthesiologists are expected to perform their role responsibilities and communicate nominal information, but not to otherwise interact with the team, though they need to be able to play with the team in particular emergencies.

What matters in the performance of the surgical team, then, is not merely the skills of the professionals involved or the sheer structure of the team—thus it is not appropriate to simply use a theory of behavior aggregated to the team level; powerful explanations can be derived from the dyadic-level analysis, individual differences within the team, social structuration within the team, and theories at the corresponding levels of analysis. The same is true for other teams. In almost any team, and more importantly in the cross-functional teams relevant to today's knowledge economy, there are individual differences, differential team needs over time or across situations, differential team member

capabilities to deal with team situations, and therefore a fluid set of power, status, interdependencies, and other social processes that affect the contributions, interactions, and behaviors of team members toward goals. Unfortunately, research on teams usually ignores such mechanisms and the theories that inform them (see Crawford & LePine's, 2013 recent discussion on "unpacking" team processes). It is the rare exception that scholars explicitly acknowledge these multilevel, multi-period issues. For example, Arrow, McGrath, and Berdahl (2000) specifically framed their book on teamwork around the issues we focus upon in this paper. It is, in many ways, the result of their book that scholarly research has taken an increased look at multilevel, multi-period issues within teams.

This paper contributes to an emergent call for a more authentic and dynamic view of teams (Aime, Humphrey, DeRue, & Paul, in press; Arrow et al., 2000; Bell & Kozlowski, 2012; Crawford & LePine, 2013; Cronin, Weingart, & Todorova, 2011; Mathieu et al., 2008; Tannenbaum, Mathieu, Salas, & Cohen, 2012). Specifically, we intend to call attention to the opportunities inherent in moving beyond the static collectivist approach to team research. We first highlight the growing interest within OB in emphasizing the relational, interdependent, and organizing aspects of teams and discuss possible reasons why this approach has not been frequently pursued in the literature. We then present a review of the teams' literature focused on some of those instances in which team scholars implicitly or explicitly integrate an organizing and dynamic lens. We conclude by outlining the opportunities and needs for a microdynamic insight into team and teamwork. We provide guidance for scholars who are interested in adding a microdynamic perspective into their models of teamwork. We present theoretical models that are directly applicable to a relational approach, as well as discuss the tools that can be used for analyzing relational theories.

The continued emphasis on the collective of workgroup research seems to contradict the increased focus on teams as opposed to groups in OB research, and the definitional efforts to separate the two concepts to acknowledge the interdependent organizing nature of teams and therefore the organizing, coordinating, or microdynamic elements that make teams different from groups. One way to visualize the growing emphasis on teams in the management literature is to do a simple keyword search and plot the results. We undertook this exercise, investigating the seven top OB/Organizational Psychology (OP) journals: *Academy of Management Journal, Academy of Management Review, Administrative Science Quarterly, Journal of Applied Psychology, Organizational Behavior and Human Decision Processes, Organization Science*, and *Personnel Psychology* (Podsakoff, MacKenzie, Bachrach, & Podsakoff, 2005).[1] We performed a keyword search on the PsycInfo database from 1970 to 2013 for the above-listed journals. Specifically, we counted all articles that included "team" or "group" as a keyword. In addition, we counted the total

number of articles published in those journals each year. We then calculated the percentage of total publications in those journals each year. Finally, we plotted five-year moving averages (so as to smooth the publication trends) of the resulting percentages (broken down by "team", "group", or both "team and group" keywords), presenting the cumulative results of these three terms for each year.[2] The result of this exercise is presented in Figure 1.

As shown in the figure, an emphasis on "teams" was close to non-existent prior to 1992 (averaging only 1.5 publications per year between 1970 and 1991). In the early 1990s, research began to take off, with publications on teams crossing the 5% threshold in 1998. Between 2000 and 2009, these journals averaged 29 publications on teamwork per year, with approximately 10% of all publications in these journals now including the keyword "team". This phenomenon can be compared to the publication of articles that use the keyword "group". As indicated by the five-year moving average, research on groups (not in conjunction with the teams' keyword) has held steady at approximately 8% of all publications per year, with a notable exception in the 1990s. Specifically, 7.90% of all publications from 1970 to 1989 use the keyword "group" without "team", as compared to 10.93% from 1990 to 1999. Exiting the 1990s seemed to return the publication levels to the same baseline, as the average from 2000 to 2013 was similar to the prior decades (8.47%).

This emergence of "teams" research seems to coincide with scholars' observations at the time. Levine and Moreland (1990, p. 620) rather famously noted that group/team research was "alive and well, but living elsewhere" than social psychology, a trend that Sanna and Parks (1997) empirically observed. There
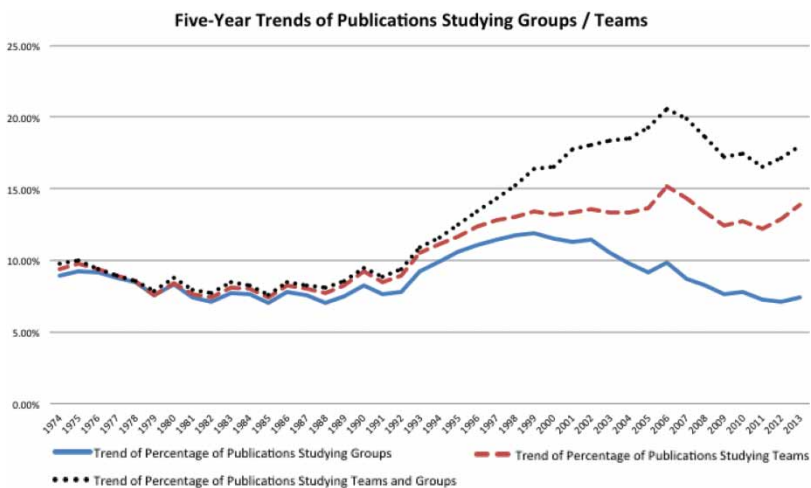

Figure 1   The Emergence of Team Research in OB.

are likely many reasons for this trend. First, given the implementation of teams within organizations during the 1990s (Devine, Clayton, Philips, Dunford, & Melner, 1999), it is probably not a surprise that both groups and teams' research grew during the same period (at a time when the terms "group" and "team" were used rather interchangeably in the academic literature; Cohen & Bailey, 1997). Although it is reasonable to suspect that the term "team", at least in part, became a buzzword that mangers would utilize to highlight a focus on a collective (rather than individualistic) work orientation, there was a demonstrable increase in the leveraging of teamwork in organizations.

Second, there has been a movement to concentrate upon "real teams", rather than mislabeled groups. Katzenbach and Smith (1993a, 1993b) were partially responsible for this movement. Between their book and the related *Harvard Business Review* article, they pushed practitioners to consider teamwork as something beyond simple collectives. To them, teams were not ad hoc groups lacking a shared identity, but rather collectives with goals, organizational support, and drive. Their award winning work helped shift the conversation within the workplace from "teams are a good idea" to "we need to develop and implement teams with meaning".

It is perhaps not surprising that scholars within OB picked up on this change. As research on collectives has shifted from social psychology to OB, scholars have increasingly looked to how teams (rather than ad hoc groups) perform. Some scholars have focused upon quantitative field studies (see Cohen & Bailey, 1997), while others have expanded to using qualitative methods for studying teamwork (Bechky & Okhuysen, 2011). Even in the case of laboratory research (which was historically the purview of social psychology and is now a meaningful part of the OB team research studies), there has been a clear attention paid to studying questions arising from field contexts (see Driskell & Salas, 1992; Ilgen, 1985), rather than studying theories devoid of contextual reference. This has resulted in the near absence of the study of nominal groups (at least under the guise of the team lens) within the OB literature. This means that works such as Asch (1956)—which examined the impact of a collective of confederates on an individual's decision-making—would not be labeled a team study in today's OB team research (but would still have a place in the group research), given that the participants did not think of themselves as a team (nor did they have any interdependence).

Another indication of the field's need to emphasize the organizing or team aspect of groups came in the form of attempts to separate the definitions of the constructs. There have historically been numerous definitions of teams. At a minimum, a team can be thought of as: a collective of interdependent individuals performing tasks relevant to the organization(s) they are embedded within (c.f. Kozlowski & Bell, 2003; Kozlowski & Ilgen, 2006; Mathieu et al., 2008). This definition highlights some critical factors differentiating "teams" from

"groups"—"team" members see themselves and are seen by others as a social entity (Guzzo & Dickson, 1996) given their task and/or outcome interdependence (Hambrick, Humphrey, & Gupta, in press; Hollenbeck, Beersma, & Schouten, 2012), whereas "group" members may not perceive themselves or be perceived of by others as a collective given a lack of interdependence and/ or a lack of organizational embeddedness (Aime, VanDyne, & Petrenko, 2011; Garud, Jain, & Tuertscher, 2008). Although this distinction may be perceived of as "splitting hairs", the distinction has become a meaningful one within the literature.[3]

If the various definitions within the literature are combined, it results in the fairly large (highly specified) definition introduced by Kozlowski and Ilgen (2006, p. 79): a team is

> (a) two or more individuals who (b) socially interact (face-to-face or, increasingly, virtually) (c) possess one or more common goals; (d) are brought together to perform organizationally relevant tasks; (e) exhibit interdependencies with respect to workflow, goals, and outcomes; (f) have different roles and responsibilities; and (g) are together embedded in an encompassing organizational system, with boundaries and linkages to the broader system context and task environment.

However, although the above definitions (and other component definitions) highlight the interdependence and identification aspects of teams, the definitions themselves may not be useful for research to focus beyond the explanatory collective. Prior definitions of teams have been shaped by an implicit assumption that teams were externally constructed (e.g. designed and staffed by an external manager, who provides the goals and directions for the team). Yet, scholars have begun to articulate a perspective that teams are not necessarily mechanistic in design—teams may self-select members (Harrison & Humphrey, 2010), self-design role responsibilities (Burton & Beckman, 2007), self-regulate member behavior (Barker, 1993), and/or self-set goals and direction (Morgeson, DeRue, & Karam, 2010). Moreover, although teams may have once been the purview of a single organization, an increasing number of teams span organizations (or are not embedded in any organization; Hertel, Niedner, & Herrmann, 2003).

To emphasize the organizing relations and activities that may form the bases for group microdynamics, we propose a definition of teams that reflects the open, systemic, and dynamic nature of real-life teams. As in any open systems approach, our definition is meant to include teams with more or less clear or stable boundaries and co-dependencies. Because of the nature of modern teams, it is increasingly difficult and arbitrary to draw clear boundaries for some team structures and it is equally important for teams to maintain and span those boundaries. We therefore do not assume or negate common understandings of goals or outcome evaluations, nor bound the team to reside within

an organization. We focus, as is usual in open system approaches, on interdependent relations and activities between individuals, and more importantly, on the organizing aspect of those activities, so that non-organizing links imply boundary spanning but organizing activities imply boundary creation or maintenance. As Taylor and Van Every (2000) put it: metaphorically, organizing unfolds both as a *crystal*—regular and stable, conditions of teams defined in a more static tradition—and *smoke*—varied, complex, and unpredictable conditions of a purely dynamic view of teams. Organizing therefore resides in relations and shared activities rather than individuals and does not imply an absence of boundaries but rather a more or less stable and concrete definition of team boundaries based on the organizing activities of participating individuals. Boundary drawing may vary between the strict and clear crystal-like boundary of a self-aware, named, stable, and explicit team, and the more diffuse, smoke-like boundary of a less aware team based on activity and relationship interdependencies with less stable or localized actors. But in essence, it is the organizing nature of the activities and relationships between individuals that defines the team boundary, leaving out non-organizing links with other teams, organizational units, and non-organizational entities that do not imply organizing relations and activities. That is, within any broader collective, any individual, or collectives of individuals that self-organize (or do not organize in conjunction with the focal team) are not part of the focal team even when they may be the source of material, cognitive, or other resources for the focal team. Also, it implies that people who exit or engage in the organizing activities and relationships over time invariably exit or join the team over time. As noted by Arrow et al. (2000), an implication of this perspective is that the boundary of a team is fuzzy, with some teams being more "team-like" than others (with the potential that some individuals are considered as part of the team by some members, but not others; Mortensen & Hinds, 2002).

Also, our definition, drawing from the open systems perspective (Scott, 1981) and Arrow et al.'s (2000) definition (which itself was shaped by—in part—the open systems perspective in conjunction with complexity theory; Gell-Mann, 1994) emphasizes the embeddedness and relevance of such organizing relations and activities to wider resource and institutional environments, broadening the definitional location, sourcing, and valence of teams beyond the organizational core.

Therefore, we define teams as *assemblies of interdependent relations and activities organizing shifting sets or subsets of participants embedded in and relevant to wider resource and institutional environments*. As stated, this definition broadly encompasses self-organizing collectives, and could be interpreted to include organizations, cities, or even nations. Thus, an important codicil to this definition is that a team is bound to the extent it self-organizes (as noted in the prior paragraphs).

Our definition provides several advantages over past definitions. First, by asserting emphasis on relations and activities through an open systems perspective (Scott, 1981), this definition refocuses our lens on the interactions between individual team members, effectively reducing the need to rely on explanatory collectivisms to explain action out of potentially heterogeneous teams and losing the information embedded in such differences. Second, those same relations and interactions emphasized in the definition as organizing the collective put focus on the dynamic aspect of teams, as does the "shifting" expression implying the possibility of change, movements, or rearrangements within the team. In these ways, the new definition expresses a system view of what a team is and emphasizes the opportunity to study the microdynamics of teams at multiple levels, with an array of theories emerging at different levels of analysis. This revised definition is at the core of our recommendation to add an organizing framework to our arsenal of approaches for the study of teams based on a multilevel, multi-theoretical, and multi-period research lens. In the next section, we review the literature to highlight research that has already started incorporating multilevel, multi-theoretical, or multi-period perspectives and provide insights into the microdynamics of teams.

Shifting to an Organizing Approach to Studying Teams: Several Considerations

As we consider the literature to date that has examined organizing within teams, it is important to begin by providing both a clear definition of relationships and the organizing approach to theorizing. A relationship can be thought of as any interpersonal connection between two people. This may be a long-standing connection (e.g. siblings). It may be organizationally embedded (e.g. co-workers) and/or organizationally prescribed (e.g. team members). It may be a temporary association with prescribed roles (e.g. cockpit crews), or emergent ones (e.g. team members in a pickup basketball game). A relationship is also not delineated by team or organizational boundaries, but is instead defined by the interpersonal contact (e.g. a salesman working with a client, a doctor treating a patient, or two executives discussing the merger of their organizations).

In contrast, an organizing approach to studying teams would not consider all potential relationships that one may have (e.g. having a sister is likely irrelevant to team theorizing unless she is a part of the team). Instead, it would focus on the interpersonal relationships between the team members—whether Dante trusts Randall is not exclusively defined by characteristics of Dante, but also must consider Randall's characteristics, the history of the relationship between Dante and Randall, any additional relationships between members on the team, and the climate of trust within the team. For

example, if Jay does not trust Randall but Dante trusts Jay, then the likelihood of Dante trusting Randall is lower.

Moreover, an organizing approach should consider multi-period issues. The extent to which Dante trusts Randall today may be very different compared to how much he trusts Randall tomorrow. Intervening events, the natural growth of relationships over time, or perhaps changes in situational contingencies affect the meaning of interpersonal relationships over time.

Why is There Not More Research on Organizing in Teams?

Answering this question requires an examination of several issues. We first examine the methodological issues that serve as potential roadblocks for the study of organizing within teams. Second, we consider the conceptual issues associated with this dearth of research. We conclude this section by directly addressing these considerations, suggesting ways to overcome the concerns.

Methodological considerations. One of the largest methodological considerations associated with examining organizing data within teams is one of data collection. Put in a rather straightforward way, pursuing multilevel, multi-period research requires more data collection. For example, if one were interested in studying all relationships within a team, the researcher would need to utilize a round-robin approach, where each member rates their relationship with each other. The number of questions needed to complete a simple assessment becomes daunting as the team size increases.

Although it is tempting to respond that social network scholars have been utilizing this method for decades (and successfully at that), one problem with this comparison is that what is of interest in social network theory is different from what team scholars are interested in. For example, a social network scholar is typically interested in the presence or absence of ties (perhaps reciprocated) between members of a group, which they use to calculate variables such as one representing the density of the focal individual's network. To collect these data, respondents often have to do something as simple as checking a box next to a name signifying that this is a person that he/she asks advice of, or is friends with—in essence, this is a 1-item evaluation of a simple to understand idea (noting that a respondent may be asked to evaluate each individual in the team on several network relationships).

In contrast, teams' scholars are interested in team processes and emergent states (Marks, Mathieu, & Zaccaro, 2001), which are often more complicated to represent or measure. Generally, all psychological constructs measured by teams' scholars are expected to be captured by measures of at least three items in length (with many scales being much longer). Connecting this to

the round-robin approach to data collection, it is easy to see how the survey would get tiresome quickly. Consider a situation in which a scholar is interested in measuring three constructs (task conflict, relationship conflict, and trust), which are operationalized using 3-item measures. These data could be collected in four different ways, by having each team member rate: his/her experienced conflict and trust with each other team member (five ratings times nine questions = 45 items); his/her incoming and outgoing relationships (e.g. initiated and received task conflict or how much I trust you versus how much I think you trust me) on these constructs (10 ratings times 9 questions = 90 items); the conflict and trust between each dyadic pair (15 ratings times 9 questions = 135 items); or the incoming and outgoing relationships on each of the constructs for each dyadic pair (30 ratings times 9 questions = 270 items). As can be seen from this simple example, collecting data that captures actor, partner, and observer ratings becomes daunting rather quickly in a relatively small team. In a 10-person team, these numbers become completely unmanageable (81, 162, 405, and 810 items, respectively). Now imagine that the scholar is interested in multi-period research, where the development of conflict and trust is the central research question. Multiplying those items by the number of periods makes it clear that the team members may suffer from fatigue through the data collection process.

Secondly, undertaking an organizing approach is computer intensive. Running a social relations model (SRM; Kenny, Kashy, & Cook, 2006) with a relatively small sample size (100 teams of 5 members) takes upwards of 20–30 minutes to complete on today's computers. However, to be fair, time to complete analyses has decreased substantially from even 10 years ago, where the same analysis could have taken hours to days to complete.

Third, cross-level modeling is not necessarily straightforward (or even possible, in some cases). A multilevel organizing approach to studying teams assumes that you are interested, at least in part, in variance at a lower level than the team (e.g. the conflict between two members of a team). Yet, as applied teams' scholars, we are ultimately tasked with predicting the effectiveness of the team as a whole. This produces a situation where lower-level variables (dyadic pairs) are needed to predict a team-level variable.

Conceptual considerations.   One major conceptual challenge is that, rather than the predominant within-level theorizing found in the groups and teams' literature (Bell & Kozlowski, 2012), taking an organizing approach requires an express consideration of multiple levels while theorizing. That is, one cannot simply specify that a team variable influences another team variable. Instead, it is likely that aspects of the individual, the dyad, and the team must all be specified within the model, as well as the mechanisms by which the effects propagate upwards and downwards through the team. For example, a multilevel model may specify that the (mis)fit between team members on personality

characteristics affects the quality of the dyadic relationship, influencing dyadic trust and cooperation between members, as well as the climate of trust within the team, ultimately shaping team performance and individual satisfaction. As suggested from this model, constructs are represented at multiple levels, with relational constructs impacting both higher and lower-level constructs.

A second conceptual consideration is that multi-period organizing models require dynamic theorizing. Because individuals are nested within multiple relationships, which are in turn nested within a team, the relationship between any dyad can and likely will affect other dyads within a team. For example, a dyadic contagion may occur when behavior in one dyad is observed by other team members—relationship conflict (which may include emotional outbursts) between two team members may put others in the team in a bad mood, queue negative emotions, and prime emotional outbursts of a non-related member toward others (see Robinson & O'Leary-Kelly, 1998). This is particularly likely when team members "take sides" in fights (Morrill, 1991), initiating new conflict in support of (or against) the team members involved in the initial conflict. Individuals react to others emotional expressions both by having their own affective reactions (e.g. anger) and making inferences about the person expressing the emotion (e.g. judging one's competency; Van Kleef, Homan, & Cheshin, 2012). Thus, there is a clear observational form of the contagion that needs to be considered when creating relational theory.

Similarly, a team member who has been involved in a fight with another member may cause other problems for the team. Not only will there likely be a negative effect on his individual behaviors—as being in a bad mood can suppress both rational cognition and impede creativity (Allred, Mallozzi, Matsui, & Raia, 1997)—it is likely that the negative mood that emerges from interpersonal conflict will carry into other dyadic relationships. One's experienced negative events will affect how he/she treats others (Andersson & Pearson, 1999), meaning that being yelled at will increase the incidence of that person yelling at others in the team. Scholars must therefore consider a direct transmission form of the contagion when considering relational theory.

Why These Concerns Should No Longer Be an Impediment

Although the concerns discussed thus far have had an impact on the study of organizing models within teams, we expect that they will no longer obstruct the development and testing of theory in modern OB research. In the following sections, we discuss how scholars have developed solutions that address these concerns.

Methodological considerations. Although an organizing approach requires more data collection than team-focused studies, there has been some

acknowledgement that shorter forms of scales (e.g. 3-item scales) are psychometrically sound (Yarkoni, 2010), and thus a reasonable approach to the round-robin data collection problem. Rather than using a 10-item scale, a shorter scale may be useable (and not be as exhausting to the participant).

Another important advance, which has offset some of problems associated with organizing research, is the continual optimization of statistical programs and the exponential increases in analytical power of computers. What once took days to complete may now take hours or even minutes on a normal desktop computer. Additional increases in computing power will only continue to reduce the time necessary to calculate relational models such as SRM (Kenny et al., 2006). Moreover, the increases in computational power will unlock possibilities not previously considered, such as an integration between SRM and latent growth modeling, where variance decomposition can be shown to change over time (due to various specified factors).

Third, the current growth in new cross-level modeling techniques, such as multilevel structural equation model (MSEM; Preacher, Zyphur, & Zhang, 2010), allows for testing more complex models. For example, MSEM can be used to test both higher-level constructs affecting lower-level constructs (2-1-1 or 2-2-1 models), as well as lower-level constructs affecting higher-level constructs (1-1-2 or 1-2-2). Moreover, it can also test complex mixed models (1-2-1 or 2-1-2) that shift back and forth between two levels. Applying this to relational models would allow a scholar to theorize and test a model where team characteristics (e.g. reward structure) affect dyadic relationships (e.g. trust), which in turn affects team outcomes (e.g. performance). Putting this into a single model would give more insights into the mediational effects of the dyadic relations on the team-level model. In essence, previously untestable theoretical models are now testable using advanced statistical techniques. Similar arguments can be made for the advances in other techniques, such as latent growth modeling (Van Iddekinge et al., 2009).

Conceptual considerations. Although the conceptual considerations discussed so far may have held back some of the development of organizing models within teams, there is reason to believe that these concerns may no longer be troubling. The biggest reason for this is that scholars have begun to develop models focused on multilevel, multi-period issues, providing a template for others to build off of. For example, Kenny and Kashy (1994) developed SRM as a way to address differences in co-orientation in the interpersonal perception process. The problem of co-orientation (the degree to which people do or do not view the world in the same way) dates back to Newcomb (1953), who argued that having a relationship with another (e.g. friendship) influences the degree to which the two people possess shared

perceptions. Kenny and Kashy argued that there are four types of co-orientation (consensus, assimilation, self-other agreement, and assumed similarity). They developed rationale for whether these are likely to occur as a function of friendship relationships, and subsequently empirically tested this model. Their model is one example of a way of conceptualizing the effect of relationships on individuals within groups, but can serve as a stepping stone for other scholars in this space.

Second, when considering multi-period organizing models, not only are there useful theoretical models that one can build off of, there are now useful guides for determining what models are appropriate for the research question a scholar is interested in addressing. A prior *Academy of Management Annals* chapter by Cronin et al. (2011) provided a functional guide to considering and building dynamic theory within teams. Integrating multilevel theory (MLT) with the existing multi-period models documented by Cronin et al. can provide a true organizing model of teamwork.

The Organizing Approach to Teamwork: A Review

As previously noted, there is a small, but growing literature investigating multi-level, multi-period, multi-theory issues in teams. In no small part, this is due to the work of Arrow et al. (2000), who presented a compelling and thorough argument for why teams should be thought of as complex, adaptive, and dynamic systems. Interestingly, although there is a history of studying micro-dynamics within the social psychological group literature (which Arrow et al. rightfully acknowledge), there has been noticeably less research taking this approach in the management literature. This has had a noticeable effect on the dissemination of the ideas developed utilizing a multilevel, multi-period, and/or multi-theory approach, given the previously noted point that teams' research primarily is studied within OB.

In the following section, we provide a review of the subset of teams' literature that has utilized the organizing frame. Our goal is not to be exhaustive in the review—for some of the literature we touch on, there are fairly in-depth review papers already published on the topic (e.g. Ren & Argote, 2011 recently reviewed the transactive memory systems (TMSs) literature in the *Academy of Management Annals*, which means that our treatment of that topic will be notably sparser than their comprehensive analysis). Instead, our goal is to provide an overview of research that has leveraged one or more components of the multilevel, multi-period, or multi-theoretical approach. We also want to point out some of the shortcomings of these various approaches, where initial approaches that utilized an organizing philosophy have devolved into uni-level, cross-sectional, single-theory research. We organize the review around three broad topics: team development, team structure and composition, and team mediators (i.e. processes and emergent states).

Team Development

How a team develops over time has been an interest of scholars for almost as long as people have studied small groups. Intuitively, we know that how a team acts immediately after formation is different from how it acts one day/one month/one year after formation. Yet, accurately specifying the development process is not easy, and drawing generalities from these models is even more difficult (Arrow et al., 2000). Although there are numerous approaches to construing team development, they can be broadly categorized into lifecycle (stage-based) models and equilibrium models. In the following sections, we discuss each type in turn, highlighting the extent to which models within each category leverage the microdynamics approach in the development or testing of each model.

Lifecycle models. Early work on team development focused heavily on *lifecycle models* (Arrow, 1997). These models posited that teams could be thought of as being in specific phases of development. As opposed to some other models of team development, these models consciously focused on interpersonal issues amongst team members, rather than the task activities that team members performed. That is, the relationships amongst members (e.g. team cohesion, role development, and social structure) are the primary focus of these models. Given the focus on interpersonal issues, the authors argued that, if the specific phase that a team was in could be identified, specific interventions could be devised.

One of the earliest models was put forth by Bales (1952) and Bales and Strodtbeck (1951). They found that within a single session, problem-solving teams tended to move from "problems of orientation" to "problems of evaluation", and finally to "problems of control". In each of these phases, teams must resolve functional problems before they can move to the next problem. For example, problems of orientation concern whether the team has collected sufficient relevant facts (though they may yet know which facts are relevant, nor have shared those facts amongst all members yet) to make a decision. In empirical studies, they found relative changes across time in the frequency of activities indicative of each phase. Notably, as teams were studied over a longer time period (i.e. across sessions), some of these tendencies broke down, as social structure (particularly the power and prestige ordering; Berger, Cohen, & Zelditch, 1972; Heinicke & Bales, 1953) became the focus of team interaction.

Bennis and Shepard (1956) developed a similar lifecycle model. Yet, rather than using the data alone to create their theoretical model, they coupled their experiences teaching "group dynamics" with Freud's (1922) theory of group psychology and the ego. They argued that each team works forward and backward through the phases (repeating old phases and advancing to new phases in most interactions), where—much like in Freud's other theories—the teams can

get "stuck" in a phase of group interaction that they are not able to resolve. The two main phases (dependence and interdependence) modeled an individual's transition from dependent child to independent adult, where social factors (love, power, authority, and intimacy) were the primary issues that needed to be managed.

A decade later witnessed the emergence of the most famous lifecycle model (Tuckman, 1965; Tuckman & Jensen, 1977). This model, as compared to prior models, is particularly notable in that it emerged from a review of the literature of group development (rather than grounded theory). His review of the literature suggested that teams progressed through five (initially four) phases: forming, storming, norming, performing, and adjourning. Each of these phases has unique challenges, and (like in Bales's models) has characteristic task activities indicative of the interpersonal challenges faced. Similar to Bales' work (but in contrast to Bennis and Shepard), Tuckman did not suggest that all teams would proceed linearly through these phases. Instead, he felt noted that most teams seemed to go through these phases, and mostly in the order that he presented. Because his article was a review of the literature, he did not have an empirical demonstration of the model. Yet, despite the popularity of the model (both within the academic literature, as well as its use in practice; Bonebright, 2010), there has still only been one direct empirical test of the model (Runkel, Lawrence, Oldfield, Rider, & Clark, 1971) and even Tuckman acknowledged that the article suffered from a fairly large observer bias (Tuckman & Jensen, 1977).

Numerous other lifecycle models have appeared, with a differing number of stages (see Hill & Gruner, 1973; LaCoursiere, 1980; Worchel, 1994), though generally possessing most of the same factors with the phases. Most recently, Kozlowski, Gully, Nason, and Smith (1999) introduced a unique lifecycle model, which presented a fairly comprehensive argument for the development of individual, dyadic, and team network constructs across time, through four phases: team formation, task compilation, role compilation, and team compilation. Taking the prior lifecycles a step further, they clearly elucidated how factors resident at different levels (e.g. dyadic role relationships) have effects at multiple levels. Moreover, a critical point of their theoretical model was the transition points that shifted teams between phases. More so than the prior models, this (yet untested) model provided a great deal of description that leveraged multilevel, multi-period views to describe the self-organizing process within teams over time.

Ultimately, from a microdynamics perspective, scholars advancing lifecycle models did several things well, with several notable weaknesses. On the positive side, these models were embedded in a multi-period, multilevel paradigm. A theory of team development cannot exist unless one accounts for multi-period issues. In nearly all cases, the lifecycle team development models examined groups and teams across time, identifying dynamic changes within the

teams (which they labeled phases or stages). Moreover, the vast majority of these models focused specifically on the interpersonal relationships amongst members, along with the related impact on team activities. Although multilevel issues were more salient in some of the models, nearly all of the theoretical models were multilevel in nature.

These models were not without flaws, however. Perhaps the largest challenge is that a lifecycle model implies clear breakpoints, where activities start and stop. As demonstrated empirically by Chang, Bordia, and Duck (2003), activities may increase or decrease at different points in time, but are unlikely to cleanly start or stop. Any model that suggests clean transitions is likely to struggle with validation. Second, these models suggested multilevel issues, but did not consistently articulate how constructs related across levels. For example, Tuckman's (1965) model implies that team members going through the forming stage will have dynamic development of horizontal and vertical relationships, created as a result of individual testing of interpersonal and task behaviors with each member. However, this model never articulated how that process would truly work (though it is important to note that others have built upon those ideas; see Aime et al., in press; Berger et al., 1972). A second notable weakness was that most of the empirical studies were very small in size. For example, Dunphy (1968) studied only two teams, LaCoursiere (1974) only studied three teams, and Bales and Strodtbeck's (1951) study only had eight teams. This calls into question some of the generalizability of this work. Although qualitative research can serve as a fantastic grounding from which to build theory, refinement and validation of that theory generally requires broader quantitative study, which seems to mostly have eluded the lifecycle models. Third, because the authors of the lifecycle models began with the assumption that there were clear phases, they found clear phases within their own work. As Tuckman and Jensen (1977) demonstrated in their review of Tuckman's (1965) model, finding covariation in different models is easy when you anchor from a starting perspective (four stages) and interpret the findings of other manuscripts to fit that perspective (even when the authors found two or six stages).

Equilibrium models.   One set of alternatives to the lifecycle model of team development are equilibrium models. Equilibrium models differ from lifecycle models in that they are not focused on phases through which a team progresses, but instead rest upon the idea that the natural state of a team is one of stability. In these models, it is assumed that a team will organize itself into a stable pattern of behaviors, including stable power and prestige orderings, and the concomitant role relationships inherent in this social system.

Within equilibrium models, the important differentiating question is where organizing systems originate (Arrow, 1997). For Carley (1991), the organization (and changes to that organization) stems from the individuals in the

team. Her model frames teamwork as a process emerging from the interactions amongst members, where the critical questions are how long the team has been together, how much homogeneity (versus heterogeneity) there is amongst members, and how stable the team is. Once these factors are accounted for, one can begin to predict who will interact with whom, with the result being the stability of patterned interactions. Her model is clearly multi-period in approach, as she builds time (operationalized in part as frequency of interaction) as a central construct. Moreover, her model is multilevel in focus, as she is interested in the combinatorial effects of relationships within the team. For example, in a section examining the discovery of new information (a new fact entering the team), she discussed how new information cascades through a team (based upon its movement across relationships), and its effect on the endurance of the team over time.

In contrast to more *robust equilibrium* models such as Carley (1991) or Bales (1955), where teams are assumed to move toward (and maintain) a stable state relatively quickly, an alternative model is a *punctuated equilibrium* model. Gersick's (1988, 1989) model began with some of the same predictions of a robust equilibrium model, wherein teams were expected to enter equilibrium rather quickly. However, drawing from evolutionary biology, she further argued that the primary way change occurs is when an external shock to the team forces the team to reevaluate its current practices, redefines its patterned actions, and perhaps create a radically different structure, after which it returns to an equilibrium state until the next radical change occurs.

As compared to other theories of team development, Gersick (1988, 1989) began with several empirical studies (a small sample size grounded theory-based field study, followed by a larger sample size lab study) before publishing a fuller theoretical model (Gersick, 1991). For that reason, it is perhaps not surprising that her theory has had more empirical validation (and more citations) than other team development models. Clearly, her model natively addresses multi-period issues, as she discussed the stability of routines over time. However, although implied in her model, multilevel issues were not particularly articulated (e.g. how the interpersonal interactions are structured, how they develop, or the potential cascading effect of an external shock across individual members or relationships).

There is a substantive literature that has followed Gersick's (1988, 1989) lead in examining punctuated equilibrium in teams as a meaningful component of team development. Burke, Aytes, Chidambaram, and Johnson (1999) found that interpersonal evaluations of distributed team members dropped (relative to collocated members) at the midpoint of a team's task, likely due to changing pressure to complete the task aligning with a perception that distributed team members were less capable of completing the task. Woolley's (1998) study of team interventions found that the timing and content of an intervention must be specifically aligned to have an effect on performance.

Specifically, she found that making a team focus on task strategy was beneficial at the midpoint (rather than the beginning) of a task, whereas cueing a team to focus on teamwork had no effect either at the beginning or midpoint of a task (suggesting that it was not a sufficiently strong event to change the equilibrium state of the team). Labianca, Moon, and Watt's (2005) study of midpoint transition found that clearer midpoints were more successful change-inducing events. Specifically, they found that teams allowed to start their one-hour tasks at "typical times" (either on the hour or 45 minutes after the hour) were better able to perceive the midpoint of the task—and thus shift their behaviors—than teams who started their one-hour task at "atypical times" (e.g. at 4:52 pm). Okhuysen and Waller (2002) examined the boundary conditions of midpoint transitions, finding that the midpoint was more likely to serve as a disruptive event when teams were cued to consider time management, information sharing, or information elaboration.

A second way to conceptualize the punctuated equilibrium model is to treat it more generally as disruptive events that change the equilibrium state of the team, rather than just transitions that occur near the midpoint of the team. That is, whereas Gersick (1988, 1989, 1991) suggested that equilibrium would be fairly stable without major events (thus perhaps limiting disruptive events to major milestones, much like evolutionary biology suggested that rapid changes to biological systems occur as a function of major events, such as a meteor hitting the Earth), it is possible to consider a more micro-punctuated equilibrium model (which is also reflected in evolutionary biology, where rapid evolutionary selection can occur due to smaller changes in the environment, such as the introduction of an ash-spewing coal plant that makes white bugs harder to catch than black bugs).

Zellmer-Bruhn (2003) found that interruptions (generally defined as the occurrence of non-routine events, such as membership change or meeting a milestone) to a team task shifted the equilibrium of a team, increasing knowledge transfer amongst members, resulting in new collaboration routines. As an expansion upon Woolley's (1998) ideas, Morgeson (2005) found that certain events were disruptive enough to trigger a reevaluation of routines, and leader interventions were more successful when coupled with the disruptive events. Thus, equilibrium is most likely to be disrupted (resulting in a change of behaviors and relationships) when major events are coupled with an external intervention. Bechky and Okhuysen (2011) provide another example of this, demonstrating across two studies that surprising events shift the pattern of activities within a team. They build upon this, however, by showing that preparation for surprise (or expecting the unexpected)—through practice, building cross-member expertise, or planning—allows teams to smoothly adapt their routines (through methods such as role shifting or reordering work). Maznevski and Chudoba's (2000) qualitative study of global virtual team utilized adaptive structuration theory to develop a

general model of the rhythms and pace of virtual teams, including how they react to shocks in the environment.

Taking this a step further, Ancona and Chong's (1996, 1999) theory of entrainment takes a highly dynamic view of team development. Although they also posit that equilibrium is the end state (and that teams move toward equilibrium rather quickly; see also Bales, 1955), rather than start from the perspective that the members are the catalyst for equilibrium, Ancona and Chong posited that the external temporal environment is the driver. They define entrainment as attuning the pace of a team's activity to fit with another activity outside the team. For example, a team may increase its production pace to match a shortened production schedule (or solve tasks more quickly in more constrained time periods; Kelly & McGrath, 1985). One interesting facet of this theory is that, even though they posit equilibrium as a proximal state, they also expect that teams will constantly shift what the equilibrium state is, given ever-changing external factors. That is, they expect an external interruption to shift the nominal state of the team, causing the team to stabilize on a new steady state (assuming that there are not so many changes that the team cannot find an equilibrium state; Ancona & Chong, 1999) until the next interruption occurs.

Aime et al. (in press) presented a hybrid model of change within teams. In their article, they focused on the integration of power and prestige ordering within a team (much like the earlier work on lifecycle models) with the fit between situational needs (external cues) and team member capability (internal composition). In 45 cross-functional teams observed across 3 time periods, they demonstrated that team members with the capability to resolve situational needs were more likely to express power (directing team member actions), which in turn affected the creativity of the team. Most importantly, they noted that *who* expressed power shifted from time period to time period (confirming their proposition that power arrangements within teams may be heterarchically arranged). Interestingly, if the teams had been surveyed cross-sectionally, information about how the team organized interaction would have been much harder to gather, likely missing out on the dynamic nature of cooperative behavior.

Empirical comparison of different development models. Three articles have tested the punctuated equilibrium model against other team developmental models. Arrow (1997) pitted the robust equilibrium model against two punctuated models: midpoint transition and task change. Her study of 20 teams over 13 weeks involved changes of tasks each week (where each task had to be completed by the end of the two-hour meeting). In this study, she found that the robust equilibrium model seemed to better fit the overall team development, such that neither the midpoint in the 13-week study, nor week-to-week task changes shifted team behaviors. As she noted in her article, the

midpoint transition model did not map exactly onto what Gersick (1988, 1989) studied, such that teams did not complete a single task over a prolonged period of time, but rather they completed unique tasks each week (and thus a midpoint transition model may have better fit the internal dynamics of the team within a given task session). Nonetheless, her study is notable for several reasons. First, she pitted multiple team development theories against each other to see what better fits the population she studied. Second, she studied these teams over 13 weeks, collecting data each week, providing the opportunity to changes in power and prestige ordering, team cohesion, and team performance over time.

Both Seers and Woodruff (1997) and Chang et al. (2003) pitted the punctuated equilibrium model against the lifecycle model. Seers and Woodruff (1997) found that although there was a shift in activities at the task midpoint for teams in their study, they did not see a clean "phase shift", wherein teams displayed uniquely different behaviors before and after the midpoint. Although they took this to mean that Gersick's (1988, 1989) model was not supported, one could interpret it to be supportive of her model. The punctuated equilibrium model posited that there would be a change to the intragroup equilibrium as a result of significant events (such as the midpoint of the task)—nothing about this theory suggests that behaviors would stop or start altogether around the transition period. In fact, given that this is not a lifecycle (phase-based) theory, the fact that behaviors are not confined to phases (further demonstrated in Chang et al.'s, 2003 comparison of the lifecycle versus the punctuated equilibrium models) seems to strengthen the perspective that shifts, not phases, are better for understanding team development. Nonetheless, Seers and Woodruff (1997) did make a critical point in their article: although Gersick suggested that the punctuated equilibrium model would have multilevel effects, her model did not distinguish between team dynamics versus individual behaviors, or specifically deal with changes to the social structure. As previously noted, a defining feature of the lifecycle models was that they put the social structure front and center in their investigation of team development, whereas the punctuated equilibrium model implies changes to the social structure, but primarily focuses on changes to task behaviors (note Arrow's, 1997 exception to this). Thus, ultimately, the punctuated equilibrium model has not sufficiently integrated both multi-period and multilevel issues simultaneously.

Team development conclusion.   At their core, team development models must assume some dynamic organizing principles. As such, each of the theories discussed contain, at a minimum, a multi-period perspective on development. Moreover, it is notable that the earliest theories on team development (the lifecycle models) also were multilevel in nature, concentrating primarily on the development of interpersonal relationships within teams (and how this affected

team outcomes), while also discussing task behaviors. Kozlowski et al.'s (1999) model is a great example of this, simultaneously theorizing across three levels and across time. Yet, the major weaknesses of the lifecycle models persist—limited empirical support coupled with a preoccupation on discreet phases not supported by the limited empirical research.

In contrast, the equilibrium models do not suffer from a lack of empirical research. There are many tests of equilibrium models (with notable variance in the support for alternative operationalizations of the models). Yet, these models have historically been less bold than the lifecycle models. Most of the work has failed to account for multilevel issues, focusing primarily on team-level processes and outcomes while ignoring within-team organization over time. Fortunately, recent research has begun to match internal team behaviors with external contingencies, capturing at least part of the multilevel nature of the question (see Arrow, Poole, Henry, Wheelan, & Moreland, 2004 for additional commentary on this point). As research continues in this space, scholars are encouraged to draw from the ideas embedded in the lifecycle models (interpersonal relationships; role structure; networks) and meld them with the more flexible orientation adopted within the dynamic equilibrium space (i.e. the research on punctuated equilibriums that do not rely solely upon midpoint transitions). Moreover, drawing in new (and more applicable) theories into this space (see our subsequent discussion on the General Guide to Team Microdynamics Research) will broaden the ability of team development models to accurately capture the self-organizing process that occurs within teams.

Team Structure and Composition

From nearly any perspective, team structure and composition are central factors in understanding teamwork. From the classic Input–Process–Output model (Hackman, 1987; McGrath, 1984) to the updated Input–Mediator–Output–Input (Ilgen et al., 2005) model, central organizing theories of teamwork argue that how a team is constructed (both in terms of design and staffing; Morgeson & Humphrey, 2008) directly influences the performance of the team. Not surprisingly, a plethora of studies have been conducted on structure and composition, with numerous quantitative and qualitative reviews published on the topic (Bell, 2007; Bell, Villado, Lukasik, Belau, & Briggs, 2011; Ilgen et al., 2005; Kozlowski & Ilgen, 2006; Mathieu et al., 2008; Morgeson & Humphrey, 2008; Stewart, 2006). In an effort to focus this component of the review, we highlight research in this space that specifically incorporates organizing principles (particularly multilevel and/or multi-period components), and suggest Mathieu, Tannenbaum, Donsbach, and Alliger's (2014) very recent review as a more comprehensive read.

Multilevel structure and composition.   Although team structure and team composition are amongst the more intensely studied topics within the teams domain (see Harrison & Klein, 2007; Joshi & Roh, 2009; Van Knippenberg & Schippers, 2007), there has been surprisingly little research examining these topics utilizing a microdynamics perspective. For example, although Tsui and Gutek (1999) dedicate an entire section to horizontal dyadic relationships in their book on demography, they can only identify studies on mentorship, friendship, or marital relationships as representative studies addressing dyadic issues. Fortunately, some scholars have begun to incorporate multilevel issues into their analysis of structure and composition.

Kozlowski and Klein (2000) argued that there are two major types of aggregation models: compositional (where team member attributes combine relatively simply to create higher-order composition—such as using the mean of team members' cognitive ability to represent "team cognitive ability") versus compilation models (where team member attributes combine in a complex form to represent a team characteristic—such as a team taking on the personality of a single member). For the most part, compositional models ignore the organizing process within the team. Like light bulbs, team members are thought to be interchangeable, representing nothing more than the sum of the parts. Adding an extremely intelligent member should have a diluted effect on the team, as one individual cannot have an outsized effect on the mean of a 10-person team (at least when considering the constrained scales primarily used in social science research).

In contrast, because compilation models allow for more complex representations of the team, there is often an implicit (or even explicit) argument pertaining to the organizing process. Consider the work by LePine, Hollenbeck, Ilgen, and Hedlund (1997) and Barrick, Stewart, Neubert, and Mount (1998), both of whom argued that a team's personality is differentially represented by the mean, min, max, or variance of team member characteristics, depending upon the task being performed. Using Steiner's (1972) task typologies, they argued that a team performing an additive task (which depends upon the total contribution of the members) should be represented by the mean of the team members' characteristics. In contrast, a team performing a conjunctive task (for which the weakest link defines the team's capabilities) should be represented by the minimum of the team members' characteristics (see also their arguments for disjunctive and compensatory tasks).

Disappointingly, there has not been extensive support for the application of Steiner's (1972) typology to the team personality literature (Bell, 2007; Prewett, Walvoord, Stilson, Rossi, & Brannick, 2009). Yet, there have been several additional models put forth suggesting more complex, multilevel representations of team member characteristics based upon organizing principles.

One clear example of a more complex multilevel framework of structure and composition is Hollenbeck et al.'s (1995; Hollenbeck, Colquitt, Ilgen,

LePine, & Hedlund, 1998a; Hollenbeck, Ilgen, LePine, Colquitt, & Hedlund, 1998b) MLT of team decision-making. In their initial article, Hollenbeck et al. (1995) advanced a team-level adaptation of Brunswik's (1956) lens model of decision-making in which a leader compiled the judgments of team members to arrive at a highly accurate decision. Where their model differed from previous team-level decision-making models (Brehmer & Hagafors, 1986) is that they specifically argued that leaders compile information from team members using a series of increasing complex multilevel evaluations (at the team, dyadic, individual, and decision levels). For example, a leader must appraise the amount of information each team member has about the decision at hand (noting that, similar to the hidden profile studies, some information may be shared amongst team members and other information may be held uniquely by a single member). Yet, an important organizing dimension of this work was that it explicitly modeled the extent to which a leader considered how to weight each individual team member recommendation in light of all of team members' recommendations. Elsewhere, Humphrey, Hollenbeck, Meyer, and Ilgen (2002) argued that this dyadic sensitivity of a leader to the individual validity of each team member has important combinational implications—a team where team members radically vary in their validity (so much so that the individual team member recommendations are *negatively correlated* across multiple decisions) can actually produce more accurate decisions than where team members are aligned in their recommendations. Using an example of a journal editor making a decision based upon the recommendations of three reviewers, they suggested that an editor who solicits feedback from both proponents and critics of a theory is likely to get negatively correlated recommendations, which will lead to more accurate decisions if utilized properly.

The MLT of team decision-making has received a good deal of support. In the initial test of the theory, Hollenbeck et al. (1995) found that across two studies, there was general support for their theory. The ability to organize the decision-process to incorporate disparate recommendations led to more accurate decisions, with the three core constructs of their model explaining between 24% and 27% of the variance in decision accuracy. Building off of this study, Hedlund, Hollenbeck, and Ilgen (1998) studied the extent to which collocation versus computer-mediated communication affected team decision-making accuracy. They found that team structure affected how teams processed information, such that teams operating face to face did a better job of sharing information amongst team members, leading to more accurate decisions by the team. In contrast, teams that utilized computer-mediated communication technology processed information differently; although leaders of computer-mediated teams were not as well-informed as their collocated counterparts, they were better able to make sense of their team members' recommendations—essentially, they did a much better

job utilizing the comparatively less accurate recommendations of team members.

Working in parallel, Sniezek and Buckley (1995) articulated a judge–advisor system paradigm of team decision-making, which also focused on the ability of a team leader to accurately weight recommendations from team members. Their initial research showed that team leaders were more apt to overweight ratings of team members who expressed high confidence in those ratings, even if the recommendations were not accurate (noting that confidence had little relationship with decision-accuracy). Two follow-up studies (Harvey & Fischer, 1997; Yaniv, 1997) further clarified how team leaders make sense of the recommendations of team members. Yaniv observed that leaders are likely to mostly ignore recommendations that fell outside the norm for the remainder of the team, whereas Harvey and Fischer found that team leaders are uncomfortable with completely ignoring members' recommendations, as the leaders prefer to diffuse responsibility on high-risk decisions across the entirety of the team.

Whereas the prior approaches focused on the multilevel representation of team member knowledge (and the subsequent transfer of knowledge between members), other approaches focused on how the combination of team members' roles (which represent the combination of expectations held by others in the team of one's behaviors; Bales, 1950; Biddle, 1979) impact team outcomes. Humphrey, Morgeson, and Mannor (2009, p. 50) introduced a role composition approach to studying teamwork, where the strategic core of a team, defined as

> the role or roles on a team that (a) encounter more of the problems that need to be overcome in the team, (b) have a greater exposure to the tasks that the team is performing, and (c) are more central to the workflow of the team

is more critical to a team's performance than less core roles. In an empirical study, they found that the characteristics of the strategic core role holders were more predictive of team performance than the characteristics of the less core role holders. Similar work by Ellis, Bell, Ployhart, Hollenbeck, and Ilgen (2005) and Pearsall and Ellis (2006) found additional support for this approach, with these studies providing evidence that the knowledge and personality of critical members impacted processes and performance. This approach contrasts with prior studies, in that role relationships are ultimately defined from the interactions amongst members, and thus team member roles crafted (via dyadic interaction) to best fit the capabilities of members is suggested to be an effective strategy for team performance (and also more reflective of actual organization team behavior; Harrison & Humphrey, 2010).

A different literature has focused upon the profile of the team—how the mixture of a characteristic within a team affects team action. The team diversity

literature generally falls under this category, where it is often argued that a various configuration of member characteristics (e.g. diversity of functional background) benefits the team. Interestingly, this literature almost exclusively examines the collective representation of the team—that is, how "diverse" the team is—rather than the multilevel representation and impact of this diversity (see Bell et al., 2011; Harrison & Klein, 2007; Jackson, Joshi, & Erhardt, 2003). Joshi (in press) provides a contrast to this approach, examining team gender composition as a multilevel phenomenon. Across three studies, Joshi unpacked the effect of gender by demonstrating that gender affected both how other assess the focal individual and how one's gender affected the assessment of expertise of others. This, in turn, affected the utilization of expertise (and thus team performance). This is a great example of a manuscript taking a microdynamics approach to studying teamwork. Rather than relying on simple aggregations—where the percentage of women in a team would be considered as a satisfactory construct—Joshi posited that the interpersonal relationships between members shaped the relationships formed, thereby affecting how individual capabilities were harnessed in a team. This nuanced view of the interpersonal dyadic relationships shone light on a downside of diversity that would not traditionally captured in single-level team studies, as those interpersonal relationships would be washed out across the entirety of the team (Joshi & Roh, 2009).

Relatedly, Anderson, Srivastava, Beer, Spataro, and Chatman (2006) investigated self-perceptions of status in groups. Across two studies, they found that individuals were extremely accurate in their assessment of their place in status hierarchies. Moreover, they found that group members that engaged in status self-enhancement were less accepted by others in the group, demonstrating that activities to change status (which is derived from one's personal characteristics) can negatively impact other members' social judgments.

Finally, another attempt to conceptualize the effect of team composition on team outcomes was offered by LePine, Buckman, Crawford, and Methot (2011), who presented a multilevel model of the effect of personality on teamwork. They specifically argued that personality should be represented at two levels (individual and team), with concurrent effects at each level—whereas collective personality (such as variance or mean on agreeableness) should have an effect on collective processes (such as cohesion), the personality of individual team members should have an effect on individual role adoption. For example, Humphrey, Hollenbeck, Meyer, and Ilgen (2007, 2011) argued that a highly extraverted team member would be likely to take on a leadership role within the team, whereas an introverted member would be more likely to take on a followership role. Thus, LePine et al.'s (2011) model called for the simultaneous examination of personality at two different levels.

In summation, there is some research focused on multilevel issues within the team structure and composition literature. This literature has identified

that the relationship between members is fundamental for understanding how processes emerge (particularly resulting from dyadic exchanges), and that various nested levels within the team may be of relevance. What is clear from this literature, however, is that scholars have not yet integrated the different foci. Consider that the LePine et al. (2011) model examined personality at two levels (individual and team). Yet, as shown in Joshi's (in press) paper, the dyadic interaction between members may have additional capability to explain how and which roles emerge (Humphrey et al., 2009). We can imagine a model that maps out four levels of analysis (individual, role, dyad, and team), better elucidating the total impact of personality (which is but one set of relevant compositional constructs) on teamwork. Through more complex multilevel models that specifically account for the organizing process within the team, we imagine that some of the disappointing findings within the personality literature will be overcome.

Dynamic structure and composition.   Turning to the multi-period dimension of organizing, it is important to note that research on team member structure and composition has rarely incorporated change into theoretical or empirical models. As Mathieu et al. (2008, p. 442) state, "there has been very little in the way of research on dynamic team composition". Fortunately, several scholars have moved beyond the team development models to focus specifically on dynamics of structure and composition in teams.

One model of dynamic team structure is structural adaptation theory (SAT; Hollenbeck, Ellis, Humphrey, Garza, & Ilgen, 2011), which posited that it is easier for a team to shift from a tightly coupled structure to a loosely coupled structure than vice versa. This theory started from the simple observation that most theories of team structure were cross-sectional in nature, failing to account for the impact of history when specifying current effects. Across a series of studies, there was general support for this theory.

First, Moon et al. (2004) argued (and found) that shifting from a functional to a divisional role structure would lead to higher performance than the opposite shift—performance changes were due greatly to the effect of the team structure on team communication and coordination. Teams that initially started with a functional role structure retained many of the cooperative behaviors necessitated by the functional structuration when they shifted into a divisional structure, even though teams arranged in the divisional structure did not need (but benefited from) the cooperative behaviors. In contrast, teams making the opposite shift did not have the cooperative behaviors established and thus carried the maladaptive behaviors to their current structure.

Johnson et al. (2006) built off of the prior article by examining the effect of shifting team rewards on team cooperation and performance. They found that teams that began with competitive rewards and shifted to cooperative reward structures took upon a "cutthroat cooperation" mindset, where cooperation

was not valued even if it was rewarded (as evidenced by the lack of information sharing within this team configuration). In contrast, teams that shifted from a cooperative to a competitive reward structure took upon a "friendly competition" frame, where cooperation was still valued even if it was not rewarded (where these teams continued to share information at a high rate). Beersma et al. (2009) unpacked this effect, finding that the extent to which allowing a team to diffuse past team reward structure through self-directed role assignment (versus autocratic assignment of roles based upon historical performance) promoted cooperation and performance—teams previously competitively rewarded performed better, had higher coordination, and lower conflict when they were afforded the opportunity to discuss role allocation than if the role were autocratically assigned to them. In contrast, teams that had a history of cooperative rewards actually had lower performance and coordination (and higher conflict) when they had the opportunity to discuss role allocations relative to situations in which roles were autocratically assigned to them.

Finally, adding decision-making centralization to SAT, Hollenbeck et al. (2011) found that it was harder to shift from a centralized to a decentralized decision-making structure than vice versa. Once again, they found that it was harder to develop the positive team processes following a shift than adopting the negative processes. Thus, across the four studies, it was made clear that it is critical to understand what routines a team has developed before considering making changes, as changing to more tightly coupled structures (and thus developing processes critical for those structures) is much harder than shifting to loose coupled structures and adopting the processes inherent to them.

Within the dynamic team composition space, scholars have taken one of the two approaches: examine how the effects of stable composition change over time or how changing composition affects teamwork. Scholars have been much more active in studying the latter phenomena than the former; yet, they answer meaningfully different questions. Studying the changing effects of stable composition addresses the question of whether team member characteristics have differential value at different points in a team's development. Not surprisingly, this research is aligned (at least in spirit) with the lifecycle models. In contrast, studying the impact of changing composition is more akin to the punctuated equilibrium models, where specific events (e.g. replacing a team member) are expected to lead a team to revisit its processes and interactions. What is nice is that both literatures—to limited extent that either have empirical data—focus on the dynamics of teams over time.

Turning first to questions about the changing effect of composition on teams, Harrison, Mohammed, McGrath, Florey, and Vanderstoep (2003) and Harrison, Price, Gavin, and Florey (2002) argued that the demographic characteristics of team members (surface-level diversity) would only effect a team early in a team's development, whereas deep-level team characteristics

(such as personality or values) would not be immediately obvious to others in the team, and thus would take longer to have an effect. These results fit work by Watson, Johnson, and Merritt (1998), who demonstrated that team cultural diversity had an immediate positive impact on performance, but led to lower performance over time (relative to teams that were non-culturally diverse). Deuling, Denissen, van Zalk, Meeus, and Aken (2011) focused specifically on personality and cognitive ability over time. In their study, they found that whereas extraversion was valuable for influence throughout the lifespan of a team, other personality characteristics (openness to experience, neuroticism, and conscientiousness) increased in relative impact on influence later in the lifespan. Cheng, Chua, Morris, and Lee (2012) found that a low average of (but moderate variance in) uncertainty avoidance early in the lifespan of a team was most valuable, whereas high mean level of relationship orientation was most beneficial for teams later. LePine (2003) had a slightly different take on this idea, demonstrating that certain team member characteristics (cognitive ability, achievement striving, and openness to experience)—although not predictive of team performance in stable conditions—were predictive of performance following an unforeseen change to the task being performed.

Across the various studies examining the changing impact of stable composition, there is evidence (through a limited number of studies) that team member characteristics do not have a constant effect on processes and performance. Instead, certain team configurations may be more beneficial early, late, or under periods of uncertainty. What is mostly absent, however, is an integration of multilevel studies examining the changing influence across levels of team member composition.

Shifting to composition change, there is a larger collection of studies primarily focused on membership change. Twenty years ago, Arrow and McGrath (1993, p. 335) noted that there was a scarcity of membership change studies, due to the proliferation of one-off laboratory studies and "the tendency of researchers to view member change in longitudinal studies as an unwelcome and bothersome source of variation". Fortunately for the teams' literature, Arrow and McGrath (1993, 1995) recognized that membership change is a critically important phenomenon for teams, and should not be readily dismissed. Instead, they used these publications to lay out a research plan for studying membership dynamics.

Arrow and McGrath (1993) launched the membership change literature by identifying several critical factors that matter for understanding team composition dynamics: the arithmetic (addition/subtraction/replacement) matters, the impetus for the change (why they change) matters, temporal aspects (when and how frequently they change) matters, and who changes matters. These factors, combined with their note that these changes will impact the team processes and performance, have served to orient the team composition change literature.

The earliest literature on team composition change focused on the addition of new members. Because of the focus on new membership, it is perhaps not surprising that this literature focused on the socialization of the newcomer: how social structure is affected by similarity on team tenure, how he/she tries to fit in with the team, and how the other members try to change his/her behaviors or expectations to conform to social norms. The initial theoretical models examining newcomer socialization (Moreland & Levine, 1982, 1984, 1989; see also Sutton & Louis, 1987) provided a broad roadmap for understanding how team members evaluated each other (particularly their relationships), which affected interpersonal commitment. Finally, drawing from the lifecycle models, teams and their members were expected to transit through phases, where team members' roles shifted in response to the new team phase. Research on these models demonstrated support for the basic ideas (Moreland, 1985). Chen (2005; Chen & Klimoski, 2003) took this a step further, utilizing a motivational frame to develop a multi-period, multilevel model of newcomer adaptation. A nice addition of these articles was the simultaneous consideration of individual and team perspectives (e.g. expectations, self-efficacy, empowerment) within their models, over time. Across all of the articles, regardless, there was an explicit consideration of the development of relationships within the team.

Another set of research has examined the impact of replacing members. Within this space, two different approaches are taken. On the one hand, stability is argued as preferential, as it develops routines that benefit productivity and efficiency. On the other hand, stability is argued to be detrimental, as change benefits creativity and limits stagnation. From the *stability is beneficial* perspective, for example, Insko et al. (1982) found that teams with less turnover were more productive (higher speed and efficiency) than teams with more turnover, given their stable routines and lower hierarchical differentiation amongst members. Goodman and Leyden (1991) found similar results in their field study of coal mining teams, where higher stability was related to higher productivity. Ramos-Villagrasa, Navarro, and García-Izquierdo (2012) also confirmed these results with professional basketball teams. Gruenfeld, Martorana, and Fan (2000) took a slightly different approach to this question, again finding that lack of stability is problematic; however, their unique contribution involves their focus on the changing member, such that they found that a member who leaves and returns to the team is perceived of as being more argumentative and creating less valuable output, even if his/her ideas are considered more creative. Their findings fit the resocialization literature (Moreland & Levine, 1988), which discusses how out-group members are dealt with.

Lewis, Belliveau, Herndon, and Keller (2007) further refined this idea by showing the impact of change on the knowledge structure of the team. They posited and found that changing membership of a team results in a

maladaptive TMS, such that team members will have errors in encoding, storing, and retrieving information within the team due to an incorrect match between new member and old member knowledge, skills, and abilities.

Summers, Humphrey, and Ferris (2012) go even further in their investigation of stability and routines. Recall that Arrow and McGrath (1993) suggested that scholars consider more factors than just the arithmetic of change (which is what most research has considered). They also argued that scholars should consider *who changes*. Surprisingly, most research has treated the people changing as essentially the same (note that Choi & Thompson, 2005 refer to their effect as "old wine in a new bottle", signaling that it is not the changing content that matters as much as the change itself). Summers and colleagues found that changing members who hold strategically core role responsibilities (Humphrey et al., 2009) was more disruptive to the team's functioning. Second, they examined how the cognitive ability of the departing member, relative to the cognitive ability of the incoming member, affected teamwork. Thus, they specifically modeled the changing of the collective capabilities of a team following change. Not surprisingly, they found that the more intelligent the departing member, the more disruptive the change. More interestingly, they found that the intelligence of the incoming member was curvilinearly related to disruption. Low intelligence new members' contributions were minimized, requiring minimal contribution from them. On the flip side, high intelligence members integrated immediately into the team, figured out how to perform their role, and moved forward with minimal disruption. The problematic population was the moderately intelligent new members—the new members were not weak enough for the team to minimize their contributions, nor were they strong enough that they could take upon their roles smoothly. Thus, teams experienced a lot of flux in coordination as a result of taking on these members.

The *stability is detrimental* perspective has found very different results. De La Hera and Rodriguez (1999) found directly contradictory findings to the prior authors, with the low stability (high change) teams in their study exhibiting higher productivity than the high stability teams. Choi and Levine (2004) and Choi and Thompson (2005) found that membership change can directly benefit a team by offering the new member greater opportunities for influence (note that this contradicts Moreland, 1985), which in turn results in higher team creativity. Kane, Argote, and Levine (2005) refined this argument further, finding that a new member can have greater influence under specific conditions—if the new member shared a superordinate identity with the remainder of the team and his/her idea was clearly superior to existing ideas. A unique insight comes from Gorman, Amazeen, and Cooke (2010), who demonstrated that teams that underwent membership change were more adaptive than teams who had stable team compositions. Their research suggests that

the punctuated equilibrium event of membership change allows teams to avoid rigid routines, and thus better adapt to changes in the environment.

The last approach to team composition change is that of reduction in membership. To date, this is the least-studied area of team composition change. Although both an individual-level and organizational-level literature exist for downsizing, the team downsizing literature appears to be mostly limited to the study by DeRue, Hollenbeck, Johnson, Ilgen, and Jundt (2008). In this study, DeRue et al. examined different ways that a team could adapt to the reduction in membership of a team. They found that how a team manages the downsizing (maintain, eliminate, or integrate hierarchy) impacts how the team adapts to the downsizing event, ultimately influencing performance. Eliminating hierarchy is a dramatic enough of a change to force a full reevaluation of team routines. In contrast, maintaining or integrating hierarchy result in maladaptive structures (similar to Lewis et al.'s, 2007 findings).

In summation, the team composition change literature has obviously integrated the multi-period component of the organizing perspective. This research has examined pre-/post-change effects, demonstrating that change can have a meaningful impact on team processes and performance. What is notable, however, is that the majority of this research has focused exclusively on the dynamics aspect, without a simultaneous consideration of the multilevel issues. With a few exceptions (Chen, 2005; Chen & Klimoski, 2003; Summers et al., 2012), the team members themselves are considered interchangeable, and thus the models have not incorporated the individuals or the team member relationships in the model. We expect that this oversight is at least partially to blame for the directly contradictory results within the literature (e.g. stability is good, bad, or neither). Utilizing an organizing perspective—coupled with a reflection on Arrow and McGrath's (1993) initial organizing propositions for team composition change—should provide a greater insight into the effect of change.

Team Mediators: Processes and Emergent States

In the first review section, we focused on holistic models of team development, detailing how scholars have incorporated components of the microdynamics perspective into their theorizing and empirical research. In the second section, we focused on the inputs to team functioning, examining models that have included multilevel and/or multi-period considerations into their models of team structure and composition. In this section, we examine studies that have investigated mediating constructs: those constructs that fall between team inputs and team outputs (Ilgen et al., 2005). In this section, we focus on two broad categories of mediators: information processing and cooperation. Both of these categories are at the heart of teamwork models

(Gladstein, 1984; Hackman, 1987; Ilgen et al., 2005) and serve as critical mechanisms for creating team outcomes.

Information processing. One emerging stream of research within teams is the "groups as information processors" literature (Hinsz, Tindale, & Vollrath, 1997). At its core, this literature considers that one of the primary purposes of teams is as systems that process, store, exchange, and use information (Arrow et al., 2000). That is, a team exists because individuals alone are not sufficient, and in order to succeed, the unique capabilities of the team must be accessible and the external information entering a team must be managed. Much of the research within this space explicitly acknowledges organizing issues: knowledge structures are multilevel in nature and develop over time from the interactions between members. Thus, this is a useful literature to highlight an effective leveraging of microdynamics.

As with the team composition literature, it is impossible to comprehensively review this literature in our paper (see Mohammed, Ferzandi, & Hamilton, 2010; Ren & Argote, 2011). We instead focus on the broader theoretical models and several representative empirical studies that are relevant to this discussion. The three areas that we examine are TMMs, TMSs, and sociocognition.

A *TMM* can be thought of as an organized representation of aspects of a team's environment that are shared across team members (Klimoski & Mohammed, 1994). It reflects both the sharedness (similarity) of the mental representations, as well as the accuracy of those representations, across members. A TMM thus can be thought of as a collective property of the team (i.e. the extent to which the team, as a whole, has similarly accurate perceptions of information). However, it can also be thought of as a multilevel phenomenon, such that the "breaks" in TMM (i.e. where team members do not all share the same mental representation) reflects critical team functioning. As noted by Cooke, Gorman, and Winner (2007), members have different influences within the team, making similarity or accuracy across all members less important than the similarity amongst or accuracy of some members (see Humphrey et al., 2009). Yet, despite this important multilevel consideration, research in this space is moving even more toward exclusively team-level examinations of TMMs (Cooke et al., 2007; Waller, Gupta, & Giambatista, 2004). Moreover, despite the fact that TMMs are theorized to emerge from the social interaction amongst members (and therefore reflects an organizing process within the team), there has been limited multi-period research, most of which has been focused on convergence of TMMs (Edwards, Day, Arthur, & Bell, 2006; Levesque, Wilson, & Wholey, 2001; Marks, Zaccaro, & Mathieu, 2000; Mathieu, Heffner, Goodwin, Cannon-Bowers, & Salas, 2005) rather than the interactive process through which they converge.

TMSs are a shared system for encoding, storing, and retrieving information (Ren, Carley, & Argote, 2006). In contrast to a TMM (which focuses on the sharedness and accuracy of information across all members), a TMS reflects a distributed system of information across a team (as well as the three processes involved in bringing in and utilizing information). That is, a TMS does not assume that all members have the same cognitive representation of information, but rather an effective TMS results in the team having knowledge about who knows what. In essence, transactive memory is an indexing system for information within a team.

TMS is inherently multilevel in nature: knowing who knows what is an individual characteristic, and reflects a series of dyadic relationships representing the knowledge structure in the team. Although the idea of TMS was introduced to explain dyadic relationships such as marriages (see Wegner, Giuliano, & Hertel, 1985) and there are a number of studies of dyadic TMSs (Hollingshead, 1998a, 1998b), it was quickly transferred to the team level of analysis (Liang, Moreland, & Argote, 1995), where most of the research now rests (Ren & Argote, 2011). As scholars migrated the construct to the team level, two different approaches emerged. One approach has been to focus on TMS solely as a collective construct, where a TMS is the extent to which the team as a whole acts a certain way (see Faraj & Sproull, 2000; Lewis, 2003; Liang et al., 1995). Although these measures contain references to individuals or relationships within the team, specific team members (or specific team member relationships) are not differentiated within the team. As such, the multilevel aspect of TMS is removed. A second approach is to directly assess each member's knowledge about each other member's capabilities (Austin, 2003). The full matrix of information is used to calculate higher-level constructs (e.g. consensus and accuracy). Although this method provides a much more accurate representation of a TMS within a given team, it is not without its own weaknesses. First, this method requires knowledge of information relevant to the team before asking the team to assess these factors. Second, it is much more time consuming on the part of the team members than the other methods, as it requires an assessment of all individuals on all dimensions (see our prior comment about the challenges of conducting dyadic research). Third, as currently implemented, the dyadic relationships are ignored, with scholars only focusing on the team-level representations of the TMS.

However, as discussed with TMMs, understanding a TMS at multiple levels will provide a greater insight into the operation of the team. A team member holding a core role likely needs a more accurate representation of knowledge in the team, as he/she will be more likely to have time pressures in accessing that information (see Ellis, 2006; Pearsall & Ellis, 2006). Further, as discussed in our introductory example of a surgical team, it may not be important for some roles to have a fully conceptualized TMS—some roles may only have interdependent relationships with a subset of a team. Fortunately, some scholars have

begun to investigate TMSs across multiple levels. For example, Yuan, Carboni, and Ehrlich (2010) and Yuan, Fulk, Monge, and Contractor (2010) have investigated how team-level and individual-level TMSs work together to impact information exchange within teams. However, the literature has not embraced this approach yet.

Additionally, TMS scholars have rarely studied TMSs across time. A rare exception (Lewis, 2004) noted that TMSs develop at different times and have a differential effect on team outcomes depending upon when the TMS is measured. Clearly, future research is needed to further consider the developmental process of TMSs (how they develop, what the interchange is between team members and how those relationships affect TMS' accuracy and effectiveness, what the impact is at different phases of teamwork, etc.). Again, we recommend that scholars more fully leverage the organizing perspective to the study of knowledge representation.

Whereas the prior information-processing theories implicitly suggest organizing within the team, *sociocognition* theories make it much more explicit. As Gruenfeld and Hollingshead (1993, p. 384) note, "cognition is a product of social interchange and is constructed, shared, and distributed amongst groups of individuals during the course of interaction". The expectation within this literature is that team members affect each other, causing cognitions to develop and change. Particularly notable is that this idea is predicated on the idea that the products of cognitions (e.g. scripts, routines, memories, schemas, etc.) are in part represented entirely within an individual team member, and in part distributed amongst the team—sociocognition is thus requiring a multilevel conceptualization of information that develops over time through multiple interactions in which team members "contaminate" each other.

In one of the earliest investigations of team sociocognition, Gruenfeld and Hollingshead (1993) studied the construction of information within teams over 12 weeks. They found that teams developed integrative complexity (i.e. multidimensional integrated interpretations of differentiated perspectives) over time, where team members began to create collective interpretations of their team that reflected complex and diverse perspectives. That is, the team members began to see events from multiple perspectives, and they were able to hold these multiple perspectives simultaneously while considering events within the team.

Subsequent articles have trended toward theoretical refinement of sociocognition (Reus & Liu, 2004; Thompson & Fine, 1999). However, some empirical research (Akgün, Lynn, & Yilmaz, 2006; Bangerter, 2002; Gruenfeld & Fan, 1999) has shown support for the notion that information cascades across team members, creating higher-order knowledge constructs that differ from individual aggregations of knowledge. This empirical work has integrated multilevel and multi-period issues into their studies, fitting the theoretical model. Yet, where this research suffers compared to TMMs or TMSs is the dearth of

research. Between TMMs and TMSs, there are well over 100 empirical studies that dealt with these theories. In contrast, sociocognition (which has its roots in psychological theories from the nineteenth century; Thompson & Fine, 1999) has had very few empirical tests.

Cooperation.   Within the last two decades, numerous scholars have examined the extent to which cooperation (and related constructs such as trust) emerges from interpersonal relationships within teams. Cooperation is at the heart of teamwork (Chen, Chen, & Meindl, 1998; De Jong & Elfring, 2010; Jones & George, 1998), making the ability to better understand how teams cooperate critical for understanding the drivers of team success.

From a multilevel perspective, there has been a recent movement to examine cooperation as the combination of interpersonal interactions. For example, De Jong et al. (2007) examined the task dependence of 132 individuals nested within 29 work teams on trust. Drawing from theories of power and social judgment (Emerson, 1962; Fiske, 1993), the authors argued that the degree of symmetry in task dependence (i.e. there was mutual interdependence between two team members) impacts helping and trust. Their model was supported, finding a significant interaction between two members' task dependence on helping and trust. This article is notable, as it explicitly focuses on organizing—how a dyadic relationship was arranged, in terms of reciprocal dependence, affected whether a team member perceived that he/she received help from another team member. Moreover, De Jong et al. utilized SRM to test their hypotheses, serving as one of the earliest OB studies to utilize this method.

Continuing the symmetry theme, in parallel studies, Jehn, Rispens, and Thatcher (2010) and De Jong and Dirks (2012) examined the asymmetrical perceptions between team members on conflict and trust, respectively. In Jehn et al.'s study, they argued and found that differences in perceptions by team members on the level of conflict within the team (both as an aggregate phenomenon and as individual differences in perception) affected the operation of the team (and ultimately performance of both the team and team members). More specifically, they found that asymmetry on task conflict inhibited a team's creativity (a particularly problematic outcome, considering that creativity is purportedly the main benefit of task conflict; De Dreu, 2008), as well as team member satisfaction and performance. Their study demonstrated that a team organized such that individuals felt and/or experienced different amounts of task and relationship conflict would in turn affect the success of that organizing structure. In examining a more positive form of Jehn et al.'s model, De Jong and Dirks argued that teams can only capitalize on the benefits of interpersonal trust when there is little asymmetry in perceptions between members. Having even one member perceiving a low level of trust (when the remainder of the team universally trusts each other) will inhibit

cooperation within the team, in term harming performance. Much like in Jehn et al.'s study, how the team organizes itself—particularly in terms of the quality of the relationships between all members—affects how the team performs. Taken together, Jehn et al.'s and De Jong and Dirks' research highlights that a lack of consideration of all team members' perceptions (particularly in terms of the relationships between members) limits the applicability of team theories (e.g. whereas high levels of trust should produce high levels of performance, that is invalidated when even one member disagrees on interpersonal trust within the team), necessitating a further investigation of the sharedness of all emergent states within teams.

Interestingly, the scholars studying cooperation have drawn from many different theories to develop and test multilevel cooperative studies. Milton and Westphal (2005) integrated the notion of identity confirmation with social network theory to find that cooperation arises from the alignment between team members on social perceptions of a member (in terms of valued characteristics such as intelligence or creativity), and the similarity of members in terms of placement in an identity confirmation network. Drawing from theories of power, Van der Vegt, Bunderson, and Oosterhof (2006) developed a three-level model in which they suggested that perceived expertise of individual team members affected dyadic commitment and helping, which in turn affected team performance. They found that cooperation within the team arose from perceptions that some individuals were higher on expertise, with perceived experts receiving more help from others. Interestingly, the effectiveness of a teams' organizing process was therefore dependent upon the incorrect recognition of expertise (or the failure to enact this process), such that teams require experts to help non-experts in order to perform well. Drawing from social exchange theory, Anand, Vidyarthi, Liden, and Rousseau (2010) examined the extent to which the unique relationship between a team leader and each team member affected helping (operationalized as individual and organizationally focused organizational citizenship behaviors). They found that the effect of an idiosyncratic deal between the leader and team member influenced helping, to the extent that the leader and team member had a high quality relationship and/or if the team member had a high quality relationship with the remainder of the team.

Turning to the lack of cooperation (or, more specifically, interpersonal harm), Hubbard, Dodge, Cillessen, Coie, and Schwartz (2001) examined aggression in groups of boys during "play". The authors argued that aggression is a function of both one's personal disposition, as well as an individual's attribution of hostility to their dyadic peer in the context of ambiguous behavior from that peer. Their study showed that aggression in groups is not solely derived from one's disposition, but it also arises from one's dyadic interactions. This article represents a dyadic explanation of Jehn et al.'s (2010) work on

conflict asymmetry, such that the performance detriment found in Jehn et al.'s research (as a result of differences in conflict) may occur due to dyadic hostility related to difficulty in interpreting the meaning of conflictive behavior.

In a study thematically similar to Hubbard et al.'s (2001), Lam, Van der Vegt, Walter, and Huang (2011) investigated the extent to which interpersonally harmful behavior arises from dyadic interactions. Lam et al. drew from social comparison theory (Buunk & Gibbons, 2007) to argue that the combination of upward comparison to a dyadic partner with low expectation of future performance similarity produced harmful behavior in teams. However, consistent with their model, the results of their two studies (one study of student teams and a second of sales teams) demonstrated that this result was contingent on cooperative goals in the team, such that it only occurred in the absence of cooperative goals. As they state in their article, one of the key contributions of this article is that they found that almost 50% of the variance in interpersonal harming behavior is located within the dyadic relationships in the teams, and thus the fact that nearly all research preceding this article neglected to account for the dyadic relationship suggests that theoretical and empirical models are underspecified.

Although there are quite a few cooperation studies that have integrated a multilevel perspective, fewer studies have examined cooperation from a multi-period perspective. Chatman and Flynn (2001) provide one such approach, examining how cooperative norms change across the lifespan of a team. They found that demographic heterogeneity had a decreasingly negative impact on cooperative norms over time, both at the individual team member and the collective team level. By capturing the team norms at two periods of time and examining the effect of a stable characteristic of the team (team demography) on the norms at both times, Chatman and Flynn were able to demonstrate that the drivers of cooperation (or at least cooperative norms) shift over time. On the negative side of cooperation, Greer, Jehn, and Mannix (2008) studied team conflict over time. Their study demonstrated that conflict early in the lifespan of a team has a long-lasting effect on how a team cooperates over time, limiting the ability of a team to cooperate following an early negative event.

There are two particularly notable points from the cooperation research. First, for a large portion of these studies, there is an explicit acknowledgement that how a team interacts (either positively—in terms of cooperation, trust, or helping—or negatively, in terms of aggression, conflict, or withdrawal) is a function of the interpersonal relationships. Second, although there are fewer studies on dynamics, those that did integrate multi-period considerations recognized that structural characteristics of the team have a dynamic effect on how the team cooperates. These studies approach the question of cooperation from a number of different theoretical perspectives (utilizing psychological, sociological, and OB theories), yet they share the view that

team cooperation is a complex process, requiring a multilevel and/or a multi-period perspective.

A General Guide to Team Microdynamics Research

In what follows, we provide guidance toward advancing an organizing level framework for teams' research. We have argued that new insights in team research may result, like in the examples highlighted in our review, from moving beyond static collective conceptualizations of teams and proposed a definition of teams that may better fit a more systemic or "organizing" approach to teams. Given our previously articulated definition of team (*assemblies of interdependent relations and activities organizing shifting sets or subsets of participants embedded in and relevant to wider resource and institutional environments*), we argue that multilevel, multi-theory, and multi-period approaches should form the basis of an integrated framework that can help us gain an insight about team microdynamics. The need for multi-period or longitudinal approaches to team research has been emphasized in previous research (Cronin et al., 2011). Our call for a microdynamics approach also emphasizes the multilevel and multi-theoretical needs of the field and the interaction between them.

Multilevel

The recognition that teams are multilevel phenomena is necessary in order for explanatory value to be derived not only from the collective level of analysis, but also by recognizing the multilevel dimension of the organizing relations and activities that are at the core of teams. Inherently, teams are made out of individuals, their differences, the relations and activities that link them, the varying situational needs of the team, and the collective implication of institutional and resource environments in which the team exists. This implies that a variety of levels of analysis in themselves and combined will add richness to our research.

This does not mean that every study should be conceived with a multiplicity of levels, risking parsimony and formal explanatory power in our approach. It implies that an adequate recognition of the level of emergence of our question of interest and how such question informs the teams' literature will enrich our perspectives. If, for example, relational conflict is originally a relational emergence, studies that track conflict back to particular relationships between people or sets within the team and then explore the issue of transformation—or more explicitly, when, how, and why that relational aspect of a team moves or does not move from the relational to the collective level and its implications—can enrich our understanding of team relational conflict. Such an understanding may also help to better differentiate relational conflict

from other forms of conflict, like for example task conflict, that could be tracked to particular team interaction needs that may be identified at different levels of analysis in terms of within team aggregations or time in team evolution.

We discussed a number of multilevel teams' research studies and their contribution in our review of the literature. But examples of questions amenable to multilevel approaches abound and could result in important contributions to the literature. Researchers could look at externally determined events and question, for example, how changes in membership, or changes in the environmentally determined needs in teams could redefine power or status orders in teams with effects on outcomes at different levels of the team, such as staying members' behaviors, relational and task conflict, cooperation or coordination, or team performance. Similarly, researchers could be assessing the implications of the nesting of team members within multiple different organizational units. Team members can have multiple affiliations, such as when a particular team member participates in more than one team, when he or she is also nested within a particular unit or profession (e.g. manufacturing or engineering). By cross-nesting team members across memberships, we could parse out the implications of multiple memberships. It is not the same to have team members that participate in only one team or are all from the same organizational function than having a cross-nested membership. Multilevel research in other areas has found significant implications of cross-affiliation on individuals, their behaviors, and their units, and this line of questioning may be a rich area of opportunity in teams' research. At the core, multilevel approaches can inform a diverse set of questions that may enrich our understanding of teams. A variety of opportunities lie in looking at how individual differences affect relations and dyadic behaviors within teams; how particular relations affect team or team subdivisions in their behaviors or climate; how multiple affiliations affect team members and their relationship with each other or across affiliations; how time, as a level capturing periods, situations, events inside or outside the teams, and so on, may help explain relational, behavioral, and team outcomes.

Multi-theoretical

Second, the expansion of our theoretical arsenal in the teams literature stands out as an important and related next step in a microdynamic approach to understanding team work. The knowledge received from the prevailing aggregation of individual-level theories to the group level can be enhanced by an arsenal of existing and potential theories constructed at other levels of analysis. For example, theories that acknowledge the differences between team members, look at the implications of such differences for their relationships with others in the teams, or for the relationships between subsets in the

team, can enrich our understanding of organizing and therefore team outcomes. A wide array of theories that has been largely bypassed in OB team research can enrich our understanding of teams beyond the contributions of the collective explanations that form the core of the existing teams' literature. Table 1 presents a non-exhaustive list of theories and examples of mechanisms that can inform our exploration of teams. These theories can help address multilevel issues, allow setting our theories at consistent levels of analysis instead of aggregating to a collective, and provide an array of arguments to further our understanding of team dynamics and team behaviors. Theoretical approaches in the tradition of *exchange theorizing* can help understand team processes and dynamics by enhancing theorizing with inter-relational and activity based aspects of group functioning. Looking at the exchange relations between team members adds both process and level conditions to team theorizing. Exchange theorizing approaches point to the need to understand how the natural exchange of social, material, and informational resources in exchange relationships between team members of sub-team aggregations may affect team processes and outcomes. For example, the first exemplar in the table, social exchange theory (Emerson, 1976), in the exchange theorizing tradition, can help us understand how team members will address differences in member's perceived or expected contribution to teams with rebalancing efforts. Social exchange approaches were utilized to expand process explanations in theorizing leader member exchanges (Anand et al., 2010) and in studying team power dynamics (Aime et al., in press). According to social exchange theory (Emerson, 1969), power imbalances are mitigated through four mechanisms: (a) increasing alternatives available to the less powerful actor, (b) reducing the alternatives available to the most powerful actor, (c) reducing the value of the exchange for the less powerful actor, or (d) increasing the value of the exchange to the most powerful actor. Differences in resources or value attributions between team participants may result in interesting contributions to the literature by suggesting theoretically expected challenging, ingratiation, commitment, and similar behaviors as power rebalancing actions that affect relational processes and team outcomes and are emergent at the dyadic or sub-group levels. Therefore, social exchange theorizing can help understand team dynamic processes and add nuance at additional levels of analysis.

Similarly, within the exchange theorizing tradition, strategic contingencies theory points to the need to conceptualize power and exchange dependency transitions based on a team member's access to resources that enable the team to cope with uncertainty (Crozier & Friedberg, 1980; Hickson, Hinnings, Lee, Schneck & Pennings, 1971). This further contextualizes the open systems nature of teams within the power tradition and offers opportunities to understand team dynamics and power and influence processes based on the location of resources in the team member network within or outside the team. Because

Table 1   Non-Exhaustive List of Theories with Potential Value for the Study of Teams in OB Research

Theory	Examples of theoretical mechanisms in teams
Exchange theorizing	
Social exchange theory	Actors seek to balance their resource exchanges. Rebalancing can be achieved through interaction (e.g. ingratiation, challenging)
Resource dependence theory	Availability of resources or access to resources create dependencies between team members
Strategic contingencies theory	Authority flows to those capable of dealing with team uncertainties
Role theorizing	Role verification in groups support coordination activities
Inequality, power, and status theorizing	
Expectations states theory	Individuals seek to perform in line to social expectations about them based on status orders within the team
Power	Power structures depend on visible sources of power and result in ordering and influence that can be hierarchical or heterarchical in nature
Legitimation theory	Legitimacy validates or makes appropriate power and status orders and reinforces their operation
Comparison theorizing	
Social comparison theory	People compare to relevant others with multiple effects (e.g. motivation, feelings of equality, turnover)
Tournament theory	People compete for significant visible opportunities with multiple effects (e.g. motivation, feelings of equality, turnover)
Social identity theory	People choose based on group identities
Social categorization theory	People categorize into advantaged or disadvantaged groups and act out their categorization
Theories of proximity	Individuals choose and decide based on access, effort, and personal costs
Collective action theorizing	
Institutional theories	Result in norms and imitative behaviors
Social information processing	Create opportunities for social influence
Network theorizing	
Social capital	Social capital provides team members with access to resources and opportunities
Cohesion/density	Member network structures result in information, resource, and access inequalities between team members

team uncertainties change and access to different types of resources are available to different team members or sub-groups, team dynamics can be mapped and theorized against the set and sequence of uncertainties that teams experience based on their goals and activities. In this sense, the dynamic nature of team uncertainties and team members' resource configurations may lead to theorizing that can shed light on dynamic needs of teams, changes in power structures, and team configuration theories that are consistent with team development over time. For example, in revisiting mixed findings in the team conflict literature, a longitudinal study of task conflict with a strategic contingencies theory approach may find that task conflict has different implications for team performance in situations when task conflict redefines power structures than when task conflict does not affect such structures.

Role theorizing can contribute to our understanding of teams by providing arguments about how emotionally valenced cognitions about the situational identity of team members or sub-groups may affect group processes and outcomes over time (Burke, 1991; Stryker, 1980). A focus on roles implies that the level of analysis may need to take into account the type of activity or group function served by individual or sub-group role holders, therefore providing opportunities for theorizing at levels of analysis that are consistent with team functions or activities. Also, a focus on roles provides avenues for a more process-oriented view of teams. If verification opportunities and role meanings are affected by the situational needs faced by teams, verification can be argued to be less stable than previously thought and/or role identities can be considered more fluid than previously theorized. As such, role taking/making processes may be dynamic, and changing emotionally valenced cognitions may result in unstable team emotions and behaviors.

Similarly, *inequality, power, and status theorizing* provide avenues to enhance our theories about teams. For example, legitimation theories provide arguments about how team members' status, power structures, influence efforts, and behaviors in general, can be constructed as valid or appropriate by team members and their implication for behaviors and outcomes. Legitimacy can be derived at many levels of analysis—the individual, the group, the sub-group, the social category of group members—and is situationally relevant, again providing opportunities to redefine our team theories at multiple levels or longitudinally. For instance, team performance may be affected by the perceived legitimacy of team membership or by changes in legitimate membership over time.

Finally, *comparison theorizing, collective action theorizing*, and *network theorizing* provide similar opportunities to contribute to the teams' literature. In essence, these theories open up opportunities to redefine the ideas at different levels of analysis than the usual team aggregation level and to expose the dynamic nature of teams in organizational life. For example, social comparison theory's idea that people compare to referent others (similar others) may help

refine our understanding of team rewards by exploring team rewards in terms of team composition and perceptions of similarity (Aime, Meyer, & Humphrey, 2010; Ridge, Aime, & White, in press). Also, networks theorizing may provide an avenue to refine our understanding of teams. Network theorizing is consistent with a view of teams as open systems because it is, in many ways, multilevel and dynamic by nature. Both teams and their team members are embedded in organizational networks, cross-nested in the personal or "ego" networks of the team members, and feed on the resources of both the team members, their networks, and the material and resource networks that surround the team functions. As such, network theorizing provides arguments and methodological approaches to inform our team theories. For example, mixed findings in the team configuration literature (Mathieu et al., 2014) can benefit from theorizing that takes into account how team member access to resources and the dynamism of team networks affect configurational choices and their outcomes over time.

Multilevel, Multi-Theory, Multi-Period

Implicit in the call for a multilevel, multi-period, multi-theory approach to teams' research is the recognition of the fundamental interlock between these component calls and the importance of the evolution of multilevel methods with their promise for the study of team phenomena. The call for multilevel and multi-period approaches, for example, redefines the space of our theorizing. Table 2 creates a 2 × 2 typology combining these dimensions at a broad level with regards to theorizing. Contributions to the team literature can happen in all four cells within this typology. For example, the bottom left quadrant of Table 2 characterizes theorizing approaches that still focus on the

Table 2 Map of Multilevel/Multi-Period Theorizing

	Single level	Across levels
Multi-period	*Emergent longitudinal theorizing* Theorize time emergence of individual, team, coalition, or other sub-group behaviors	*Dual emergent theorizing* Fully exploit the potential of multilevel multi-period theorizing for microdynamic explanations of team phenomena
Cross-sectional	*Collective explanation theorizing* Problematization	*Emergent vertical theorizing* Theorize micro-level effects on higher-level outcomes across two or more levels Theorize team or other higher unit effects on micro outcomes across two or more levels

collective explanation paradigm. The call in this more traditional approach to teams comes in the form of problematizing the literature by challenging the implicit assumptions of the existing theories or reconfiguring them by redefining the collective constructs with compositional or configurational constructs rather than the usual averaging, therefore challenging the assumption of homogeneity within teams (see Alvesson & Sandberg, 2011; Grant & Pollock, 2011; Locke & Golden-Biddle, 1997 for guidance on problematizing a literature).

All of the other three quadrants of Table 2 correspond with our call for a microdynamic approach to teams. The top left quadrant—which we call *emergent longitudinal theorizing*—represents theory at a single level developed across periods. For example, role behaviors or normative behaviors may vary over time and across situations or events, and central positions within the team can develop over time and can be predicted by particular individual behaviors or personal or social capital characteristics of members. Emergent longitudinal theorizing can help broaden theory by reflecting the time emergence of relational or team attributes and differentiating behaviors over time. For example, researchers in the team conflict literature could ask if relationship conflict develops at different times in team history than task conflict and therefore differentiate the theoretical nuances of both conflict dimensions not only because of their characteristics but also because of their emergence and implications at different times in teams. As is clear from the previous section, theories included in Table 1 can contribute to this emergent longitudinal theorizing. For example, emergent task conflict could result from role identities and role verification opportunities over time.

In contrast, the bottom right quadrant—which we called *emergent vertical theorizing*—refers to theorizing that occurs cross-sectionally but has dependencies across levels of analysis. For example, team-level configurations may affect member behaviors within teams, such as when a team has or does not have cross-functional membership or when a team possesses particular functional membership (e.g. engineers) with effects on members' behaviors. Emergent vertical theorizing can help separate or clarify the implication of different levels of analysis for the questions at hand. Researchers can ask how much of the explanation is dependent of team or other collective levels or explain the collective as dependent on micro emergent effects. Again, theories in Table 1 may be useful in this type of extensions to the teams' literature. For example, explanations of team performance may benefit from network theories by looking at how the ego networks of the team members may provide access to resources beyond those exposed in configuration studies to explain firm performance and by exploring how team density facilitates the utilization of resources within teams therefore affecting team performance.

Finally, the top right quadrant—which we have called *dual emergent theorizing*—refers to theorizing that occurs longitudinally and across levels of analysis. If actors' re-balancing of their exchange relations with valuable

others in the team results in the development of coalitions, task conflict, or team-level turnover, over time, we are theorizing within this dual emergent quadrant.

Moreover, the call for multilevel, multi-period, multi-theoretical approach to teams' research has effects on research designs. Data collection may need to represent the hierarchical or clustered structure implied by our theories and analytical methods need to be able to address the multilevel nature of our data. In general, a variety of analytical approaches utilized in hierarchical modeling, networks, research, time-series research, and structural equation modeling are readily available in commercial software packages. Table 3 lists a variety of these approaches and some software packages that support them. Guides to multilevel modeling and applications abound in the form of general multilevel modeling books (Gelman & Hill, 2006; Raudenbush, & Bryk, 2002; Snijders & Bosker, 1999), books on longitudinal data analysis that include multilevel approaches (Hedeker & Gibbons, 2006; Singer & Willett, 2003), books that provide guidance with implementations in SAS (Littell, Milliken, Stroup, Wolfinger, & Schabenberger, 2006), in MlWin, (Rasbash, Steele, Browne, & Goldstein, 2009), in HLM (Raudenbush & Bryk, 2002), in SPSS (Bickel, 2007; Hedeker & Gibbons, 2006), in MPlus (Muthén

Table 3 Analytical Techniques and Commercial Software Availability for Multilevel/Multi-Period Approaches

	Single level	Across levels
Multi-period	*Longitudinal modeling*	*Multilevel, multi-period, modeling*
	Time series (Sas, MLWIN, HLM, Stata, M-Plus)	Random-effect models with time (Sas, MLWIN, HLM, M-Plus)
	Growth models(Sas, MLWIN, HLM, Stata, M-Plus)	Cross-classified models(Sas, MLWIN, HLM, M-Plus)
		MSEMs (Mplus, SAS)
		P*, P2, random graph models, models (Sienna)
		Multilevel growth models (Mplus, SAS)
Cross-sectional	*Cross-sectional, single-level modeling*	*Multilevel modeling*
	Traditional OLS	Fixed effect models (SPSS, Sas, MLWIN, HLM, M-Plus)
	Structural equation models	Random-effect models (Sas, MLWIN, HLM, M-Plus)
		MSEMs (Mplus, SAS)
		P*, P2, random graph models, models (Sienna)

& Muthén, 2012), and finally materials that discuss particular techniques like MSEMs (Preacher et al., 2010 and related articles) P, P*, and dynamic network analysis models (Ripley, Snijders, & Preciado, 2013).

Conclusion

Team researchers in the field of OB seem to be increasingly aware of the need to embrace the organizing nature of teams. We have outlined the limitations of the prevailing static collectivist explanations in team research and suggested how an increased emphasis on a microdynamics-oriented approach that takes into account the essentially relational and organizing nature of teams can provide new insights to our understanding of team work. We think that such an approach required a systemic and dynamic redefinition of teams, and we therefore defined teams as *assemblies of interdependent relations and activities organizing shifting sets or subsets of participants embedded in and relevant to wider resource and institutional environments*. With this new definition in mind, we argued that a multilevel, multi-theoretical, and multi-period framework might help enhance our understanding of teams. To show the advancements of the field in this sense, we reviewed the OB literature on teams and highlighted exemplars of research that have started to emphasize the microdynamic nature of teams consistent with this general framework, and their contributions to our understanding of team phenomena.

Our hope was to highlight the gains in understanding inherent in such approaches and suggest general avenues to continue to pursue research focused on the organizing dynamics of teams. These gains and novel approaches to team research certainly set the stage for new insights, and our call may result in a growing theoretical and methodological eclecticism in the study of teams within OB. We believe that there is growing evidence that new approaches may hold important gains in our understanding of teams. We understand that this call may result in higher publication hurdles for those that adopt innovations as self-referentialism and institutionalized paradigms limit new bold research approaches. We think, however, that this article may help pave the road by pointing out exemplars of diversion from the prevailing static explanatory collectivism in top-level journals and legitimating innovation with an explanation of the need and a call for innovation in theoretical applications and research design in teams' research within the field of OB.

Endnotes

1. Note that because we were focused specifically on publications in OB and OP, we did not include *Strategic Management Journal* (a publication that focuses exclusively on macro phenomena) in our list, and instead included *Organization*

Science, a journal that is now considered an upper-echelon OB/OP journal (Conlon, Morgeson, McNamara, Wiseman, & Skilton, 2006).

2. Although we differentiate between teams, groups, and the combination of teams and groups as keywords in our figure, for the simplicity of discussion, we consider the teams and "teams and groups" combination as a singular representation of the emergence of the "teams" language.

3. We recognize that some scholars still use the terms "group" and "team" interchangeably. For example, Arrow et al.'s (2000) book on Groups as Complex Systems—perhaps the most forward-thinking work on multi-period/multi-level research on teamwork—used the "group" label as an overarching term for work collectives, and had a sub-category labeled "team" (which they differentiated from "task forces" and "crews"). Given the importance of teams to addressing the primary focus of OB research (Heath & Sitkin, 2001) and the challenges associated with typological organizing systems (Hollenbeck et al., 2012), we believe that the management literature would be better served using "team" as the overarching terminology. Moreover, differentiating between groups and teams aids the literature, given that the term "group" evokes images—such as individuals standing in an elevator—different than the term "team" —which suggests an image of people playing together. Standardizing language can help develop a critical paradigm within the OB literature (Pfeffer, 1993), making the teams' literature more relevant (Pfeffer, 2007).

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