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The 1996 Mount Everest climbing disaster: The breakdown of learning in teams

D. Christopher Kayes

ABSTRACT

Qualitative analysis of the events leading to the deaths of eight climbers on Mt Everest in 1996 illustrates the breakdown of learning in teams. The analysis contributes to research on the role of teams in organizational disasters by considering team learning and development as the basis for success in complex and changing organizations. Multiple qualitative methods reveal three precursors associated with the breakdown of learning in teams: narrowly defined purpose, directive leadership and failure to sense an ill-defined problem. Findings have implications for normal disasters and sense-making, performance in short-term project teams, and organizational learning.

KEYWORDS

disaster sense-making ■ errors and accidents ■ organizational and experiential learning ■ teams and groups

There's so many things that went wrong – little errors, things that are black and white down here aren't really black and white up there. You know, the decision-making process is a little bit more muddled.

(Mountain climber and rescue party member Ed Viesturs, quoted in Rose, 1998: 8)

Researchers know that muddled team process often leads to disastrous consequences (Elmes & Barry, 1999; Gephart, 1993; Janis, 1972; Perrow, 1984;

Snook, 2000; Weick, 1993). As organizations increasingly rely on teams to respond to complex organizational problems, research on how teams learn in the face of these challenges takes on heightened importance.

This article analyzes the 1996 Mt Everest climbing disaster with regard to the breakdown of learning in teams. It follows a growing body of research about the role of learning in organizational errors and their prevention (Edmondson, 1996, 1999; Rasmussen, 1990; Weick & Roberts, 1993). Although it is well understood that team learning contributes to stability when organizations face complex and challenging situations, this study takes a different direction to argue that the breakdown of team learning can lead to organizational disaster.

The analysis is organized as follows. First, I analyze the role of team learning in organizational disaster. Drawing on Mills's (1967) notion of team development, this article describes the importance of learning in teams when faced with complex problems emblematic of disaster. Second, multiple qualitative analysis methods used to interpret the Mt Everest events are described. Third, I recount the events of the 1996 Mt Everest climbing disaster to illustrate the breakdown of team learning in the face of a complex organizational problem. Fourth, analysis of the events reveals factors that impede learning. This analysis integrates theory on adult learning (King & Kitchener, 1994), team development (Mills, 1967) and organizational sense-making (Kiesler & Sproull, 1982). I discuss the implications for learning in short-term project teams, team leadership and the study of organizational disaster.

Organizational disaster

There is growing interest in the study of organizational disaster. This research is intended to uncover the factors that lead to organizational breakdown and the mechanisms required to recover. The aim of this research entails: (i) uncovering hidden sources of variability in organizational disaster; and (ii) identifying the chain of events that, taken together, constitute the recipe for disaster. Several interrelated streams of research on disasters exist, each focusing on different levels of analysis.

One stream has focused on how individuals and teams conceive, deliberate and act upon organizational problems. Janis's (1972) groupthink hypothesis, for example, focused on how consensus seeking in policy-making teams led to a breakdown in critical thinking among team members. *Groupthink* explains how teams forgo valuable deliberation in favor of team cohesion. Often, consensus-seeking behaviors characteristic of groupthink take on a dysfunctional characteristic, leading teams to take action without consideration of multiple options for action or the potential implications of

certain actions. Similarly, Weick (1993) and Weick and Roberts (1993) explored interactions and cognitive sense-making in wild land fire-fighting and aircraft carriers, respectively, in order to identify how teams respond to crises. Lack of team coordination, confused roles and the failure to respond to small setbacks mark just a few factors that ignite disaster and fuel a team's inability to recover.

A second stream of research has focused on systemic factors that lead to organizational disaster. The systems approach focuses on how minor incidents of breakdown during normal operations create a chain reaction leading to large-scale disaster (Gephart, 1993; Perrow, 1984). Perrow, for example, described how the mechanisms by which a small breakdown escalates into a larger disaster are related to the degree of interconnectedness or 'coupling' in the system. For example, in a highly coupled system, one in which systems are closely linked, a small incident will quickly create a chain reaction leading to a larger disaster. By contrast, in a more loosely coupled system, one in which systems do not connect closely to each other, a small incident is less likely to quickly lead to a greater disaster. Vaughan (1996) identified additional system-related factors, such as culture, that lead to organizational disaster. Vaughan described how deviant culture launches organizational disaster by allowing certain kinds of thinking to go unchecked. The underlying theme of the systems approach lies in the idea that disasters arise from systematic breakdowns, from the culture of the organization, or via some other means beyond the discretion and control of individual operators.

A third and emerging stream of disaster studies has sought to integrate multiple levels of analysis. The integrated approach seeks to provide a more robust, cross-level approach to organizational disaster. This approach looks at how cognitive, systemic and institutional factors work together to create a disaster. For example, Elmes and Barry (1999) focused on how psychological factors, such as individual narcissism, intermingled with structural changes in the mountain-climbing industry led to mounting problems in ad hoc teams. Along the same lines, Snook (2000) created a multidimensional analysis of the accidental shooting-down of a civilian aircraft by the United States military. The study revealed how, even in highly controlled systems, the engagement of individual, team and organizational-level factors together can declare disaster.

The study of organizational disasters remains a broad and interdisciplinary program of research directed at understanding the various factors associated with preventing, detecting and responding to organizational breakdowns. Disaster studies pull from a broad range of traditions, including psychology, sociology and engineering, and across multiple levels of analysis, including individual, team, organization and industry. An emerging

theme that reaches across these streams of analysis is the growing recognition that learning plays a central role in the detection (Edmondson, 1996) and prevention of (Druskat & Pescosolido, 2002), as well as the response to (Rasmussen, 1990) organization disaster.

Learning and organizational disaster

Recently, research has begun to assess how organizations learn from mistakes, adapt to changing technologies and surface errors before they escalate into larger organizational disasters. Zsombok and Klein (1997), for example, focused on how individuals in teams learn from experience to make decisions in response to shifting environments. Kiesler and Sproull (1982) explained how failure to sense an impending problem may result from limitations in individual cognitive capacity. Similarly, Edmondson (1996, 1999) showed that team psychological safety – the perceived ability to surface and discuss errors – is a key factor in the ability to learn from errors.

Rasmussen (1990) also focused on learning in the context of large-scale organizational accidents. Rasmussen viewed the role of human error in organizational breakdowns as an interaction between two sets of constraints: (i) individual access to resources such as knowledge and competence, access to information, and the ability to process data; and (ii) task constraints such as degree of discretion over the task, the various strategies available for making choices, and control over the path taken to achieve goals.

This article proposes to enhance our understanding of organizational disasters by looking at the breakdown of learning in teams. First, this article fills a gap in understanding the processes related to the breakdown of learning. Although research has identified the processes that enhance learning in teams, little research has focused on learning breakdowns. This is important because the factors that lead to breakdown are often different from those that lead to learning (Mohr, 1982). Second, the article illustrates Mills's (1967) proposition that teams engaged in complex tasks require learning. For Mills, team learning is not tangential to team performance. Team learning lay at the heart of effective teams, particularly when a team faced a situation with a wide range of contingencies and multiple potential responses. When learning breaks down, teams fail to function. As knowledge work, short-term project teams and task forces become core strategy for accomplishing goals in organizations, Mills compels us to see the significance of learning in teams as central to organizational success. A qualitative analysis of the 1996 Mt Everest disaster serves as the basis to explore learning in teams.

Methods

The 1996 Mt Everest climbing disaster served as the data for this exploration of the nature of learning and its breakdown. The year 1996 stands as the deadliest year in the 43-year history of climbing Mt Everest, with a total of 15 climber deaths and several other serious injuries. This analysis focuses on three expedition teams and the death of eight climbers as a dramatic example of organizational disaster.

Data collection

Data consisted of more than 1750 pages of information drawn from multiple public sources, including photographs, charts, Internet filings by expedition teams, published first-hand accounts of survivors and observers, popular press reports, videotaped interviews by reporters, and the personal experience of the principal investigator. With the exception of personal experience, all data were obtained from public sources. Data collection began in May 1996, immediately following the disaster, and has continued until the final preparation of this manuscript. I obtained accounts from as many participants as possible. Post hoc data came from the Internet in the form of downloaded daily reports filed by climbing teams via satellite directly from their campsites prior to the May 10 summit attempt. Additional documents were obtained and reviewed by following the public debate that ensued in the aftermath of the events. Following the events, numerous documents were produced by survivors who participated in public forums, press reports, talk-show interviews, Internet chat rooms, lectures and documentaries.

Analytic strategy

The events of 1996 pose unique research challenges because, unlike other disaster sense-making, there were no publicly authorized investigations, no hearings or inquiries conducted by authoritative bodies, no systematic assemblage of archival records and little trace data (Gephart, 1993; Weick, 1993). As is common with sense-making strategies, I combined multiple analytic strategies of analysis.

First, a timeline of likely events was created after an extensive review of public accounts of survivors and observers. Reliability for the timeline was enhanced when a set of researchers, working completely independently of this principal investigator, published a similar timeline of events in a peer-reviewed journal (Elmes & Barry, 1999). The timeline was then put into a narrative, which consisted of identifying and organizing the sequence of

events, clarifying important attributes of the actors, creating the context, establishing an evaluative framework and setting the narrative voice (Pentland, 1999).

The second strategy applied Mohr's (1982) process approach to theory construction. Employing Mohr's theory-building strategy helped to further refine the massive amounts of data, to synthesize or narrow the relevant constructs, and to generalize the events. Mohr outlined five factors of a process theory:

- 1 *Focal unit* describes the unit of analysis.
- 2 *Precursors* describe two or more encounters or processes experienced by the focal unit. Importantly, these precursors are not variables; they are discreet events or processes.
- 3 *Motivators* describe the forces that initiate the precursors and put them into action.
- 4 *Probabilistic processes* describe the forces that bring the precursors together.
- 5 *Outcome* describes how the combination of precursors impacts the focal unit to create an incident.

The analysis was further enhanced by the personal experience of the researcher, who was in the Everest region of Nepal in the aftermath of the disaster and who participated in unstructured conversations with several individuals associated with the mountain-climbing community. Experience is recognized as an important element in sense-making research (e.g. Weick, 1993). Similar to ethnographic approaches to disaster sense-making, experience informs the analysis as the investigator becomes immersed in the culture under investigation (Gephart, 1993). Investigator involvement is consistent with action-learning approaches (Reason & Bradbury, 2001) to organizational research, even though the principal investigator was never directly involved in the events – only in the culture.

The combination of strategies helped to achieve medium accuracy, medium generality and low simplicity in the trade-offs inherent in qualitative research (Langley, 1999). The next two sections detail the outcomes of this analysis, using the narrative and process theory approaches.

The 1996 Mt Everest disaster

The final assault

The New Zealand (NZ) team, lead by Rob Hall, consisted of 15 members and was assisted by guides Mike Groom and Andy Harris. The American (US) team consisted of 12 members, including Scott Fischer, the expedition leader, as well as assistants Neal Beidleman and Anatoli Boukreev. Each team went through nearly 6 weeks of acclimatizing and preparation, and each reached the highest camp (Camp IV) on May 9.

Expedition leaders knew that the best time to attempt the climb to the summit was in the early morning. Accordingly, the NZ team left Camp IV at 11.35 p.m., followed by the US team at 12 a.m. Earlier in the week, many of the leaders of the 30 expeditions seeking the summit had met to determine the order in which each team would begin the final summit. The expeditions led by Hall and Fischer were to be the only teams leaving for the summit from the highest camp, Camp IV, on May 10. The Taiwanese expedition leader broke this apparent agreement and set out from Camp IV between 12 a.m. and 1 a.m. with Sherpa guides (Krakauer, 1997a).

In his personal account of the events, climber Jon Krakauer (1997a) explained that during the final 18-hour push to the summit, 'survival is to no small degree, a race against the clock' (p. 173). Ideally, if climbers begin their summit attempt at 12 a.m., they should reach the summit between 12 and 1 p.m. and head down soon after. Climbing teams typically establish turnaround times that represent chronological reminders for when to abandon efforts for the summit and begin descent. Past Everest expeditions had set turnaround times ranging from a conservative 12 noon to a risky 2 p.m. Most team members were also equipped with individual support technology, such as supplementary bottled oxygen and emergency steroids to provide energy in case of severe exhaustion. The team members were not, however, equipped with radios to communicate either within or between teams.

At about 5.30 a.m., three members of the American team reached the beginning of a long narrow ridge running between 27,200 and 28,000 ft known as the Southeast Ridge Balcony. Krakauer (1997a), who was a member of the NZ team, reported seeing three US team members on the ridge and assistant guide Sherpa Lapsong Jangbu pulling another climber behind him. Here the teams were forced to stop because fixed safety ropes had not been secured beyond that point. The NZ, US and Taiwanese teams intermingled as the teams worked together to secure the safety ropes that would improve the safety of the next leg of the climb. This created the first of several

bottlenecks that were to occur during the climb. The teams slowly ascended along the Balcony between 8 and 10 a.m. (Kennedy, 1996; Krakauer, 1997a).

Traffic jam at the summit

Between 11 a.m. and 12 noon, another bottleneck occurred at the Hillary Step, one of the most difficult sections of the climb, just below the summit at 28,800 feet. Again, ropes had not been fixed as planned. The queue of climbers waiting their turn to ascend the Earth's tallest peak created a 'traffic jam' on top of the world. At about 11.40 a.m., climbers began again to set the fixed safety ropes so that others could continue their ascent (Krakauer, 1997a). Realizing that they could not reach the summit at a reasonable time, several members of the US and NZ team aborted their summit attempt at about 11.30 a.m. (Kennedy, 1996).

Accounts of when climbers reached the summit conflict. However, between 1.12 and 1.25 p.m., eight members of the NZ and US teams reached the summit, followed shortly by two more US team members. Several more members of each team arrived at the summit between 2.00 and 2.15 p.m. (Kennedy, 1996) and several more arrived at about 3 p.m. (Krakauer, 1997a). At about 3.30 p.m., members of both teams continued to the summit. US guide Fischer and NZ guide Hall reached the summit with clients an hour and a half after the absolute latest turnaround time. In addition, a member of a fourth team from South Africa was estimated to have reached the top of the mountain at 5 p.m. – nearly four hours after the turnaround time agreed upon at base camp.

The descent

Sometime between 4 and 5 p.m., things started to go awry. An impending snowstorm, which had been visible for some time, engulfed the mountain and slowed the descent to a near halt. Climbers equipped for only 18 hours of climbing ran out of bottled oxygen and quickly became fatigued without the supplemental support. Two members of the US team, including guide Fischer, and at least two members of the NZ team, including guide Hall and one of his clients, struggled through the storm near the top of the mountain. The whereabouts of assistant guide Harris were unknown.

Between 5.00 and 5.20 p.m., assistant guide Beidleman assumed leadership for a team of eight climbers from both the NZ and US teams. At 27,600 feet, this team found NZ team member Weathers shivering in the cold. Weathers, who had aborted his summit bid 10 hours earlier when his vision became severely impaired, had been instructed by Hall to stay still until Hall returned on his descent. Realizing that Hall would not return soon,

Weathers joined the team to descend. Meanwhile, the team members who had aborted their summit attempt at the traffic jam, as well as a few of the other climbers who had successfully reached the summit, such as Krakauer and Boukreev, began to arrive at Camp IV between 4.30 and 6.00 p.m.

The huddle

By 8 p.m., the team now led by Beidleman reached the South Col, about 350 yards from Camp IV, but became lost in the blinding storm. Unable to locate camp and unaware they were just a few hundred yards from shelter, team members forced each other to stay awake in double-digit subzero wind chill. The team continued to pound on each other to stay warm and fought exhaustion by forming a tight human barrier against the wind and cold in what has become known as 'the huddle.' Some injected the emergency steroids (Kennedy, 1996). Faced with the prospect of dying on the mountain, some climbers began to panic, while others contemplated death. At about 12 a.m. on May 11, a clearing in the clouds allowed Beidleman and Scheoning to navigate the short distance to Camp IV and to send Boukreev, who had been trying to organize a search party, for help. Boukreev retrieved all but Nambu and Weathers, who were both believed to be dead (Kennedy, 1996). More than 24 hours after beginning their summit attempt, 26 of the original 33 climbers were back in their tents. Leaders Hall, Fischer and Gau of the NZ, US and Taiwanese teams, respectively, were still missing, as were assistant guide Harris and climber Hansen. Taiwanese climber Nambu and NZ team member Weathers were left for dead on the mountain.

Rescue attempts

At 8.30 a.m., three teams of Sherpas headed out to find the remaining climbers. Hall, trapped near the summit, had been in radio contact throughout the night and reported that Hansen could not continue down the mountain. At about 10 a.m., the Sherpas reached Fischer and Gao but were unable to rouse Fischer. The rescue party virtually dragged Gao behind them, a difficult and dangerous act at high altitudes, and returned to Camp IV. Weathers, left for dead a second time, amazingly regained consciousness and stumbled into camp without assistance at 4.30 p.m. (Coburn, 1997).

Attempts to rescue Hall were aborted due to weather. At 6.40 p.m., Hall, still conscious, was patched through by satellite phone to his wife in New Zealand. Hall had survived for more than 32 hours at close to 28,700 ft but was frostbitten, without supplemental oxygen and unable to move. Later that day, another climbing team, consisting of veteran climbers Ed Viesturs and David Breashears, joined the rescue efforts. Working with the stronger

surviving members, they helped weaker members, including Weathers and Gau, down to a lower camp. In a rescue that had never been attempted above 18,000 feet, Nepalese Army Pilot, Lt. Col. Madan K.C. arrived in a helicopter and hovered above a makeshift landing strip marked by pink Kool-Aid. Because a helicopter's ability to fly is unpredictable at higher altitudes, no one knew if it could lift off with the weight of even one extra passenger; so Gau was lifted first, and about 45 minutes later, Madan K.C. returned to take Weathers to safety.

Harris's whereabouts were not clearly established. Krakauer (1997b) suggested that Harris had become trapped near the summit while assisting Hall and Hansen. The three teams would sustain eight deaths, including three guides – Hall, Fischer and assistant guide Harris – as well as climbers Hanson and Nambu, plus a Tawainese climber who had died earlier in the expedition. Two Sherpa guides were killed: one during an earlier accident, and one during the rescue attempt. Additionally, seven climbers from other expeditions also died that season, including a member of the South African team who reached the summit at 5 p.m. on May 10. Gau and Weathers collectively suffered amputated hands, feet and nose.

Analysis

Mt Everest as a source for team analysis

The Mt Everest events serve as a source of data for analyzing team process, for at least four reasons. First, these events fit Perrow's (1984) definition of a disaster 'incident', because the events led to the breakdown of specific units of an organization. The consequences of the Mt Everest event were confined to a few units (teams) and created no ongoing disruption to climbing on Mt Everest or mountain climbing in general.

Second, the events meet the three criteria for a critical event worthy of research (March et al., 1991). The disaster: (i) served as a branching point for the historical development of the mountain-climbing industry, as it transitioned from an informal network of climbers to a commercialized industry (Elmes & Barry, 1999); (ii) contradicted a belief, widely held at the time of the disaster, that climbing Mt Everest had become routine and required no special expertise in climbing; and (iii) evoked strong metaphorical power as demonstrated through the multiple accounts of the events in the popular press.

The third reason to study the Everest events is that mountain climbing serves as a symbolic representation of complex social process (Mitchell, 1983), and the specific events of 1996 served as the topic of several best-selling books and movies and countless press features. Thus, the events achieved a symbolic importance beyond the local climbing community. The

disaster has been invoked to illustrate a variety of organizational phenomena, including leadership (Useem, 2001), strategy (Digenti, 2001) and ethical decision-making (Kayes, 2002).

Fourth, the Mt Everest disaster fits Vaughan's (1992) three criteria for developing general theory from the particulars of experience, because the events: (i) provided a vivid example of how a breakdown in team learning contributed to an organizational disaster; (ii) provided data for an understudied level of analysis, namely, teams in organizational disaster; and (iii) shed light on an understudied type of team, task forces, expeditions and short-term project teams.

As a study in team learning, these events exemplify a team goal that requires the ability to shift a course of action based on new information and to address multiple goals and changing circumstances (Mills, 1967). Exhibition teams climbing Mt Everest represent a team whose primary purpose lies in what Mills called a 'fourth-order' purpose: effectively, the ability of a team whose purpose is learning. According to Mills, a fourth-order purpose requires teams to establish 'enough freedom from external restraints, obligations, and commitments, and sufficient emancipation from past routine, habit, and tradition' (p. 102) to respond to complexity and contingency. When learning breaks down in the face of a fourth-order purpose, not only does a team fail to learn, but it may fail to survive. Just such a scenario existed on Everest.

This article extends knowledge about organizational disasters by examining the process nature of team learning. The study draws on Mills's (1967) proposition that when a team is confronted with a complex and challenging task, learning lies at the heart of team success. Mills viewed team learning as a 'combination of reciprocity to new information and readiness to revise past assessments of a situation' (p. 98). A team that is ready to learn relies on three processes: a stance of selecting and screening information, the ability to draw conclusions from extant experience, and the ability to distinguish the irrelevant and insignificant from the important.

Breakdown in team learning: elements of a process theory

The first step in analysis was to apply Mohr's (1982) five process-theory factors to the Everest events. This included identifying a focal unit, precursors, motivational drives and organizing processes. Each is outlined below.

The focal unit

Teams served as the focal unit of the analysis. The individuals assembled on Everest during the 1996 climbing season qualify as teams by at least three definitions. First, the various coordinated activities of individuals on Everest

met the basic definition of a team because the primary focus of decision-making, interaction and communication among members was at the team level, not at a level of independent individuals acting in isolation, or as units in an organization (Homans, 1950). The teams constitute work teams because the individual members came together for the specific purpose of climbing Mt Everest (Thelen, 1963). Second, the teams met the criteria of expedition teams because skilled individuals actively coordinated through highly complex and specialized roles, improvised actions in the unpredictable circumstances of climbing Mt Everest, and were embedded within a total context of the climb for a one-time performance event (Sundstrom et al., 1990). Third, the teams also met four criteria for a task force, members: (i) had different specialties suited to perform specific tasks, (ii) exercised decision autonomy and environmental dependence, (iii) created a single creative act, and (iv) were constrained by specific time deadlines (Hackman, 1990).

Motivations, precursors and organizing processes

Table 1 summarizes the precursors, motivational drives, and organizing processes identified in the research.

Motivation

Mills (1967) saw development and learning as a higher team function, a necessary function for achieving a higher, more complex team purpose. Mills researched primarily from a sociological perspective; however, the importance of learning in team success draws on a rich history of team development (Bennis & Shepard, 1956; Bion, 1959; Tuckman, 1965), which emphasizes that achieving higher team functioning, especially in situations of high complexity and change, requires a process of continuous adaptation and learning. In this way of thinking, the ability of a team and its members to solve problems, to deal with changing psychological needs, and to adapt to changing environmental circumstances is the defining characteristic of team functioning.

Precursors

Narrowly defined purpose

Research shows that under most conditions, setting high and ambitious goals will lead to success (Locke & Latham, 1990). There are, however, limits. Winters and Latham (1996) found that learning goals were more effective than performance goals in the face of novel tasks. Similarly, the positive

Table 1 Factors leading to team breakdown

<i>Process or event</i>	<i>Everest example</i>
<i>Motivational drives (Learning and development)</i>	
Drive to learn	Seek challenging situation in mountain climbing
Need to adapt	Respond to constantly changing conditions on the mountain
Force for development	Encounter complex situation
<i>Organizing processes (Team dynamics)</i>	
Join team to acquire means to accomplish goals	Expedition provides means to climb Everest (e.g. financial, technical, social)
Multiple competing motivations	Publicity, personal challenge, career enhancement, mountain 'experience'
<i>Precursors</i>	
Narrowly defined purpose	Reach summit
Directive leadership	Leaders provide technical expertise but fail to create environment in which members can adapt
Failing to sense an ill-defined problem	Complex weather patterns, organizational and team dynamics, industry changes, intermingling of expedition teams

effects of goal setting may be lost when a goal is defined too narrowly (Tenbrunsel et al., 2000). A narrowly defined goal characterizes team purpose as linear and logical with successful goal achievement following a cause-and-effect logic. In this view, the means to achieving team purpose is seen as a rational, systematic process that leads to a pre-defined and clear goal. Goals are achieved by applying existing formulas. One strategy for climbing Mt Everest presented by a reporter, exemplifies the cause and effect logic of achieving a narrowly defined goal.

The South Col, the site of the highest camp on the Nepalese side of the mountain, is at 7,906 meters [25,938 feet]. The summit is 8,848 meters [29,029 feet]. Climbing 90 meters [295 feet] per hour you should gain the difference in about 10 hours. Add a couple of rest stops and some time to enjoy the view on top, and you're looking at 12 hours up. Six hours for the descent makes it 18 hours round trip. Then there's the oxygen. At an average flow of two liters per minute, a bottle will last six hours. You'll carry two – with regulator and mask, they'll total

maybe 15 pounds – and your Sherpa support climbers will carry a third for you. That gives you 18 hours of total climbing time.

(Kennedy, 1996: 96–7)

In contrast, a broadly defined purpose accounts for emotion, perception and contingencies of the problem. Expert mountain climber Ed Viesturs's strategy for climbing Everest serves as a contrasting example of a broadly defined purpose.

When you're up there, you've spent years of training, months of preparation, and weeks of climbing and you're within view of the summit, and you know, you have – in the back of your mind you're telling yourself, 'We should turn around 'cause we're late, we're gonna run out of oxygen,' but you see the summit, and it draws you there. And a lot of people – it's so magnetic that they tend to break their rules and they go to the summit – and, on a good day, you can get away with it. And on a bad day, you'll die.

(Viesturs, quoted in Rose, 1998)

Viesturs's comment demonstrates at least three characteristics of a broadly defined purpose:

- 1 Multiple, often contradictory solutions (e.g. the lure of the summit versus knowing one should turn around), often expressed through the negative or contradictory demands inherent in an activity.
- 2 The emotional, subjective and potentially ambiguous nature of the solution (e.g. the 'lure,' being 'drawn' there, when to 'break the rules').
- 3 The contingency of the situation in relation to prior experience (e.g. 'on a good day, you can get away with it . . . on a bad day, you'll die').

Reliance on directive leadership

The issue of leadership has become paramount in discussions about the explanations of the successes and failures of teams in the Everest disaster (Elmes & Barry, 1999). Leadership played a part in Everest, but the present analysis revealed that relying too heavily on leadership to make choices can have negative consequences. The events reveal that the consequences of strong leadership lie in limiting the discretion of team members in their ability to respond to changing circumstances. During much of the climb, the US, NZ and Taiwanese teams opted to rely on the directives of an individual leader. Several vivid illustrations of the power of directive leadership existed in spring 1996:

- 1 NZ guide Hall took sole responsibility for declaring and enforcing the summit schedule and turnaround times at base camp.
- 2 US guide Fischer, although by most accounts (e.g. Boukreev & DeWalt, 1997) the least authoritative of the three guides, illustrated the bravado of the rugged individualist by dealing with increasingly weak and sick team members by claiming, 'It's attitude, not altitude.'
- 3 Taiwanese team leader Gau abandoned his fallen teammate to continue his ascent alone, leaving a weakened climber alone on the mountain.
- 4 One NZ team member commented that climbing is based on 'self-reliance, on making critical decisions and dealing with the consequences, on personal responsibility' not on team work (Krakauer, 1997a: 168).
- 5 Assistant guide Biedleman, in post hoc analysis of the events, stated, 'Sure, we made little mistakes all along the way. But looking back, none of it went to cause the death of [team leader] Scott Fischer' – failing to recognize the interdependence of team members.
- 6 The teams' decisions not to rope together for many difficult sections of the climb are also indicative. Roping entails securing a 150-foot rope to a harness worn around a climber's body. Several climbers 'clip in' to the same rope, creating a common outcome for all attached.
- 7 NZ team member Beck Weathers was directed by Hall not to descend before Hall returned. Weathers had at least two opportunities to descend with other climbers but refused to descend because of his pact with the guide. Weathers agreed to descend 12 hours later without Hall, but only after assistant guide Groom, had got permission from Hall via radio.

Failing to sense an ill-defined problem

The third precursor is the concept of an ill-defined problem. Many approaches to problem definition have emerged from diverse fields such as leadership (Heifetz, 1994) and social psychology (Gruenfeld & Hollingshead, 1993). This study relies on a definition, most consistent with learning, that emerges from developmental theory. An *ill-defined problem* arises when the solution to the problem cannot be answered with current knowledge. Three criteria establish an ill-defined problem: (i) the goal to be achieved is unclear, (ii) the solution to achieve the goal is unclear, and (iii) experts will disagree on whether the goal has been achieved (King & Kitchener, 1994). Examples showing that many of the teams believed they faced a well-defined problem can be found in pre-summit statements (e.g. 'as long as the weather holds we will have success', 'we've got the Big E [Everest] all figured out', 'all indications point towards a successful climb') and the reliance on a prior

'100% success rate' in the face of mounting complexity. Importantly, the teams, for a variety of reasons, failed to sense the problem as ill-defined. (For a discussion of why an individual might fail to sense a problem, see Kiesler & Sproull, 1982.)

Organizing processes

To facilitate the testability, thoroughness and ultimate usefulness of the proposed theory for explaining the organizational breakdown, several tests were conducted (Mohr, 1982). First, each precursor was conceived as a dichotomous phase or event, not a continuous variable. Second, the incident (i.e. organizational breakdown) occurred when all three precursors merged. That is, no single element is inherently problematic on its own or when combined with any other single element. Each element alone is necessary but not sufficient for the the outcome. The combination of a narrowly defined purpose, directive leadership and the failure to sense an ill-defined problem provides the ingredients for organizational breakdown. For example, three possible combinations of precursors can arise that do not spell disaster:

- 1 The combination of a narrowly defined goal and directive leadership may be necessary for achieving certain aspects of a goal. This combination may account for Hall's '100% success rate,' because narrow goals and directive leadership are expected to facilitate the achievement of goals (Locke & Latham, 1990).
- 2 The combination of narrowly defined purpose and ill-defined problem often results in enhanced learning, as individuals exercise discretion over changing circumstances (Rasmussen, 1990). The combination of ill-defined problem and narrowly defined purpose may have improved performance in earlier expeditions to Mt Everest, when individuals were responsible for exercising considerable discretion in response to changing circumstances (Elmes & Barry, 1999).
- 3 The combination of directive leadership and ill-defined problem can allow for necessary adaptation when discretion is built into the system. For example, in Viestur's characterization of the purpose of mountain climbing – 'getting to the top is optional, getting down is not' – he inherently refers to being adaptive in the face of unknown contingencies characteristic of an ill-defined problem. Directive leadership is likely to provide a common focus and standardize procedures, necessary for organizing during changing circumstances.

Another test ensured the process nature of the theory by identifying a sequence of events. The specific sequence is essential for an incident to occur.

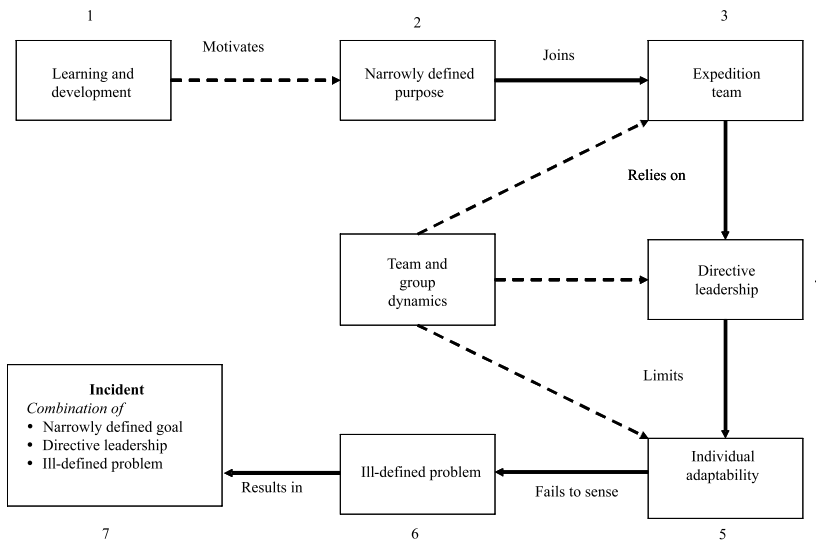


Figure 1 Process model of the breakdown of team learning

A break at any point in the sequence will prevent the incident. Figure 1 shows a proposed sequence of the events that led to the incident. The motivating force – the desire to learn and develop – is shown as the first stage; the organizing forces of team dynamics are shown to impact the process at stages 3, 4 and 5. Stages 2, 4 and 6 of the sequence show the role of the disaster precursors.

The sequence shown in Figure 1 provides an explanation for why the Everest teams continued to pursue their goal, the summit, in the face of mounting evidence that it could not be attained. Learning and development motivate the pursuit of difficult and ambitious goals. Achieving difficult goals requires the efforts and resources of a team. Participation in a team creates multiple and competing goals that often require directive leadership, which in turn limits individual discretion over learning. When a team with a narrowly defined purpose and little discretion over learning fails to sense an ill-defined problem, the formula for disaster is in place.

A more detailed explanation of this logic can be applied to the Mt Everest events. Individuals motivated to meet new challenges sought to climb the world's tallest mountain. The resources necessary to reach the summit – including economic, physical, expert and psychological resources – required the efforts of a team. Joining a team where members share competing goals created ambiguity and anxiety within the team members. This ambiguity and anxiety created dependence on team leaders, which in turn reduced

individual discretion over learning. In the course of pursuing their individual goals, the expedition teams failed to sense ill-defined and unexpected problems in the form of changing weather patterns, complex team dynamics, multiple competing goals, bottlenecks at key points of the climb, and limited resources such as the use of a single route, a limited number of days when a summit attempt is possible, and the reliance of multiple teams on a single fixed set of safety ropes.

Put succinctly, in the final phases of the ascent, directive leadership restricted learning in the face of the mounting ill-defined problem. Focused on achieving a narrowly defined goal, the teams continued pursuit of the summit, at the expense of attending to the broader purpose of the team, getting down.

Discussion

This study shows how team learning breaks down in the face of a changing environment. The Everest events provide the basis for a process theory of team breakdown and reveal key variables that led to this breakdown. By suggesting a recipe for why team learning fails, the study provides the basis to better understand the limits of how organizations learn and respond to changing environments. The study provides insight into learning in short-term project teams, common organizational disaster and the relationship between learning and leadership.

This article contributes to understanding the importance of team-level learning and its impact on organizational learning (Edmondson, 2002) by focusing on the process (rather than variance) factors associated with the breakdown of team learning. An interesting area for future research lies in the link between face-saving behaviors, such as psychological safety (Edmondson, 2002) and its application to organizational disaster. The study has particular significance for learning in short-term project teams that typically form and dissolve after one time events. Because project teams often lack the time and resources to progress through a developmental sequence necessary for higher levels of learning (Gersick, 1988), performance may take precedence over learning (see Kayes, 2003). In the face of an environment that requires learning, short-term project teams may encounter the limits of the positive effects of goal-setting (e.g. Locke & Latham, 1990).

The Everest events shed light onto the dynamics that occur as organizations move within the coupling–interaction grid (Perrow, 1984). The coupling–interaction grid tends to view organizations as stable classifications

and says little about the process of transitioning from one dimension to another. For example, Elmes and Carlile (2002) describe how the changing nature of the mountain-climbing industry may have contributed to this disaster. An application of Perrow's Normal Accident hypothesis suggests that the mountain-climbing industry has moved from a loosely coupled and interactive organization to a complex and intermediate-coupled organization. This move marks a shift from a single- to a multiple-goal organization and requires that organizations rely on a different type of knowledge. A multiple-goal organization cannot rely on spurious knowledge of elites (such as expedition leaders) and tradition (such as the mountain-climbing folklore) but must devise multiple agendas with alternative pathways (Perrow, 1984). The same logic holds for teams. Teams that function with multiple goals require greater learning in order to adapt to changing organizational circumstances.

One surprise of this study came in the close relationship between learning and leadership; it shows how leadership gets in the way of team learning. Consistent with Elmes and Barry (1999), the present analysis of the Everest disaster describes how leaders often inhibit rather than enhance team performance. This study, however, moves beyond the narcissistic leader to suggest a different metaphor. The narcissistic leader is driven by the need to prove personal worth and in the process drags the team along. Leader as Narcissus is a story of self-indulgence. The story of Mt Everest is one of how the temptation of goal achievement overtakes the leader's ability to consider alternative courses of action. Narcissus focuses on individual limitations; the Everest story focuses on the temptations established by clearly defined goals and the rewards that flow from achieving them.

This study attempted to create a general theory based on a single case study, accordingly, only medium accuracy and generality were achieved, while the complexity of the study remains high. Although the events create vivid details of the breakdown of learning, the theory requires further verification, elaboration and measures for testing. Also, by creating a narrative, some details of the events were highlighted, whereas others were deemed less important, thus, although the study accurately depicts known details of the events, the presentation is necessarily selective. Based on the limitation of using a single case, the study is best generalized to short-term project teams involved in complex and changing tasks.

This study suggests two specific areas for future research. Continued rational pursuit of goals can easily become unproductive and lead to organizational breakdowns when the goals are narrowly structured, learning is restricted and the problem faced is complex. Future research should develop

and test a comprehensive process model of learning in short-term project teams in the face of a complex task. The model should include a new logic of goal-setting that accounts for its unintended consequences. A clearer understanding is needed of how learning procedures impact team functioning. In addition, future research should focus on how leaders tempt teams into taking risky actions and how narrowly defined team purpose limits learning.

The 1996 Mt Everest climbing season marks the most widely publicized mountain-climbing disaster in history. This unique illustration of organizational disaster provides a vivid example of the breakdown of learning in teams. Three factors – a narrowly defined purpose, directive leadership and the failure to sense ill-defined problems – combined to halt learning. Analysis of the events exposes the limits of rational goal-setting, the need for more research about short-term project teams, and the role of leaders in limiting team member learning. Ultimately, this study illustrates how the muddled decision-making that mountain climbers experience during high-altitude mountain climbing may provide clues to how more traditional teams detect, respond to and recover from incidents of organizational disaster.

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