Journal of Organizational Behavior, J. Organiz. Behav. **33**, 428–444 (2012)
Published online 13 January 2012 in Wiley Online Library (wileyonlinelibrary.com) **DOI**: 10.1002/job.1774

From causes to conditions in group research

J. RICHARD HACKMAN*
Department of Psychology, Harvard University, Cambridge, Massachusetts, U.S.A.

Summary It is time to move beyond standard conceptual and research paradigms in scientific work on group behavior and performance to better align our models and methods with the phenomena we are studying. Cause–effect models are of limited use in conducting research and generating useable theory about group behavior and performance. This paper proposes and illustrates an alternative conceptual approach that focuses on the *conditions* within which groups chart their own courses. The paper suggests three implications of a condition-focused approach for those who create, lead, and serve in purposive groups, and closes with a discussion of the conceptual challenges that must be overcome if the potential of a condition-focused approach is to be realized. Copyright © 2012 John Wiley & Sons, Ltd.

Keywords: group research; theory; cause; conditions

Research on any social phenomena always addresses, whether explicitly or implicitly, all three legs in the simple triangle shown in Figure 1. The vertices of the triangle are (i) the phenomena of interest, (ii) theory about those phenomena, and (iii) empirical research on those same phenomena (Hackman, 2011b). Scholars who aspire to publish in mainstream academic journals in social psychology and organizational behavior often choose (or are required by journal editors) to emphasize the first leg of the triangle, the one linking theory and empirical research. Others, such as some business school faculty, emphasize the second leg, inductively developing theory solely (or mainly) on the basis of deep immersion in the phenomena. And, still, others, such as some "applied" researchers, emphasize the third leg, bringing empirical data to bear on specific problems without worrying too much about conceptual issues.

It probably is asking too much to expect that any one researcher, or even any one research group, will be able to work all three legs of the triangle. Yet, the development of basic-but-useful knowledge about group behavior and performance requires overcoming, or at least circumventing, several self-imposed barriers that slow progress by keeping scholars focused on one or another of the legs. We need to quit acting as if writing about what we have learned about groups from case studies or consulting assignments is, by itself, scholarly work. We need to quit pretending that the system context of group behavior is irrelevant to understanding what happens within groups—let alone to changing how they operate. And, directly to the point of this paper, we need to become more inventive in developing conceptual models and research strategies that respect the fact that groups are social systems.

The time is right to rethink how we construe and study groups because the balls are in the air and in ways that pose direct challenges to traditional conceptual models and research methodologies. Indeed, recent papers by Mortensen (2009) and Tannenbaum, Mathieu, Salas, and Cohen (in press), as well as the articles in this special issue, convincingly document that the phenomena group researchers study are in considerable flux these days.

*Correspondence to: J. Richard Hackman, Department of Psychology, 33 Kirkland St., Harvard University, Cambridge, Massachusetts 02138, U.S.A.
E-mail: hackman@fas.harvard.edu

 Received 2 December 2011, Accepted 4 December 2011

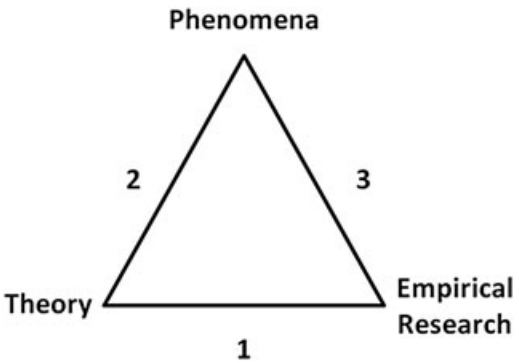


Figure 1. The three legs of group scholarship

What Is This Thing Called "Group"?

Traditionally, groups in organizations tended to be intact, stable, and tightly bounded social systems. Now, the composition of many groups shifts so often that it can be nearly impossible to pin down who actually is a member (Wageman, Nunes, Burruss, & Hackman, 2008, Chapter 2). Traditionally, group members tended to be co-located and to interact almost exclusively face-to-face. Now, many groups are so widely distributed across geographies and time zones that members may never even see one another, relying instead on an ever-expanding set of technological resources to coordinate their activities (O'Leary & Cummings, 2007). Traditionally, most task-performing groups generated some identifiable product, service, or decision. Now, groups handle a much wider variety of tasks that often have considerable complexity and uncertainty, such as providing organizational leadership (Berg, 2005), carrying out negotiations (Behfar, Friedman, & Brett, 2008), and managing organizational change initiatives (Hackman & Edmondson, 2008). Traditionally, groups operated within a single organizational context. Now, groups often include members from two or more different organizations that may have different policies, practices, and cultures (Dess, Rasheed, McLaughlin, & Priem, 1995). And, finally, groups traditionally have been created top–down by an organizational manager or, in the laboratory, by the experimenter. Now, increasing numbers of groups are self-created, often using electronic technologies, to explore shared interests (Shirky, 2008) or to pursue activist social agenda (Andrews, Ganz, Baggetta, Han, & Lin, 2010).

An iconic group from the past would be a coal-mining team, a clearly bounded and highly stable group whose members were deeply dependent on one another for safely carrying out their collective work and who commonly spent a considerable portion of their non-work time together as well (Goodman & Leyden, 1991). By contrast, consider a research team composed of both university researchers and pharmaceutical company scientists charged with investigating a new compound that may have therapeutic potential. These scientists work in laboratories in three different countries located in three different time zones, they communicate and coordinate using electronic technologies exclusively, and group composition gradually changes over time in response to the different expertise that is needed at different stages of the project.

Is that research team actually a "group" or is it some other type of social organization? The answer to that question, of course, depends on what we mean by the term. Although numerous ways of defining groups have been proposed in the scholarly literature, I will suffice here with this relatively simple and inclusive definition: *A group is an intact social system, complete with boundaries, interdependence for some shared purpose, and differentiated member roles*. This definition means that it is possible to distinguish members of groups from nonmembers, even if they do not have regular face-to-face contact and even if membership changes frequently. Moreover, members of groups depend on one another in pursuing some collective purposes(s), they develop specialized roles within the group as they do so, and they are capable of relating as a unit to other individuals or groups.

DOI: 10.1002/job

The pharmaceutical research team described earlier falls within that domain. But casual gatherings of people who have no shared purpose do not. Nor do reference groups, identity groups, and statistical aggregations of the attributes or preferences of people who do not actually interact with one another. So, nominal groups (such as the average SAT scores of a college's "group" of incoming students) lie outside the domain. Also out are the crowds in crowdsourcing, estimates or forecasts that are generated by averaging the views of individuals who have no contact with one another, and work outcomes that are obtained by merely compiling what has been produced by separate individuals (as is the case, for example, when devices such as Mechanical Turk are used to create "group" products).

The key is that real groups are *social systems*. They may be small, they may be temporary, and their membership may change over time. But they are perceived as entities by both members and nonmembers, they create and redefine internal and external realities, and they have transactions with external entities that can be legitimately attributed to the group as a unit.

The proper concepts for describing groups, therefore, are those that are situated at the group level of analysis, not those that describe the cognitive or affective processes of individual members (Larson & Christensen, 1993). To describe a collective entity such as a group as having thoughts and feelings is to significantly increase the difficulty of explicating how the states and processes of individual persons combine to shape group-level processes, structures, and outcomes. As will be seen next, these system properties of groups are critical both to conceptual models of group behavior and performance and to the statistical methods that are used to assess those models.

How Analytic Models Have Changed

In the earliest days of group research, scholars relied on simple cause–effect models that assessed the effects of some "input" factor (x) on some "output" state (y). The hope was to establish causal relationships that, taken together, would both generate robust understanding of group dynamics and provide guidance for those who wished to improve how groups behave and perform.

$$x \rightarrow y$$

Kurt Lewin, Ron Lippitt, and Robert White conducted one of the earliest experimental studies of group behavior in the late 1930s. In a carefully counterbalanced experimental design, these researchers sought to assess the effects of three different leadership styles—autocratic, democratic, and laissez faire—on the social climates that emerge in groups. Driven by questions about the tenability of democratic leadership in an era when Fascism was on the rise in Europe, the researchers hoped their findings would help identify what leaders could do to foster democracy in groups, organizations, and nations (Lewin, Lippitt, & White, 1939). Another early study in the $x \rightarrow y$ tradition assessed the effects of group cohesiveness on productivity. Conducted by Stanley Seashore in the early 1950s, this correlational study of 228 factory work groups assessed the degree to which members of highly cohesive groups were more productive than those in low-cohesiveness groups (Seashore, 1954). Had a strong positive relationship been obtained (it was not), the study would have identified a potentially useful "lever" for directly improving group productivity.

Studies such as these were important not so much because of their specific findings but because they opened up entire fields of study that eventually generated substantial bodies of knowledge. The Lewin–Lippett–White study, for example, prompted an enormous number of studies of the effects of leadership styles on group and organizational behavior, and the Seashore findings gave rise to a substantial research literature on the effects of group cohesiveness.

The problem with the early studies was that the direct cause–effect relationships they assessed rarely were strong and robust. That naturally and appropriately prompted group researchers to examine the mechanisms that mediated the cause–effect relationships, as well as to search for moderators that affected the size or direction of such relationships.

DOI: 10.1002/job

Mediators

A mediator (*m*) is a variable that is affected by an "input" variable and that, in turn, affects an "output" variable. The input variable operates *through* the mediating mechanism to determine the output.

$$x \rightarrow m \rightarrow y$$

Spurred by the development of statistical techniques that allow reliable assessment of the degree to which mediation is occurring, increasing numbers of group researchers have sought to document the mechanisms by which input variables (leader style or cohesiveness, for example) shape outcomes. But it was not merely the availability of statistical tools that led to an increased focus on mediators in group research. It also was the widespread acceptance of the input–process–output model set forth decades ago by Joseph McGrath and his colleagues (McGrath, 1964; McGrath & Altman, 1966).

The core idea of the model is that input states affect group outcomes via the interaction that takes place among members.[1] To illustrate, consider once again the relationship between group cohesiveness and performance. If a highly cohesive group (input at $time_1$) were to perform better on some task (output at $time_2$) than a group low in cohesiveness, it should be possible to explain the performance differences by comparing the interaction processes of the two groups. Perhaps, members of the cohesive group talked more about the work and encouraged each other to work hard. Or, perhaps, they simply spent more time together and used that extra time for work on the task. Whatever the explanation for this (hypothetical) finding, it should be discernible in the group interaction.

I was reared on the input–process–output model in the McGrath laboratory in the mid-1960s, and it guided both my and many others' research subsequently. Indeed, Tony Morris and I conducted what may have been the only joint dissertation project ever performed at the University of Illinois in an attempt to empirically document all three links in the input–process–output model. It was a massive study—108 three-person groups each performed four tasks drawn from a set of 108 different tasks, yielding 432 transcriptions of group interaction and 432 written group products. We sought to document how task characteristics (specifically, task type and difficulty) affected group behavior and performance.

Tony's part of the project was to assess task effects on group process, using an interaction-coding system he had developed in his master's thesis. Mine was to assess task effects on group products, using a set of dimensions that I had developed in my master's thesis. Both analyses were successful: we obtained strong, statistically reliable input–process and input–output relationships (Morris, 1966; Hackman, 1968). All that remained was to document that my input–output relations were, in fact, mediated by Tony's measures of group interaction process.

The first step was simply to demonstrate that the 16 measures of group interaction process actually did relate to the eight attributes of the group products—that is, to establish empirically the process–output link. That is where we got into trouble. Our first try was to compute a canonical correlation between the 16 process measures and the eight outcome measures. I still can recall the pleasure I felt when I saw in the computer output a large and statistically significant relationship between the two sets of measures. Closer inspection, however, showed that although the weights on many process indicators were substantial, their pattern was entirely uninterpretable. So, we dropped back to more familiar statistical ground and computed regressions, predicting each of the output measures in turn from the set of process measures. We obtained substantial and reliable multiple correlations—but, again, the patterns of predictor weights defied substantive interpretation. So, now feeling some desperation, we retreated even further and computed the zero-order correlations between each of the process measures and each of the outcome measures. The result: large matrices containing a great many significant correlations, but no interpretable pattern that we could discern.

We thought our failure to demonstrate the mediating role of group process was an anomaly—perhaps the short period participants had to work on tasks that they surely did not care much about did not leave enough "room"

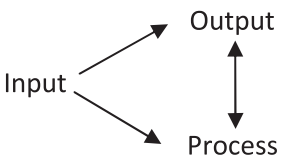
[1]Interestingly, group researchers' increased focus on interaction process mediators appeared at about the same time as the emergence of research and theory on cognitive mechanisms at the individual level of analysis, the latter in response to the strict behaviorism that previously had dominated studies of individual behavior and performance.

DOI: 10.1002/job

for the effects of group interaction to show themselves. But when I subsequently reviewed the research literature on group processes, I found that other researchers also had had little success in empirically documenting the mediating role of group interaction process (Hackman, 1987).

Moreover, intervention studies conducted with real groups in field settings, groups whose members presumably cared more about how they performed than did the college sophomores in our experimental laboratory, also did not provide much empirical support for process–output relationships (Kaplan, 1979a; Woodman & Sherwood, 1980). The title of Kaplan's review article provides a compact summary of his findings: "The conspicuous absence of evidence that process consultation enhances group performance." Kaplan also conducted an experimental study in which he found that even a well-conceived and competently implemented intervention intended to improve the quality of group interaction, although it did foster member satisfaction with the group experience, actually *impaired* measured group performance (Kaplan, 1979b).

What is going on here? Could it be that the input–process–output model, as sensible as it seems, is somehow wrong? Might it be, for example, that input factors directly and simultaneously influence *both* interaction process and performance? If so, the correlations between process and performance might merely reflect the fact that both are affected by the same input variable. And, further, might it be that performance and process have reciprocal influences on one another (that is, interaction process both affects and is affected by how the group is doing), thereby further muddying the interpretive waters? If so, then group interaction process might be better viewed as an *indicator* of the state of the group, rather than as either a term in the causal chain or a point of intervention.



Despite the shaky state of evidence supporting the input–process–output model, it has shown great persistence in group research over the decades (Ilgen, Hollenbeck, Johnson, & Jundt, 2005). The model is so reasonable that it surely must be correct—if only we could come up with the proper way of selecting, measuring, and analyzing group interaction. And, in fact, there have been a sufficient number of encouraging findings recently to provide reason for hope that eventually we may be able to document the mediating role of group interaction process, at least in some circumstances (see, Littlepage, Schmidt, Whisler, & Frost,1995; Mesmer-Magnus & DeChurch, 2009).

Moderators. . .and more

The mediating model deals exclusively with causal main effects—that is, *x* causes *m*, which in turn causes *y*. But it is both unrealistic and excessively optimistic to assume that one can understand group dynamics by focusing only on main effects. Even a brief reflection on group behavior prompts the realization that something that generates a particular outcome in one set of circumstances may make no difference (or even have the opposite effect) in other circumstances. Any robust model of group behavior, therefore, surely must also include moderators—exogenous factors that affect the strength or direction of input effects. So, we develop and empirically test models in which a moderator (z) is posited as conditioning input–output relationship:

$$\begin{array}{c} z \\ \downarrow \\ x \rightarrow y \end{array}$$

Analyses of moderating variables are pervasive in social research these days, perhaps nowhere more prominently than in studies of the effects of different leader styles. Although the Lewin–Lippitt–White study described earlier focused on the main effects of autocratic, democratic, and laissez faire styles, subsequent researchers have devoted

DOI: 10.1002/job

a great deal of effort to identifying the circumstances under which each of those (and related) styles generates favorable outcomes. The same logic applies to research on many other popular "input" variables in group research. In studying compositional diversity, for example, it is altogether reasonable to explore the potential moderating role of task interdependence on the effects of diversity on group behavior and outcomes.

The problem is that things can become quite complex as increasing numbers of potential moderating variables are identified and empirically assessed. And, as researchers incorporate *both* mediators and moderators into their conceptual models, things get more complicated still. We now have, for example, not only mediation and moderation but also moderated mediation and mediated moderation—the distinction between which I have always found hard to grasp, even with the explanation offered by Muller, Judd, and Yzerbyt (2005) in their wonderfully titled paper "When moderation is mediated and mediation is moderated".

$$\begin{array}{c} z \\ \downarrow \\ x \rightarrow m \rightarrow y \end{array}$$

There is more still to come. Nowadays, we use structural equation modeling to explore complex causal models in which many boxes are connected by many arrows, with latent variables lurking around the margins. And hierarchical linear modeling now provides a means of extracting and documenting cross-level influences on our phenomena—how what happens in groups is shaped by factors "higher" (e.g., contextual features) and/or "lower" (e.g., attributes of individuals) than the group level of analysis. I am on record in this very journal as strongly advocating cross-level analyses of group phenomena (Hackman, 2003). But I also have to acknowledge that I sometimes find myself muttering, as I try to figure out from a results table what actually was going on in a study that uses state-of-the-art statistical tools, "But what are the *means*?" It is ironic that the powerful statistical techniques we have developed for analyzing group behavior often wind up keeping us at arms' length from the very phenomena we are attempting to understand.

With every methodological advance, it seems, things become both more complex and more distant from the phenomena. That which started so simply, with an analysis of direct input–output relationships, now risks sinking of its own weight, of becoming decreasingly useful to both scholars and practitioners. It may be time, therefore, to question the appropriateness of the cause–effect models that have pervaded group research from its inception and to consider an alternative way of construing group behavior and performance.

Beyond causes and effects[2]

As noted earlier, groups are social systems. They redefine objective reality, they create new realities (both for their members and in their system contexts), and they evolve their own purposes and strategies for pursuing those purposes. Groups are not mere assemblies of multiple cause–effect relationships; instead, they exhibit emergent and dynamic properties that are not well captured by standard causal models.

Moreover, as more is learned about factors that moderate the effects of various input factors, contingency tables are needed to identify the actions or interventions that are indicated in various circumstances. What could help an experienced, competent group develop a plan of action, for example, will be quite different from what would be recommended for a group of novices that is just getting started. Perversely, the more knowledge about mediators and moderators that research provides, the greater the amount of cognitive processing that is required of those who create or lead groups. And because we humans are quite limited in our ability to process multiple contingencies in making behavioral decisions (Gigerenzer, 1999; Simon, 1990), it becomes less and less likely that group leaders will be able to draw appropriately on research findings to guide their actions in real time.

[2]Philosophers of science and statistical theorists have explored in depth both the nature of causation and empirical strategies for establishing causal relationships. I do not address those literatures in this paper and instead keep my focus on issues that have directly to do with group dynamics. For a thoughtful and accessible discussion of philosophy of science considerations that bear on social science research, see Rosenberg (2008).

DOI: 10.1002/job

These days, the limitations of human cognition in processing information about multiple contingencies can be overcome, or at least circumvented, by the use of technological aids. Recognizing this, one distinguished contingency theorist had an electronic device constructed to inform leaders' decisions about their behavioral choices. Various switches are set on the device in accord with the characteristics of the situation, a button is pushed, and the proper course of action is electronically revealed. Although the construction of this device was something of a light-hearted enterprise, it nicely symbolizes the difficulty of using complex contingency models as guides for behavior.

Let me go further and suggest that any attempt to *make* a group do well is doomed from the start—it is likely to be ineffectual or, in some cases, to result in effects that are the opposite of what was intended. Consider, for example, the track records of exhortation, close monitoring and supervision, and the administration of behavior-contingent rewards or punishments. All these interventions have spotty records at best—they make little or no difference (as is the case for exhorting group members to exhibit better teamwork), or they induce resistance and reactance (in response to close monitoring and supervision), or they require considerable overhead to administer and ensure fairness (as generally is the case for attempts to shape work behavior using operant techniques).

One explanation for these less-than-encouraging realities is that the influence attempts mentioned earlier all are based on essentially the same causal model: an intervention (x) is intended to affect a hoped-for outcome (y) via some mediating mechanism (m), perhaps moderated by some contextual and/or individual difference factor (z). These kinds of models can be quite appropriate for mechanical systems in which causes really do reliably generate specific effects, but they are far less appropriate for social systems. By relying on them, we are pursuing old-style causal thinking further than it can carry us. And we are perpetuating a paradigm that the so-called "hard" sciences moved beyond literally decades ago. It is as if we are building a science on the basis of Newtonian principles in an age of quantum mechanics. And perhaps most worrisome of all is the current enthusiasm for "evidence-based management" (Briner & Rousseau, 2011), which risks perpetuating those traditional ways of thinking, implicitly endorsing the myth that by pulling the right levers at the right time we really can make groups operate just the way we want them to.

These concerns are hardly original—many other scholars have expressed similar views and have offered their own alternatives to traditional causal models for understanding group dynamics. Some of these alternatives, such as hermeneutics (e.g., Hansen & Rennecker, 2010) and complex systems theory (e.g., Arrow, 2005; Arrow, McGrath, & Berdahl, 2000), offer entirely fresh ways of construing and conceptualizing group phenomena. Others, such as ethnographic studies (e.g., Arber, 2007) and action research (e.g., Bartunek & Louis, 1996), have the potential of enriching what we learn about groups by providing nontraditional ways of gathering, summarizing, and reporting data about them.

Each of these approaches has much to offer and merits greater attention by group researchers than they historically have received. Hermeneutics invites us to consider a wholly different way of understanding groups and what happens within them, but the approach is so discrepant from how most of us construe group phenomena that it probably will continue to occupy a small niche in the field of group research. Ethnographic studies and action research have complementary virtues and limitations. Ethnographies provide rich and detailed descriptive accounts of what transpires in groups but leave unaddressed the gap between what exists and what might be done to change or improve group behavior or performance. Action research, by contrast, focuses explicitly on implementing and assessing constructive change but runs the risk of becoming so problem-specific and system-specific that it can be difficult to extract from what was done and found any general propositions about group behavior.

Complex systems theory merits special attention because it offers a way of construing group dynamics that focuses specifically on the properties of groups as social systems—thereby overcoming one of the main limitations of the standard causal models discussed earlier. A number of researchers have drawn upon complex systems ideas to explore how groups self-organize and develop emergent structures. In this approach, a group is viewed as a complex system made up of individuals who are themselves complex systems, each guided by goals and perceptions that change over time:

DOI: 10.1002/job

> *We see groups as complex, adaptive, dynamic systems. Rather than simple, groups are complex entities embedded in a hierarchy of levels and characterized by multiple, bidirectional, and nonlinear causal relations. Rather than isolated, groups are intricately embedded within, and have continual mutual adaptation with, a number of embedding contexts. Rather than static, groups are inherently dynamic systems, operating via processes that unfold over time, with those processes dependent both on the group's past history and on its anticipated future* (McGrath, Arrow, & Berdahl, 2000, p. 98).

There is much to like about complex systems theory as an approach to understanding group dynamics. Yet, the approach has not yet become widely used in group research, perhaps because it poses some difficult conceptual challenges and requires the use of methodologies that are unfamiliar to most group researchers. So, at this writing, we see reasonably widespread acceptance of complex systems ideas such as emergence and self-organization, and it is relatively straightforward to use systems concepts retrospectively to describe something that already has happened. So far, however, there has not been much progress in using the concepts and methods of complex systems theory in empirical research on groups.

Conditions Not Causes

Let me now offer yet another alternative to traditional causal models of group behavior and performance—one that is much simpler than those just mentioned but that I have found to be of some value in studying groups, generating theory about them, and crafting interventions intended to help them improve. As will be seen, the basic idea is to move thinking about group behavior from a focus on cause–effect relations to an analysis of the conditions under which groups chart their own courses.

My research in recent years has focused on identifying the minimum number of conditions which, when present, increase the likelihood (but do not guarantee) that specified normative outcomes will obtain. To illustrate, here is an example drawn from my studies of civilian and military flight deck crews that I sometimes use to highlight the basic difference between conditions and causes.

Consider what is involved in landing an aircraft that presently is several miles from the runway and several thousand feet above it. The pilot's objective is to arrive at the runway threshold just above stall speed ready to flare the aircraft and touchdown smoothly. This involves achieving, in an environment that can change unpredictably, the correct heading, the correct airspeed, and the correct rate of descent. A causal analysis would identify the consequences of having the wrong heading, having too much (or too little) airspeed, and having a rate of descent that is too fast (or too slow). Novice pilots try to manipulate these causes in real time, "flying the airplane down" by continuously adjusting heading, airspeed, and sink rate. But that strategy is not as safe as it could be—the Flight Safety Foundation (2000) found that unstabilized approaches were a factor in 66 per cent of 78 approach-and-landing accidents and incidents that occurred worldwide between 1984 and 1997.

Experienced pilots, by contrast, give first attention to getting *established on approach* while still a good distance from the airfield. That means that if the pilot did nothing at all in an unchanging environment, the aircraft still would arrive at the runway threshold at just the right airspeed, ready to touchdown smoothly. Because the basic conditions for a successful landing are in place well ahead of time, the pilot can focus on monitoring the aircraft's performance and the external environment, making adjustments as needed to keep the plane on track for a routine landing. And if things do get complicated, the pilot has more cognitive resources available to deal with the problems than would be the case if he or she were actively flying the plane down.

To be stabilized on approach is to have conditions in place such that the natural course of events leads to the desired outcome—in this case, a good landing. As will be seen next, the same way of thinking applies in a wide variety of other domains of human endeavor.

DOI: 10.1002/job

--Economics. Constantly tinkering with a nation's interest rates, money supply, and tax policies versus establishing fundamentally sound economic conditions that allow an economy to manage itself, making small adjustments at the margins as needed to keep things on track.
--Medicine. Treating certain kinds of maladies or injuries such as a moderately severe burn aggressively (e.g., by grafting skin from another part of the body to the burn area) versus fostering the patient's general health and letting the body heal itself, again providing medical interventions at the margin as required.
--Child development. Using operant techniques in an attempt to cause the child to develop in a desired way versus creating a stable, supportive, and bounded home environment in which the child's autonomous development occurs, making interventions at the margins when needed.
--Gardening. Actively monitoring and managing the development of individual plants versus planting good seeds in a sunny, well-tilled, and well-fertilized plot and letting the garden grow as it will, weeding and watering only as needed.

Although there are no guarantees that focusing on enabling conditions will result in favorable outcomes (exogenous factors always can turn things sour), it remains true that the better strategy in each of the aforementioned cases is to devote the first and greater portion of one's energies to establishing conditions that lead naturally to the desired outcomes and the lesser portion to online process management. And the list could go on, as scholars have explored the special features and advantages of condition-focused thinking in a variety of other fields, including inter-group negotiations (Lax & Sebenius, 2006), human cognition (Cheng & Novick, 1991), social mechanism design (Maskin, 2008), and even legal studies.

The law is of special interest because it identifies a circumstance when a condition-focused approach is *not* appropriate.[3] Constitutional law follows the principle that sociotechnical theorists refer to as "minimal critical specification." That is, only the basic conditions needed for the operation of a political system are established, which is consistent with the approach being explored here. In tort law, however, a distinction must be made between the direct causes of an incident and the conditions that enabled it to occur. The conditions approach has been mostly abandoned in tort law because of the overriding need to fix blame—indeed, causal contributions often are apportioned using percentages to assign each party's share of the blame. Tort law is one instance for which a focus on conditions rather than causes is inappropriate because it is inconsistent with system purposes.

To assess the potential usefulness of a condition-focused approach to group research requires generating answers to two questions: (i) *what* conditions are most important to group life (the list of possibilities is limitless) and (ii) how much of a difference do those conditions actually make?

The answer to the first question, of course, depends on the outcomes in which a scholar has special interest. In the group research my colleagues and I have conducted, we have focused on identifying the conditions that are most powerful in fostering group performance effectiveness. By "effectiveness" we mean that whatever the group produces is at least acceptable to those who receive, review, or use it; that the group becomes a more competent performing unit over time; *and* that the group experience contributes positively to individual members' learning and development. We assessed a variety of structural and organizational conditions for a large number of groups, ranging from senior leadership teams to front-line production and service teams, and also collected performance data for each of the teams we studied.

Six conditions gradually emerged as the most general and powerful in fostering group effectiveness (Hackman, 2002, 2011a; Wageman et al., 2008). Briefly, they are as follows: (i) the performing unit is a real team (rather than a team in name only); (ii) the team has a compelling direction or purpose; (iii) the team is composed of the right number of people who have the right skills; (iv) the team has clear norms of member conduct; (v) the organizational context supports rather than impedes teamwork; and (vi) the team has access to competent team-focused coaching (see Table 1 for additional details about these conditions).

[3]I am indebted to legal scholar R. Bhaskar for explaining this to me.

DOI: 10.1002/job

Table 1. Brief summary of the six enabling conditions.

Real team. Real work teams are intact social systems whose members work together to achieve a common purpose. They have clear boundaries that distinguish members from nonmembers. They work interdependently to generate a product for which members have collective, rather than individual, accountability. And they have at least moderate stability, which gives members time to learn how to work well together.
Compelling purpose. A compelling purpose energizes team members, orients them toward their collective objective, and fully engages their talents. Purpose has high priority when establishing a team because so many other design decisions depend on it—how the team is structured, the kinds of organizational supports that are needed, and the type of coaching by team leaders that will be most helpful.
Right people. Well-composed teams have the right number and mix of members, each of whom has both task expertise and skill in working collaboratively with others. And they are as small and diverse as possible—large size and excessive homogeneity of membership can cripple even teams that otherwise are quite well designed.
Clear norms of conduct. Norms of conduct specify what behaviors are, and are not, acceptable in a team. Having clear, well-enforced norms greatly reduces the amount of time a team must spend actively managing member behavior. The best norms promote continuous scanning of the performance situation and the deployment of work strategies that are well tuned to the special features of the team's task and situation.
Supportive organizational context. Even teams that are properly structured and supported sometimes founder because they cannot obtain the organizational supports they need to perform well. Having the material resources needed to carry out the work is of course essential. But beyond that, team performance is facilitated when (i) the reward system provides recognition and positive consequences for excellent team performance, (ii) the information system provides the team with the data and the information-processing tools members need to plan and execute their work, and (iii) the organization's educational system makes available to the team any technical or educational assistance members may require.
Team-focused coaching. Competent and well-timed team coaching can help a team minimize its exposure to process losses and increase the chances that it will operate in ways that generate synergistic process gains. But even highly competent coaching is likely to be futile when the other enabling conditions are not in place, or when the team is not at a stage of its life cycle when members are ready to receive it. That is why coaching, as important as it can be in fostering competent teamwork, comes last in the list of enabling conditions.

Adapted from Hackman (2011a, pp. 51–52).

How much of a difference do these conditions make in how well teams perform? A number of empirical studies have addressed this question. In a study of field service teams at Xerox, for example, Wageman (2001) found that the way teams were designed and organizationally supported accounted for significantly more variation both in the level of team self-management and in team performance than did team leaders' hands-on coaching. Specifically, structural conditions controlled 42 per cent of the variation in self-managing behavior, compared with less than 10 per cent for leaders' coaching activities, and they accounted for 37 per cent of the variation in team performance, compared with less than 1 per cent for leaders' coaching activities.

In a study of intelligence community analytic teams, the enabling conditions controlled well over half of the variation in an independent, multi-attribute measure of overall team effectiveness (Hackman & O'Connor, 2004). And a cross-national study of senior leadership teams documented that the enabling conditions strongly predicted team effectiveness ratings made by panels of outside assessors (Wageman et al., 2008).

Clearly, the presence of the enabling conditions does make a considerable difference in performance effectiveness for teams of many different kinds. That said, there, no doubt, are alternative explanations for what we have found.[4] For now, however, I take these findings as being reasonably supportive of a condition-focused approach to group

[4]Because none of the studies just mentioned experimentally manipulated the enabling conditions, it is at least possible that some unknown and unmeasured third variable affected both the presence of the conditions and team performance, although this is unlikely because the studies were conducted in several different organizations using somewhat different measures and methodologies.

DOI: 10.1002/job

research and theory about group performance. The broader question is whether this approach also would enrich understanding of other group phenomena—how well members deal with intra-group conflict, for example, or how seamlessly members move from group to group in multi-team systems. We do not yet know much about the generality or potency of a condition-focused approach for non-performance processes and outcomes. I look forward to the day when we find out.

Implications and Challenges

If conditions do come into serious contention with causes in shaping how we think about and study group behavior, they will bring with them a number of implications for those who create, lead, and serve in purposive groups. Three that I find especially significant are briefly discussed next. And then, to close the paper, I identify three reasonably daunting conceptual and methodological challenges that will have to be overcome if a conditions-focused approach is to become a viable guide to scholarly work on groups.

Action implications

The general imperative for practitioners of a conditions-focused approach can be said quite simply: It is to create structural and organizational conditions that increase the likelihood that a group will naturally operate in ways that foster the achievement of group purposes, the viability of the group as a social system, and the learning of individual members. That statement, however, is so general as to be of little practical use. Here, then, are three somewhat more focused imperatives for action that my colleagues and I have found to be helpful in implementing a conditions-focused approach for real groups that operate in real time.

Reprioritize leadership tasks

Of the many different ways of thinking about leadership, the functional model of leadership is the most consistent with a conditions-focused approach to groups. The functional model posits that anyone who helps a group fulfill functions that are critical for achieving its purposes—be that a person who occupies a formal leadership role, a regular group member, or even an outsider—is exercising group leadership (Hackman & Wageman, 2005b; McGrath 1962).

Our research has identified three generic leadership functions that appear to be germane to purposive groups (Hackman, 2011a). It will by now not be surprising that the first of these is creating and maintaining the structural and contextual conditions that remove roadblocks and smooth the path to achieving the group's purposes. The second is launching the group—in effect, breathing life into a basic structure that already has been created. And the third is providing coaching to the group as it proceeds with its work.

Let me go out on a limb and make rough estimates of the size of these effects. I propose that 60 per cent of the difference in how well a group eventually does is determined by the quality of the condition-setting *prework* the leader does. Thirty per cent is determined by how the initial *launch* of the group goes. And only 10 per cent is determined by what the leader does after the group is already *underway* with its work. This view stands in stark contrast to popular images of group leadership—the conductor waving a baton throughout a musical performance or an athletic coach shouting instructions from the sidelines during a game.

The relatively smaller percentage assigned to hands-on activities by a team leader after a group is underway does not mean that group processes are unimportant. To the contrary, how a group handles the management of members' effort, how it develops and implements its performance strategy, and how it draws upon and develops its members' knowledge and skill are enormously consequential for how well a group eventually does. Coaching interventions that address such matters make a difference mainly at the margin, however. It is a strained analogy, but once a rocket has lifted off the pad, it is on a mostly predetermined trajectory. All that those who designed and launched it can do

DOI: 10.1002/job

at that point is make small corrections along the way or, if things turn really sour, blow the whole thing up. It is the same with a group. Once it is underway, the leader can facilitate team processes but cannot change its basic course without actually taking over the team, which, of course, would in effect be to destroy it.

Focus on temporal dynamics

The findings of Connie Gersick (1988, 1989) have called into question the validity of the stage models that previously dominated the thinking of both scholars and practitioners about how groups develop (Tuckman, 1965). Her work showed that very soon after members initially convene, they get onto a "track" that shapes their interaction until the temporal midpoint of their work. Then they experience a major transition that typically results in some fundamental changes in how they operate, and they remain on that new track until near the end of their performance period.

On the basis of Gersick's work, Ruth Wageman and I developed a model of team coaching that explicitly identifies the kinds of coaching activities that are likely to be most helpful at three key times in the group life cycle: beginnings (motivational coaching to help a team get off to a good start), midpoints (consultative coaching to help a team harvest the lessons learned thus far and rethink its performance strategy going forward), and ends (educational coaching to help the team learn from its experience) (Hackman & Wageman, 2005a). Coaching, then, is not just a matter of helping a group deal with problems and opportunities that come up. Instead, it involves giving focused attention to where a team is in its temporal life cycle—and then providing the kind of assistance that is likely to be especially helpful at that particular time.

As noted earlier, what happens at the very beginning of a group's life—how it is launched—is highly consequential for what transpires subsequently and therefore especially worthy of attention by both leaders and team members. Indeed, many key leadership functions are fulfilled, for better or for worse, by the time a team is only a few *minutes* old (Wageman, Fisher, & Hackman, 2009). The most pressing piece of business when a team first comes together is for members to get oriented to one another and to team purposes. This involves establishing the boundary that distinguishes members from nonmembers, starting to differentiate roles and formulate norms about group behavior, and engaging with the work that the team will perform (Ginnett, 1993). When this is done well, the team is likely to find itself on a better initial track than otherwise would be the case. And being on a good track both decreases the likelihood that a group will encounter incapacitating problems and increases the chances that when members do hit rough spots they will be able to find ways to get through them.

Keep things simple

We have seen that in a condition-focused approach, the creation and leadership of groups is decidedly front loaded: the decisions and actions that make the most difference are those that occur even before a group convenes and at the very beginning of its life. Perhaps because they want to do everything they can to help a group succeed, leaders sometimes find themselves tempted to over-design the group and to provide excessively detailed guidance during the launch process.

Research in the sociotechnical systems tradition strongly suggests that it is wise to resist that temptation and instead to adhere to the principle of *minimum critical specification*. That principle asserts that one should specify only those few design features that are absolutely essential, thereby leaving a great deal of latitude for group members to chart their own course (Cherns, 1976; Herbst, 1974). Keeping the design and launch of a group simple allows one to avoid the perils of contingency thinking—that is, making ever more distinctions and adding ever more conditions and qualifications to general propositions. The search for contingencies, once underway, soon arrives at the point of diminishing returns as increments in explanatory power come more slowly than do increases in model complexity. And, as noted earlier, people are not adept at processing multiple contingencies in making decisions about how best to be helpful to a group.

Conceptual challenges

Taking to heart the three behavioral imperatives just discussed would require some nontrivial changes in the behavior of those who structure, lead, or serve in purposive groups. But those changes pale in comparison with what

DOI: 10.1002/job

a conditions-focused approach would require of those of us who study and theorize about groups. Here are three scholarly challenges that I find to be especially daunting.

Contending with overdetermination

One of the advantages of traditional cause–effect models is that they assume that causal factors can be conceptually and methodologically isolated and the magnitudes of their effects assessed. The problem is that what happens in groups usually is overdetermined. It is not any one factor or even any linear combination of factors that drive what transpires. It is, instead, that numerous features of the group structure, its context, its leadership, and even the behavior of its members tend over time to come into congruence—sometimes in ways that foster a group's viability but other times in ways that mitigate against teamwork (Walton, 1985; Walton & Hackman, 1986).

Influences on group behavior and performance do not come in separate, distinguishable packages. They come, instead, in complex tangles of redundant features and forces. To try to partial out and assess the causal effects of each component can be an exercise in frustration because each ingredient of what may be a spicy stew loses its zest when studied separately from the others. The fact that group behavior and performances are overdetermined—that is, that they are products of multiple, nonindependent factors whose influence depends in part on the fact that they *are* redundant—means that we will need to find new ways of construing and researching group phenomena. Even our most powerful multivariate models may not be of much help in sorting things out, because their assumptions risk being so substantially violated in such circumstances. What alternative analytic approaches can we develop that are more consistent with the reality that group behavior is shaped by multiple, redundant, and non-independent conditions?

Dealing with emergence and equifinality

Two concepts from systems theory—emergence and equifinality—are critical to any conditions-focused approach to understand group behavior and performance.

Emergence. Some group-level concepts, such as size, *exist* only at the collective level; group size has no meaning applied to single individuals. Other concepts describe phenomena that *emerge* from their components but that cannot be explained by them. To illustrate, consider odor, which is a property of certain molecules. Molecules can have odor, but atoms, from which molecules are composed, cannot. Another example is mind, which emerges from the biology of complex animals. Yet, another is group spirit, which emerges from the interactions among individual group members. In each of these cases, the process of emergence is lawful, but the dynamics of the emergent phenomenon cannot be explained solely with reference to their components' properties. Emergent phenomena must be studied in their own terms and at their own levels. We need to find ways of doing this analytically that take appropriate account of the emergent, self-organizing character of the group phenomena we seek to understand.

Equifinality. There are many different ways for a group to operate and still achieve its purposes, and there probably are even more ways for it to find its way to failure. Systems theorists call this aspect of organized endeavor "equifinality" (Katz & Kahn, 1978, p. 30). According to the principle of equifinality, a social system can reach the same outcome from various initial conditions and by a variety of means. Consistent with the position I have taken in this paper, groups for which the proper conditions are in place have ample latitude to develop and implement their own idiosyncratic ways of proceeding. There is no one right or best way to operate, nor is there any single cause of what transpires in the life of a group. Even groups that have very similar initial conditions can operate quite differently and still achieve equivalent outcomes.

As was the case for emergence, the question for scholars is how properly and informatively to develop conceptual and analytic models that allow us to learn more about how equifinality operates in groups. Without question, concepts such as emergence and equifinality are helpful in crafting *post hoc* explanations of what happened

DOI: 10.1002/job

in some group that interests us. But it remains unclear how these powerful systems theory concepts can be used to carry out real-time (let alone predictive) analyses of group dynamics. If a condition-focused approach is to be useful in understanding or intervening with groups, we must find a way to get analytic purchase on these concepts.

Bracketing group-level phenomena

It is generally accepted that any robust understanding of group behavior and performance requires attention to both the individual level of analysis (e.g., the attributes of members) and the contextual level (e.g., attributes of the organizational or cultural context within which the group operates). The challenge is to deal with cross-level influences in a way that treats them as part of the actual phenomena of group life, rather than as items on an ever-growing list of potential moderators.

Bracketing group-level phenomena with concepts from one level "up" and one level "down" is easier to advocate than to execute. How does one decide what constructs to assess at the higher and lower levels of analysis? Surely, explanations of group behavior can be substantially enriched by attending to factors at levels of analysis where sociologists and psychologists already have performed a great deal of conceptual and empirical works. But which sociological or psychological constructs should be used in bracketing analyses? The literature of organizational sociology is filled with constructs that deal with the properties of bureaucracies, network processes, authority and status structures, stratification, mobility regimes, and more. The literature of individual psychology has an abundance of constructs about human personality, skills and abilities, attitudes and beliefs, cognitive scripts and schemas, and more. Sociologists and psychologists developed these constructs to help answer some of the central questions of their fields. It would be surprising indeed if they turned out to be just what was needed for generating good explanations for group behavior.

What, then, is the alternative to importing constructs intact from adjacent fields of study? My preferred strategy is what I call "informed induction." This involves drawing upon all the information one can capture—qualitative and archival data as well as quantitative measures—to identify the structures and processes at adjacent levels that are most likely to shape, or be shaped by, the group-level phenomenon of interest. Informed induction can be quite challenging because it involves the use of research strategies and skills with which one may be unfamiliar or uncomfortable. To attend as intently to substantive phenomena as to one's abstract concepts and variables requires both personal immersion in the research setting and finely honed skills in inductive conceptualization.

Inductively developed constructs may, of course, turn out to be a poor choice, of little use in enriching understanding in a particular instance. Even then, however, one almost certainly will have learned more than would have resulted from merely dropping down to the individual level to pick up an off-the-shelf measure of the Big Five personality dimensions or stopping by the sociology literature to collect some standard measures of network properties. Using informed induction to identify functionally significant constructs at adjacent levels of analysis is to begin the process of bootstrapping to ever-better explanations of group phenomena.

Conclusion

As new forms of groups continue to proliferate, it may be a propitious time to rethink how we conceptualize, analyze, and work with them. We cannot now know about the attributes of new kinds of groups that one day will appear. Nor can we know in advance what we will need to do to understand the dynamics of those groups. Even now, however, there are signs that we may be on the cusp of a paradigm shift in how we conceptualize groups, in the ways we study them, and in how we help them achieve their purposes—the legs of the triangle with which I began this paper. My hope is that changing our focus from attempts to pinpoint the causes of group behavior and performance to analyses of the conditions within which groups chart their own courses may contribute in a modest way to the development of whatever new paradigm eventually emerges.

DOI: 10.1002/job

Acknowledgements

Portions of this article draw on or were adapted from Hackman (1985), Hackman (1987), Hackman (2003), Hackman (2011a,b), Hackman & Katz (2010), and Wageman, Fisher, & Hackman (2009).

Author biography

J. Richard Hackman is Edgar Pierce Professor of Social and Organizational Psychology at Harvard University. He received his doctorate in social psychology from the University of Illinois and taught at Yale for twenty years before moving to his present position. His most recent book is *Collaborative intelligence: Using teams to solve hard problems* (Berrett-Koehler, 2011).

References

Andrews, K. T., Ganz, M., Baggetta, M., Han, H., & Lin, C. (2010). Leadership, membership, and voice: Civic associations that work. *American Journal of Sociology*, *115*, 1191–1242.

Arber, A. (2007). "Plain talk" in hospice and palliative care team meetings: An ethnography. *International Journal of Nursing Studies*, *44*, 916–926.

Arrow, H. (2005). Chaos, complexity, and catastrophe: The nonlinear dynamics perspective. In S. A. Wheelan (Ed.), *The handbook of group research and practice* (pp. 201–220). Thousand Oaks, CA: Sage.

Arrow, H., McGrath, J. E., & Berdahl, J. L. (2000). *Small groups as complex systems*. Thousand Oaks, CA: Sage.

Bartunek, J. M., & Louis, M. R. (1996). *Insider/outsider team research*. Thousand Oaks, CA: Sage.

Behfar, K., Friedman, R. A., & Brett, J. M. (2008, November). The team negotiation challenge: Defining and managing the internal challenges of negotiating teams. Paper presented at the 21st Annual Conference of the International Association for Conflict Management, Chicago, IL.

Berg, D. N. (2005). Senior executive teams: Not what you think. *Consulting Psychology Journal*, *57*, 107–117.

Briner, R. B., & Rousseau, D. M. (2011). Evidence-based I/O psychology: Not there yet. *Industrial and Organizational Psychology*, *4*, 3–22.

Cheng, P. W., & Novick, L. R. (1991). Causes versus enabling conditions. *Cognition*, *40*, 83–120.

Cherns, A. (1976). The principles of sociotechnical design. *Human Relations*, *29*, 783–792.

Dess, G. G., Rasheed, A. M. A., McLaughlin, K. J., & Priem, R. L. (1995, August). The new corporate architecture. *The Academy of Management Executive*, 1–11.

Flight Safety Foundation. (August–November 2000). FSF ALAR briefing note 7.1—Stabilized approach. *Flight Safety Digest*, 133–138.

Gersick, C. J. G. (1988). Time and transition in work teams: Toward a new model of group development. *Academy of Management Journal*, *31*, 9–41.

Gersick, C. J. G. (1989). Marking time: Predictable transitions in task groups. *Academy of Management Journal*, *31*, 9–41.

Gigerenzer, G. (1999). Fast and frugal heuristics: The adaptive toolbox. In G. Gigerenzer, & P. M. Todd (Eds.), *Simple heuristics that make us smart* (pp. 3–34). New York, NY: Oxford University Press.

Ginnett, R. C. (1993). Crews as groups: Their formation and their leadership. In E. L. Wiener, B. G. Kanki, & R. L. Helmreich (Eds.), *Cockpit resource management* (pp. 71–98). Orlando, FL: Academic Press.

Goodman, P. S., & Leyden, D. P. (1991). Familiarity and group productivity. *Journal of Applied Psychology*, *76*, 578–586.

Hackman, J. R. (1968). Effects of task characteristics on group products. *Journal of Experimental Social Psychology*, *4*, 162–187.

Hackman, J. R. (1985). Doing research that makes a difference. In E. E. Lawler, A. M. Mohrman, S. A. Mohrman, G. E. Ledford, & T. G. Cummings (Eds.), *Doing research that is useful for theory and practice* (pp. 126–175). San Francisco, CA: Jossey-Bass.

Hackman, J. R. (1987). The design of work teams. In J. Lorsch (Ed.), *Handbook of organizational behavior* (pp. 315–342). Englewood Cliffs, NJ: Prentice-Hall.

Hackman, J. R. (2002). *Leading teams: Setting the stage for great performances*. Boston, MA: Harvard Business School Press.

DOI: 10.1002/job

Hackman, J. R. (2003). Learning more from crossing levels: Evidence from airplanes, orchestras, and hospitals. *Journal of Organizational Behavior*, *24*, 1–18.
Hackman, J. R. (2011a). *Collaborative intelligence: Using teams to solve hard problems*. San Francisco, CA: Berrett-Koehler.
Hackman, J. R. (2011b). Walking on three legs. In S. A. Mohrman, & E. E. Lawler, III (Eds.), *Useful research: Advancing theory and practice* (pp. 103–110). San Francisco, CA: Berrett-Koehler.
Hackman, J. R., & Edmondson, A. C. (2008). Groups as agents of change. In T. Cummings (Ed.), *Handbook of organization development* (pp. 167–186). Thousand Oaks, CA: Sage.
Hackman, J. R., & Katz, N. (2010). Group behavior and performance. In S. T. Fiske, D. T. Gilbert, & G. Lindzey (Eds.), *Handbook of social psychology* (5th ed., pp. 1208–1251). New York, NY: Wiley.
Hackman, J. R., & O'Connor, M. (2004). *What makes for a great analytic team? Individual vs. team approaches to intelligence analysis*. Washington, DC: Intelligence Science Board, Office of the Director of Central Intelligence.
Hackman, J. R., & Wageman, R. (2005a). A theory of team coaching. *Academy of Management Review*, *30*, 269–287.
Hackman, J. R., & Wageman, R. (2005b). When and how team leaders matter. *Research in Organizational Behavior*, *26*, 37–74.
Hansen, S., & Rennecker, J. (2010). Getting on the same page: Collective hermeneutics in a systems development team. *Information and Organization*, *20*, 44–63.
Herbst, P. G. (1974). *Sociotechnical design*. London: Tavistock.
Ilgen, D. R., Hollenbeck, J. R., Johnson, M., & Jundt, D. (2005). Teams in organizations: From input-process-output models to IMOI models. *Annual Review of Psychology*, *56*, 517–543.
Kaplan, R. E. (1979a). The conspicuous absence of evidence that process consultation enhances task performance. *Journal of Applied Behavioral Science*, *15*, 346–360.
Kaplan, R. E. (1979b). The utility of maintaining relationships openly: An experimental study. *Journal of Applied Behavioral Science*, *15*, 41–59.
Katz, D., & Kahn, R. L. (1978). *The social psychology of organizations*. New York, NY: Wiley.
Larson, J. R., & Christensen, C. (1993). Groups as problem-solving units: Toward a new meaning of social cognition. *British Journal of Social Psychology*, *32*, 5–30.
Lax, D. A., & Sebenius, J. K. (2006). *3-D negotiation*. Boston, MA: Harvard Business School Press.
Lewin, K., Lippitt, R., & White, R. K. (1939). Patterns of aggressive behavior in experimentally created 'social climates'. *Journal of Social Psychology*, *10*, 271–299.
Littlepage, G., Schmidt, G., Whisler, E., & Frost, A. (1995). An input-process-output analysis of influence and performance in problem-solving groups. *Journal of Personality and Social Psychology*, *69*, 877–889.
Maskin, E. S. (2008). Mechanism design: How to implement social goals. Nobel Memorial Prize Lecture, Stockholm.
McGrath, J. E. (1962). *Leadership behavior: Some requirements for leadership training*. Washington, DC: U.S. Civil Service Commission.
McGrath, J. E. (1964). *Social psychology: A brief introduction*. New York, NY: Holt.
McGrath, J. E., & Altman, I. (1966). *Small group research: A synthesis and critique of the field*. New York, NY: Holt.
McGrath, J. E., Arrow, H., & Berdahl, J. (2000). The study of groups: Past, present, and future. *Personality and Social Psychology Review*, *4*, 95–105.
Mesmer-Magnus, J. R., & DeChurch, L. A. (2009). Information sharing and team performance: A meta-analysis. *Journal of Applied Psychology*, *94*, 535–546.
Morris, C. G. (1966). Task effects on group interaction. *Journal of Personality and Social Psychology*, *4*, 545–554.
Mortensen, M. (2009). What is a team? The changing characteristics of teams and their effects on individual and team outcomes. Working Paper, Sloan School of Management, Massachusetts Institute of Technology.
Muller, D., Judd, C. M., & Yzerbyt, V. Y. (2005). When moderation is mediated and mediation is moderated. *Journal of Personality and Social Psychology*, *89*, 852–863.
O'Leary, M. B., & Cummings, J. N. (2007). The spatial, temporal, and configurational characteristics of geographic dispersion in teams. *MIS Quarterly*, *31*, 433–452.
Rosenberg, A. (2008). *Philosophy of social science*. Boulder, CO: Westview Press.
Seashore, S. (1954). *Group cohesiveness in the industrial work group*. Ann Arbor, MI: Institute for Social Research, University of Michigan.
Shirky, C. (2008). *Here comes everybody: The power of organizing without organizations*. New York, NY: Penguin.
Simon, H. A. (1990). Invariants of human behavior. *Annual Review of Psychology*, *41*, 1–19.
Tannenbaum, S. I., Mathieu, J. E., Salas, E., & Cohen, D. (in press). Teams are changing: Are research and practice evolving fast enough? *Industrial and Organizational Psychology*.
Tuckman, B. W. (1965). Developmental sequence in small groups. *Psychological Bulletin*, *63*, 384–399.
Wageman, R. (2001). How leaders foster self-managing team effectiveness: Design choices versus hands-on coaching. *Organization Science*, *12*, 559–577.

DOI: 10.1002/job

Wageman, R., Fisher, C. M., & Hackman, J. R. (2009). Leading teams when the time is right: Finding the best moments to act. *Organizational Dynamics*, *38*, 192–203.
Wageman, R., Nunes, D. A., Burruss, J. A., & Hackman, J. R. (2008). *Senior leadership teams: What it takes to make them great*. Boston, MA: Harvard Business School Press.
Walton, R. E. (1985). From control to commitment: Transforming workspace force management in the United States. In K. B. Clark, R. H. Hayes, & C. Lorenz (Eds.), *The uneasy alliance: Managing the productivity-technology dilemma* (pp. 237–265). Boston, MA: Harvard Business School Press.
Walton, R. E., & Hackman, J. R. (1986). Groups under contrasting management strategies. In P. S. Goodman (Ed.), *Designing effective work groups* (pp. 168–201). San Francisco, CA: Jossey-Bass.
Woodman, R. W., & Sherwood, J. J. (1980). The role of team development in organizational effectiveness: A critical review. *Psychological Bulletin*, *88*, 166–186.

DOI: 10.1002/job