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Review

# The functions and dysfunctions of hierarchy

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**Abstract**

Functionalist accounts of hierarchy, longstanding in the social sciences, have gained recent prominence in studies of leadership, power, and status. This chapter takes a critical look at a core implication of the functionalist perspective – namely, that steeper hierarchies help groups and organizations perform better than do flatter structures. We review previous research relevant to this question, ranging from studies of communication structures in small groups to studies of compensation systems in large corporations. This review finds that in contrast to strong functionalist assertions, the effects of steeper hierarchies are highly mixed. Sometimes steeper hierarchies benefit groups and sometimes they harm groups. We thus propose five conditions that moderate the effects of hierarchy steepness: (1) the kinds of tasks on which the group is working; (2) whether the right individuals have been selected as leaders; (3) how the possession of power modifies leaders' psychology; (4) whether the hierarchy facilitates or hampers intra-group coordination; and (5) whether the hierarchy affects group members' motivation in positive or deleterious ways.


*Keywords:* Hierarchy; Power; Status; Leadership; Groups; Performance; Satisfaction

**Contents**



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## 1. Introduction

In 1832, as Charles Darwin travelled through Tierra del Fuego on the southernmost tip of South America, he encountered a series of native tribes whose living conditions he described as ''wretched.'' Darwin knew of many impoverished societies but wrote that there, ''man exists in a lower state of improvement than in any other part of the world'' (1909, p. 184). He blamed their conditions squarely on the egalitarian nature of their tribes: ''The perfect equality among the individuals composing the Fuegian tribes must for a long time retard their civilization. As we see those animals, whose instinct compels them to live in society and obey a chief, are most capable of improvement, so is it with. . .mankind. In Tierra del Fuego, until some chief shall arise with power sufficient to secure any acquired advantage, such as the domesticated animals, it seems scarcely possible that the political state of the country can be improved'' (1909, p. 245).

Darwin's belief that hierarchies are necessary for groups to succeed pervades the social sciences. Functionalist theories of hierarchy have long been espoused in organizational behavior (Bavelas, 1950), psychology (Thibault & Kelley, 1959), sociology (Davis & Moore, 1945; Weber, 1947), and economics (Frank, 1985). And with evolutionary theory's growing influence in the social sciences (e.g., Simpson & Kenrick, 1997), functionalist models have gained particular prominence in recent work on leadership (Van Vugt, Hogan, & Kaiser, 2008), power (Magee & Galinsky, 2008), status (Anderson, Srivastava, Beer, Spataro, & Chatman, 2006), and dominance (Tiedens & Fragale, 2003).

But do hierarchies actually improve group functioning? At first blush, the ubiquity of hierarchy would seem to suggest the answer is ''yes.'' Many scholars have argued that hierarchies are a universal feature of all human groups, including organizations (Bernstein, 1981; Davis & Moore, 1945; Eibl-Eibesfeldt, 1989; Hogan, 1983; Leavitt, 2005; Magee & Galinsky, 2008; Mazur, 1973; Parsons, 1940; Schjelderup-Ebbe, 1935; Tannenbaum, Kavcic, Rosner, Vianello, & Wieser, 1974; Van Vugt et al., 2008). Thus, the pervasiveness of hierarchies alone would seem evidence of their efficacy. If different forms of social organization were more advantageous, groups would have adopted them long ago (Leavitt, 2005).

However, the direct test of the utility of hierarchies is not their frequency, but whether groups function better when they have a hierarchical structure than when they have a flat structure. Groups with a steeper hierarchy – that is, those with larger asymmetries in members' power, status, and influence – should exhibit higher levels of performance, cohesion, intra-group coordination, and lower levels of intra-group conflict, for example, than groups with a flatter structure.

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In the current chapter, we review empirical research on whether hierarchy steepness predicts better group functioning. As we summarize below, the empirical evidence refutes strong functionalist arguments and finds that the effects of hierarchy steepness are highly mixed across studies. Some studies show steeper hierarchies facilitate better group performance and intra-group coordination, yet many other studies (in fact, a larger number of studies) show that steeper hierarchies lead to worse group performance, lower motivation and satisfaction among members, and breakdowns in inter-member coordination. These mixed results are consistent with contingency theories of organizations, which argue that steeper hierarchies are not universally good or bad for organizations, but rather, their effects depend on a host of factors (e.g., Argyris, 1964; Burns & Stalker, 1961; Galbraith, 1973; Hage, 1965; Lawrence & Lorsch, 1967; Pugh, Hickson, Hinings, & Turner, 1969).

If the effects of hierarchy steepness are mixed, the critical question is *when* steeper hierarchies are helpful for group success and when they are harmful. That is, what conditions moderate the effects of hierarchy on group functioning? Previous scholars have proposed a few boundary conditions (e.g., Burns & Stalker, 1961), yet as we will discuss, these factors cannot account for a substantial number of empirical results. Therefore, this chapter also proposes a broader range of conditions that determine when steeper hierarchies help or harm group welfare. More specifically, these factors include the following:

1. *The type of task on which the group is working*. For example, steeper hierarchies will harm collective success when groups work on tasks that require a broad range of ideas and perspectives
2. *Whether the right individuals have been selected as leaders*. For example, steeper hierarchies will harm collective success when groups select leaders who are selfish, use biased decision-making processes, or use an autocratic leadership style
3. *How the possession of power affects leaders' psychology*. For example, steeper hierarchies will harm collective success when the possession of power induces leaders to be disinhibited and less sensitive to others' needs
4. *Whether the hierarchy impedes intra-group coordination*. For example, steeper hierarchies will harm collective success when the hierarchy impairs communication, trust, and coordination among group members
5. *Whether the hierarchy dampens group member attitudes and motivation*. For example, steeper hierarchies will harm collective success when the hierarchy lowers group members' motivation to perform

In sum, this chapter had two broad aims. First, we review the empirical research on the effects of hierarchy steepness. Then, finding that the results are mixed, we propose five factors that determine when hierarchies will help or harm group functioning. To set the stage for these two aims, we begin by first offering some definitional clarity and outlining the scope of our thesis. We also flesh out functionalist accounts of hierarchy and outline some of their major tenets.

## 2. Definitions and scope

Much attention has been given to the definition and conceptualization of hierarchy (Adams, 1953; Bales, Strodtbeck, Mills, & Roseborough, 1951; Benoit-Smullyan, 1944; Bernstein, 1981; Coie, Dodge, & Coppotelli, 1982; Davis, 1942; Ellis, 1993; Goldhamer & Shils, 1939; Gruenfeld & Tiedens, 2010; Lenski, 1954; Lukes, 1974; Magee & Galinsky, 2008; Ng, 1980; Parsons, 1940; Tannenbaum, 1962; Weber, 1947). Typically, hierarchy is defined as a rank ordering of individuals along one or more socially important dimensions (Gruenfeld & Tiedens, 2010; Magee & Galinsky, 2008; Parsons, 1940). Yet hierarchies come in many different forms. For example, group members can be rank ordered in terms of their power, or their ability to influence others (French & Raven, 1959); their status, or the respect and admiration they enjoy in the eyes of the group (Goldhamer & Shils, 1939); and their leadership, or the degree to which they use influence to attain shared goals (Bass, 2008; Van Vugt, 2006). Hierarchies can be formally delineated, as when power and authority are vested in some official positions more than others (Mills, 1956; Mintzberg, 1979; Tannenbaum, 1962), or they can emerge informally, as when differences in status and influence naturally develop among peers working together (Bales et al., 1951; Blau, 1964).

For the purposes of the current chapter, we focus less on the distinctions between different kinds of hierarchies and emphasize instead the consistent patterns that generalize across its various instantiations, sometimes considering differences in leadership, power, status, and rank as interchangeable. This is not meant to imply that differences between hierarchical forms are unimportant – far from it. There are sometimes substantive differences in the way

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power and status affect social, psychological, and organizational processes, for example (e.g., French & Raven, 1959; Henrich & Gil-White, 2001; Magee & Galinsky, 2008). However, functionalist theories of hierarchy offer highly similar claims about the benefits of hierarchy across its specific forms, and as we discuss below, the effects of steeper hierarchy tend to be similar across its different types.

Our focus throughout the chapter will be on work-related contexts, such as teams and organizations, but we will occasionally draw from findings in non-work-related contexts to generate hypotheses (e.g., social-living communities). Moreover, our focus will be on groups of at least three individuals because the hierarchical dynamics of dyads can be qualitatively different from those in groups (Ridgeway, 1984). For example, coalitions have an important impact on hierarchies (Keltner, Van Kleef, Chen, & Kraus, 2008), yet cannot develop in dyads (Moreland & Levine, 1999). For the sake of convenience, we will use the term ''group'' as an umbrella term that encompasses work groups ranging from small teams to large complex organizations. Again, this is not to imply that the differences between types of groups are unimportant; we simply wish to focus on consistent patterns of phenomena across group types.

## 3. Functionalist theories of hierarchy

Working in groups presents at least three major problems. First, because group members often disagree over the group's goals, the strategies to pursue those goals, and possible solutions to problems, groups must *make collective decisions* in a peaceful and efficient manner (e.g., Cartwright & Zander, 1953; Levine & Moreland, 1990; Van Vugt et al., 2008). Second, groups must *motivate members* to behave selflessly and contribute to the group's success, even when such behavior requires personal investment and sacrifice (e.g., Hardin, 1982; Kerr & Tindale, 2004; Latane, Williams, & Harkins, 1979; Willer, 2009). Third, groups must *coordinate individual behavior* so that members work in concert toward collective success; for example they must allocate tasks and responsibilities, maintain communication among members, and minimize intra-group conflict (e.g., Blau & Scott, 1962; Cartwright & Zander, 1953; Hinsz, Tindale, & Vollrath, 1997; Levine & Moreland, 1990). According to the functionalist perspective, hierarchies help groups solve each of these problems.

### 3.1. Collective decision-making

Hierarchies help groups solve the problem of collective decision-making by giving disproportionate control to one or few members (Van Vugt et al., 2008). Group leaders are given control over decisions and allowed to direct others' actions, whereas lower ranked individuals are expected to defer to others and keep their opinions to themselves (Bales et al., 1951; Berger, Rosenholtz, & Zelditch, 1980; Goffman, 1967; Keltner, Gruenfeld, & Anderson, 2003). This concentration of control at the top helps groups make decisions more efficiently and avoid conflict over control (Cartwright & Zander, 1953; Van Vugt et al., 2008).

Hierarchies are also thought to increase the quality of group decisions by giving disproportionate control to the most competent individuals. Decisions about a group's goals or strategies are often fraught with ambiguity and intimidating complexity. Competent individuals presumably will make better decisions for the group than would those with lesser or average acuity (Berger et al., 1980; Davis & Moore, 1945; Eibl-Eibesfeldt, 1989; Ridgeway & Diekema, 1989). Therefore, groups strive to put their most competent members in charge.

In support of these arguments, much research has shown that groups tend to give higher rank to members who exhibit superior abilities (for reviews, see Bass, 1981; Driskell & Mullen, 1990; Hollander & Julian, 1969; Mann, 1959). The specific abilities required to attain high rank can depend on the group's specific tasks (e.g., Anderson, Spataro, & Flynn, 2008; Hogan & Hogan, 1991), but in general individuals are given higher rank if they exhibit expertise related to the group's technical problems as well as social and leadership skills (Lord, 1985; Van Vugt, 2006). Moreover, studies have found that when a group's hierarchy is based on expertise it performs better (e.g., Anderson & Kilduff, 2009; Maier, 1967; Roby, Nicol, & Farrell, 1963), which supports the notion that meritocratic hierarchies promote group success.

### 3.2. Motivating members

To help overcome the second major challenge, that of motivating individual members to contribute to the group, hierarchies are thought to provide social, material, and psychological incentives (Barnard, 1964; Berger, Cohen, &

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Zelditch, 1972; Blau, 1964; Davis & Moore, 1945; Frank, 1985; Hardy & Van Vugt, 2006; Homans, 1950; Kanter, 1977; Keltner et al., 2008; Lambert, Larcker, & Weigelt, 1993; Lazear & Rosen, 1981; Pfeffer & Cohen, 1984; Tannenbaum et al., 1974; Thibault & Kelley, 1959; Van Emmerik, Lambooy, & Sanders, 2002; Willer, 2009). For example, high rank comes with greater respect and admiration, autonomy, power, social support, self-esteem, well-being, lower physiological stress, and material resources.

Groups allocate higher rank to members believed to contribute to the group's goals. Individuals perceived as making important contributions are granted higher rank, whereas those believed to be making fewer contributions, or even to be undermining a group's success, are assigned lower rank. Valued contributions can take several forms, such as expending effort for the group or providing expertise to fellow members. By rewarding group-oriented behavior, hierarchies compel individual members to work toward the group's goals, which facilitates collective success.

As supportive evidence of this idea, studies have consistently found that groups give higher rank to members who make more sacrifices for the group (Blau, 1964; Flynn, Reagans, Amanatullah, & Ames, 2006; Ridgeway & Diekema, 1989; Hardy & Van Vugt, 2006; Willer, 2009). In contrast, individuals who are perceived as acting in ways that are selfish and harmful to the group are given lower rank (Anderson, Ames, & Gosling, 2008; Anderson et al., 2006; Blau, 1964; Homans, 1950; Ridgeway & Diekema, 1989; Roethlisberger & Dickson, 1939). Additionally, recent work has shown that providing individuals higher status motivates them to act more selflessly (Willer, 2009).

### 3.3. Intra-group coordination

Finally, hierarchies are thought to help groups address the third major challenge, that of intra-group coordination, by reducing conflict and facilitating communication. As previously mentioned, hierarchies putatively facilitate an orderly division of resources and influence among group members, using such means as allowing or denying different individuals access to resources and the rights to perform certain behaviors (Barnard, 1964; Berger et al., 1980; Chance, 1967; Durkheim, 1893/1997; Katz & Kahn, 1966; Keltner et al., 2008; Leavitt, 2005; Magee & Galinsky, 2008; Marx, 1844/1964; Mintzberg, 1983; Parsons, 1961; Tiedens, Unzetta, & Young, 2007). Differential allocation of responsibilities and control helps mitigate the common problem of having ''too many cooks in the kitchen,'' wherein too many individuals desire access to the scarce resource of leadership.

Hierarchies are also thought to allow information to flow between members more efficiently and for the integration of this information to occur more easily (Arrow, 1974; Bavelas, 1950; Leavitt, 2005; Scott, 1998; Vroom, 1969; Williamson, 1975). For example, in the prototypical pyramid hierarchy, information travels up through hierarchical levels until it reaches group leaders. The leaders integrate this diverse information and make the relevant decisions. Their decisions then flow down to each respective hierarchical level and get implemented according to leaders' plans.

Research has shown that group members perceive differences in influence and control among their members very clearly and with high consensus (Kenny, Horner, Kashy, & Chu, 1992; Sherif, White, & Harvey, 1955; Tannenbaum, 1968; Thibault & Kelley, 1959). In fact, group members even accurately perceive their own rank within the informal, implicit hierarchies that emerge in small groups – in spite of the psychological benefits that positive illusions about one's rank might provide (Anderson, Ames, et al., 2008; Anderson et al., 2006). Moreover, research has shown that when group members disagree about their relative rank in the group hierarchy the group suffers from higher levels of conflict (Anderson, Ames, et al., 2008; Anderson et al., 2006; Bendersky and Hays, in press; Kilduff & Anderson, 2010). And dyad members who exhibit complementary behavior, wherein one behaves dominantly and the other submissively, like each other more and engage in smoother interactions (Tiedens & Fragale, 2003).

## 4. Do steeper hierarchies help groups function better? A Review of the empirical research

As just described, research has supported many corollaries of the functionalist perspective of hierarchies. For example, groups give higher rank to individuals who contribute more, which supports the argument that steeper hierarchies incentivize self-sacrifice. However, a more direct test of functionalism is whether groups with more hierarchical structures actually function better than groups with flatter structures. Even if more hierarchical groups reward members who contribute more with higher rank, this does not necessarily mean that more hierarchical groups tend to outperform flatter groups. Flatter groups might outperform even the most merit-based group that has a steeper hierarchy.

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In this section we review empirical studies that directly assessed whether more hierarchical groups function better than flatter groups. Though there have been previous reviews of a similar kind that focused on the effects of hierarchy steepness, each limited its scope to only one or a few domains of the literature. For example, Shaw (1964) focused on the effects of communication networks only; Porter and Lawler (1965) and Berger and Cummings (1979) focused on the effects of tallness, span of control, and centralization, but no other forms of hierarchy; and Gerhart and Rynes (2003) focused only on the effects of compensation hierarchies. None of these reviews attempted to synthesize the broader range of hierarchy literatures. There have also been excellent reviews of the hierarchy literature more recently (Gruenfeld & Tiedens, 2010; Keltner et al., 2008; Magee & Galinsky, 2008), though these did not focus primarily on the effects of hierarchy on group and organizational functioning.

For this review, we focused on studies that have made inter-group comparisons, or assessed differences across groups in their functioning. In contrast, studies that have compared high- to low-ranking members within the same group are not appropriate because they do not address whether more hierarchical groups function better than flatter groups. High-ranking group members might exhibit higher levels of motivation than lower-ranking group members (e.g., Tannenbaum et al., 1974), but this does not mean that steeper hierarchies increase motivation in groups as a whole.

Furthermore, as much as possible, it we focused on studies that have assessed the impact of steeper hierarchies on group-wide outcomes, such as group performance or average levels of satisfaction across all members. In contrast, previous literature reviews have included studies that examined only a subset of group members, which can provide a distorted picture. For example, if high-ranking members were found to be more satisfied in more hierarchical groups than in flatter groups (El Salmi & Cummings, 1968), this might seem to imply that steeper hierarchies promote greater satisfaction. But lower-ranking members might be less satisfied in hierarchical groups than in flatter groups, which could bring the overall average below that found in flatter groups. Therefore, one must consider the impact of steeper hierarchies on all group members, not just a subset.[1]

There are many literatures relevant to the effects of hierarchy steepness we did not review here. Classic organizational research on contingency theory has examined whether various organizational forms developed out of responses to environmental changes, such as increased uncertainty in the industry (e.g., Burns & Stalker, 1961; Emery & Trist, 1965; Lawrence & Lorsch, 1967; Woodward, 1965). While we were inspired by this work and build from it later in the chapter, we did not include it in this empirical review because those studies did not directly assess the effects of an organization's hierarchical structure on its effectiveness. While becoming flatter in response to heightened uncertainty in the environment might imply that flatness benefits organizations in such conditions, this evidence is indirect.

Similarly, the literatures on organizational voice (Kish-Gephart, Detert, Trevino, & Edmondson, 2009), empowerment (Conger & Kanungo, 1988), and leadership styles (Lewin, Lippitt, & White, 1939), were not included because they do not typically address whether the steepness of a group's hierarchy affects group functioning on the whole. For example, lower-ranking employees who feel more empowered might perform better, but that does not necessarily mean that empowerment benefits organization-level performance.

Within these scope conditions, we drew from three empirical literatures: laboratory studies of structure within smaller groups and teams, field studies of organizational structure, and field studies of organizational compensation systems. We review these three literatures in turn; when reviewing each, we broke up the studies according to whether they focused on performance-related and attitude-related (e.g., satisfaction, motivation) outcomes, because the two types of outcomes exhibit a very different pattern of results from each other.

### *4.1. Laboratory studies of more hierarchical vs. flatter groups*

#### *4.1.1. Performance*

The classic laboratory studies of communication structure by Bavelas and colleagues were among the first to empirically examine the effects of hierarchy steepness on group performance (e.g., Bavelas, 1950; Leavitt, 1951;

[1] A few studies we review focus on slices of organizations (e.g., teachers, middle managers). However, we included these studies when they assessed workers at different levels in the hierarchy and still found similar results – thus lending confidence that the findings generalized to all members of the group.

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Christie, Luce, & Macy, 1952). These studies experimentally manipulated the communication channels between different group members while they worked on a joint task, allowing some members to directly communicate with each other while precluding others from communicating. For example, in a four-person group with a ''wheel'' structure, one person was allowed communicate with all others, whereas all other members could communicate only with this central person, and all messages thus had to flow through that central person. In contrast, in a ''comcon'' configuration, all members could communicate with each other, and a priori, no member was more central in the communication flow than any other.

These different communication structures determined the steepness of the group's hierarchy (e.g., Bavelas, 1950; Leavitt, 1951; Shaw, 1954). Structures such as the wheel tended to have a more hierarchical structure, with the central members receiving more leadership nominations and having more control over the decisions made by the group (Mulder, 1960). In contrast, structures such as comcon had flatter hierarchies with a more equal distribution of leadership nominations.

Shaw (1964) reviewed the results of these studies and found that sometimes more centralized communication structures led to higher performance than less centralized communication structures, and sometimes to lower performance. For example, of the 36 relationships he tallied between centralization and the speed with which the group solved its problem (faster times indicating better performance), more centralized structures led to faster problem solving in 14 instances, and slower problem solving in 22 instances. Of the 20 relationships he reviewed between centralization and the number of errors made by the group, more centralized structures led to more errors in 6 instances, fewer errors in 10 instances, and centralization had no effect in four instances.

Moreover, Shaw (1964) found that the effects of centralization depended on the complexity of the group's task. For example, in one commonly used simple task, members were each given a card containing a number of symbols such as an asterisk, a square, and a diamond. Only one symbol appeared on all members' cards, and the group's task was to identify which symbol all members shared in common. More complex group tasks included math questions or sentence-construction problems. When groups worked on simple tasks, more centralized structures were clearly advantageous, leading to faster solutions 78% of the time and to fewer errors 90% of the time. In contrast, when groups worked on more complex tasks, less centralized structures led to faster solutions 100% of the time and to fewer errors 60% of the time.

A related line of laboratory studies manipulated or measured hierarchy steepness more directly by focusing on leadership structures. These studies, even though they used a very different methodology, also found mixed results. A few studies found positive relations between hierarchy steepness and group performance. For example, Carzo and Yanouzas (1969) examined 15-person groups who estimated how much demand there would be of a product in various markets and thus how much of that product they should order from suppliers. They found that groups performed better in a taller (3-level) than in a flatter (2-level) hierarchy. Maier and Solem (1952) found that groups working on a math task performed better when they had a leader than when they did not. However, this effect must be qualified because leaders were specifically instructed to encourage participation, to avoid expressing their own views, and to accept the views expressed. Therefore, it is unclear whether the findings are due to hierarchy steepness or due to the effects of highly democratic leaders.

Other studies found negative association between hierarchy steepness and group performance. Torrance (1955) examined three-person Air Force flight crews and found ''real'' crews (that had been actually working together for a long time) performed worse on a math task than crews of strangers that were constructed temporarily for the sake of the experiment – and that this effect emerged because the real crews were more hierarchical than the temporary crews. For example, when lower ranked members of real crews knew the correct answer to the problem they were less able to convince the others to accept it.

Roby et al. (1963) manipulated whether or not groups had an appointed leader while they worked on a simple task involving flipping switches in response to display lights. They found overall that the effect of hierarchy steepness on group performance (i.e., the speed with which they solved problems) depended on whether group members had to coordinate with each other or not, and whether a competent or incompetent person was appointed leader. However, their means suggest that egalitarian groups outperformed hierarchical groups in all conditions except one: when the group worked on a task that required more coordination and when there was a highly competent person in charge.

Becker and Blaloff (1969) also manipulated whether three-person groups had an appointed leader or not and had them perform a task involving estimating the demand for products based on a series of dimensions. They found that more hierarchical groups performed worse than flatter groups. And Berdahl and Anderson (2005) measured the degree

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to which undergraduate student teams who worked in a group project together naturally formed more centralized leadership structures (i.e., leaders with more control over group activities), and found that more centralized groups performed worse on the team project and received lower project grades.

Finally, some studies found null effects of hierarchy steepness. McCurdy and Lambert (1952), as well as McCurdy and Eber (1953) manipulated whether groups had an appointed leader or not when they worked on a light-switching task in which subjects were asked to turn a switch as fast as possible when given the signal. They found no differences in performance between groups in which one member was appointed the leader, and groups in which all three members presumably had equal influence. Haslam et al. (1998) assigned leaders in groups based on their scores on a leadership survey and had them work on a Desert Survival problem. They found that groups with leaders did not perform better than leaderless groups. Curiously, groups in which a leader was randomly assigned outperformed both of those kinds of groups. Similarly, Blinder and Morgan (2007) found that groups with leaders appointed based on their pre-test scores of task ability did not outperform groups without leaders in a monetary policy task.

#### 4.1.2. Attitude-related outcomes

While the results summarized above were mixed regarding the effects of steeper hierarchy on performance, studies have been highly consistent regarding the effects of steeper hierarchy on members' attitudes: namely, steeper hierarchies predict worse attitudes. In Shaw's (1964) review of the communication structure studies, he found that in 89% of the relationships he reviewed, there was a negative effect of hierarchy steepness on member satisfaction. And, in contrast to the effects on performance, this effect was not moderated by the complexity of the group task.

Becker and Blaloff's (1969) aforementioned research found that groups working in a hierarchical structure were more frustrated than groups working in egalitarian structures. In Pierce, Gardner, Cummings, and Dunham (1989), managers worked on organization simulation tasks in which their company was more or less hierarchical. In the more hierarchical organization, individuals had lower levels of organization-based self-esteem. Only one study found a null effect: O'Connell, Cummings, and Huber (1976) did not find any differences in tension (or stress) between groups that were given an appointed leader and those that were not. No studies found a positive link between hierarchy steepness and member attitudes.

### 4.2. Field studies of more hierarchical vs. flatter organizations

The degree to which an organization adopts a more hierarchical structure can be measured in a number of ways. For example, the *tallness* of an organization refers to the number of levels in its formal organizational hierarchy (Dalton, Todor, Spendolini, Fielding, & Porter, 1980; Hall & Tolbert, 2005; Porter & Lawler, 1965). *Span of control* refers to the number of subordinates who report directly to the same supervisor (Urwick, 1956). Tallness and span of control are inversely related, in that controlling for the number of employees in a company, relatively tall structures (with more hierarchical levels) must have a narrower average span of control (Dalton et al., 1980; Simon, 1947; Urwick, 1956). *Centralization* refers to the degree to which decisions are made by fewer individuals who are higher in the hierarchy rather than by a wider group of employees throughout the organization (e.g., Hage, 1965; Scott, 1998; Tannenbaum et al., 1974). We review studies here that examined any of these three instantiations of hierarchy.

#### 4.2.1. Performance

The empirical evidence does not support the classic argument that managers should have a span of control of less than 7 employees (Urwick, 1956). In terms of performance outcomes, most field studies have observed null or equivocal results of tallness and span of control. A large-scale study of a major branch of a national manufacturing organization that involved nearly 25,000 participants did not find a single positive correlation between organizational tallness and performance outcomes (e.g., earnings; Ronan & Prien, 1973). Similarly, a study of 704 research physiologists who were members of institutes or other research organizations (Meltzer & Salter, 1962) also found no evidence that tallness benefited performance (i.e., the number of scientific papers published); when taking into account organizational size, the only significant relation between tallness and performance was curvilinear. Leonard (1990) also did not find clear evidence for the benefits of tallness in a study of 80 large U.S. companies; controlling for the total number of employees, the number of levels of management in an organization did not predict its return on equity (ROE), though he did find that firms with more hierarchical structures had less of a decline on ROE than flatter firms.

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The one field study that observed a significant main effect found that steeper hierarchies predicted worse performance. Specifically, Ivancevich and Donnelly (1975) examined 295 salespeople in marketing departments of three large organizations and found that those working in a taller organization performed worse (i.e., received fewer orders per client visited) than those working in a flatter organization.

Studies of centralization have tended to find more centralization to be associated with poorer performance. Studies by Tannenbaum and colleagues (Smith & Tannenbaum, 1963; Tannenbaum, 1961) found that more centralized chapters of the League of Women voters were less effective (e.g., had less of an impact on their community) compared to more decentralized, democratic chapters. Ouchi's (2006) study of school districts found that decentralized districts that gave more power to principals and less to superintendents performed better (e.g., students in those districts had higher test scores).

#### 4.2.2. Attitude-related outcomes

Similar to laboratory research summarized above, field studies of organizations have consistently found negative effects of steeper hierarchies on attitude-related outcomes. In the aforementioned study of physiologists, Meltzer and Salter (1962) found that tallness was related to lower job satisfaction and this relationship emerged across organizations of different sizes.[2] Smith and Tannenbaum (1963) found that more decentralized chapters of the League of Women Voters had higher member loyalty; they also found that more decentralized decision-making in divisions of a delivery company predicted better morale. In a study of 2976 managers outside the United States, Porter and Siegel (1965) found that employees of taller organizations were less satisfied than those in flatter organizations. Carpenter's (1971) study of schoolteachers found that teachers were less satisfied when working in a taller organizational structure; in particular they reported lower satisfaction with their autonomy and authority levels. Tannenbaum et al. (1974) found that organizations that were less centralized had higher worker motivation; though this effect did not extend to satisfaction. Ivancevich and Donnelly's (1975) study of salespersons found that working for a taller organization was related to being less satisfied and experiencing more anxiety and stress than working for a flatter organization.

One study obtained mixed findings: In a study of 1913 U.S. managers, Porter and Lawler (1964) reported that taller structures predicted greater need satisfaction for larger companies (5000 employees or more) but flatter structures predicted greater need satisfaction in smaller companies (less than 5000 employees). However, given that the interaction between tallness and size was not replicated in Porter and Siegel's (1965) aforementioned study that used the same methods and measures, this finding is not conclusive.

### 4.3. Field studies of dispersed vs. compressed compensation systems

Finally, we turn to the literature on pay dispersion among organization members. Income disparity is obviously a form of hierarchy (Keltner et al., 2003; Marmot, 2004; Ng, 1980; Weber, 1947) and pay differences are often a sign of asymmetries in status and power as well (Bloom & Michel, 2002; Davis & Moore, 1945; Desai, Brief, & George, 2010; Frank, 1985). For example, individuals use their relative pay as a sign of how respected and valued they are relative to co-workers – and thus as a sign of where they fall in the status hierarchy (Desai et al., 2010).[3]

#### 4.3.1. Performance

A study of 102 business units in 41 corporations found that greater discrepancies in pay between top management and lower-level employees predicted lower product quality (Cowherd & Levine, 1992). Hambrick and D'Aveni (1992) compared companies that went bankrupt to a matched sample and found that in the years leading up to the bankruptcy,

[2] Porter and Lawler (1964), and thus others (e.g., Carpenter, 1971), erroneously characterized Meltzer and Salter's findings as non-significant because once the significant main effect of tallness is broken down by organization size, the simple effects within each size are non-significant. However, the negative effect of tallness remains throughout each category of organization size; the non-significance is likely due to the small sample size in each category. Therefore, we interpret the findings as strong evidence that tallness negatively predicted satisfaction – not as evidence that the findings are non-significant.

[3] We did not include in this summary research on tournaments within professional sports such as golf or racing (e.g., Becker & Huselid, 1992; Ehrenberg & Bognanno, 1990) because those were outside the scope of more typical organizational forms. For example, it is unclear how competitors might "cooperate" during a race to increase the organization's (e.g., NASCAR's) success. Also, we did not find any laboratory studies that examined the effects of pay structures on group functioning.

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the companies that eventually went bankrupt had greater discrepancies between CEO pay and the rest of the top management team. Pfeffer and Langton's (1993) study of nearly 20,000 faculty members in 600 different academic departments found that greater wage dispersions within academic departments predicted lower levels of productivity (i.e., research publications). And Bloom (1999) found that greater pay disparities within major league baseball teams predicted poorer player and team performance. Thus, players on teams who had greater pay dispersion performed more poorly as individuals, as did their teams as a whole. Interestingly, greater pay dispersion hurt players' individual performance even when they were at the top of their team's pay scale. Finally, Carpenter and Sanders (2002) found that the more the top management team's pay was similar to the CEO's and aligned with the complexity of their responsibilities, the better the firm performed (i.e., had higher return on assets in subsequent years). Thus, firms performed worse when the CEO's pay was much higher than that of the top management team.

A few studies found null or mixed results. In Leonard's (1990) study, he found no relationship between pay disparity across the executive rank and organizational performance (ROE). Shaw, Gupta, and Delery (2002) examined the effect of pay dispersion among truckers and also among employees of concrete pipe plants, and found a mix of results suggesting that in almost all conditions pay dispersion harmed performance (varying by degree). They found pay dispersion predicted better performance only when employees worked completely separately and there was an incentive structure in place. However, even this effect did not hold up for rated job performance, so its robustness is unclear. Brown, Sturman, and Simmering (2003) examined pay dispersion in hospitals and found no effect on performance (e.g., patient care outcomes), though the results trended in the direction of a negative effect. Siegel and Hambrick (2005) examined dispersion within top management team pay and found strong negative effects for firms characterized as high in "technological intensity," whose work is more collaborative and interdependent, but null effects on performance for firms low in technological intensity.

Finally, two studies found evidence for positive effects of pay dispersion on performance. Main, O'Reilly, and Wade (1993) found a positive relation between pay disparity within executive teams and firm performance. And an unpublished study by Halevy, Chou, Galinsky, and Murnighan (2010) found that pay disparities among members of professional basketball teams predicted winning percentages and a host of individual-level performance metrics (e.g., assists, defensive rebounds, field goal percentages).

#### *4.3.2. Attitude-related outcomes*

The study described above by Pfeffer and Langton (1993) found that greater wage disparities among faculty members of the same academic department strongly predicted lower overall satisfaction and lower levels of collaboration among faculty members. This effect was mitigated when wages were more closely associated with merit (e.g., research productivity), but the effects of wage disparity were still negative in more meritocratic departments. Trevor and Wazeter (2006) examined approximately 2000 public school teachers and found that greater pay disparities within school districts were related to greater feelings of unfairness with regard to pay.

Turnover is another sign of low job satisfaction, as employees who are less satisfied with their jobs are far more likely to leave the organization (for a review, see Griffeth, Hom, & Gaertner, 2000). A study by Bloom and Michel (2002) examined two data sets with a total of 460 and 274 organizations, respectively, and found that firms with higher compensation dispersion among senior-level managers had lower managerial tenure and higher turnover. Similarly, Wade, O'Reilly, and Pollock (2006) examined 122 publicly held firms over a five-year period and found that greater pay dispersion among the top management ranks predicted higher turnover. However, Pfeffer and Davis-Blake (1992) found no overall effect of salary dispersion within academic departments and turnover, though there was higher turnover among those at lower levels of pay. Of course, for some firms, higher turnover is an explicit goal of the hierarchical compensation system; by paying low-performing performers so little, you increase their chances of leaving (Lazear & Rosen, 1981).

### *4.4. Summary of the empirical evidence*

In light of the empirical evidence reviewed above, the answer to the question of whether steeper hierarchies help groups function better is: "it depends." First, it depends on the outcome under consideration. In terms of attitude-related outcomes such as satisfaction or commitment to the group, the evidence was robust. Taller hierarchical structures almost always predicted worse attitude-related outcomes. Groups and organizations with steeper hierarchies tended to have members who were less satisfied, less motivated, and more inclined to leave the group.

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With regard to group performance, the evidence was much more mixed. Laboratory studies of small groups and teams as well as field studies of organizational structure and compensation systems showed that sometimes steeper hierarchies help groups perform better and sometimes they do not. Sometimes flatter, more egalitarian structures were better for group and organizational performance.

Given the consistent negative relation found between hierarchy steepness and attitude-related outcomes, and the highly mixed findings on performance, it is reasonable to conclude that strong functionalist arguments were not supported by the data. More hierarchical groups did not uniformly function better than flatter groups. In fact, not only did more hierarchical groups often fail to outperform flatter groups (which would have been demonstrated by null effects) – they often performed *worse* than flatter groups. This suggests that flatter structures are often more advantageous for group and organizational success.

Indeed, the performance-related evidence supports not functionalist theories of hierarchy but contingency theories of organizations (e.g., Argyris, 1964; Blau & Scott, 1962; Burns & Stalker, 1961; Duncan, 1973; Hage, 1965; Hall & Tolbert, 2005; Katz & Kahn, 1966; Lawrence & Lorsch, 1967; Pugh et al., 1969; Woodward, 1958). Contingency theories propose that different types of organizational structures are appropriate for different kinds of situations, and therefore steeper hierarchies will sometimes benefit groups and sometimes flatter structures will be better. No form of organizational structure is best for all groups. It depends on the group's tasks, industry, and environment, as well as many other factors. We thus turn to those theories in the next section.

## 5. Prior contingency theories of hierarchy

Given the highly mixed effects of hierarchy steepness on performance, a critical question is *when* steeper hierarchies will benefit performance and when they will harm it. Contingency theories of organizations have long proposed many different factors that moderate the effects of organizational structure. For example, scholars have argued that the effects of steeper hierarchies will depend on whether the group operates in a stable vs. changing environment (Aldrich, 1979; Argyris, 1964; Barnard, 1964; Burns & Stalker, 1961; Chandler, 1962; Duncan, 1973; Hage, 1965; Katz & Kahn, 1966; Lawrence & Lorsch, 1967); whether the speed with which the group completes its tasks is critical to its success (Argyris, 1964; Blau & Scott, 1962; Duncan, 1973; Katz & Kahn, 1966); whether the group's tasks are routine or complex and ambiguous (Argyris, 1964; Blau & Scott, 1962; Christie et al., 1952; Duncan, 1973; Hall & Tolbert, 2005; Katz & Kahn, 1966; Shaw, 1954); and whether task solutions require creativity and innovation or not (Burns & Stalker, 1961; Katz & Kahn, 1966; Scott, 1998).

As some have pointed out, many of these moderating factors cluster together (Burns & Stalker, 1961; Lawrence & Lorsch, 1967). For example, groups and organizations that operate in consistently changing environments are typically confronted with more complex and ambiguous tasks; complex and ambiguous tasks often require more creativity and innovation. Therefore, in general, contingency theorists have argued that steeper hierarchies are more helpful in stable, simple, less ambiguous conditions that require little creativity, whereas flatter structures are better for changing, complex, more ambiguous conditions that require a lot of creativity (Argyris, 1964; Burns & Stalker, 1961; Duncan, 1973; Hage, 1965; Katz & Kahn, 1966; Lawrence & Lorsch, 1967).

However, these clusters of environmental conditions do not account for many of the empirical findings we reviewed. For example, as we discuss below, in some studies the effects of hierarchy steepness depended not on the group's task or environment but on the qualities of the individuals in charge (Maier, 1967; Roby et al., 1963). Moreover, some studies found different effects of hierarchy steepness across companies in the same industry that work on the same tasks and in the same external environment (e.g., Shaw et al., 2002). What is needed, therefore, is a framework that might help synthesize some of the previous empirical results more thoroughly. We next outline such a framework, building from classic contingency theory but also extending beyond it.

## 6. What moderates the effect of hierarchy steepness? Five possible conditions

In this section we propose five factors that are likely to moderate the effects of hierarchy steepness on group functioning: (1) the type of task on which the group is working, (2) the group's ability to select the right leaders, (3) whether the possession of power modifies leaders' psychology in positive or deleterious ways, (4) the effects of the hierarchy steepness on intra-group coordination, and (5) the effects of the hierarchy steepness on member motivation to contribute to the group. We focus on these factors because, as we describe, they are likely to determine whether

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hierarchies help groups overcome the three fundamental challenges outlined at the chapter's outset: collective decision-making, motivating group members, and coordinating group member behavior.

In proposing these five moderating conditions, we discuss how they might not only shape the effects of hierarchy steepness on performance outcomes but attitude-related outcomes as well. Although prior results have consistently shown that steeper hierarchies tend to worsen group member attitudes, it is still possible that steeper hierarchies, under the right conditions, might lead to more positive attitude-related outcomes.

### 6.1. The type of task

A core feature of a group hierarchy is that some members have more control than others. Individuals at the top have disproportionate influence over the group's processes, decisions, and ultimately, its outcomes. How disproportionate can this influence be? Bales' classic studies of small groups found that the top-ranking group members spoke 15 times more frequently than the lowest-ranking group members and nearly five times more than the next highest-ranking members (Bales et al., 1951). Buzaglo and Wheelan (1999) found that higher-ranking members of a team in a health services organization (e.g., physicians) dominated discussions for more than 75% of the time, even though they represented only 30% of the team's membership. Our own studies of teams working on math problems found that 94% of the time, teams chose the first proposal offered by any member as their final answer – and that the two top-ranking members were nearly three times more likely to provide the first proposal than anyone else (Anderson & Kilduff, 2009).

According to functionalist theories, this concentration of influence at the top benefits groups. Those at the top are more competent, and more competent individuals presumably make better decisions. By giving higher rank to the most competent individuals, groups increase the chances that the right decisions will be made (e.g., Davis & Moore, 1945; Eibl-Eibesfeldt, 1989).

But is the hierarchical approach to decision-making always superior? We suggest that the answer to this question depends in part on the type of tasks on which the group is working. Many scholars have made distinctions between the various tasks on which small groups or organizations work. For example, small groups researchers have distinguished between tasks according to the relation between the group and its task, whether there is one correct answer or not, how the outputs of group members are combined, and so forth (Davis, Laughlin, & Komorita, 1976; Hackman, 1968; McGrath, 1984). Similarly, as just described, contingency theorists have distinguished between routine vs. non-routine tasks, the degree of creativity required in the task, and whether the task is relatively clear or ambiguous (Argyris, 1964; Katz & Kahn, 1966; Lawrence & Lorsch, 1967).

In general, we argue that when groups or organizations work on tasks in which it is advantageous to give disproportionate control to the most expert members, steeper hierarchical structures will be better. However, when groups work on tasks that benefit from a broader range of opinions and perspectives, flatter structures should be more advantageous (e.g., see Hill, 1982).

Research on collective decision-making shows why for many tasks, a more decentralized, egalitarian approach to decisions can lead to better judgments. Since the 1920's, studies on combined forecasts (Clemen, 1989), aggregate judgments (Gordon, 1924), and the averaging principle (Larrick & Soll, 2006), have demonstrated how aggregating judgments across individuals, even through simple mathematical averaging, can provide highly accurate answers to problems (for reviews, see Armstrong, 2001; Clemen, 1989). In fact, the average of all group members' judgments can sometimes provide more accurate answers than the judgments of the group's most expert members. This collective approach to decision-making was popularized in Surowiecki's (2004) book, *The Wisdom of Crowds*.

Larrick and Soll (2006) succinctly illustrated one primary reason why aggregation can be so effective: "Imagine two people forecasting the high temperature in Honolulu tomorrow, which turns out to be 73. If they guess 60 and 70 they miss by 13 and 3, respectively, or 8 on average. The average guess, 65, also misses by 8. Here, the average estimate performs equally well as the average judge. Now imagine they guess 60 and 80, so that the two estimates 'bracket' the truth. In this instance, their guesses miss by 13 and 7, or 10 on average. But the average guess of 70 misses by only 3. Averaging outperforms the average individual (and, in this case, happens to outperform both individuals)." They write that over multiple judgments, if there is at least one instance of bracketing, the error that emerges from averaging is less than the error of the average individual. Therefore, combining judgments in a more democratic fashion can be effective largely because the aggregation of imperfect judgments reduces error.

The empirical literature provides many examples of the benefits of aggregation. Famously, Sir Francis Galton (1907) examined a weight-guessing competition at the West of England Fat Stock and Poultry Exhibition in which 787

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entrants tried to guess the weight of a 1998-lb. ox (after being dressed). The average guess was 1207, only 9 pounds off. Batchelor and Dua (1995) were able to reduce the error of economists' forecasts of various economic variables (e.g., GNP, inflation) by 16.4% simply by combining 10 economists' forecasts together. Winkler and Poses (1993) examined physicians' predictions of survival for patients in an intensive care unit and found that errors in predictions dropped by 12% when they combined all judgments together (as compared to combining the judgments, of say, the senior physicians only). Even when groups work on divergent thinking tasks that require creativity and innovation, aggregating multiple group members' perspectives leads to better performance (De Dreu & West, 2001; Nemeth, 1986).

These findings suggest that flatter structures should be advantageous for tasks that benefit from the aggregation of opinions and ideas. Flatter groups by definition allow a wider range of group members to contribute to the decision-making process and thus would better leverage the power of aggregation. Hierarchies, on the other hand, give control over the group to those at the top and rely more heavily on their perspectives and opinions.

One might argue that hierarchical groups often use aggregation, but typically in the form of a weighted-average approach. That is, the opinions and ideas of individuals lower in the hierarchy are often solicited, as in a team brainstorming session, but the judgments of those at the top are given more weight. Moreover, this differential weighting might seem more optimal than simple averaging, given that those at the top are assumed to have greater expertise.

However, research suggests that even a weighted-average approach often fails compared to more democratic averaging. First, in many cases, expertise does not facilitate more accurate judgments (Armstrong, 2001). For example, Winkler (1967) found that in forecasting the outcomes of football games, weighting judges' estimates according to their past success (a common indicator of expertise) or their self-perceived expertise failed to provide more accurate estimates than weighting judges' guesses equally. Johnston and NcNeal (1967) had health care professionals predict the length of hospital stay for mental patients over an 18-month period and found that professionals' experience did not predict their accuracy. Tetlock's (2006) impressive longitudinal study of political forecasts found that experts' predictions of future political or economic events were no more accurate than those made by well-informed laypersons. Indeed, in Armstrong's (1980) review of studies from finance, psychology, economics, medicine, sports, and sociology he concludes that ''expertise, above a very low level, and accuracy are unrelated. . .This minimal expertise can be obtained quickly and easily'' (p. 1).

Second, even in cases where individual expertise does predict higher accuracy in judgments, people tend to overestimate the skills and abilities of those at the top of the hierarchy, and thus are likely to give their judgments too much weight (Barnard, 1964). In our own work, we found that groups believed that the higher ranked members were more skilled at tasks than they actually were (Anderson & Brion, 2010; Anderson & Kilduff, 2009). In other research, group members and even outside observers perceived that group leaders exhibited more ''leader-like'' behaviors than they actually did (Rush, Phillips, & Lord, 1981). The positive illusions we hold of those with higher rank can be due to a host of reasons, including stereotypes of those high in status (Fiske, Cuddy, Glick, & Xu, 2002), the motive to justify the existing status structure (Barnard, 1964; Jost & Banaji, 1994; Lee & Ofshe, 1981), or implicit notions of leaders' characteristics (Lord, 1985; Meindl, Ehrlich, & Dukerich, 1985). But the bottom line is that high-ranking individuals are typically believed to be smarter and more capable than they actually are – and thus their judgments are often given too much weight.

Third, hierarchies create social-environmental conditions that diminish the efficacy of aggregation. Specifically, the aggregation of individual group member's answers provides more accurate answers only when individual group members' errors are uncorrelated. In other words, group members cannot be homogeneous in their opinions and biases (Armstrong, 1989). Rather, diversity in judgments and ideas allows aggregation to work. As Larrick and Soll's example of weather forecasting points out, diversity increases the chances of bracketing, which in turn leads to better answers. Yet hierarchies produce homogeneity in thinking through a variety of mechanisms (see Gruenfeld & Tiedens, 2010, for a review). For example, when high-ranking individuals have discretion over the individuals that are accepted into the group, they are likely to choose individuals who are similar to them. An abundance of research has shown that individuals are attracted to similar others (for reviews, see Berscheid & Walster, 1983; Byrne, 1971; Fehr, 1996; Schneider, 1987), suggesting that high-ranking members will reduce diversity partly through selection effects. Indeed, top management teams of organizations have been shown to be homogeneous (e.g., Barsade, Ward, Turner, & Sonnenfeld, 2000).

Individuals are also likely to adopt the perspectives and attitudes of high-ranking individuals (Newcomb, 1943), increasing homogeneity in opinions even further. For example, we found that individuals in long-term relationships

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became more similar to each other over time (Anderson, Keltner, & John, 2003). However, this convergence was driven entirely by the higher-ranking individuals. Lower-ranking individuals became extremely similar to higher-ranking individuals, even over the course of a few months. Even when low-ranking members have dissenting opinions or ideas, they are unlikely to express them (Kish-Gephart et al., 2009; Milanovich, Driskell, Stout, & Salas, 1998). Therefore, there will be little chance of aggregating diverse ideas, even when they exist, because many of them go unexpressed.

In a remarkable longitudinal natural field experiment, Tannenbaum (1957) found that in clerical organizations that were randomly assigned to be more hierarchical, employees reported that they did less thinking on their own, based their decisions less on their own opinions, and were more dependent on their superiors' views, behaving in more submissive and deferential ways. This suggests that hierarchies create more correlated errors than flatter structures.[4]

For reasons such as these, researchers have found that the statistical aggregation of individual group member's decisions, in absence of any group discussion, can provide better judgments and answers than group discussions do. For example, Rowse, Gustafson, and Ludke (1974) asked experienced firefighters a series of questions (e.g., ''is a fire more likely in a public or private building?''). They found that various mechanical averaging techniques, like a simple averaging before the discussion, provided better answers than those derived from the group discussion. Similarly, Huffcutt and Woehr (1999) found that panel discussions of job candidates produced less accurate judgments than the opinions of any single interviewer before the discussion. And research on group polarization has found that after participating in a discussion group, members tend to advocate more extreme positions and prefer riskier courses of action than individuals who did not participate in any such discussion (Moscovici & Zavalloni, 1969).

What about tasks that do not benefit from the aggregation of group members' opinions? When will steeper hierarchies promote better decisions? These tasks are likely to be those that are simple and routine – ones in which decision-making is straightforward. When groups work on these tasks, steeper hierarchies should be advantageous. Some of the empirical evidence reviewed earlier supports this argument. More hierarchical groups tended to perform better on simple tasks that did not require the aggregation of group members' opinions (Carzo & Yanouzas, 1969; Shaw, 1964). However, flatter groups tended to perform better on more complex, more ambiguous tasks that benefitted from the input of many members and that often required creativity (Berdahl & Anderson, 2005; Bloom, 1999; Shaw, 1964; Siegel & Hambrick, 2005; Torrance, 1955).

Research on contingency theory also found that when organizations' work was more routine, predictable, and stable, they tended to adopt more hierarchical structures; in contrast, when their work is more ambiguous, changing, and requires more flexibility and creativity, they adopted flatter structures (e.g., Blau & Scott, 1962; Burns & Stalker, 1961; Katz & Kahn, 1966; Lawrence & Lorsch, 1967; Shaw, 1964). This work suggests that organizations were adapting their structures to best address their organizational demands and environments.

#### *6.1.1. Summary*

One possible factor that moderates the effects of hierarchy steepness is the type of task on which the group is working. For some tasks, groups are better off giving disproportionate control to their most talented and capable members, who make more of the decisions for the group. These tasks tend to be simple, predictable, and routine. For other tasks, groups are better off giving equal control to a broader range of group members and allowing more members to contribute to the decision-making. These tasks tend to be more complex, difficult, and ambiguous.

### *6.2. The selection of leaders*

A second factor that is likely to determine whether steeper hierarchies benefit or harm group functioning concerns the processes by which hierarchies develop in the first place. Functionalists have argued that groups strive to place individuals in charge who are competent and committed to the group's goals. However, much research suggests that

[4] It is also worth noting Tannenbaum's (e.g., 1956; 1957; 1961; 1962) work on the ''total'' amount of control across groups and organizations. He notes that all employees of some companies might have more control than all employees of other companies. However, he also notes that the total amount of control is independent from the distribution of control within the company (e.g., 1956). Companies wherein employees have more on average might show steep discrepancies between the control that managers and workers have, or small discrepancies, for example. Therefore, as we are currently concerned with the distribution of control within groups and organizations (and not the total control therein), we do not focus on this work.

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groups often fail in selecting the right people, placing incompetent individuals in positions of leadership. This failure in selection might give the wrong individuals disproportionate control over the group and its decisions, thereby increasing the chances for group failure (Barnard, 1964). In other words, even in contexts in which groups *should* give disproportionate control to a small subset of members at the top, groups might select the wrong people to occupy those top positions. We thus suggest that more hierarchical groups will function better than flatter groups when they select the right individuals as leaders, and that they will function worse when they do not.

In exploring leadership selection as a possible moderator of the effects of hierarchy steepness, we focus on four different individual attributes: a commitment to the group's success, the tendency to use unbiased decision-making processes, the use of a democratic leadership style, and technical competence. These attributes were chosen because prior research suggests (a) they contribute to leadership effectiveness, and (b) groups often fail to use them as criteria when choosing their leaders. This list of four attributes is not meant to be a complete account of all characteristics important for leaders to possess; there are many important leader attributes we do not discuss here (e.g., socio-emotional skills; see Bass, 2008 for a review). Rather, we focus on these four attributes merely to illustrate how groups can sometimes fail in the process of selecting leaders – and how this failure might explain why hierarchy steepness can have negative effects.

Note that when discussing problems with leadership selection, we will often use the term ''leader'' rather than ''high-ranking group member'' because it is more convenient to discuss a ''leader's'' characteristics than it is a ''high-ranking group member's'' characteristics. Moreover, high-ranking group members tend to serve as leaders (Bales et al., 1951; Berger et al., 1972; Gruenfeld & Tiedens, 2010) and thus these terms are often interchangeable.

#### 6.2.1. Assumptions

It is necessary to lay some theoretical foundation for this discussion. First, there has been debate over whether leaders' personal characteristics matter at all to group and organizational success. Some have argued that leaders play little to no role in determining a group's performance or success (Pfeffer, 1977; Stogdill, 1948), and others have argued that the importance of leaders is greatly exaggerated (Meindl et al., 1985). However, we assert that leaders' characteristics do matter, and summarize an abundance of empirical evidence below that provides strong support for this assertion.

Further, although we argue below that groups sometimes place the wrong people in charge, we agree with the functionalist notion that groups typically *strive* to put the right people in charge. This point is important because some theorists have argued that hierarchy-organizing processes are the product of dominance contests and conflict (Lee & Ofshe, 1981; Mazur, 1985). Such ''dominance'' theories of hierarchy imply that individuals attain high rank for reasons altogether separate from their merit or leadership ability. However, the evidence consistently suggests that groups strive for merit-based hierarchies, and that individuals who try to take charge through force fail to do so (for reviews, see Berger et al., 1972; Driskell & Mullen, 1990).

#### 6.2.2. Commitment to the group's success

It is perhaps obvious that groups have a greater chance of success when their leaders are committed to the group's well-being rather than driven by their own selfish agenda. Recent examples of selfish behavior among leaders in major corporations (e.g., Enron, Worldcom, AIG) illustrate the disastrous consequences that can occur when leaders put their own needs above those of the group. And empirical research has documented the benefits of having a prosocial individual in charge.

A large meta-analysis covering over 85 years of research showed that agreeableness, which involves a greater concern for others (John & Srivastava, 1999), is a significant predictor of leaders' effectiveness (Judge, Bono, Ilies, & Gerhardt, 2002). In 14 samples that included leaders from over 200 organizations, Judge and Bono (2000) also found that agreeableness was consistently related to more effective leadership styles. Bass (2008) also summarizes a range of evidence that groups are more likely to thrive with collectively minded leaders and fail with selfish leaders.

Why are agreeable leaders better? A study of 3445 grocery store employees found that those who had more agreeable leaders perceived their workplace to be more fair, just, and ethical (Mayer, Nishii, Schneider, & Goldstein, 2007). In turn, these workers were more satisfied and committed to the company. The authors argued that ''due to their concern for others, agreeable leaders may be more successful in communicating respect, avoiding impropriety, and providing candid justifications for decisions that were tailored to employees' needs'' (p. 951).

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Agreeable leaders also create more productive environments. One study found that agreeable CEOs had more cohesive top management teams (their members got along together and worked as a mutually supportive team), lower corruption (i.e., less of the process was run by backroom deals, nepotism, and self-serving interests), and more decentralization in decision-making (Peterson, Smith, Martorana, & Owens, 2003).

Having a prosocial rather than selfish leader is particularly important because the possession of power can magnify individuals' pre-existing proclivities. Chen, Lee-Chai, and Bargh (2001) found that individuals with a more exchange orientation, who are more self-oriented, became even more selfish when they were placed in a high-power mindset than when in a low-power or neutral mindset. In contrast, De Cremer and van Dijk (2008) found that leaders with a more socially responsible mindset were more generous with their followers in allocating resources, and Livingston and Halevy (2010) also found that more prosocially minded leaders were more giving in allocating resources to their group members.

Despite the benefits of having leaders who are committed to the group's success, studies suggest that much of the time – and perhaps even most of the time – groups fail to select prosocial individuals as leaders. For example, a meta-analysis showed that agreeableness has the weakest and only consistently null effects on leader emergence of all Big Five personality traits (Judge et al., 2002). Similarly, we have found null effects for agreeableness on influence in diverse kinds of organizations (Anderson, Ames, et al., 2008) and on status in social-living groups like dormitories, fraternities, and sororities (Anderson, John, Keltner, & Kring, 2001). McClelland and Boyatzis (1982) even found that individuals higher in the need for affiliation – which involves less of a desire for close and friendly interpersonal relationships – were less likely to ascend their organization's hierarchy. A recent study also found that groups tend to select more ''social'' rather than ''prosocial'' leaders, despite their intentions to select prosocial leaders (Livingston, Cohen, Halevy, Berson, & Oreg, 2010). And, even though women tend to be more prosocially minded and have more concern for others than men (for a review, see Feingold, 1994), there is vast evidence that women are selected as leaders less often than men (for a review, see Eagly & Karau, 1991).[5]

Finally, not only do groups often fail to select prosocial individuals as leaders, they often systematically place more selfish individuals at the top. Recent research has shown that the desire for higher social rank is associated with selfishness (Willer, Feinberg, Flynn, & Simpson, 2010). And studies have consistently shown that individuals who desire higher rank tend to achieve it (Flynn et al., 2006; McClelland & Boyatzis, 1982; Winter, 1988).

Based on these findings, we suggest that the effects of steeper hierarchies should be moderated by whether groups select individuals as leaders who are committed to the group's success or whether those individuals are more selfishly driven. As this previous work illustrates, groups often fail to select benevolent, collectively minded individuals to lead them, and even might systematically select selfish individuals. We believe that by doing so, groups hamper their chances of success.

### *6.2.3. Decision-making biases*

It is axiomatic in the literature on judgment and decision-making that unbiased decision-making processes tend to produce better decisions. For example, research has shown that overconfidence is a major problem to optimal decision-making: Overconfident entrepreneurs start too many firms and enter too many markets (Camerer & Lovallo, 1999), overconfident stock market traders trade too much (Odean, 1998) and earn less money (Cheng, 2007), and overconfident CEOs engage in too many acquisitions (Malmendier & Tate, 2008). Similarly, individuals who rely on small samples to draw their conclusions make suboptimal decisions and inaccurate judgments (Ross, 1977). Those who are dogmatic and rely too heavily on their pre-existing ideologies make less accurate predictions of future events (Tetlock, 2006). And, people who fall prey to the confirmation bias tend to confirm their preconceptions or hypotheses, independently of whether or not they are accurate (Kunda, 1999).

This research suggests that groups are better off when they choose individuals as leaders who use an unbiased decision-making process. In contrast, leaders who are overconfident, risk-prone, or dogmatic in their views would tend to make worse choices and increase the chances of group failure.

[5] It is important to note some recent laboratory research showing that individuals who behave more generously attained higher rank (Hardy & Van Vugt, 2006; Willer, 2009). However, as Livingston and Halevy (2010) point out, in these group contexts, all group members were presented directly with evidence of those individuals' behavior, which is unlikely to occur in many real world contexts. Also, Flynn and colleagues found that individuals who behaved generously with their colleagues were perceived as more generous by others and attained higher rank in their social network (Flynn et al., 2006). However, generous behavior in his study was also predicted by self-monitoring, and thus seemed strategic rather than genuine.

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Despite the importance of avoiding bias in decision-making processes, research suggests that groups often select for their leaders individuals who are *more* biased in their decision-making style than the average person. That is, even though the average person exhibits a range of biases in their judgments (Bazerman & Moore, 2009), studies show that groups often systematically select as leaders individuals who are particularly biased.

For example, in a series of studies we recently found that individuals who were overconfident in their abilities were more likely to attain higher rank in joint tasks than individuals with accurate perceptions of their abilities (Anderson & Brion, 2010). Similarly, groups are more likely to give higher rank to narcissistic individuals (Brunell et al., 2008), who tend to be overconfident (Campbell, Goodie, & Foster, 2004). Along related lines, research has shown that individuals are given more influence, prominence, and status when they are dogmatic and unwavering in their views, even when those views are objectively incorrect (Moscovici, Lage, & Naffrechoux, 1969; Staw & Ross, 1980; Tetlock, 2006).

Groups also often systematically place individuals who are more risk-prone in higher positions of authority. The need for power is a consistent predictor of the attainment of higher rank (McClelland & Boyatzis, 1982; Winter, 1988), yet those higher in the need for power tend to take risks more than others, such as gambling, physical risks, drinking, drug use, and risky sex (Winter & Stewart, 1983). Finally, recent work suggests that even the process of deliberation itself makes individuals look less powerful (Magee, 2009). Individuals who act with less consideration of possible alternatives are viewed as more influential.

To make matters worse, research suggests that groups frequently tend to choose individuals as leaders whose biases become *worse* when put into high-ranking positions. We have found that individuals high in trait-level dominance let power ''go to their head'' more than others (Anderson & Berdahl, 2002). Their sense of power increases dramatically when they are placed into a high-power position, yet for individuals lower in trait-level dominance, their sense of power does not change much at all when given power. In turn, the sense of power leads to an increased propensity to take risks (Anderson & Galinsky, 2006), to perceive information in a more biased, overly positive fashion (Anderson & Berdahl, 2002). Yet, dominant individuals consistently attain higher-ranking positions than less dominant individuals (for a review, see Lord, De Vader, & Alliger, 1986).

These findings suggest that the effects of hierarchy steepness are likely moderated by whether the group selects leaders who use unbiased decision-making processes. For example, more hierarchical groups should function more poorly when individuals who use particularly biased decision-making processes are in charge. In steeper hierarchies, those in charge have particularly strong control over group decisions, and their biases go unchecked by others around them.

#### 6.2.4. Leadership style

Bass's (2008) review concluded that the myriad dimensions of leadership styles can be roughly categorized into two broad clusters: autocratic-authoritarian and democratic-egalitarian. Although each of these leadership styles is multifaceted, it tends to form a consistent factor. The autocratic leader tends to make decisions him/herself and exerts more control over subordinates' behavior and performance, whereas the democratic leader tends to use a more consensual decision-making style that includes followers; autocratic leaders tend to prioritize task completion whereas democratic leaders care more about cohesion and interpersonal relationships (Bass, 2008).

Further, they concluded that the democratic style of leadership is typically more effective: ''Evidence has accumulated that in specified circumstances, authoritarian direction may, in fact, result in heightened productivity, particularly in the short term; but overall, the democratic approach is likely to be more effective, particularly in the long run'' (Bass, 2008, p. 445). For example, Lewin's classic experimental research on groups showed that when leaders used a more democratic style the group was more cooperative, constructive, cohesive, stable, and less aggressive and apathetic than when leaders used a more autocratic approach (Lewin & Lippitt, 1938; Lewin et al., 1939; see also Maier, 1950; Maier, 1967; Maier & Solem, 1952). Flowers (1977) found that open styles of leadership in which leaders encouraged discussion led to more information sharing, more solutions proposed, and less groupthink. Maier found in a series of studies that groups with leaders who were skilled in facilitating discussion and refrained from imposing their views on the group facilitated better group decisions (for a review, see Maier, 1967). Indeed, authoritarian leadership tends to create more hierarchical and less egalitarian decision-making.

Yet despite the benefits of having a leader who uses a democratic style, the empirical evidence suggests that groups frequently fail to select individuals who use such a style. As noted above, people who are higher in the need for power attain higher rank across a variety of social groups and contexts (McClelland & Boyatzis, 1982; Winter, 1988). Yet the

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need for power is associated with less of a democratic leadership style. For example, Fodor and Smith (1982) found that groups whose leaders who were higher in the need for power discussed fewer facts, considered fewer proposals, exhibited less emphasis on moral considerations (e.g., the impact of their decision on the well-being of others), and produced lower quality decisions. Similarly, Fodor and Farrow (1979) found that leaders who were high in the need for power evaluated subordinates more favorably and rewarded them more when the subordinate was ingratiating, suggesting that leaders higher in the need for power promote conformity to their own views and ideas.

The personality trait dominance is a strong and consistent predictor of attaining high social rank (for reviews, see Judge et al., 2002; Lord et al., 1986). However, individuals high in assertiveness (a trait almost synonymous with dominance; Wiggins, 1979) are rated as being less effective at keeping team members involved and at creating an environment in which team members are comfortable to voice disagreements, as compared to moderately assertive individuals. Similarly, groups tend to choose overconfident individuals to be leaders (Anderson & Brion, 2010), but overconfident individuals are less likely to listen to others or heed others' advice (Dunning, Heath, & Suls, 2004; Gino & Moore, 2007). Groups choose narcissistic individuals as leaders (Brunell et al., 2008), yet narcissists fail to acknowledge the positive input of others (Campbell, Reeder, Sedikides, & Elliot, 2000; Farwell & Wohlwend-Lloyd, 1998; John & Robins, 1994). Finally, women are chosen as leaders much less often than men (for a review, see Eagly & Karau, 1991), yet as leaders, women are more likely than men to use a more democratic or participative style (see Eagly & Johnson, 1990; Eagly, Johannesen-Schmidt, & van Engen, 2003).

Based on this evidence, we propose that the effects of hierarchy steepness will be moderated by whether groups select leaders who use a more democratic or autocratic style. For example, more hierarchical groups will function worse than flatter groups when individuals are chosen as leaders who are more autocratic. The steeper the hierarchy, the more influence the autocratic leader will have, and thus the wider his or her negative impact will be on the group.

#### *6.2.5. Technical competence*

Although a leader's responsibilities are highly social in nature, such as motivating others, coordinating group activity, and solving conflicts, it is also important for leaders to understand the technical problems faced by the group. Having task competent people in charge helps groups perform better (for a review, see Bass, 2008). Therefore many groups even prioritize task competence over social skills when allocating influence (Lord, Phillips, & Rush, 1980). On a team of engineers, for example, technical ability would likely be seen as more important than the ability to communicate.

However, again research suggests that groups often fail to organize their hierarchies in line with differences in task competence. For example, much research on Status Characteristics Theory has documented how groups are more likely to select leaders according to their sex, age, physical attractiveness, and ethnicity, based on the assumption that those characteristics are associated with technical competence – even when those characteristics are wholly unrelated to task competence (for a review, see Berger et al., 1980). Similarly, as noted earlier, individuals higher in self-confidence are also more likely to be selected leaders (Edinger & Patterson, 1983; Stogdill, 1948), yet self-confidence is not highly predictive of actual abilities (Harris & Schaubroeck, 1988).

One particularly telling case concerns the personality trait dominance. As we mentioned earlier, an abundance of research has also shown that individuals higher in trait dominance tend to establish more influence and control in group settings than others (Anderson & Berdahl, 2002; Anderson & Kilduff, 2009; Borg, 1960; Carbonell, 1984; Fleischer & Chertkoff, 1986; Fenelon & Megargee, 1971; Gough, McClosky, & Meehl, 1951; Hills, 1984; Hogan, Curphy, & Hogan, 1994; Hunter & Jordan, 1939; Judge et al., 2002; Kalma, Visser, & Peeters, 1993; Klein & Willerman, 1979; Lord et al., 1986; Mann, 1959; Megargee, 1969; Megargee, Bogart, & Anderson, 1966; Nyquist & Spence, 1986; Richardson & Hanawalt, 1952; Smith & Foti, 1998; Stogdill, 1948). In fact, one meta-analysis found trait dominance to predict who emerges as a leader in groups more consistently than any other individual difference variable, including intelligence (Lord et al., 1986). Another meta-analysis that included 73 independent samples found dominance to have the strongest relation to leadership in groups of all personality dimensions examined (Judge et al., 2002).

However, dominance is unrelated to many of the competencies putatively required to attain influence. For example, in prior research, individuals high in trait dominance attained influence in groups that discussed an ethical dilemma (Aries & Weigel, 1983), worked on mechanical tasks (Megargee et al., 1966; Smith & Foti, 1998), and allocated funds to employees in a hypothetical company (Anderson & Berdahl, 2002). It is difficult to believe that dominant individuals possessed any special expertise in ethical issues, mechanical tasks, or organizational compensation systems. Further, evidence suggests that trait dominance is largely unrelated to general cognitive abilities (Dodge,

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1937; Donahue & Sattler, 1971; Gough, 1949; Schippmann & Prien, 1989; Smith & Foti, 1998). Of course, dominance might be related to social skills such as the ability to persuade others, but these social skills are often insufficient for leader success in the absence of technical abilities (Van Vugt, 2006). Moreover, dominance is related to a more autocratic and less egalitarian leadership style (e.g., Locke & Anderson, 2010).

Based on the frequency with which groups fail to select individuals as leaders who are technically skilled, and the benefits of having such skilled individuals in charge, we believe that hierarchical groups are more subject to failure, relative to flatter groups, when they choose individuals as leaders who lack technical competence. Although social skills are often cited as being more important to a leader's abilities than technical skills, the latter are still important (Van Vugt, 2006).

#### 6.2.6. Summary

In this section, we reviewed four characteristics that are important for leaders to possess, but that groups often fail to use when selecting their leaders: commitment to the group, a propensity to make decisions in an unbiased fashion, the tendency to use a democratic leadership style, and technical competence. Based on these findings, we proposed that the effects of hierarchy steepness will depend on whether groups select the right individuals as leaders – for example, individuals who are collectively minded, unbiased in their decision-making, use a more democratic style of leadership, and who are technically expert.

One important question is why groups would so often fail to choose individuals as leaders who possess attributes that will help their group. For example, if having a leader who makes decisions in an unbiased fashion is important for group success, why do groups so often select individuals who are particularly prone to biased decisions? In part, the fault lies in the processes we use to select leaders. For example, Hogan and Kaiser (2005) write that when organizations hire leaders from outside their company, "Most formal selection tools are rarely used. Former subordinates – those who are best able to report on a person's talent for leadership – are almost never consulted." (p. 176). Therefore, companies often have little information about a leaders' style and job candidates are able to manage impressions during the process. Similarly, when it comes to internal promotion, "The people who rise to the tops of large organizations are distinguished by hard work, intelligence, ambition, political skill, and luck but not necessarily by talent for leadership" (p. 171). Thus, we tend to choose flawed leaders in part because of problems in the selection process.

### 6.3. The corrupting effects of power

Earlier we discussed the functionalist argument that placing people in high-ranking positions motivates them to contribute to the group and make greater self-sacrifices. Although some research has supported this notion (Willer, 2009), much work has also suggested that occupying a high-ranking position can corrupt individuals and lead to patterns of thought, decision-making, and behavior that are harmful to the group. Based on that research, which we outline below, we propose that steeper hierarchical structures can lead groups to perform worse when their high-ranking members are corrupted by the power the group affords them. In other words, even in contexts in which groups should give disproportionate control to high-ranking members over group decisions, and in which the group selects the right individuals as leaders, steeper hierarchies still can lead to negative group outcomes when leaders' psychology is adversely affected by their lofty position.

The Approach-Inhibition Theory of Power (Keltner et al., 2003) argues that power tips the balance of activation between the behavioral approach and inhibition systems—the behavioral systems associated with rewards and threats, respectively. The behavioral approach system is posited to regulate behavior associated with rewards, such as food, achievement, sex, safety, and social attachment. The presence of attainable rewards and opportunities activates approach-related processes that help the individual pursue and obtain goals related to these rewards. For example, positive affect motivates approach-related behavior, scanning for rewards in the environment, and forward locomotion (Carver & White, 1994; Depue, 1995; Gray, 1994; Higgins, 1997, 1998).

Possessing high power is posited to activate the approach system for two reasons. First, elevated power is associated with increased access to rewards, such as material resources, physical comforts, as well as social resources, such as higher esteem, praise, and positive attention (Buss, 1996; Chance, 1967; Derber, 1979; Eibl-Eibesfeldt, 1989; Ellis, 1993; French & Raven, 1959; Keltner, Young, Heerey, Oemig, & Monarch, 1998; Mazur, 1973; Operario & Fiske, 2001; Savin-Williams, 1979; Weisfeld, 1993). Second, when people have high rank, they are aware that they will

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encounter less interference from others when approaching potential rewards (Keltner et al., 1998; Weber, 1947; Winter & Stewart, 1978).

The Approach-Inhibition Theory does not argue that the possession of power necessarily leads to corrupt, selfish behavior. However, it suggests that power can and often does lead to such behavior. And, a plethora of studies have documented the diverse ways in which high-ranking individuals' thoughts, feelings, and behaviors can be affected in ways harmful to their group.

For example, giving individuals power can make them less accurate in perceiving others and more likely to rely on stereotypes when judging others (Depret & Fiske, 1993; Ebenbach & Keltner, 1998; Fiske, 1993; Keltner & Robinson, 1996, 1997; Mannix & Neale, 1993; Sondak & Bazerman, 1991). Powerful individuals do this because they pay less attention to others (Chance, 1967), and are less likely to take others' perspectives. To demonstrate, Galinsky and colleagues placed randomly selected individuals into a powerful mindset by asking them to recall a time in which they had higher power than others (Galinsky, Magee, Inesi, & Gruenfeld, 2006). They then asked them to write the letter ''E'' on their forehead with an erasable marker. Prior research had found that some individuals draw an E as though one is reading it oneself, which leads to a backward and illegible E from the perspective of another person, while others draw the E as though another person is reading it, which leads to production of an E that is backward to oneself. Galinsky and colleagues demonstrated that participants in the high-ranking condition, compared with those in the low-ranking condition, were more likely to draw the E in the self-oriented direction, indicating a lesser tendency to adopt another person's perspective. Given that the ability to accurately perceive others is a core social skill (Riggio, 1986), these findings suggest that giving individuals high rank reduces their social skills.

Some related, and perhaps more humorous, evidence of powerful individuals' lack of social awareness concerns norm-violating behavior. For example, research suggests that individuals in high-ranking roles are less polite (Brown & Levinson, 1987). They interrupt others more and are more likely to speak out of turn (DePaulo & Friedman, 1998). Ward and Keltner (1998) found that power even led to socially inappropriate styles of eating: people randomly assigned a high-ranking position ate more than others and chewed with their mouths open, allowing crumbs to fall onto their faces and the table.

The Approach-Inhibition Theory also proposed that power can lead individuals to selfishly view others as means to one's own ends (Keltner et al., 2003). Research by Gruenfeld and colleagues empirically demonstrated the effects of possessing power on the objectification of others (Gruenfeld, Inesi, Magee, & Galinsky, 2008). For example, they found that when participants thought about co-workers with lower rank than them, they viewed those co-workers as means to their own goals, and evaluated those co-workers more according to how valuable and useful the person was to them. This notion is consistent with Kipnis' (1972) classic work, which showed that putting individuals in higher-ranking positions makes them view others as objects of manipulation and desire more distance between themselves and others (see also Kipnis, Castell, Gergen, & Mauch, 1976).

High rank can also lead individuals to treat others in hostile and aggressive ways. In a recent survey of 775 employees, individuals reported that rude, uncivil behaviors were three times as likely to come from individuals higher up in the organization than from peers or subordinates (Pearson & Porath, 1999). Across contexts (e.g., hospital settings), high-ranking individuals were more likely to tease (rather than avoid the potentially offensive teasing in the first place), and when they teased, to do so in more hostile ways (Keltner, Capps, Kring, Young, & Heerey, 2001).

A study we mentioned earlier directly questions whether providing individuals with high rank uniformly makes them more selfless (Chen et al., 2001). Specifically, different individuals seem to be affected differently by occupying a high-ranking position. Individuals with more communal orientations (Clark & Mills, 1979), who are primarily focused on responding to the needs and interests of others, responded to high rank by acting in more socially responsible, selfless ways; but individuals with more exchange orientations, who are focused primarily on keeping a ''tally'' of the giving and receiving of benefits in their relationships, responded to high rank by acting in more selfish ways (Chen et al., 2001).

In addition to a corrupting influence, research has found that the possession of power can also lead to more biased decision-making. We found in a series of studies that when individuals were given higher rank, asked about a time in which they occupying a higher-ranking decision (specifically a powerful position), or were even non-consciously primed with rank-related words (e.g., *authority, boss, control, executive, influence*), they showed more optimistic perceptions of risk (Anderson & Galinsky, 2006). For example, they underestimated the risk of dying from various causes and viewed engaging in unprotected sex as less dangerous. In turn, they were also more likely to choose riskier options, such as communicating vulnerable information in a negotiation or selecting the riskier option in an adaptation of Tversky and Kahneman's (1981) ''Asian Disease Problem.''

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Studies also suggest that when individuals were given power they were particularly confident in their beliefs, and thus less likely to incorporate new information that might change their pre-existing attitudes (Briñol, Petty, Valle, Rucker, & Becerra, 2007; Eaton, Visser, Krosnick, & Anand, 2009). This suggests a more rigid and less flexible style of cognitive processing among powerholders that would be particularly dangerous in current organizational environments, which frequently change and demand higher levels of flexibility and openness to new strategies and ideas.

In sum, we believe that the effects of hierarchy steepness are likely moderated by the way high-ranking group members are psychologically affected by their power. For example, placing people into high-ranking roles can make them less socially intelligent, more selfish, and more risk-prone. And, because high-ranking individuals have disproportionate control over the group, their behavior would have even more serious consequences on the group when the hierarchy is steeper.

#### *6.3.1. When will power corrupt?*

If the possession of power can sometimes affect leaders in deleterious ways and sometimes in positive ways, a key question is when either effect is more likely to occur. Drawing upon extant literatures, at least three processes – the stability of power relations, accountability, and social values embodied in cultural differences – are likely to moderate the effects of power on those who possess it.

Social systems vary in the extent to which power relations are stable (e.g., Heinicke & Bales, 1953). For example, some groups have more frequent changes to the composition of the group (e.g., Savin-Williams, 1977), or revoke individuals' power more readily, thus increasing flux in hierarchical positions. The threat to powerholders caused by instability should keep their behavior more in check. This leads to more careful attention to others and more inhibited behavior on the part of the powerful (Keltner et al., 2003).

Accountability – the sense that one's actions are personally identifiable and subject to the evaluation of others – should also act as a constraint upon unchecked power. Individuals in power who know they will be held accountable are more likely to consider social consequences and take others' interests into account (Lerner & Tetlock, 1999; Tetlock, 1992). This partly explains why U.S. Presidents exhibit greater cognitive complexity after they are elected, when they are accountable to a diverse array of constituents, than prior to election (Tetlock, 1981).

And finally, national and organizational culture predicates the extent to which power differences are accepted and consensually reinforced (e.g., in high-power distance cultures) or disputed, challenged, and consensually negotiated (e.g., in low power-distance cultures; Hofstede, 2001). One should expect cultures defined by high power-distance (i.e., those cultures who endorse power differences) to facilitate disinhibition in the powerful, and allow for more of the negative patterns of behavior described above. For cultures with less power distance, one would expect less of such behavior.

### *6.4. Group member motivation*

Another major tenet of functionalist theories is that hierarchies motivate all individuals (not just leaders) to contribute to the group. Specifically, by offering high rank as a reward for self-sacrifice, hierarchies incentivize all individuals to do more for the collective (Blau, 1964; Frank, 1985; Thibault & Kelley, 1959). And, as indicated earlier, some research has provided support for this function, showing that possessing higher rank motivates individuals to behave more selflessly (Willer, 2009), and that individuals higher in their organizational hierarchy are more satisfied with their job and committed to the organization (for a review, see Porter & Lawler, 1965).

Yet some research suggests that steeper hierarchies can also lead to lower, rather than higher, levels of motivation to contribute to the group on average. Even if providing individuals with higher rank motivates them to make more sacrifices for the group's success, this does not necessarily mean that steeper hierarchies have a net positive effect on group members' motivation as a whole. For example, possessing lower rank might decrease individuals' motivation to such a degree that the motivational effects on those at the top of the hierarchy might be outweighed by the damage done to those on the bottom.

Indeed, the studies on satisfaction summarized above might speak to this issue. Some have argued that satisfaction is related to the motivation to contribute to the group and perform well – that individuals who feel satisfied with their occupational rank or compensation are more motivated to perform (for a review, see Judge, Thoreson, Bono, & Patton, 2001; though this finding is controversial; see Hage, 1965). On balance, the research reviewed above indicates that

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members in more hierarchical groups are less satisfied than members of less hierarchical groups. If lower satisfaction indeed leads to lower performance, this suggests that when you take into consideration all group members, steeper hierarchies lower the motivation to contribute on the whole.

Similarly, Tannenbaum (1956) found that in more democratic labor unions, where members had relatively high levels of control, members participated more than did unions in which the members had relatively lower levels of control. Morse and Reimer (1956) conducted an impressive natural field experiment, and found that in divisions of a large company that gave more control to lower-level workers (clerical workers), those workers felt more self-actualization over time, and greater satisfaction with their jobs, managers, and company. In contrast, in divisions that gave less control to the workers, those workers felt less self-actualization over time and less satisfaction with their jobs, managers, and company.

Why would occupying a lower rank reduce individuals' motivation? There are at least three reasons. First, individuals lower in rank might contribute less simply because they feel as though they have less to contribute. Argyris (1957) postulated that within formal organizations, placing individuals into lower-ranking positions makes feel more passive and less effective over time, and in turn, lose their motivation to perform. The empirical research has confirmed his argument, in that individuals lower in the hierarchy tend to have lower self-perceptions of competence and ability (for reviews, see Edinger & Patterson, 1983; House, 1988; Korman, 1971; Stogdill, 1948; Van Vugt, 2006). When individuals are randomly assigned to lower-ranking positions, they tend to perceive themselves as less efficacious (e.g., Stolte, 1978), providing causal evidence that lower rank reduces self-perceptions. Korman (1971) reviewed a range of studies showing that placing people into organizational roles with less control and autonomy decreases their level of self-efficacy and performance.

A second and related reason is that individuals occupying a lower-ranking position tend to form highly positive perceptions of their superiors' competence – leading them to believe that those individuals should make more of the contributions. Again, Argyris's (1957) theorizing is relevant here. He argued that employees in lower-ranking positions become more dependent on their superiors and defer to them more, similar to the way children become dependent on and defer to their parents. As we discussed earlier, much research has shown that individuals with higher rank are viewed as more intelligent and task-skilled, independent of their actual competence levels (Darley & Gross, 1983; Sande, Ellard, & Ross, 1986). Thus, individuals in lower-ranking roles might begin to form overly positive perceptions of those at the top, and assume that those individuals have the capacity to take on the bulk of the group's problems. A recent study of ours (Locke & Anderson, 2010) found that when individuals placed in a lower-ranking role perceived their superior as more competent, they contributed less to the discussion and joint decision-making.

Third, people in possession of lower rank might feel unfairly treated by the group, which would reduce their motivation to contribute. According to equity theory (Adams, 1965), individuals in any social exchange relationship believe that rewards should be distributed according to the level of each individual's contributions to the relationship. Individuals judge the fairness of their exchange by comparing the ratio of their contributions (e.g., work effort) to their rewards, with others' ratio of contributions to rewards. When individuals perceive that their ratio of contributions to rewards is similar to that of others, they feel a sense of equity. When individuals perceive that their ratio of contributions to rewards is too low relative to others, they feel a sense of inequity. They can deal with this inequity in a number of ways, such as changing their perceptions of their own contributions or rewards, or altering their actual contributions (e.g., decreasing their work effort; Cowherd & Levine, 1992; Pfeffer & Langton, 1993).

Theorists have applied this social exchange framework to intra-group hierarchies, arguing that individuals gauge whether their rank in the hierarchy is commensurate with their contributions, effort, skills, and abilities (Thibault & Kelley, 1959). If individuals feel that their rank (i.e., their reward) is lower than it should be, or feel ''underplaced'' in the hierarchy, they should feel a sense of inequity.

Moreover, research suggests that feelings of underplacement are quite likely. People tend to overestimate their contributions to the group (Ross & Sicoly, 1979). Research by Tannenbaum (1962; Smith & Tannenbaum, 1963; Zupanov & Tannenbaum, 1968; also see Bowers, 1964) also found that in many organizations individuals lowest in rank believe they should have more control than they actually do – and that this gap between ideal control and actual control is greater than among those at the top. In other words, those at the bottom feel they should have more control much more often than do those at the top.

When are steeper hierarchical structures more likely to de-motivate those lower in rank? Again, the program of research by Tannenbaum and colleagues is relevant (Tannenbaum, 1968; Tannenbaum et al., 1974). In their studies, they consistently found that when lower-ranking organization members felt more in control over their own work and

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over the organization – regardless of the number of levels in the formal hierarchy – the more motivated and committed they were to the organization. Research on voice similarly demonstrates the motivational benefits of making employees feel part of the decision-making process (Leavitt, 2005; Locke & Schweiger, 1979; Miller & Monge, 1986; Schweiger & Leana, 1986; Wagner & Gooding, 1987).

Procedural justice should also moderate the effects of steeper hierarchical structures on motivation (Barnard, 1964; De Cremer & Tyler, 2005; Moorman & Byrne, 2005). Procedural fairness is the perceived fairness of procedures in the allocation of resources to organization members (Tyler, 1988). Procedures are perceived as more fair when they are applied consistently over time and over people (Van den Bos, Vermunt, & Wilke, 1996), without regard for authorities' self-interest (De Cremer, 2004), and when they allow employees to voice their opinion on decisions (Greenberg, 1987; Lind, Kanfer, & Earley, 1990; Thibaut & Walker, 1975). Fair organizational procedures have been shown to positively influence cooperation. For instance, in experimental research, De Cremer and Van Vugt (2002) showed that people who had the opportunity to voice their opinion in the decisions of the authority (cf. Thibaut & Walker, 1975) reacted with more cooperation. Similar effects have also been found in field studies showing that employees experiencing procedural fairness engage in more cooperation (Blader & Tyler, 2009; see De Cremer & Tyler, 2005, for an overview). This research thus suggests procedural fairness will moderate the effects of steeper hierarchical structures on group member motivation; in conditions of low procedural fairness, steeper hierarchical structures should have a particularly damaging effect on motivation because of low levels of trust.

#### *6.4.1. Summary*

With this fourth proposition, we explored the possibility that the effects of steeper hierarchies depend on whether they increase or decrease group members' motivation to contribute. While some research suggests that steeper hierarchies might boost member motivation, other research shows otherwise; steeper hierarchies might make lower-ranking members feel less competent and unfairly treated, thereby decreasing their incentive to perform. In turn, whether steeper hierarchies increase or dampen motivation should depend on factors such as whether the group allows their lower-ranking members to feel efficacious and in control, and whether they feel a sense of procedural justice.

### *6.5. Intra-group coordination*

Functionalist theories also posit that steeper hierarchies help group members work together more efficiently by facilitating communication and increasing cooperation among members. The empirical research mentioned at the outset of the chapter supports this argument by showing that groups whose members agree on their relative rank have lower levels of conflict and perform better.

However, a number of studies suggest that steeper hierarchies can have the opposite effects on groups, breaking down intra-group communication and coordination. In particular, steeper hierarchies can reduce trust, increase competition between group members and lower cooperation, and impede communication. Therefore, we propose that the effect of hierarchy steepness depends in part on whether the hierarchy promotes or impedes coordination.

#### *6.5.1. Communication*

In Bavelas and colleagues' research on communication structures, it was proposed that steeper hierarchies helped direct communication towards one specific member, who then made decisions for the group, and passed those decisions back outward towards the rest of the group (Bavelas, 1950). Centralized communication and decision structures were thus seen as increasing efficiency (if not satisfaction and morale).

However, formal hierarchies with multiple levels of authority introduce more layers of bureaucracy that information must travel through to get from employee to employee (Simon, 1947; Urwick, 1956). For example, managers wishing to convey a new idea to a vice president must pass through more ''red tape,'' which can waste time (Simon, 1947). But, perhaps more important, taller hierarchies might also increase *mis*communication. Research suggests that information gets easily distorted as it moves from one party to the next, leading each subsequent recipient to form different beliefs based on the information (Gilovich, 1987; Inman, Reichl, & Baron, 1993) – similar to the ''telephone game'' played by children.

Moreover, miscommunication can be further pronounced in steeper hierarchies because less powerful parties are hesitant to communicate certain information upward. The Approach-Inhibition Theory of Power mentioned above (Keltner et al., 2003) suggests that when individuals are in lower ranked positions, they are subject to more social and

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material threats, especially the threat of losing favor among the powerful (e.g., Anderson & Berdahl, 2002; Chance, 1967; Fiske, 1993; Hall & Halberstadt, 1994; Kish-Gephart et al., 2009; Whitney & Smith, 1993), and they are acutely aware of the constraints that these threats place upon their behavior (Anderson, John, & Keltner, 2010; Keltner et al., 2003). Therefore, being in a lower ranked position activates the behavioral inhibition system, which has been equated to an alarm system (Carver & White, 1994; Fowles, 1980; Gray, 1982, 1987, 1991; Higgins, 1997, 1998; Sutton & Davidson, 1997). Once activated by threats or potential punishments, this system triggers affective states such as anxiety, and heightens vigilance for threats in the environment (Gray, 1991; Higgins, 1997).

Consistent with the Approach-Inhibition theory, Kramer's (1998, 1999) research has shown that individuals in positions of lower power, such as graduate students vis-à-vis their faculty advisors, can exhibit higher levels of "paranoid social cognition" with higher levels of suspiciousness and mistrust of others. And when individuals do not trust others, they communicate with them less. Several research traditions demonstrate that low-power individuals inhibit the expression of their ideas. The vast literature on voice has documented the reluctance of lower ranked employees to communicate with their superiors. Voice has been defined as an attempt to improve the organization by speaking up (Detert & Burris, 2007; Hirschman, 1970; Withey & Cooper, 1989) or as an expression of one's point of view in the decision process (Hunton, Hall, & Price, 1998; Islam & Zyphur, 2005; Lind et al., 1990).

Based on this fear, studies have consistently shown that employees stay silent instead of raising important issues to their leaders (e.g., Kish-Gephart et al., 2009; Milliken, Morrison, & Hewlin, 2003; Read, 1962; Ryan & Oestreich, 1991). For example, over 80% of airplane accidents reviewed by the National Transportation Safety Board involved the failure of the First Officer to say something about the Captain's error (Milanovich et al., 1998). Laboratory research on groups and dyads also shows a similar pattern; participants temporarily assigned a low-power position tend to express their ideas and opinions less, even though the hierarchy was just constructed moments before (e.g., Anderson & Berdahl, 2002; Dovidio, Heltman, Brown, Ellyson, & Keating, 1988; Leffler, Gillespie, & Conaty, 1982). And Tannenbaum's research (Tannenbaum, 1957; Tannenbaum et al., 1974) suggests that these problems become exacerbated in more hierarchical organizations. Indeed, many organizational scholars have argued that more hierarchical structures impede communication in all directions, including that between peers and/or with co-workers outside one's immediate domain (Blau & Scott; Burns & Stalker, 1961; Hage, 1965).

When will steeper hierarchical structures have a positive effect on group communication and when will it have a negative effect? As noted by Shaw's (1964) review, one factor is the complexity of the group's task. When group tasks are very simple, hierarchical structures do indeed facilitate communication by funneling all group members' inputs towards one person and allowing that central person to quickly convey his or her commands down the chain of command. However, when groups work on tasks that are more complex, steeper hierarchies begin to have increasingly negative effects (Shaw, 1964).

Psychological safety should also be an important moderator of the effects of hierarchy steepness on communication (Edmondson, 1996). In steeper hierarchical structures, if there is a broad perception among those lower in rank that they can speak freely and provide their opinions without fear of retribution, then the hierarchy should not hamper communication in the same way as in steeper hierarchies that have low psychological safety (Kish-Gephart et al., 2009).

### 6.5.2. *Cooperation*

Even scholars who might disagree on the merits of hierarchy agree that steeper hierarchies tend to lower cooperation and increase competition among group members. In any hierarchy, higher rank comes not just with material rewards, but with a host of social and psychological benefits, such as increased prestige (Berger et al., 1980), more credit for group successes (Fan & Gruenfeld, 1998; Meindl et al., 1985), and better overall well-being (Adler, Epel, Castellazzo, & Ickovics, 2000). In contrast, low rank comes with social neglect (Chance, 1967; Savin-Williams, 1979), less participation and yet more blame for group failures (Weisband, Schneider, & Connolly, 1995), and heightened feelings of fear, shame, and anxiety (Mazur, 1973; Tiedens, 2000). Therefore, steeper hierarchies promote more competition by raising the stakes for competition over rank. The difference in outcomes between those at the top and those at the bottom is that much starker.

Research on tournament theory (Lazear & Rosen, 1981) examines how steeper hierarchies are used precisely to create more intra-group competition among co-workers – with the aim of increasing the group's overall productivity. However, as many theorists have argued, heightened competitiveness comes with severe costs in terms of cooperation and thus overall group success (Deutsch, 1985, 1986; Frank, 1985; Lazear, 1989; Levine, 1993; Milgrom & Roberts,

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1992; Pfeffer & Langton, 1993). For example, a study by Mitchell and Silver (1990) showed that when group members had individual-focused goals (i.e., they were being evaluated as individuals), they were more competitive with each other and the group performed more poorly. When group and organization members need to work in concert, they might instead fail to communicate or help each other, and even might sabotage each other's performance to get a leg up in the competition for rank (Milgrom & Roberts, 1992).

The negotiation literature also supports the association between steeper hierarchies and problems with cooperation. When parties with different levels of power negotiate, they have more difficulty reaching integrative or ''win–win'' agreements compared to equal-powered opponents (e.g., Mannix, 1993a; Pinkley, Neale, & Bennett, 1994). They focus more on the distributive elements of the negotiation and less on its integrative potential (Faley & Tedeschi, 1971; Mannix, 1993a), use more competitive and even coercive bargaining tactics (Lawler, 1992; Lawler & Bacharach, 1987; Lawler, Ford, & Blegen, 1988) and ultimately, reach less integrative outcomes. These problems introduced by differences in power have been documented in dyadic negotiations (Lawler & Yoon, 1993; McAlister, Bazerman, & Fader, 1986; Pinkley et al., 1994), multi-party bargaining contexts (Mannix, 1993a, 1993b), and prisoner's dilemma games (Rekosh & Feigenbaun, 1966). Given that group and organizational contexts are also ''mixed-motive'' contexts in which individuals are motivated to fend for themselves as well as work for the group's collective success (Thompson, 1990), negotiations research suggests that power differences can create obstacles to collective gain.

When will this increase in competition and decrease in cooperation help groups and when will it harm groups? Part of the answer lies in the level of coordination required for the group to complete its task. As Lawrence and Lorsch (1967) argued, flatter structures are more advantageous when co-workers must work in a coordinated fashion. Indeed, some of the previous evidence cited supports this claim: when co-workers do work alone and do not depend on each other for their task completion, steeper hierarchies tended to predict higher performance (Becker & Huselid, 1992; Ehrenberg & Bognanno, 1990; Shaw et al., 2002). However, when group members worked interdependently, steeper hierarchies tended to predict worse performance (e.g., Cowherd & Levine, 1992; Shaw, 1964).

#### *6.5.3. Summary*

In this section, we focused on intra-group coordination as a possible fifth factor that determines whether steeper hierarchical structures will lead to group success or failure. Steeper hierarchies can either impede or facilitate intra-group communication, depending on factors such as the level of coordination required by the group's work, and the level of psychological safety in the group.

## 7. Conclusions and directions for future research

We began this chapter with a quote from Charles Darwin, in which he argued that hierarchies are necessary for groups to succeed. Since he made that assertion over 170 years ago, countless social scientists have similarly argued that hierarchies help groups solve their most fundamental challenges. In fact, many theorists have even argued that hierarchies are a biologically driven form of social structure that stems from our evolutionary roots (Barkow, 1975; Eibl-Eibesfeldt, 1989; Hogan, 1983; House, 1988; Mazur, 1985; Savin-Williams, 1977; Schjelderup-Ebbe, 1935; Van Vugt et al., 2008). In other words, humans have evolved the strong tendency to develop hierarchies because of benefits hierarchies provide.

But do hierarchies always benefit the collective welfare? In this chapter we reviewed research showing that in contrast to strong functionalist arguments, the effects of steeper hierarchies are highly mixed. Sometimes steeper hierarchies helped groups succeed, and sometimes they led to group failures. The findings thus show much strong support for contingency theories of organizations (e.g., Argyris, 1964, Burns & Stalker, 1961; Galbraith, 1973; Hage, 1965; Lawrence & Lorsch, 1967; Pugh et al., 1969), which argue that different social structures have different effects on group success, depending on a host of factors.

In an effort to better understand when steeper hierarchies will benefit or harm group success, we then proposed five factors that might moderate the effect of hierarchy steepness: the type of task on which the group is working, the group's ability to select the right leaders, whether the possession of power modifies leaders' psychology in positive or deleterious ways, the effects of the hierarchy steepness on member motivation to contribute to the group, and the effects of the hierarchy steepness on intra-group coordination. These five proposed moderators received some preliminary evidence from the extant research, but unfortunately the existing research cannot sufficiently address them.

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Therefore, as much as this chapter aimed to review prior research on the effects of hierarchy steepness, it also serves as a call for future research. Hierarchies pervade social groups and have a profound impact on group functioning. Yet we have little understanding of the mechanisms that underlie the effects of hierarchy steepness. For example, we described preliminary evidence that steeper hierarchies help groups succeed only when they are working on routine, simple tasks that do not require the opinions of a broad range of group members—and that they harm groups working on tasks that are more ambiguous and complex and that benefit from a wider range of group member judgments. However, this evidence is only preliminary. Few studies tested this moderator with controlled sample comparisons, and much of the evidence stems from very different group contexts that involved different kinds of tasks. Therefore more direct tests with careful controls are needed.

Similarly, we proposed that steeper hierarchies are more likely to lead to group failure when group leaders are corrupted by their power. Yet no study has directly examined the full process in which individuals are given power, affected psychologically by that power, and subsequently make decisions that either help or harm the group. For that matter, little research has looked into the systemic and cultural factors that might moderate the effects of power on those who possess it. In general, we have only scratched the surface in our understanding of hierarchy's effects on the group.

There has been an explosion of research on hierarchy in the last decade (cf. Keltner et al., 2003; Magee & Galinsky, 2008; Overbeck & Park, 2001), as scholars have increasingly recognized the importance of hierarchy in social and organizational life. However, much of that research has focused largely on the individual level, emphasizing the psychological consequences (e.g., Keltner et al., 2003), antecedents (e.g., Anderson et al., 2001), or signals (Tiedens, 2001) of high and low social rank. Very little of that recent research has actually examined hierarchy on the group or organizational levels, assessing how differences in hierarchy steepness impact the entire collective. This oversight is unfortunate, given how important and pervasive hierarchies are in both groups and organizations. We hope that the current chapter spurs more research on this critical question.

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