

An analysis of reliability and resilience in high reliability teams

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ABSTRACT

Organizational scholars have long been interested in organizations which exemplify high reliability. While such organizational studies have provided valuable clues to the ways in which such organizations form and function, this paper argues that a more nuanced study of high reliability processes within team contexts is warranted. This study focuses on organizational teams which are faced with the challenges of maintaining high levels of reliability. Of particular interest is how teams manage adverse events which disrupt the team's process and how they make adaptations immediately to restore their functionality. In this study, I: (1) explore the existing literature surrounding high reliability organization and resilience, (2) present a qualitative analysis of Special Weapons and Tactics (SWAT) teams to explore and identify factors surrounding adaptation within the critical moment, and (3) discuss the implications of these factors in the theory and research surrounding high-reliability teams.

The findings of this study find strong connection with the work of Weick and serve to advance and clarify previous characteristics associated with high reliability organizing; however, by using the small group as the unit of analysis for the study additions to concepts traditionally associated with high reliability organizing can be noted: (1) the ability to control variability during team function, (2) accepting the value of the unexpected, and (3) the value and implications of continuous forward progress.

Keywords: Reliability, Resilience, Teams, Teamwork, SWAT, Organizing

INTRODUCTION AND LITERATURE REVIEW

There are certain lines of work and organizational types which must remain error free. This need has increased over time as systems have evolved to greater levels of complexity. As systems have grown more complex, they pose greater dangers to our ability to manage risks and prevent failures which can endanger society (Perrow, 1984a, 1984b). One only has to consider the ramifications of failures at nuclear power plants, offshore oil wells, and air traffic control facilities to recognize that maintaining an error free environment in such organizations saves lives and property. The concern for error prevention has generated a growing interest in high reliability organizations (HRO's) (LaPorte & Consolini, 1991; Weick, 1976, 1987, 1988, 1993a, 1998). High reliability organizations (HRO's) have been conceptualized as organizations which, "operate continuously under trying conditions and have fewer than their fair share of accidents" (Weick & Sutcliffe, 2007, p.1). Due to extraordinarily high levels of complexity and their embeddedness in society, these organizations must take on practices and procedures which promise to insure the highest levels of reliability in organizational performance (Weick & Sutcliffe, 2007).

A key limitation in previous research is that the concept of high reliability organizing has focused primarily on the organization as the unit of analysis as opposed to the group or team. While it may be argued that scholars interested in high reliability organizing have examined groups and teams while treating them as organizations (Weick, 1993a), organizational scholars have yet to explore systematically how high reliability organizing occurs within groups and teams. One notable exception exists in the health care organizational literature where High Reliability Teams (HRT's) have emerged as a focus within the last few years (Baker, Day, & Sales, 2006; Benn, Healey, & Hollnagel, 2007; Burke, Wilson, & Salas, 2005; Riley, Davis, Miller, & McCullough, 2010).

Both HRO's and HRT's experience unforeseen events which require them to adapt and recover quickly to avoid disaster (Rijpma, 1997; Shrivastava, Sonpar, & Pazzaglia, 2009). Yet, few attempts have explored the way adaptive behaviors within groups and teams allow them to achieve resilience by managing critical disruptions. The ability to recover from a critical disruption has long been considered important and is typically associated with debriefing processes that occur after events such as Post Project Appraisals (PPA's) and After Action Reviews (Baird, 1999; Decety et al., 1997; Lipshitz, Popper, & Oz, 1996; Popper & Lipshitz, 1998; Schindler & Eppler, 2003). While these debriefing practices differ in practice, they share a common characteristic as they focus on how participants reflect on the critical disruption and develop new strategies for success after the event has transpired (Gittell, Cameron, Lim, & Rivas, 2006; Heldring, 2004; Luthans, Norman, Avolio, & Avey, 2008; Powley, 2009; Youssef & Luthans, 2007). While such practices are important, my interest is in how teams adapt within the moment, without withdrawing from the unfolding situation, and reestablish functionality immediately following a critical disruption.

I begin with a discussion of theory surrounding high reliability organizing followed by a discussion of the research surrounding HRT's. Finally, I examine how the concept of resilience connects to group processes and then extend these concepts to the study of members of HRT's.

High Reliability Organizing

A number of scholars have explored the characteristics of organizations that are able to work for extremely long periods without a breakdown in production (Beyea, 2005; Gifun & Karydas, 2010; B. Miller & Horsley, 2009; Novak & Sellnow, 2009; Weick, 1987, 1988, 1993b;

Weick & Sutcliffe, 2007). Such complex organizations typically offer little opportunity for second chances and are normally under intense oversight from a variety of sources. Scholarship here has focused on identifying key factors and interaction patterns that lead to long periods of accident free work (Shrivastava et al., 2009; Weick, 2004).

Weick (1987, 1988, 1993) notes that several conditions are necessary, but not sufficient for minimizing or eliminating error and maintaining reliability including: (1) careful attention to existing procedures, (2) limited trial and error activities, (3) redundancy in the system, (4) decentralized decision making, (5) continuous training with an emphasis on simulation exercises, (6) strategic prioritization of safety within the system, and (7) creation of a culture which is ever vigilant toward the potential of accidents. The enactment of these factors creates a state of “mindfulness” within the organization whereby individuals pay close attention to subtle differences in organizational patterns which give clues to the potential of larger systemic failure.

Mindfulness emphasizes the importance of social cognition of the participants in the system. Weick (1998) asserts that an accident is brought about by a break in the mindful attention of participants toward the evolving organizational system. He claims that too much emphasis has been paid to the idea of routine and repetitive activities noting that routines of individuals even in the most mundane tasks are unstable and prone to fluctuations emanating from the environment surrounding those routines. Weick embraces the idea of variance in behavioral routines and contends that that reliability is not achieved by mindlessly performing a standardized routine; rather, it is the result of patterns of cognition and communication that pay attention to, and carefully manage, fluctuations and variance within a system.

Weick (1993a, 1993b) associates mindfulness with a particular approach toward sensemaking that is characterized by a preoccupation with failure, a reluctance to simplify interpretations via generalization, a sensitivity to operations with an emphasis on “big picture” or system level thinking, a commitment to resilience applicable to both the organization and the individual’s role in the system, and finally an ambivalence toward specified structure and decision making via inflexible hierarchical roles. There is a high degree of similarity between these characteristics of sensemaking and the seven features of high reliability organizations. For example, by avoiding the formulaic and disciplined approach toward sensemaking that often occurs within hierarchies, Weick and Sutcliffe (2007) argue that decision making should travel with the problem itself and fall to the people who have the most knowledge of the problem. This stands in sharp relief to rigidly structured hierarchy based decision making models in which the ability to make decisions is based on position in the company and not positional relevance to the issue itself (West, Patera, & Carsten, 2009). Weick argues that the efficiency and quality of decision making made at the same level at which the problem occurs is essential for allowing rapid correction to systemic variance, but requires the highest levels of competence among individuals at every level of the system (Weick, 1987). As will be noted in the next section, many of the characteristics described here for HRO’s are also readily present in HRT’s.

High Reliability Teams

Most literature associated with issues of high reliability has focused on characteristics of organizations and their members. Only recently have studies attempted to assess the role of teamwork as it relates to high reliability organizing. High Reliability Team (HRT) studies have largely been conducted within healthcare organizations. These organizations have pursued high reliability for a variety of reasons including a desire to avoid malpractice claims (Knox, Simpson, & Garite, 1999), form more efficient surgical teams (Benn et al., 2007; Leach, Myrtle,

Weaver, & Dasu, 2009; Undre et al., 2007), and improve efficiency within nursing units (K. Miller, Riley, & Davis, 2009).

The HRT literature begins with a fundamental proposition that HRO's are more easily created when HRT's are used as a building block (Baker et al., 2006; Burke et al., 2005; Wilson, Burke, Priest, & Salas, 2005), and therefore, most research has tended to document the presence of HRO characteristics within such teams. For example, K. A. Wilson et al. (2005) notes that HRT's exhibit five of the characteristics previously highlighted by Weick's (1987, 1988, 1993) sensemaking and decision making work: (1) sensitivity to operations, (2) commitment to resilience, (3) deference to expertise, (4) reluctance to simplify, and (5) a preoccupation with failure, a finding supported by a variety of empirical studies (Baker et al., 2006; Benn et al., 2007; Burke et al., 2005; Riley et al., 2010).

As HRTs are treated as the building blocks for HROs, the assumption is that the qualities of HRTs, conditions that promote their development, and the way that HRTs recover from critical disruptions are identical to HROs. However, teams are much smaller in scale than organizations and may prove easier to manage and monitor. This size difference presents interesting opportunities when issues of recovery and event management are considered. For example, Perrow (1984a) argues that organizational complexity eliminates the possibility of anticipating accidents and hampers rapid recovery, a position partially supported by further research indicating that the organizational process deteriorates slowly over time with a gradual drift into chaos manifesting in a systemic breakdown or accident with the symptoms of disaster being both too numerous and too complex to decipher (Snook, 2000; Turner, 1997). Yet, each of these accounts is focused on large organizations and rooted in the idea that such large organizations are made overly complex by their size. However, research suggests that at a team level fewer signals should be emitted and less coordination would be necessary to facilitate adaptation to an unforeseen event (Moldoveanu & Bauer, 2004; Morgeson, 2005). To better understand how teams recover from critical disruptions, an examination of the scholarship regarding management of critical disruptions is necessary.

Managing Critical Disruptions

To maintain reliability it is important for a group or team to demonstrate resilience and bounce back from critical disruptions. Critical disruptions may be defined as being a type of disruption which is high in event criticality, has great potential for disrupting group activity, and must be managed in order for a system to properly function (Jemal et al., 2008; Perrow, 1981, 1984a, 1984b; Shrivastava et al., 2009; Weick, 1976, 1988, 2004).

Resilience has been noted as a critical resource for individuals, groups, and organizations facing uncertain and disruptive conditions which impact normal operations. The concept of resilience is often characterized as a set of social processes that allow the system to get back on track following a severe disruption (Gittell et al., 2006). Gittell et al. suggest that resilience is informed by two assumptions: (1) resilience is a latent capacity within an organization which is constructed through social interactions over time, and (2) resilience most often manifests itself when an organization experiences a disruption. A number of scholars suggest resilience builds after years of interaction, training, and preparation; and it is only made evident at the time that it is needed. Those scholars note that resilience takes place over an extended time frame during periods of reflection and recovery (Gittell et al., 2006; Heldring, 2004; Luthans et al., 2008; Powley, 2009; Youssef & Luthans, 2007). These periods of reflection are described by Powley

(2009) as a “temporary holding space” in which the normal activities of the organization are suspended for readjustment. In contrast, only limited research has been done to determine how individuals and organizations exhibit resilience at the moment in time in which the crisis is actually occurring (Crichton, 2001; Freedman, 2004; Paton et al., 2008; van der Schaaf, 1995; van der Schaaf & Kanse, 2004).

Resilience requires that participants recognize obstacles to their progress and then make decisions which draw upon existing knowledge or mental constructions in order to overcome those obstacles and move forward in a productive manner (Schon, 1975, 1983; Weick, 1987, 1988, 2001). There are at least two dimensions that we can use to distinguish among strategies for recovery. One dimension regards the issue of consciousness, distinguishing among strategies and practices that use either tacit or explicit knowledge. The former is more preconscious with the latter being associated with mindful conscious activity. A second dimension regards temporality (Polanyi, 1966). Temporal strategies may involve preparation, an engagement with activities such as planning and environmental scanning that occur prior to a critical disruption (Aguilar, 1967; Mendonça, Pina e Cunha, Kaivo-oja, & Ruff, 2004; Schuler, 1989a), while other strategies are distinguished by periods of reflection taking place after the event has transpired (Baird, 1999; Lipshitz et al., 1996; Popper & Lipshitz, 1998; Schindler & Eppler, 2003).

As we consider recovery, we must consider how actors access knowledge to apply to the problem at hand with literature detailing two broad knowledge types. Explicit knowledge is information that is accessed through the mindful effort of an actor for application in a given situation and can be articulated by the individual (Conner & Gunstone, 2004; Gutbrod et al., 2006). Perhaps the most common example of this type of knowledge can be seen when participants face question and answer sessions in which the actor is cognizant of the fact that the knowledge he or she possesses is being called upon with the participant making an active effort to bring such knowledge to the forefront of their mind to address a specific need or inquiry. In contrast, tacit knowledge is information which is intuitively drawn upon during practice within a specific context and is rooted simultaneously in both the context and the practice of action within that context (Polanyi, 1966). This knowledge is normally drawn upon and demonstrated in the moment and is engrained within the mind of the individual prior to the moment itself (Morgeson, 2005). This type of decision making is often described by researchers and observers as intuitive or precognitive, with participants often incapable of articulating the moment-by-moment nature of evaluative processes involved in arriving at the correct decision (Gelenbe, Seref, & Xu, 2001; Lighthall et al., 2003; Maudsley & Strivens, 2000; Mitchell, Fioravanti, Founds, Hoffmann, & Libman, 2009). Here the individual is drawing upon a vast array of previous experiences organized into mental schemas. This process has been referred to as “withness” thinking and is rooted in actions which appear “off the cuff” or spontaneous and unplanned (Shotter, 2006) and demonstrate what Schon (1983) refers to as reflection-in-action or the process of reflecting on previous events in motion in order to rapidly access cognitive schemas and make sense of a currently unfolding situation in the moment through application of those previous experiences. Even when facing situations that have not been previously experienced or simulated, existing schemas may find enough similarity to adapt and “fit” the new situation. Raelin (2007) suggests that when such a situation is encountered that even though we may at first see no way forward we still “plod along” in an effort to make sense of and overcome the new experience. This effort can also be aided by cooperation with individuals who are simultaneously working to overcome the situation (Conner & Gunstone, 2004; Morgeson, 2005; Raelin, 2007; Schon, 1983).

A second dimension that can be used to distinguish among recovery strategies exists at the temporal level. This dimension relates to the ways that individuals ready themselves for action, alone or in concert with others, the assessments that they make after the action, and the knowledge that they gain from these assessments for future endeavors. These kinds of activities can occur prior to a disruption to sensemaking when people prepare for the possibility of disruption or afterwards when people reflect on the event and try to make sense of it. As the primary focus of this paper is decisions made in the critical moment, I will focus on preparation.

A critical component of the recovery process is preparation occurring prior to the disruption. Preparation implies an orientation of self to the context that surrounds us or may soon surround us in anticipation of our interaction within that context (Anderson, Baxter, & Cissna, 2004; Shotter, 2009). This process prepares us mentally for what we will face by orienting us to the task and those around us. In the context of groups this implies recognition of “otherness” and how our own outgoing activities will be accepted and reflected back to us by others as we coordinate our activity. In the course of preparation, we adjust bodily to the situation we will face as our muscles and nerves become attuned to the events surrounding us and the context we will face. This understanding of the scene we will face prepares us for what we will soon interact with: what we will see, feel, hear, and experience (Shotter, 2009).

Preparation extends to how we make use of the scene we face in order to anticipate how we should orient ourselves to others as the scene unfolds and anticipate how others will orient themselves to us. One tool for anticipating the action of others is environmental scanning. Aguilar (1967) notes that scanning the environment is the activity of acquiring information through purposeful searching as well as through undirected or less formal means in which we survey the environment and interpret results to identify events, elements, and conditions that have the potential to impact organizational strategy (Mendonça et al., 2004; Schuler, 1989b). It provides a means to focus on continuously changing environments which require constant evaluation and systemic adaptation (Albright, 2004; Engau & Hoffmann, 2011, 2011; Graefe, Luckner, & Weinhardt, 2010; Hiltunen, 2008; Kohn, 2005; Mendonça et al., 2004; Sarker & Sarker, 2009; Schuler, 1989b). Environmental scanning connects with Weick and Sutcliffe’s (2007) notion of preoccupation of failure as well as Schon’s reflection-in-action, as it directs attention outward, paying close attention to people and processes in the larger environment.

Environmental scanning is particularly useful as we experience new situations. For example, as Shotter (2009) points out, we orient ourselves to others via our expectation of what they will do in return during the interaction and how we would like them to orient themselves to us. This process of continuous preparation and assessment through constant scanning for information allows us to orient ourselves to the situation as it develops so that our actions are appropriate and effective.

Rationale and Research Questions

While there is a growing literature on HRT, the current research has tended to focus on characteristics and practices specific to medical teams to reduce failure rates. Further, existing scholarship has yet to stipulate the specific kinds of disruptions which may take place in the context of HRTs and how they disrupt sensemaking. This line of reasoning is a departure from the study of medical teams and leads to the first research question.

RQ1: What kinds of critical events disrupt the sensemaking and coordination in high reliability teams?

A relatively small amount of literature has been dedicated to the management strategies for dealing with critical disruptions within HRTs during the critical moment. The literature has tended to focus on the way that teams use strategies after the occurrence of critical disruptions and does not explore how teams manage these disruptions as they are unfolding. This line of reasoning leads to the second research question.

RQ2: How do high reliability teams recover from critical events that disrupt their ability to make sense of and coordinate their activity?

METHODOLOGY

This study examines thirty-six (36) members of Special Weapons and Tactics (SWAT) teams from three law enforcement agencies in the southwestern United States. SWAT teams represent HRT's as: (1) they routinely function in contexts where functional decision making and adaptation to irregularities are commonplace; (2) they are forced to function in intensely variable high tension situations with every operation requiring them to manage the unexpected or unpredictable behavior of suspects which they are attempting to subdue; and (3) they are forced to adapt to these unexpected events in the critical moment without the possibility of withdrawing from the operation (Clark, Jackson, Schaefer, & Sharpe, 2000; Compton, Demir, Oliva, & Boyce, 2009; Davidson, 1979; Kolman, 1982).

SWAT teams are units are designed to take on exceptionally high risk infiltration, weapons, hostage, and counterterrorism operations that fall outside the operational parameters and training of the ordinary patrol officer. These operations may require advanced weaponry and equipment specially designed to deal with critical incidents arising out of highly variable situations, particularly those involving shooting suspects, suspects who are expected to escalate to violence, suspects with hostages, and suspects who possess explosives (Angell, 1971; Clark et al., 2000; Compton et al., 2009; Davidson, 1979; Fry & Berkes, 1983; Kraska & Cubellis, 1997).

Due to their para-military nature SWAT teams have often been the subject of scrutiny by the public and the academic community (Fry & Berkes, 1983; Kraska & Cubellis, 1997; Kraska & Kappeler, 1997; Williams & Westall, 2003). This high level of scrutiny has necessitated that such teams strive for the highest levels of performance, professionalism, and reliability, as any mistake made in the execution of their duties will be highly publicized and immediately criticized (Davidson, 1979; Kolman, 1982; Kraska & Cubellis, 1997; Kraska & Kappeler, 1997).

Due to the nature of their tasks, SWAT units often operate in highly variable environments which require adaptation during critical moments of execution. Additionally, the contexts of the missions undertaken by SWAT teams are often governed by tight temporal constraints which necessitate immediate action decisions and on the spot adaptation.

I used purposive sampling techniques to recruit participants for interviews, selecting participants based on their tenure in the department (Lindlof & Taylor, 2002). This choice was made in order to ensure a variety of responses across experiential levels and ensure the greatest variety of perspectives on questions asked during the interview process (Creswell, 2009; Fielding & Fielding, 1983; Frey, Botan, & Kreps, 2000; Jick, 1983; Seale, 1999).

Due to the exploratory nature of this study, semi-structured qualitative interviews were conducted with SWAT team officers to determine what events were experienced as critical disruptions and how officers adapted to them. Qualitative interviews are useful in gaining an understanding of the participant's experience and perspective particularly as these apply to the context and intentionality and allow the emergence of new information during the interview

which was not expected by the researcher (Lindlof & Taylor, 2002). Interviews varied in length lasting from 35 to 90 minutes and were conducted in private offices within the departments where the participants normally worked. All interviews were transcribed by a professional transcriptionist service.

Data Analysis

The interview data was analyzed using thematic analysis to identify commonalities in responses and emergent themes to address the research questions (Gummesson, 1991). Thematic analysis proved valuable in determining the common threads within the accounts of officers. This type of analysis was particularly suited to this research project given its exploratory nature.

To identify emergent themes from within the data set I began with a single interview and performed open coding. After independently coding each interview, I compared the various codes across interviews for the entire study and refined and consolidated codes. I then conducted axial coding where I attempted to group the smaller sub-categories into larger “meta-categories” which I will present below. This process involved analysis of emergent themes applicable to each research question and determining saturation for emergent themes (Fox-Wolgramm, 1997; Perrow, 1967; Yin, 2009).

RESULTS

The first research question of the study addresses what kinds of critical events disrupt sensemaking and coordination in high reliability teams. It must first be noted that officers considered instances of true surprise somewhat rare, reporting that they were constantly considering the unexpected, which served to limit instances of surprise. However, officers did acknowledge that missions rarely go exactly as planned. One officer explained:

No I always expect everything to happen – I mean, you start calculating and forming plans in your head because if it's one of those times when it's everything happens and everything lines up and everything's perfect, it's like, "Wow. Okay. I got away with that one." Because usually, it doesn't. Usually, you gotta be able to respond to anything. Especially when it's, you know, some bad guy and he's doing whatever he's doing, you know, you don't wanna be surprised.

Of interest here is that officers begin to mentally prepare for multiple contingencies. This process of considering what “might happen” appears to have a positive effect on reducing instances of shock and incapacitation during operations as officers have already mentally considered as much variability as possible.

While officers were initially reluctant to admit that they had been surprised during operations, additional probing of the idea about “weird stuff” that had caught them off guard and required recovery efforts generated accounts of critical disruptions. These accounts can be divided into two broad categories: (1) unexpected suspect actions, and (2) unexpected officer actions, which also included officer mistakes.

Though assault tactics are designed to tip the scale of the engagement in favor of the officers, suspect's behaviors and actions during a raid were often described as only mildly predictable due to incomplete intelligence regarding the suspect and location prior to assault, the

rapid pace at which assaults take place, and variability in the way that each suspect reacts to law enforcement. Officers reported that, even with the best preparation and knowledge, it was impossible to fully predict what human suspects might do when confronted or how they might be able to withstand tactics and procedures designed to force them into compliance. Officers' recounted rare occasions when suspects had been able to defeat tools such as CS Gas (military grade tear gas) or tasers designed to bring suspects into submission. As officers experience the effects of these tools personally prior to using them in the field, suspects who were able to withstand those effects surprised officers. For example, one officer noted:

We had a guy that – we put a buncha gas in there, no movement, no nothing. And we thought, "Well, either the guy's already committed suicide or he's not in there..."

You know, and surprisingly (CS) just didn't really bug him that much. Didn't have a gas mask. Didn't have anything else, just didn't bother him as much as, you know – you put gas, gas is one of those things, you don't like to be in it. It, you know, sucks really bad and it's just one of those surprising things.

Perhaps the most shocking thing officers experience occurs when suspects open fire. Officers reported that shots fired during an assault are somewhat rare. In this example officers were called upon to serve a warrant on a known drug dealer. During the operation, the officers entered the front door of the home and made their way into the living room where the suspect's sister and niece (an infant) were sitting on the sofa. The suspect was in an adjacent room, a garage which had been converted to a living area, with a prostitute. When the officers entered the house, the suspect panicked and opened fire with an AK-47 through the wall separating him from the living room where the officers, the suspect's sister, and the suspect's niece were located. Two officers were shot and seriously injured during the assault. One officer recalled:

As soon as the door got breached open, there was a lady and a baby sitting on a couch watching TV. We put them down and started going into the house.

I went with another officer,...and we started heading to the back left of the house, which is where the intel said he stays. As we're heading into the back of the house, we start hearing gunfire. He had picked up the AK-47 in the converted garage and started firing through the wall even though his sister and niece were sitting there, he was going to shoot past them, too. He didn't care about them.

He was sitting back in a recliner getting a blow job, and she (the prostitute) tells the investigators that "I heard the breach of the front door, and I heard police... he got up out of the chair, went to the door, picked up the gun. I told him, 'That's the police, you fool,' and he just started firing through the walls anyway."

The second category of critical events which disrupt sensemaking occur when officers take unexpected actions during operational activities. Officers noted that when their colleagues acted in unplanned or unexpected ways this disrupted the flow of sensemaking producing the need for rapid adaptation. For example, officers always enter rooms in pairs, so they always have backup. Officers' reported that if their partner broke away leaving them alone they felt that

they could not go forward with the mission without violating the norms of tactical procedure. In the following example, the respondent's partner continued forward into the structure without backup. The respondent had broken away while dealing with another occupant in the structure, and his partner had mistakenly gone on without him. Once the occupant had been subdued, the officer then moved forward to find his partner waiting to enter an adjacent room. The respondent noted that his partner had become disoriented due to the fact the respondent had fallen behind, and this had slowed his progress to a stop. This episode shows the value of working within existing team expectations and the resulting breakdown in sensemaking which manifests when there is a break in expected team member behavior. Breaks from protocol were reported to cause disorientation and termination of progress. As will be noted later, breaks in constant forward motion are something officers try to avoid for tactical reasons.

Another type of officer generated surprise concerns overt mistakes. Officers reported that personal errors produced an immediate need for rapid recovery. Younger officers often associated these errors with inexperience and as something to be expected from a novice, while older officers tended to take a more removed approach. Consider the following examples. The first officer (Officer #1), having been involved with the SWAT unit for only nine months, recalled an event in which he made an error in which recovery was required. Here the officer acknowledges the mistake as "stupid" and as an error he should have avoided. In contrast, the second officer (Officer #2), who had been on SWAT for ten years, takes a less personalized, almost observational, tone choosing to reflect on the cause of mistakes as having a strong relationship with maturity and experience noting that they were central to the learning process.

Officer #1 (less experienced)

I was supposed to basically pull down some planks so we'd get eyes on the backdoor, and they were supposed to deploy a flash bang on the second story windows which were on my side. So, as I was looking up to pull my first board, the flash bang went off outside the window and blinded me...You are never supposed to look at one going off. It was totally my fault. I was just stupid.

Officer #2 (highly experienced)

...that's how we make ourselves better...if there is something that everybody else can learn from, you know, you jump on the sword and say, "Hey, look, you know what, I messed up. I did this." And everybody else can kinda benefit from that....I mean, nobody's perfect...But, you know, as the team matures, as guys get more experience, you know, you don't make as many mistakes.

Particularly interesting is the second officer's ability to approach the concept of error from a more observational third party approach and his observation that mistakes led to improvement.

Considering the above categories of critical events, I now consider the second research question which addresses how high reliability teams recover from critical events that disrupt their ability to make sense of and coordinate their activity. The first concept officers associated with recovery was the idea of continuous forward movement. Officers' noted that when faced with unexpected events they felt compelled to continue moving physically forward. Consider the following example. Expanding on one account discussed in RQ1 in which the officer mistakenly

looked at a flash bang, the officer went on to recount that after the flash bang went off he was blinded for approximately fifteen seconds. Despite blindness, the officer reported that to recover from this disruption he continued to perform his job and move forward. The officer reported, "I just (attacked) the fence repeatedly. It wasn't very efficient because I couldn't see. So I just kept wailing at the fence, and I kept doing it until I could get through and my vision came back."

In this case, the officer's sense of duty in completing his assigned mission was central to his recovery and the eventual completion of his assignment and the team's goal. As this particular team relied heavily on the specialized task assigned to the officer, in this case clearing the way for entry, the officer recognized that "doing nothing" would negatively impact the whole team as the operation would grind to a halt. Thus, the officer felt that in order for other members of the team to perform as assigned, he had no option to fail in completion of his role.

Continued forward movement also prevented officers from becoming so shocked that they stopped which would impede the progress of officers who would be entering the room after them. This concept extended to situations in which officers faced real uncertainty. Officers reported that "doing something is better than doing nothing", and that "trying something" was better than freezing up. One officer, when faced with a question of what to do during a critical incident recalled, "I mean on SWAT...you just do something. The worst thing you could do is do nothing, and that's always kind of been my deal, if my partner has got hands on somebody, I'm gonna get hands on somebody. If something goes bad, I'm gonna (do something)."

Officers reported such dedication to the concept of continuously moving forward that even in the most ambiguous, and in some cases dangerous, situations they would continue to do so. For example, one officer recounted an assault in which he was shot by a suspect, yet continued to move forward and complete the mission.

I broke to the right. There was a hallway that went toward the main portion of the house, and I broke to the right. I remember hearing a muffled *pop, pop, pop* as I entered the door, but it was muffled. I knew it was gunshots because you just know, but I couldn't distinguish where in the house it was coming from.

I continued on through the kitchen and confronted the suspect...and that's when we exchanged gunfire. He retreated back into the bedroom. I continued on to the bedroom door, and we exchanged gunfire again, and that's when he went down.

I was hit once in the vest with no injury. It didn't really change my thought process. I was actually hit on the initial exchange when he appeared out of the doorway, but I could not let that hold me up. I had to keep moving or die.

The second concept officers associated with recovery was the idea of falling back on their training and previous operational experiences to figure out complex situations they faced and make immediate action decisions during operations. Officers reported that their training often focused on making such immediate action decisions. An example, consider the concept of the OODA Loop.

The term OODA Loop is an acronym representing the decision making model created by Col. John Boyd of the United States Air Force during the Korean War. The acronym itself, OODA, represents four actions: (1) observe, (2) orient, (3) decide, and (4) act. The

OODA Loop diagram (see Appendix A) presumes that the processes of observation, orientation, decision, and action do not necessarily unfold in a linear manner. Rather, the OODA Loop is a set of processes in continuous interaction with orientation—how we interpret the situation via our culture, training, previous experiences, and informational analysis—always at the center of the process (D. Clark, 2010).

Officers noted that with training they could shorten the OODA Loop process and make decisions faster. Officers noted that previous experiences, in which they were placed under stress, both simulated and operational, allowed for quicker assessment and decision making processes over time. Officers observed that as they gained experience in pressure situations, their ability to rapidly assess the situation and make an accurate decision improved and the decision making process was shortened. One officer stated, “The more you do it, the quicker the assessment comes and you just start reacting the way you were trained... The more stress you put yourself under and the more you do it, the more you can kind of process that stuff quicker.”

Officers reported that immediate action decision making and working through their OODA Loop process was heavily reliant on assessment of the situation and the constraints facing them. Far from purely instinctual, officers described a conscious “thinking” process in which they engaged in a cognitive assessment of the context and situation in light of their training and operational constraints. For example, one officer recalled his thought processes while being fired upon noting his conscious assessment of variables and constraints and subsequent reliance on previous experiences in training to make an immediate action decision.

I'm thinking, "Deep breath. Everybody's down. If this guy's going to keep firing, I've got to get bigger rounds. Should I advance on him or not? Should I hold where I'm at? Do I fire through the wall?" I have to think as I act.

Again, all of this is going through my mind, "I'm accountable for my rounds. I have to know where my rounds are going. I can't just blindly fire through the walls. What if my round goes through the house and into something –?" I am doing all this as a reload and move to take the suspect out. It happens all at once.

While surprised by the unexpected gunfire, the officer immediately begins an assessment process, weighing out what he should do next. The officer is also considering constraints which serve to limit the number of choices available such as his accountability for fired rounds. Even in the heat of the moment, the officer describes how his experience and training guide his decision making at a conscious level and allow him to make sense of what is happening and make an immediate action decision as he moves forward.

In conjunction with this conscious decision making process, officers often reported that their perceptions of time slowed down during critical moments. This “slowed motion” experience seemed to allow officers to calmly access cognitive schema which aided them in working through the problem. As their minds slowed the process down, officers described a way to take a rapidly unfolding chaotic sequence and work within it in order to process it mentally and make sense of it. One officer reported his thought processes as he was fired upon:

That's when all the training kind of kicked in. Everything became very surreal. It was almost like, I tell people it was like *The Matrix*...I could actually see the bullets

exploding through the wall. It's like everything slowed down in my brain, and you'd actually almost see the rounds going by. One grazed my face...

Another officer noted a similar “slowed motion” process which unfolded as gunfire began and allowed cognitive assessment, pointing to training as a key element making this calm slow motion assessment possible:

I remember stopping, and everybody getting down. I was kind of looking at everybody, real slow motion. Hindsight, I was thinking, based on the training we've had, that under extreme stress the fight or flight that kicks in for everybody. I was seeing that some were lying down and taking cover. There were a couple of us up and ready to fight.

That's when my thinking really started slowing down – Okay, I don't know what he's shooting, but it's big rounds because it's traveling through the whole house. They did tell us this guy had an AK, so let me change my rounds and put slugs in.

A lot of it is a training thing. It's a stress inoculation that we put ourselves under. When we train...we try to put ourselves under as much stress as we can and inoculate ourselves to as much of that as possible so you think slow and act fast.

DISCUSSION

In this chapter, I will apply, clarify, and expand the concepts associated with high reliability organizations to HRT's. Taking each research question in turn, I will discuss the findings and applicable connections to previous high reliability organizing scholarship and conclude by examining theoretical application of the results.

RQ1: What kinds of critical events disrupt sensemaking and coordination in high reliability teams?

Two primary themes emerged that characterize types of critical events. The first type of critical disruption involved the suspect taking an action that was unanticipated by officers. While officers reported this incident as somewhat rare, officers noted that sometimes suspects would perform actions that were shocking. These events ranged from suspects randomly opening fire blindly on police to suspects defeating SWAT tactics designed to suppress suspects.

The second area of commonality involved situations in which another officer did something unexpected or made a mistake during an operation. In either of these cases, the officer did something that was outside their anticipated role. Officers described specific tactics and planning commonly used in operations which served as the basis for expected officer conduct during raids. When an officer departed from their assigned role other officers were forced to react to the officer's departure in order to make sure that all aspects of the mission were completed, often having to perform the role of the offending officer in addition to their own.

RQ2: How do high reliability teams recover from critical events that disrupt their ability to make sense of and coordinate their activity?

When analyzing emerging themes regarding practices that facilitate recovery from critical disruptions, two broad themes emerge. The first theme captures the idea of continued forward motion by officers and the second theme addresses the idea of using training and experience as a resource for sensemaking. Continued forward motion is important first for logistical assault

reasons. If an officer stops moving due to shock or surprise the officer provides an armed suspect with a stationary target which is easier to hit than one in constant motion. An officer who stops moving may also create a logistical problem for other team members, as they now become stationary and potentially unable to move forward themselves.

The idea of continued forward motion is also important because it creates new perspectives and resources for sensemaking. By continuing to move forward, officers encounter a new set of environmental conditions to make sense of, which allows them to reorient to the evolving situation. This ongoing reorientation to the situation connects with Weick and Sutcliff's (2006) idea that taking action may result in sensemaking and that order can be created by taking action. By moving forward constantly, the officers reorient themselves continuously until they recognize an opportunity to apply existing schema that allow them to construct order in their sensemaking. This parallels Raelin's (2007) notion of "plodding" where if we encounter a situation with which we have no experience, we still continue to plod along in an effort to find enough similarities to make connections with existing schema and find a way forward.

Regarding the second major emergent theme, officers reported two benefits that previous experience and training provided for recovering from disruptions to sensemaking: (1) reduction of surprises and (2) rapid sensemaking after surprises. Extensive operational experience and training for worst case scenarios reduced the occurrence of shock and surprise and allowed officers to rapidly make sense of the unfolding situation using the OODA Loop and make immediate action decisions following the surprise. Having a repertoire of experiences to draw upon was considered so important that until officers were believed to have a sufficient amount of operations and training, they were kept out of active participation in raids and relegated to secondary roles such as driving vehicles.

In somewhat of a departure from existing literature (Gelenbe et al., 2001; Lighthall et al., 2003; Maudsley & Strivens, 2000; Mitchell et al., 2009; Morgeson, 2005; Polanyi, 1966), officers reported that immediate action decisions were not simply instinctual. Rather, when detailing their decision making processes, they described their perception of time slowing down allowing for explicit decision making processes during critical moments. Officers reported this slowed motion enabled them to consciously think about the unfolding events and make decisions in which they would actively call up and apply information to the situation they faced. These accounts find some correlation with Schon's (1983) notion of reflection-in-action, extending the concept by describing a process in which the perception of slow motion allows for individual cognitive assessments in the critical moment. This process involves accessing existing cognitive schema to apply to the situation as it unfolds (Schon, 1975, 1983; Shotter, 2006, 2009) with the experience of slowed motion allowing the actor to access those existing schema and apply them critically to the decision making process in real time.

Additional Theoretical Implications

Many of the concepts of HRO were also noted in this study of HRTs. For example, Weick's (1987, 1988, 1993) concept of careful attention to existing procedures is evidenced in the way that the SWAT teams rely heavily on training and procedure to make sense of developing events. Weick's concept of creating a culture which is ever vigilant toward the potential of accidents is also found here in that officers were constantly reminded via training and experience that errors could mean death or injury and that the team relied on vigilant efforts to limit errors at all levels.

However, there were also a number of differences in some of the practices that characterize HRTs when compared to HROs. These differences include: (1) the ability to control variability during team function, (2) accepting the value of the unexpected, and (3) continuous forward motion. The first concept of interest is controlling variability during team activity and consists of identifying, managing, and controlling or avoiding variables that may adversely impact team processes during operations as well as engaging in environmental scanning and constant situational assessment. This process enhances reliability as strict attention is paid to variables which may cause critical events, allowing the team to maintain the highest levels of reliability should those events occur. While HRO struggles with this concept due to the enormity of applying mindfulness to all the procedures present in a large organization, a concept that Perrow (1984a, 1984b) considers impossible, this study implies that this process is made easier by the use of small groups or teams with fewer variables to remain mindful of.

The second concept is the development of an appreciation for unexpected events or mistakes and their value in pushing evolution and innovation forward noted among senior officers. Mistakes and unanticipated events inform the nature of planning and procedures by illustrating areas in which improvements can be made. While the premise of HRO is avoiding the unexpected, HRTs embrace the unexpected as necessary stimulus for evolution of practice in order to enhance reliability and foster continuous improvement. This does not diminish Weick's (1987, 1988, 1993) notion that maintaining vigilance toward the potential of accidents should be maintained or suggest that groups should look for opportunities to err on purpose, rather it embraces the idea of creating a context which treats accidents as opportunities for learning and evolution. Appreciation of the value of the unexpected and mistakes finds opportunity for relatively easy application at both the group and organizational level; however, it is the innovation and change resulting from the realization of procedural inadequacies that is easier to facilitate at the group level, as adaptations can be made quickly and inadequacy overcome.

Third, the concept of continued forward motion toward the mission goal also appears relevant to promoting high levels of reliability. By continuously moving forward officers continually reorient themselves to the task through constant environmental scanning and assessment until they are able to make sense of the situation and find a way through. While the concept of continued forward motion connects with Weick and Sutcliff's (2006) notion of taking action to facilitate sensemaking the concept at least somewhat contradicts HRO's opposition to trial and error (Weick, 1987, 1988, 1993a, 2002); as the participant charges onward in an effort to find his way forward trying things and enhancing variability to some degree until sense is restored. Officers noted that "doing something is better than doing nothing", and even if decisions result in error, those errors were viewed as necessary for continuous evolution and improvement of operations and tactics.

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APPENDIX

