SAFETY, RELIABILITY, AND "THAT MAGIC SECOND": A GROUNDED PRACTICAL INVESTIGATION OF DILEMMATIC TALK IN PIT CREWS' POST-COMPETITION DEBRIEFS

by

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A dissertation submitted to the faculty of
The University of North Carolina at Charlotte
in partial fulfillment of the requirements
for the degree of Doctor of Philosophy in
Organizational Science

Charlotte

2023

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ABSTRACT

KRISTA NOELLE ENGEMANN. Safety, Reliability, and "That Magic Second": A Grounded Practical Investigation of Dilemmatic Talk in Pit Crews' Post-Competition Debriefs. (Under the direction of DR. CLIFF SCOTT)

Safety is often understood as freedom from unacceptable loss; reliability as the capacity to accomplish particular outcomes repeatedly through operational sensitivity. Both compel performance objectives for high-risk organizations. If either is absent, people, organizations, and their external environments are potentially at unnecessary risk. Focused on continuous performance improvement, debriefs are often implemented to achieve safe, reliable outcomes through post-incident discussion. Research has presumed that debriefs allow teams to pursue safety and reliability simultaneously and without contradiction. However, this theoretical assumption has never been assessed according to how a team's discourse in debriefs leads to these distinct outcomes.

This research adopts Craig and Tracy's (2021) grounded practical theory methodology to analyze talk in post-competition debriefs of stock car racing pit crews. Analysis of participants' talk, according to problem and technical levels of grounded practical reconstruction, suggests a central dilemma that constrains pit crews' efforts toward safety and reliability, namely, a contradiction among performance expectations for regulatory adherence and boundary pushing. Results also include several discursive techniques that pit crews employ during debriefs in response to this dilemma. A model of dilemmatic talk of debriefs situates these outcomes, making what is implicit about this practice more explicit.

DEDICATION

For Dad and Opa. You're right – no one can take away what you know.

ACKNOWLEDGEMENTS

I am grateful to my dissertation committee chair, Dr. Cliff Scott, for nurturing my interest in the theories and themes that informed this research. His guidance has shaped me into a capable, confident interdisciplinarian. I wish to also thank the members of my dissertation committee, Drs. Joseph Allen, Anne-Kathrin Kronberg, Steven Rogelberg, and Martha Kropf, for their invaluable feedback that strengthened the quality of this work. Lastly, I give my sincere thanks to the employees and pit crews of *Roaring Road Racing* (pseudonym) for their participation in this research and for their steadfast commitment to excellence in their sport.

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LIST OF ABBREVIATIONS

AIDA	Action Implicative Discourse Analysis
GPT	Grounded Practical Theory
NASCAR	National Association for Stock Car Auto Racing

CHAPTER 1: INTRODUCTION AND RATIONALE

High-risk work is characterized across industries as operations that are highly complex, dynamic, and susceptible to errors that may compromise life and the viability of key organizational resources, such as property and revenue (Roberts, 1990). High-risk organizations are also host to a variety of cultural, situational, and personal factors that further increase the likelihood of error (Rochlin, LaPorte, & Roberts, 1987; Weick, 1987). Current scholarship posits that normative expectations for safety and reliability (e.g, safety climate; Zohar, 1980) – particularly when managed through effective debriefing – may diminish the likelihood of accidents, injuries, and other costly lapses (e.g., Barbour & Gill, 2017; Ishak & Williams, 2017; Williams & Ishak, 2017).

As a practical tool for eliciting error patterns, debriefs and similar meetings (e.g., after-action reviews, post-mortems) are venues for participants to learn and improve their performance by way of post-incident discussion (Allen, Reiter-Palmon, Crowe, & Scott, 2018; Keiser & Arthur, 2021; Tannenbaum & Cerasoli, 2013). However, this explanatory power may wane in the face of the realities of high-risk work; that is, careless workplace behaviors among employees *despite* regulation, supervision, and the accomplishment of target performance goals (Beus, McCord, & Zohar, 2016; Casey, Griffin, Flatau Harrison, & Neal, 2017; Hallgren, Rouleau, & de Rond, 2018; Neal & Griffin, 2006; Zohar & Erev, 2007). This research concedes that further hypothesis testing will not enrich a network that may no longer predict the same observations as in the past (Cronbach & Meehl, 1955). It acknowledges concerted efforts to study communicative patterns in debriefs (e.g., Lehmann-Willenbrock & Allen, 2018) and prioritizes the inductive investigation of talk toward developing better theory about high-risk work

settings (Corley & Gioia, 2011; Locke, 2007; Shah & Corley, 2006; Thomas, 2010; Yin, 2003).

This chapter frames the debrief as a mechanism for ambiguity management and then proposes several research objectives. Asserting that talk is relevant, albeit underexamined, I evaluate the merit of directly examining strategic retrospective talk in debriefs via the more comprehensive goal of theory development. The assumption that talk reveals as well as manages the multiple, conflicting norms in a particular setting (Craig, 2015; Craig & Tracy, 1995, 2014, 2021) is also pertinent to these objectives. Research questions then frame the inductive, action-implicative investigation of debriefs to follow.

Statement of the Problem and Objectives

As overt instances of managing multiple, plausible interpretations of the environment (i.e., ambiguity), debriefs force normative expectations into the spotlight (Baran & Scott, 2010; Reiter-Palmon, Leone, Murugavel, & Allen, 2020). Group and organizational workplace expectations for safety, for instance, inform the degree to which participants will perceive the debrief to have met its goals (Allen, Reiter-Palmon, Kennel, & Jones, 2018), which influences debrief participants' normative expectations for safety (Allen, Baran, & Scott, 2010). With commonly cited sociocognitive processes behind the curtain of debriefs, such as "continuous talk" (Rochlin, 1989), "heedful interrelating" (Weick & Sutcliffe, 2001), sensemaking (Weick, 1995), and "symbolic interactionism" (Blumer, 1969), considered to be self-evident, opportunities to examine real-world contexts wherein employees regularly confront multiple assumptions, commitments, and concerns are overlooked (cf., Rae, Provan, Aboelssaad, & Alexander, 2020), as is the

chance to qualify assumptions about the causal sequences that explain observable behaviors in high-risk work settings (Beus, Smith, & Taylor, 2018). It is timely, then, for research to directly examine strategic retrospective talk to develop better theory (Beus et al., 2018; Eikeland & Nicolini, 2011; Gherardi, 2018; Zohar, 2010).

Primary Objective: Directly Examine Strategic Retrospective Talk in Debriefs

Strategic retrospective talk (or, that which occurs in debriefs) is integral for the interpretation of the high-risk work environment (Weick, Sutcliffe, & Obstfeld, 2005). Groups and teams debrief to learn from events in the past to improve coordinated action in the future (Busby, 1999). In addition, debriefs serve to develop and maintain group norms for behavior, such that successive discussions of both past failures and successes improve participants' safety (Ellis & Davidi, 2005) and reliability (Reason, 2004; Vogus & Sutcliffe, 2007a).

Debriefs are a valuable, albeit complicated, tool for learning in high-risk organizations. Rather than simply exchanges of information, debriefs are opportunities to instantiate and maintain a climate of unique values and decision premises (Baran, Shanock, Rogelberg, & Scott, 2012; C. W. Scott, Allen, Bonilla, & Baran, 2013) as well as venues to promote local team norms (Jahn, 2016). Still, questions of how to sustain effective debriefs remain (Allen, Reiter-Palmon, Crowe, et al., 2018). For instance, it is unclear whether future hypothetico-deductive models can frame a singular facet-specific climate (e.g., safety) according to important outcomes (e.g., debrief satisfaction, accident rate) across nursing, firefighting, and other high risk-occupations (c.f., Beus, Taylor, & Solomon, 2021). This question stems from differing approaches and structures to debriefs across contexts (Keiser & Arthur, 2022, 2021) as well as from the finding that debriefs

influence and are influenced by safety-specific norms and expectations (Allen et al., 2010; Allen, Reiter-Palmon, Kennel, et al., 2018; Dunn, Scott, Allen, & Bonilla, 2016). Ultimately, the conditions that make debriefs effective for high-risk operations are unclear or difficult to achieve (Crowe, Allen, Scott, Harms, & Yoerger, 2017).

Particularly noteworthy here is the importance of how debrief participants treat each other during strategic retrospective talk and the extent to which these conversations are perceived as satisfying and useful for learning (Allen et al., 2012; Kauffeld & Lehmann-Willenbrock, 2012). Therefore, it is not only *what* details about events are shared that make debriefs effective, but also *how* participants engage in this exchange. As such, the content of debriefs – namely, the talk itself – is a figurative stone left unturned. A closer examination of the communication that enables debrief participants to manage their organizational environment is key to fortifying our assumptions about the effects and utility of strategic retrospective talk for high-risk work.

Comprehensive Objective: Develop Theory

With their absence posing a threat to valuable organizational resources (e.g., people, property, and the environment), *safety* (freedom from unacceptable loss) and *reliability* (the capacity to accomplish particular outcomes repeatedly) are compelling objectives in high-risk work settings (Bigley & Roberts, 2001; Hofmann, Jacobs, & Landy, 1995; Leveson, Dulac, Marais, & Carroll, 2009; Maslow, 1943). Whereas some high-risk organizations are assessed in terms of their orientation toward safety (e.g., reduced accident rates; Griffin & Curcuruto, 2016), others are evaluated on the basis of their ability to maintain reliability (e.g., continued good standing in the competitive marketplace; Vogus & Welbourne, 2003). Debriefs are often posited as interventions to

achieve these ends (e.g., Jahn, 2019), suggesting that theory and practice should be equipped to evaluate settings wherein safety and reliability are both prioritized.

Some current scholarship articulates these differences (e.g., Grote, 2020; Sterman, 2000), posits interrelationships among normative expectations for safety and reliability for employee behavior (Engemann & Scott, 2020b; Zohar, 2008), and preliminarily tests these relationships (Renecle, Curcuruto, Lerín, & Marco, 2021). However, the multidisciplinary field of safety science maintains increasingly fuzzy construct domains (Beus, Payne, Bergman, & Arthur, 2010; Beus et al., 2021). Therefore, calls to integrate psychological and systems perspectives for an improved nomological network (e.g., Zohar, 2008) and to derive those relationships from the study of practice (e.g., Gherardi, 2015) may be going unanswered (cf., Casey et al., 2017).

Scholars note the missed opportunity to integrate relevant theoretical perspectives (e.g., mindful organizing) for "a true understanding of how to manage the full range of safety issues in organizations" (Hofmann, Burke, & Zohar, 2017, p. 384); in the same breath, they remark that it is rare for research on safety and error management to draw significantly from that work (Frese & Keith, 2015). Only recently has research proposed that mindful organizing processes mediate the relationship between organizational culture and organizational outcomes, namely, safety and reliability (Petitta & Martínez-Córcoles, 2022). To the frustration of many, attention to practice in the field of safety science is largely still pending (Rae et al., 2020).

These detours from theory development, in general, and inductive work, in particular, have thwarted greater depth and breadth of understanding in a field of practical value to high-risk and traditional organizations alike (Hallgren et al., 2018; Locke, 2007).

In response, this research aims to develop theory via the examination of empirical, talk-rich data to better "form a grammar for understanding organizing as it happens" (Leonardi, 2015, p. 264) and amend assumptions about how safety and reliability are accomplished.

Research Questions

We rely on talk to navigate and resolve *dilemmas*; that is, conflicts of normative ideals (Billig et al., 1988; Craig & Tracy, 2014). For instance, a dispute with a family member or close friend is often perceived as nonserious, and involving police in something nonserious is frowned upon (K. Tracy & Anderson, 1999). Dilemmas then shape the values that need to be traded off or integrated in (re)framing what is normative for future action (Craig & Tracy, 2021). In the instance of personal disputes requiring police intervention, when speaking with emergency dispatchers, callers who diminished their connection to the perpetrators revealed the norms that are unique to these kinds of calls: seek help in a perceived personal crisis *and* avoid wrongful police intervention.

The reality of high-risk work may instigate conflicts of normative ideals, or dilemmas, that debrief participants negotiate (cf., Jahn, 2016). For instance, participants may address dilemmas in these sessions because they derive from them what is normative about their high-risk work (i.e., safety norms; Allen et al., 2010). Unusually high financial and personal price tags on errors (e.g., hefty institutional fines per violation, injury) might preclude debrief participants from including details expected of effective retrospective discussion (e.g., acknowledgment of positive and negative behaviors and outcomes; Cheng et al., 2020), which might diminish participants' reflexivity and adaptability toward their own behaviors. That is, should debrief participants find that

their current behaviors satisfy institutional safety requirements, they might maintain these efforts or potentially reduce them to increase the efficiency with which they reach other goals (c.f., Schmidt & DeShon, 2009). With processes such as problem solving, action planning, criticizing, and complaining demonstrating significant effects on meeting satisfaction (Kauffeld & Lehmann-Willenbrock, 2012), the question becomes how these interactions (re)shape normative expectations about debriefs, in particular, and the high-risk work environment, more broadly.

Talk links what is normative about an action (e.g., making an emergency phone call) with the conflicts that emerge in the context of that action (Craig, 2015; Craig & Tracy, 1995, 2014, 2021). Debriefs essentially stage the interplay of people, organizational structures and processes, and physical system components inherent to high-risk work for their participants to interpret together. This research addresses the following questions:

RQ 1. What dilemmas do participants face during debrief sessions?

RQ 2. What techniques do participants employ during these debrief sessions to manage those dilemmas?

Illuminating the dilemmas inherent to debriefs may reveal principles by which they can be made effective (K. Tracy, 2005). In addition, a focus on inconsistencies and tensions as they naturally occur may extend theory about the norms that support error management (cf., Craig & Tracy, 2021; Horvath, Keith, Klamar, & Frese, 2022).

CHAPTER 2: REVIEW OF LITERATURE

This chapter introduces sensemaking theory, which guides the study of strategic retrospective talk. Reviewing this theory calls for a synthesis of literatures, including those addressing occupational safety, high reliability organizing, and debriefs. Although mostly limited to sociocognitive theory, constructs, and results, this review acknowledges the breadth of perspectives and outcomes from the study of high-risk work (Beus et al., 2016). A discussion devoted to safety and reliability and their conceptual intersection also further clarifies the nature of these two central concepts.

This review maintains that strategic retrospective talk (or, that which occurs during debriefs) produces a shared, plausible understanding of the organizational environment and, in turn, reduces interpretations for coordinated action. It also reveals that while concurrent demands for stability and flexibility in high-risk organizations are apparent, a theoretically and empirically grounded resolution is still needed (Beus, Lucianetti, & Arthur, 2020; Beus et al., 2016). At the intersection of this review lies ambiguity, a concept that draws further attention to tensions that are observed in both theory (Grote, 2020) and practice (Flatau-Harrison, Griffin, & Gagne, 2021).

Debriefs: A Location for Strategic Retrospective Talk

Debriefs are discussions and analyses of experiences, where participants integrate interpretations of those experiences for future events (C. W. Scott et al., 2013). Not only do debriefs serve a functional role in a variety of organizational types and settings, those that are well-conducted can demonstrably improve learning and team performance (Couper, Salman, Soar, Finn, & Perkins, 2013; Tannenbaum & Cerasoli, 2013). Because discussions of events align attention, remove distraction, and limit abstractions (Ellis &

Davidi, 2005), debriefs are among the organizational learning interventions that scholars propose as integral to the maintenance of relatively error-free operations (Sutcliffe, 2011).

Sensemaking Theory

As a process through which individuals join to understand novel, unexpected, or confusing events, sensemaking (Weick, Sutcliffe, & Obstfeld, 2008) guides the development of assumptions in support of new occupational safety and organizational climate work (Beus et al., 2018; Zohar & Polachek, 2014) and supports ongoing debrief research (Allen, Reiter-Palmon, Crowe, et al., 2018). Sensemaking theory reflects attempts to understand a universal reality: we often do not have an adequate way of objectively and comprehensively assessing the environment with optimal rationality. With ideal conditions, abundant information, and multiple contingencies out of reach, sensemaking theory contends that bounded rationality is key for decision making and coordinated action and that these processes are valuable to explore, particularly in high-risk settings (Simon, 1991; Weick, 1979, 1995; Weick & Roberts, 1993).

By extension, sensemaking theory explains how satisficing, albeit suboptimal, decisions enable individuals, groups, and organizations to act toward and react to their environments. Just as an individual faces natural cognitive limits, so do groups (e.g., Larson, Christensen, Abbott, & Franz, 1996). For instance, although more information might be shared, overlapping talk is neither clear nor productive in a group setting. Organizations contend with internal boundaries that prohibit perfect processing and complicate how to apply incoming information to sought-after solutions (e.g., multiple departments characterized by members with unique specialties and backgrounds;

Schulman, 1993). With the presumption that individuals, groups, and organizations continually engage in discussion and decision making, sensemaking theory uses organizing to configure the challenge of bounded rationality, which situates sensemaking as a process with iterative and cyclical components.

Sensemaking theory presupposes that organizing is a collective satisficing process among collaborators whose rationality is bounded. Although organizing can begin at any point in this cycle, enactment is the typical, most sensible starting point (Weick, 1988). Enactment represents the collective bracketing of some portion of a stream of experiences and the multiple, plausible interpretations of those experiences for further attention. By later imposing a finite set of interpretations upon that bracketed portion, the group develops interpretations of this enacted reality. These interpretations are grounded in assembly rules, such that a particular interpretation gleaned from a previous episode of sensemaking might seem reasonably analogous to the interpretation of a developing event (e.g., Browning, 1992). This stage, selection, is best characterized by double-interacts: interpretations are voiced and then the group provides feedback. This second stage also reveals the nature of the third stage, retention; that is, some aspects of a previously enacted reality are retained for future interpretive use. Consider the following example:

> During a research group meeting midway through the spring semester, a graduate student identifies a particular gap in a literature area, describes why this gap is important to address, and posits an approach to study it. Another graduate student interjects, giving their interpretation of that research gap as well as an alternative way to expand on this limitation in the literature. The advisor validates both approaches and evaluates them with respect to their timelines; one may be more

> appropriate than the other to pursue in light of the academic calendar. The group then designs a study to address the research gap. As they interpret their findings, the group members also posit some future research directions that reflect aspects of both graduate students' original proposed approaches.

In this instance, the students collectively enact a portion of their environment, namely, the research gap. Following some consideration for multiple interpretations, the advisor imposes a more finite limitation on their next steps. As the group collaborates within these selected boundaries, they nonetheless retain some details of the original research and incorporate them into a framework for future study.

As sensemaking theory develops so too do the linkages among these three stages and the direction and purpose of organizing. Weick and colleagues (2005) claim that a shift in one's environment often propels the sensemaking process, such that a group is expected to interact with others and emphasize certain parts of their environment as relevant (or irrelevant) in response to that change (i.e., enactment). Following some collaboration to produce potential interpretations of the state of the environment (i.e., selection), the group retains some useful interpretations for later application (i.e., retention).

Although the sensemaking process begins to reveal what the interacting group learns and acts upon, the likelihood for feedback amid these stages forces sensemaking into a more immediate and less retrospective frame. For instance, the group's perception of managing its environment may influence what and how it enacts. Further, enactment enables and constrains selection; the group is led away from subsequent interpretations even as additional incoming, discrepant information would otherwise affect their current

interpretation. The relationship among enactment, organizing, and sensemaking enables the group to realize what it thinks and knows in the present rather than what it knew previously (Weick, 1988).

Ambiguity and Debriefs for Safety and Reliability

High-risk organizations, in general, and their debriefing employees, in particular, face ambiguity; that is, multiple, plausible interpretations of their environment (Baran & Scott, 2010; C. W. Scott & Trethewey, 2008). Ambiguity is a common source of potentially disastrous error as it permeates interpretation and action in response to emergent events. Shifts in the organizational environment indicate potential hazards, whose nature and significance are open to multiple and often conflicting interpretations. Debriefs are then overt examples of attempts to resolve ambiguity through collective sensemaking.

Whereas too much ambiguity following debriefs yields inefficiencies and overcomplication, too little may result in inaccuracy, oversimplification, and, in the case of high-risk work, death (Weick, 1987). For instance, smokejumpers struggled to put their standard operating procedures into use in the midst of the wildfire at Mann Gulch, an outcome that Weick (1993) suggests was a consequence of fewer shared meanings and underarticulated mental frameworks. In fact, some level of ambiguity interpersonally benefits debrief participants as a cohesive group; perceived in-group members access and understand shared interpretations of focal events, whereas out-group members do not (Eisenberg, 1984).

Ambiguity may also sustain positive operational outcomes for debriefing groups over time. A field study of the Israeli military revealed that the performance of those

individuals who successively discussed successful and failed events improved significantly (Ellis & Davidi, 2005), suggesting that debrief participants embraced multiple, plausible interpretations of error-ridden *and* error-free events. Although successes do not often compel one to seek understanding (e.g., Heimbeck, Frese, Sonnentag, & Keith, 2003; Seifert & Hutchins, 1992), a move to preserve ambiguity in debriefs may preserve interpretations, which are likely to be modified toward more robust frames of reference for safe and reliable future action (Weick, 1979; Weick & Roberts, 1993).

Ambiguity reduction – rather than total consensus – is a sought-after and strategic outcome for debriefs (Eisenberg, 1984; Kramer, 1999; C. W. Scott et al., 2013) and represents the refinement of multiple, plausible interpretations of the environment. Notably, ambiguity and conflicting viewpoints should not be completely eliminated.[1] A debrief that adequately reduces ambiguity is characterized by the encouragement of diverse viewpoints. This is predicated on the perception that the debrief setting is safe for taking interpersonal risks (Edmondson, 1999), which is expected because of the critical role of requisite variety in combating complex, dynamic environments. Less requisite variety may mean that insights critical for problem solving are neither introduced nor discussed (Weick, 1987). Therefore, psychologically safe discussion in debriefs preserves ambiguity for potentially strategic ends (Dunn et al., 2016).

In addition, ambiguity and its preservation are central to concurrent requirements for stability and flexibility in high-risk work (LaPorte & Consolini, 1991). Ambiguity determines the effectiveness of different ways of organizing (Jarzabkowski, Lê, & Van de Ven, 2013; Van de Ven, Ganco, & Hinings, 2013); that is, the degree to which proactive

employee behaviors (e.g., being sensitive to, voicing concerns about, and refining work processes; Wall, Cordery, & Clegg, 2002) are valued and normative as well as how error is regarded and managed in a high-risk work setting (Jahn et al., 2020; see also Table 2). Moreover, ambiguity is likely to have a moderating effect on organizational effectiveness amid tension between stability and flexibility (Grote, Zala-Mezö, & Grommes, 2003; Sitkin & Sutcliffe, 1994), such that higher levels of ambiguity support greater agency, whereby employees break routine and are sensitive to the events of an unfolding crisis (Grote, 2015, 2016).

Ambiguity is a familiar component of high reliability organizing models and theories that cautiously regard bounded interpretations that emerge through strategic retrospective talk. Ongoing displays of mindful organizing are valuable for revising satisficing, suboptimal decisions and for reliably framing and responding to emergent events (Weick et al., 2005). As preliminary empirical support emerges at the group level (Renecle et al., 2021; Sutcliffe, Vogus, & Dane, 2016; Vogus & Sutcliffe, 2007b), a shared priority for reliability can presumably support mindful collective action and the preservation of ambiguity among debrief participants.

Alternatively, consensus is pertinent to models and theories in occupational safety, such that those bounded interpretations that result from mutual constitution and reinforcement of safety protocols are positively regarded (Zohar & Luria, 2003); that is, complete consensus across an organization is the linchpin in achieving safety. Although shared expectations for safety encourage participants to engage in strategic retrospective talk (Allen, Reiter-Palmon, Kennel, et al., 2018), these expectations might not necessarily prioritize much, if any, ambiguity regarding the nature and significance of workplace

events. For instance, causal ambiguity (Szulanski, Cappetta, & Jensen, 2004) did not relate to positive safety norms (Zohar & Luria, 2005) in a study of firefighters (Dunn et al., 2016), perhaps reflecting assumptions about controlled values, expectations, and rewards for safety (Zohar & Luria, 2010). A shared priority may indicate that multiple, plausible interpretations about safety are indeed so few that alignment can be readily achieved across the organizational hierarchy.

Debriefs then serve a twofold role in supporting safety and reliability in high-risk organizations. First, given that substantive crises can result from complex, dynamic environments (Perrow, 1984), collective action taken by debrief participants may slow the speed of crises as they unfold (Weick & Roberts, 1993). As debrief participants are likely exposed to discrepant information about their ever-changing work environment, their interaction transitions individual perceptions toward a shared understanding of policy, procedure, and other inputs (Zohar & Tenne-Gazit, 2008). Prescriptive procedure and oversimplified contingencies may not prove effective at withstanding unanticipated error (Weick, 1993); thus, the debrief is critical for combating complexity and reducing the ramifications of tightly coupled operations.

Second, because participants' stories and experiences lend practical coherence to future events (Browning, 1992; Browning & Boudès, 2005), the debrief is assumed to be central to how participants reify safety and reliability. This claim may be clarified by sensemaking theory: that which is mutually constituted can also be mutually destroyed (Weick & Roberts, 1993). High-risk work is structured by protocol and procedures; high-risk organizations' members regularly apply those models (e.g., during debriefs) by relying on existing expectations for safety and reliability to inform what is relevant and

meaningful to their work (c.f., Ardts, Jansen, & van der Velde, 2001). Post-incident communication may reinforce these shared expectations (Collinson, 1999).

Whereas such mutual constitution often supports the initial framework of what is safe and reliable, it also bounds interpretations. To that end, debrief participants may only assign meaning to events and coordinate future action in a manner that is consistent with existing expectations. Should this original framework – enriched by debrief participants' limited, albeit plentiful interpretations – be applied to an emergent situation and result in error, damage, injury, or other unanticipated lapse, expectations begin to deteriorate (Weick, 2011). Although debriefs may evoke this initial framework again, participants derive less substantive meaning from them, as their interpretations of safety and reliability have begun to shift. Debrief participants subsequently deviate from prescribed expectations; their sense of obligation to the initial framework has gone.

Debrief participants apply varied perceptual lenses in slowing the speed of the trajectory of error and in reifying what it means to be safe and reliable (Weick et al., 2005). Yet an expectation for consensus and the expressed benefits of such closure (e.g., improved performance) might result in the elimination of debrief participants' multiple, plausible interpretations of events (Kruglanski, 1989; Kruglanski, Peri, & Zakai, 1991). Embracing those interpretations (ambiguity) is effectively a pursuit of some, rather than total, consensus among group members (Eisenberg, 1990). Workplace expectations set the stage for the enactment of debriefs and reveal how those norms relate to debrief-specific perceptions and behaviors; debriefs enact and regulate what was previously conceived of as expected or normative (Allen, Reiter-Palmon, Kennel, et al., 2018).

Whether participants manage ambiguity toward safe or reliable ends – either in pursuit of perfect alignment of employee and management's conceptions of and actions toward safety (Zohar & Luria, 2004) or by leveraging ambiguity to confront inevitable, error-prone outcomes (Eisenberg, 1984) – will determine the perceptions and behaviors of future debriefs and further specify the nature of safety and reliability in that context (Allen et al., 2010). Thus the extent to which debrief participants engage ambiguity may coalesce around their organization's expectations for safety and reliability (Engemann & Scott, 2020b). As occupational safety scholars now question their assumptions about consensus, such that homogenous assumptions can negatively influence the relationship between normative safety expectations and motivation to act safely (Flatau-Harrison et al., 2021), questions of how and why the social environment shaped this outcome remain.

Safety and Reliability: Collectively Constructed and Conceptually Distinct

Safety and reliability are evoked as emergent characteristics of organizations that originate from a shared perception among individuals and are amplified through talk (Gherardi, 2018; Weick, Sutcliffe, & Obstfeld, 1999). Whereas safety represents an organization's freedom from injury, property damage, and death, reliability reveals an organization's capacity to accomplish particular outcomes repeatedly (Leveson et al., 2009). Both are dynamic non-events; they are important indicators of errors that are not always revealed in the unfolding trajectory of events, with any lapse attributed to multiple explanations (Weick, 1987).

Safety and reliability have not been well delineated among theories of high-risk work. For instance, Roberts and Bea (2001) grounded a highly cited discussion on accident prevention, a concept that assumes that hazards are objective, known, and

controllable (Hale & Borys, 2013), with insights derived from the study of high reliability organizations, which assumes that hazards are emergent and unpredictable (Hollnagel, 2014). These and other scholars have positioned talk as central to understanding how employees conceptualize, interpret, accommodate, or resist risks and hazards or messages about them (Hofmann & Stetzer, 1998; Zohar & Luria, 2010) without necessarily capturing these nuances in their construct operationalizations. This has contributed to a field that now examines issues of discriminant validity and inaccurate reporting of incidents attributed to error (Beus, Payne, et al., 2010; Jiang & Probst, 2015; Probst, 2015; Probst, Brubaker, & Barsotti, 2008).[2]

As the field matures, scholars draw safety and reliability apart. Roberts and Bea (2001), for example, posit the sociocognitive processes that are necessary conditions for reliability.[3] These processes have since been evoked as distinct from, yet capable of intersecting with, safety (e.g., Engemann & Scott, 2020b; Renecle et al., 2021; Zohar, 2008). As a group-level construct, mindful organizing is currently poised to make meaningful contributions to the occupational safety literature (Martínez-Córcoles & Vogus, 2020; Petitta & Martínez-Córcoles, 2022).

Distinctions Within Organizational Safety

Safety can be clarified at different levels of analysis (Denison, 1996) and is linked to a variety of construct domains (e.g., culture, climate, and norms). As a result, a review of organizational safety calls for some distinctions to be made. It is, however, important to note that discussions of safety culture and safety climate are closely tied to discussions of attitudes toward safety, reflexivity about safety practices, and handling risk. This is likely a consequence of the occupational safety literature having appropriated the public's

attention to disasters (e.g., Chernobyl and Three Mile Island; Clarke, 2000). Detailed analyses of these and similar incidents have been linked with empirically grounded safety climate literature to provide some basis for discussing these exemplar organizations' cultures (e.g., Huang et al., 2007).

Safety culture is defined by a shared set of beliefs, norms, and values concerning the prioritization and maintenance of safety as manifested through expressed attitudes and behaviors (Casey et al., 2017; Schneider, Ehrhart, & Macey, 2011). Safety norms represent the extent to which groups and organizations share an understanding of what it means to be safe (Allen et al., 2010). Safety culture addresses how an organization's social context develops out of interaction, while safety climate and safety norms address the perceptions of this social context and its influence (Bisbey et al., 2021).

Safety Climate. Safety climate, a perceptual measure of how effectively various safety polices, practices, and procedures at different organizational levels have been implemented (Zohar & Luria, 2005), indicates a shared sense of the overall value, priority, and importance placed on safety in a particular setting. Safety climate originates in the cognition and perceptions of individuals and is amplified through exchanges with others, such as during safety-relevant post-incident discussions (Zohar, 2010), a notable departure from previous conceptions of the construct as an aggregate of an objective set of conditions (Zohar, 1980). Safety climate typically demonstrates a strong relationship with employee safety performance (Christian, Bradley, Wallace, & Burke, 2009; Clarke, 2010) and features prominently in hypothetico-deductive models in the occupational safety field (Zohar & Hofmann, 2012).

Safety Norms. Safety norms not only influence proactive safety behavior (Fugas, Meliá, & Silva, 2011), they also mediate the effect of after-action review frequency on group-level safety climate (e.g., in firefighting crews; Allen et al., 2010). As they are affected by a confluence of factors in the organizational environment, safety norms have been incrementally posited as distinct from other safety-related variables. For instance, safety climate connotes formally communicated messages about safety (e.g., supervisor to employee), whereas safety norms connote informally communicated ones (i.e., peer to peer) (Ehrhart & Naumann, 2004; Zohar, 1980). This conceptual shift nonetheless begins to relax this difference. The supervisor and the group are now included as antecedents of safety climate, and the posited roles of the group and the supervisor in this process further blur distinctions between formal and informal communication (Luria, 2010; Zohar & Tenne-Gazit, 2008).

Distinctions Within Organizational Reliability

Reliability, the outcome of ongoing interrelationships among specific social cognitive processes (Weick et al., 1999), is best defined in terms of *mindfulness*, a concept that broadly describes a present-centered frame of reference. Mindfulness is a "receptive attention to and awareness of present events and experience" (K. W. Brown, Ryan, & Creswell, 2007, p. 212). This definition extends to the organizational setting as either individual or collective mindfulness. As evidence accumulates that individual and collective mindfulness share a multilevel and reciprocal relationship (e.g., Cleirigh & Greaney, 2015; Fiol & O'Connor, 2003; Fraher, Branicki, & Grint, 2017; Ritchie-Dunham, 2014), the two are important to distinguish from one another. This dissertation gives preference to the sociocognitive processes that jointly enact reliability. It is the

collective, rather than the individual, that is relevant to this research and that substantiates the framework by which scholars study reliability (Krieger, 2005; Weick & Roberts, 1993; Weick & Sutcliffe, 2015).

Individual Mindfulness. Although individual mindfulness does not have a single, universally accepted definition, momentum is building toward a unified understanding of this concept within the organizational sciences. Individual mindfulness is commonly described as a particular state of consciousness that focuses on in-the-moment events (Niemiec et al., 2010; J. Zhang & Wu, 2014). Other definitions propose that individual mindfulness is externally as well as internally focused (Dane, 2011; Ruedy & Schweitzer, 2010); that is, it concerns attention to sights and sounds as much as it does attention to emotion and intuition (Leroy, Anseel, Dimitrova, & Sels, 2013). Such wide attentional breadth further distinguishes individual mindfulness from similar concepts that occur at the individual level, such as absentmindedness (K.W. Brown & Ryan, 2003). At present, individual mindfulness demonstrates a significant negative effect on safety errors and violations (Liang, Shi, Yang, & Liu, 2022).

Collective Mindfulness. Unlike its individual-level counterpart, collective mindfulness is the joint capability of group members to discern discriminatory details about emerging issues and to act swiftly in response to these details (Vogus & Sutcliffe, 2012; Weick et al., 1999). Whereas the conceptual development of collective mindfulness is closely linked with the study of traditional high reliability organizations (e.g., Weick, 1990, 1993; Weick & Roberts, 1993), scholars often extend this framework to the study of "organizations [that] leverage shared values, an organizational culture and a commitment to achieving and maintaining reliability" (Grabowski & Roberts, 2016, p. 4),

often referred to as reliability-seeking organizations.[4] Similarly, collective mindfulness embodies social and cognitive processes that are experienced individually, dyadically, and collectively within an organization (Krieger, 2005), referred to as *mindful organizing*, an iterative accomplishment of meaning and coordinated action (Weick et al., 2005).

Mindful organizing gives order to an organization by providing latitude for ongoing, interactive interpretation, improvisation, and contextual action (Roberts, 1990). Scholars contend that specifying the mindful organizing construct "force[s] [them] to look at the role of organizational processes…which are inherently involved in the support of sustaining a 'collective mind' not only at the operational level, but […] across the organization" (Callari, McDonald, Kirwan, & Cartmale, 2019, p. 847).

Mindful organizing is then characterized by distinct, yet interrelated sociocognitive processes: preoccupation with failure, reluctance to simplify interpretations, sensitivity to operations, commitment to resilience, and deference to expertise (Weick & Sutcliffe, 2015), as illustrated succinctly in the following example and explicated in Table 1:

> At a university that derives its strategic value from its position as a prolific research institution, an academic advisor forms a graduate student research group and offers its members the opportunity to write and submit research papers for publication. The advisor also encourages the students to consistently engage and address their successes and failures in research and writing as well as any additional issues (e.g., lack of motivation, fear of failure) that they face while completing their day-to-day responsibilities. To that end, the advisor schedules frequent meetings, including post-presentation huddles and in-depth paper reviews, to elicit such discussion. The advisor conducts these sessions in a manner

that reduces ambiguity about the research process and the writing experience without necessarily correcting all mistakes or misgivings. The advisor encourages input from the students such that the group maintains a sense of discriminatory awareness with respect to ongoing challenges in their research and writing. These sessions are meant to bolster the students' perceptions that it is safe for them to take interpersonal risks and to help them develop meaningful contributions to scholarship.

From these processes emerge the collective mind, which lessens the cognitive load of each contributing member, reduces the wasted cognitive effort of overlapping knowledge, and provides greater access to a larger pool of insights (Weick & Roberts, 1993). Mindful organizing and the collective mind may be conceived of at particular organizational levels (e.g., senior management, middle managers, frontline employees) or as pervasive of the entire organization (Sutcliffe, 2018), such that processes that enable mindful organizing vary within an organization's hierarchy (Vendelø & Rerup, 2020).[5] Mindful organizing has been subsequently linked with lower turnover rates (Vogus, Cooil, Sitterding, & Everett, 2014), improved resource allocation (Wilson, Talsma, & Martyn, 2011), greater innovation (Vogus & Welbourne, 2003), and improved quality, safety, and reliability (Vogus & Sutcliffe, 2007a, 2007b).

Table 1

Processes of Mindful Organizing

Process	Definition (Weick & Sutcliffe, 2015)	In-Text Example (p. 22-23)
Preoccupation with failure	"…direct[ing] attention to ways in which your local activities can conceal or highlight such things as symptoms of system malfunction, small errors that could enlarge and spread, opportunities to speak up and be listened to, a gradual drift toward complacency, the need to pinpoint mistakes you don't want to make, and respect for your own day-to-day-experience with surprises" (p. 7).	The advisor encourages graduate students to consistently engage and address their successes and failures in research and writing.
Reluctance to simplify	"…deliberate steps to create more complete and nuanced pictures of what you face and who you are as you face it" (p. 8).	The advisor uses frequent meetings, including post-presentation huddles and in-depth paper reviews, to elicit discussion on nuanced issues related to success, failure, and daily goings-on.
Sensitivity to operations	"…about the work itself, about seeing what we are actually doing regardless of intentions, designs and plans" (p. 10).	The advisor encourages graduate students to discuss additional issues that they face while completing their day-to-day responsibilities.
Commitment to resilience	"…capabilities to detect, contain, and bounce back from those inevitable errors that are part of an indeterminate world" (p. 12).	The advisor encourages continuous input from the graduate students on the topics discussed, such that the research group's basis for future research and writing develops for more meaningful contributions to scholarship.
Deference to expertise	"…push[ing] decision making down and around…authority migrates to the people with the most expertise, regardless of their rank" (p. 14).	The advisor acknowledges that she is not necessarily a verified expert on every matter, and a graduate student might have particular insight on the issue at hand. Moreover, the graduate students perceive freedom to dissent and psychological safety in the research group.

Note. By maintaining alertness to the possibility that any issue may indicate a larger, more problematic one (LaPorte & Consolini, 1991); integrating understanding of these issues in the moment (Weick et al., 1999); actively questioning assumptions (Schulman, 1993); enabling members to thrive as adaptive, improvisational, and learning-oriented scholars (van Dyck, Frese, Baer, & Sonnentag, 2005); and migrating decisions toward those with the greatest relevant expertise (Roberts, Stout, & Halpern, 1994), the research group in the in-text example illustrates processes of mindful organizing.

Initial evidence of mindful organizing on safety performance reinvigorates calls to revise how scholars envision reducing error and harm in the workplace (Casey et al., 2017). According to Renecle and colleagues (2021), mindful organizing is a necessary prerequisite for proactive safety behaviors and adherence to safety protocols. Current occupational safety research often fails to recognize that careless behavior prevails during many routine tasks, despite ongoing managerial supervision and maintenance (Neal & Griffin, 2006; Zohar & Erev, 2007). This oversight may obscure or underrepresent proactive behaviors such as awareness of failures or the ways in which that proactivity is developed and sustained through voluntary discussion of errors and their distinctiveness (Beus et al., 2016; Zohar, 2008).

To summarize, collective mindfulness is an attribute of a group as well as a product of what that group does, which is organize itself to accomplish particular outcomes repeatedly or, in other words, achieve reliability (Martínez-Córcoles & Vogus, 2020). The group's action reflects its way of enacting its collective capability (Sutcliffe et al., 2016; Vogus & Sutcliffe, 2012; Weick et al., 1999).[6] The concerted, often daily processes and practices to achieve reliability represent mindful organizing, which is contingent upon the active transformation of information into valid appraisals and appropriate action (Callari et al., 2019).

Safety, Reliability, and Their Conceptual Intersection

Featuring an array of approaches to improve organizations' ways of managing harm to its resources, research in the fields of occupational safety and high reliability organizing is highly multidisciplinary. Theories aim to explain how risk is managed at a collective level (Gherardi & Nicolini, 2002; Weick & Sutcliffe, 2015) as well as individuals' ability and motivation to protect themselves and others from error (Zohar, Huang, Lee, & Robertson, 2015). Analyses focus on fallout from failures to balance centralized and de-centralized decision making (e.g., Callari et al., 2019) and on employees' and managers' preparedness to prioritize safety over other goals and to engage in routine measures for personal protection against workplace hazards (Ghezzi, Probst, Pettita, & Barbaranelli, 2020). Both fields contend that error is critical to performance and that proactivity (e.g., discretionary employee activities, processes of mindful organizing; Didla, Mearns, & Flin, 2009; Weick & Sutcliffe, 2007) has a place in maintaining safety and reliability (Curcuruto, Griffin, & Hodkiewicz, 2017; Frese & Keith, 2015; Griffin, Cordery, & Soo, 2016; Paolillo, Silva, Carvalho, & Pasini, 2020).

Conceptual differences between safety and reliability are often found when comparing their aims and outcomes (see Table 2), beginning with consideration of particular assumptions about error and autonomy. Examining these assumptions is valuable because it develops our language for articulating facets of the uniquely complex, dynamic environment of high-risk work (Hollnagel, 2014; Jahn, 2019) and reveals their critical role in learning from action (e.g., during debriefs; Jahn, 2022).

Table 2

Safety, Reliability, and Their Conceptual Intersection

	Occupational Safety	Intersection	Reliability
Conceptual focus	Safety is accomplished through both unified behavior and assumptions about the organizational environment. Thus, research and practice emphasize: • Assessment of adequate training in and compliance with safety procedures. • Support of a systematic, structural, and static set of values and beliefs about the consequences of error. • "Avoid mistakes."	Error is critical to performance.	Reliability is accomplished through requisite variety and conflict, which is inherent in the collective interpretation of the organizational environment. Thus, research and practice emphasize: • Assessment of enabling and constraining facets of group sensemaking. • Support of ongoing communication and, as such, a dynamic, intersubjectively constructed belief in the possibility of continued operations and the likelihood of future error. • "Learn from mistakes."

Relevant outcomes	Safe outcomes include:
	• Low rate of workplace accidents and injuries.
	• Audits and inspections.
	• Safety compliance (e.g., use of all safety equipment and correct procedure to do one's job)
	• Safety participation (e.g., voluntary acts to improve workplace safety)
		Proactive behavior supports safe and reliable outcomes.	Reliable outcomes include:
			• Continued performance with limited lapses.
			• Ongoing displays of mindful organizing, including:
			  • Proactively test assumptions about the health of the group/organization.
			  • Question new input, rather than discount it.
			  • Combat ignorance, distraction, and casual approach to work.
			  • Maintain responsive mindset to cope with failure.
			  • Decentralize organizational and/or team structure to incorporate context-specific expertise.

Organizational hierarchy	The organization limits supervisory discretion, reduces between-group safety climate variation, and helps maintain consistent implementation of policies within units. The individual enacts and sustains the group (i.e., supervisory leadership) and is unchanged by the group. Occasionally, the group maintains safety through the communication of messages about safety among peers.	Ongoing, facilitated communication is pivotal for interpreting the environment. An individual who influences the message should not be confused with the message itself.	The organization and the group are each other's symbolic resources through which ambiguity is iteratively reduced, maintained, or amplified. The individual and the group are distinct, particularly in the sense of the mind. The individual can contribute to a collective mind, yet a collective mind is distinct from an individual mind. Unlike the individual, the group is vested in the pattern of interrelated activities among many people.
Ambiguity	Presumed to be low. Alignment among the organization and its units is not possible amid high ambiguity.	Shifts in the environment affect our understanding of it.	Presumed to be high. Some alignment among the organization and its units is possible in light of high ambiguity.
Consensus	Supported by supervisors' clear indication of priorities. Complete consensus is integral to safe outcomes. Consensus eliminates ambiguity.	Some degree of consensus is desired, as it tends to promote behaviors that are important and/or rewarded.	Supported by group sensemaking and decentralized processes of mindful organizing. Complete consensus is neither necessary nor realistic for reliable outcomes. Consensus and ambiguity are in conflict.

A core assumption of safety and its management is control (Erev, Ingram, Raz, & Shany, 2010; Ostrom, 2000). Safety systems dictate operational guidelines or required

sequences of events and, in turn, evoke notions of compliance and violation. That is, employees are expected to comply with stated regulations or face consequences for violating them (Hale & Borys, 2013). This assumption reveals another, namely, that it is possible to discover any and all errors inherent to an operation. Each error can then be explained by a single root cause; such a linear trajectory to failure can be used to anticipate, and thereby avoid, future error. Safety is then accomplished through both unified behavior and assumptions about the organizational environment (Beus, Payne, et al., 2010; Lee & Dalal, 2016; Zohar, 2000; Zohar & Luria, 2005).

A core assumption of reliability is adaptability, whereby those same safety systems are resources for employees to draw upon, expand their options for action, and affect change (Dekker, 2014; Jahn, 2016; Kontogiannis & Malakis, 2013). This assumption leads to another, namely, that it is not possible to discover any and all errors inherent to an operation. That is, would-be important indicators of error do not necessarily stand out before an error occurs; errors are attributable to multiple failed and/or successful interactions among people, organizational structures and processes, and other system components (Reason, 1995). Reliability is achieved via the group working through conflicts of interpretation toward an enriched collective mind (Weick & Sutcliffe, 2006).

These assumptions also reveal whether high-risk organizations integrate autonomy in order to manage harm to their resources. Autonomy reflects the extent to which employees have the freedom and discretion to plan, schedule, and carry out their jobs as they see fit (Hackman, 1990; Langfred, 2004; Langfred & Moye, 2004) and is often framed in terms of operations (i.e., employees' latitude to decide the timing or

sequencing of tasks; Morgeson & Humphrey, 2006). Whereas autonomy is considered indispensable for managing unpredictability (Perrow, 1984), it may nonetheless impede the management of more routine situations. That is, autonomy may be seen as detrimental for safety because it may produce unsafe behavior (Hofmann et al., 2017) and as beneficial for reliability because it promotes robust mental frameworks about past failures, successes, and near-misses that may be leveraged as an unforeseen event unfolds (Weick & Roberts, 1993).

Given these assumptions about error and autonomy, the conceptual focus and goal of safety research is then the assessment of training and compliance with safety-related expectations with particular attention to the sociocognitive factors (e.g., motivation, leadership, safety climate; Flatau-Harrison, Griffin, & Gagné, 2020; Parker, Morgeson, & Johns, 2017) that support a systematic, structural, and static set of values and beliefs about the consequences of error. Assuming that protection against hazards is fairly straightforward and broadly applicable, protection against hazards requires nuance, which is only sustained as a group continually engages in mindful organizing (Weick & Sutcliffe, 2015). The conceptual focus and goal of reliability research is then based on assessing the enabling and constraining components of sensemaking, namely, that a dynamic, intersubjectively constructed belief in the possibility of continued operations *in light of* future error exists (Blatt, Christianson, Sutcliffe, & Rosenthal, 2006; Schippers, Edmondson, & West, 2014).

Endnotes

[1] This suggestion is an allusion to loose coupling (Weick, 1976), a mechanism whereby tensions for stability and flexibility can be managed despite the reality that organizations are both indeterminate and unclear as well as needing completeness and certainty (Thompson, 1967).

[2] Beus and colleagues (2016), for example, contend in their review of workplace safety paradigms that generalized measures of safety behavior (e.g., Burke, Sarpy, Tesluk, & Smith-Crowe, 2002; Griffin & Neal, 2000) do not capture the full range of context-specific safety-related behaviors that indeed mitigate error. This claim is similar to that of Zohar's (2008), which supports more nuanced conceptualizations of safety-related behavior that are in accordance with high reliability/mindful organizing theories.

[3] Roberts and Bea's (2001) work supports the theory of high reliability/mindful organizing, an iterative accomplishment of meaning and coordinated action that is characterized by distinct, yet interrelated sociocognitive processes: a preoccupation with failure, reluctance to simplify interpretations, sensitivity to operations, commitment to resilience, and deference to expertise (Weick & Sutcliffe, 2015). See also Table 1 for a summary of these processes and an illustrative example.

[4] For example, Ray and colleagues (2011) posit that the complexity of a university's business school necessitates that the institution become a reliability-seeking organization. That is, the business school's competitive environment (e.g., limited instructional resources, accreditation maintenance, technological change) calls for faculty and administration's mindful awareness and cross-communication before and during the implementation of new policies. The business school is thus "reliability-seeking" because it continuously leverages collective mindfulness amid complex, dynamic environmental shifts to repeatedly achieve outcomes that are unique and specific to the business school and that are based on that which its environment demands (e.g., accreditation, enrollment).

[5] Frontline employees and leaders supporting operations of one of the largest European music festivals differed in terms of which processes of mindful organizing they regularly engaged (Vendelø & Rerup, 2020). Whereas all were preoccupied with failure and sensitive to operations, only upper levels of the organizational hierarchy questioned the viability of their sustained performance and engaged in frequent practice-oriented trainings (i.e., reluctance to simplify interpretations and commitment to resilience, respectively). Lastly, high turnover and inexperience forced their deference to expertise.

[6] Examples of this action are illustrated in Table 1 by the five processes of collective mindfulness (Weick et al., 1999).

CHAPTER 3: METHODOLOGY

Methodologies that support theory development have been overlooked in the multidisciplinary field of safety science (Rae, 2015). Systematic reviews include limited evaluations of interventions (Robson et al., 2007; Vilela, Castro, Martins, & Gorschek, 2017). Moreover, Dov Zohar's (2008) criticism of the field's overemphasis on operationalization, measurement, and climate-behavior hypothesis testing has led scholars to propose how to improve their science:

> Unfortunately, we started quantifying these constructs long before the phenomena were qualitatively investigated or theorized (at least within the safety domain). As a result, to the extent that there are theories of safety leadership, safety climate, safety culture, safety behavior or safety perception, these theories are assemblages of relationships between constructs that lack ecological validity. We do not have adequate descriptions or explanations of the phenomena, so we do not know what real-world referents the constructs are truly associated with. (Rae et al., 2020, p. 5)

Amid unfulfilled calls to more concertedly address how high-risk organizations manage their complex, dynamic environments, scholars have remarked on the blatant conceptual gaps in the field: "Several recent attempts have been made to integrate the high-reliability concept and error management theory, an endeavor we think is overdue, given the overlap of recommendations and approaches, but that beckons more scientific work" (Frese & Keith, 2015, p. 681). The field now implores "empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the

boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used" (Yin, 2003, as cited in Rae et al., 2020).

This dissertation applies a methodological framework, that of grounded practical theory (Craig & Tracy, 1995), to address normative questions (i.e., "how should we…") as well as theoretical ones (e.g., how do employees jointly understand and address multiple, co-existing, and potentially conflicting outcomes in their high-risk workplace?). These kinds of inquiries lead to more meaningful theoretical and practical recommendations (Rae et al., 2020). A practice – rather, a communicative practice – is the target of analysis here, with practice meaning the way something is done. "Communicative" conveys that the cultural and technical aspects of talk are intertwined, to wit: meaning does not exist prior to talk, meaning emerges *from* talk (Craig, 2006, 2018; K. Tracy & Craig, 2010). Robert Craig and Karen Tracy (2021) invoke yoga and breathing to link the study of talk with an enriched, situated view of a practice:

> Like breathing, communication is also a process that occurs naturally among living organisms and is shaped into culturally meaningful social practices that sometimes involve the use of structured techniques (e.g., for interviewing or dispute mediation) or technological media (e.g., creating and consuming video content or interacting through social media). As activities that can be done intentionally, social practices can be done well or poorly, and we tend to evaluate them as such. The object in yoga is not just breathing but a specific type of breathing for a specific effect, just as the object in communication is good or effective communication. But communication is a far more complex and contested practice than breathing exercises. We may often be puzzled by or

> disagree about what should count as good communication [and] communication problems can be especially difficult when they involve tensions among multiple goals or values that are at stake in a situation. (p. 15-16)

The results of analyzing talk are then not meant to directly reveal everything we might need or want to know about a practice or the setting in which it takes place. Rather, analysis of talk supports our "discursive consciousness" (Giddens, 1984), or our ability to discuss and theorize in terms of how that practice actually occurs. Thus grounded practical analysis addresses a limitation of the hypothetico-deductive model; that is, a failure to address "how [safety] methods are used in practice, and the challenges and problems with [those] methods in practice" (Rae et al., 2020, p. 8).

This chapter frames a methodology in the grounded practical tradition that includes inductive and action-implicative techniques (Strauss & Corbin, 1990; K. Tracy, 1995). I first review the institutional site and the talk-rich data collected from debriefs, meetings in which their participants determine action in the face of uniquely high-risk and ambiguous work (Engemann & Scott, 2020a). Next, I describe instances of and techniques for managing conflicting normative ideals (dilemmas) that are inherent to this practice. Such examination identifies how tensions are actually resolved, setting the stage for mid-range theory development about high-risk work.

Data Collection

Data were collected at *Roaring Road Racing*, or "Triple R," the pseudonym given to a professional stock car racing organization in the southeastern United States.[1] Stock car racing is characterized by vehicles constructed under strict design and mechanical standards, oval tracks measuring up to nearly three miles, speeds close to 200 miles per

hour, and races ranging up to 600 miles. Stock car racing also includes pit stops, where the car slows into a lane that runs parallel and is connected to the race track ("pit road") and is then refueled and repaired by the pit crew, a group of highly specialized and mechanically minded athletes. Whereas the stock car itself is the presumed feature of the race, stringent regulations designate the pit stop as a key strategic component for optimal race performance (cf., Albert, 2018).

Triple R has operated pit crews for several stock cars across multiple major national racing series, earning the National Association for Stock Car Auto Racing's (NASCAR) highest level of achievement, the premier racing series championship, several times. Triple R's pit crews are currently among 17 full-time teams that operate under the branding of major American car manufacturers. Given the size of the pool of Triple R's competitors and the public availability of racing series performance outcomes, further details about *Roaring Road Racing* as an institution is limited to preserve participants' anonymity.

The study of Triple R began as an informal, exploratory effort to determine its potential as a research site. To do so, I led the evaluation of the events, processes, and behaviors relevant to this context and how they might be observed, with support from my faculty advisor and a few doctoral students. Data were first collected by means of qualitative fieldwork. Field notes were written onsite and then typewritten with more detail offsite and within 36 hours of observation (Emerson, Fretz, & Shaw, 2011). Triple R was observed for about eight hours across a few non-consecutive days. Although these observational data influenced my initial understanding of the site as well as my decision to propose this dissertation, they were not included in this analysis.

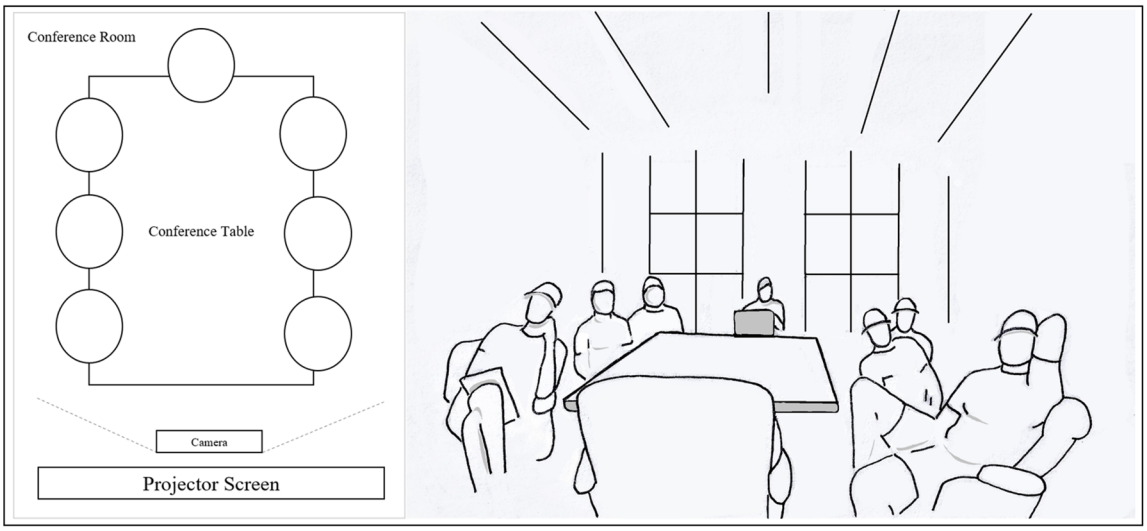
The investigation and study of *Roaring Road Racing* then continued as my own effort under faculty supervision. I invited Triple R's strength and conditioning coach and its performance director to validate observations made, lend their perspectives on pit crews' goals and challenges, and reflect on the roles of facilitation and feedback in their work (see Appendix A). Discussion with the performance director particularly pertained to how debriefs (referred to as "film reviews") shape what occurs during pit stop practice, how pit crews address near-misses, and how performance expectations are routinized across pit crews. After observing a few of these debriefs and post-session pit stop practices (see Appendix B for a sample of field notes), I negotiated access to the institutional site. In addition to collecting documents such as performance metrics and schedules of internal meetings, I corroborated initial interpretations of the institutional site from the data previously gathered. Video recordings of debriefs began as the 48th premier racing season commenced, spanning March through November 2019. As the least obtrusive way to observe these sessions was to have its facilitator record them rather than to have a note-taking observer present, Triple R's performance director, *Tom*, was supplied with a Go-Pro video camera for this purpose. Tom and pit operations lead, *Nathan*, assumed the responsibility of placing the camera and removing it from its mutually agreed upon location in the conference room where debriefs took place.[2] Recordings captured five to seven Triple R employees at a time sitting around a conference table. Pit crew members were seated around the sides of the table, whereas the session's facilitator – typically, the pit operations lead – was at the head. Thus, pit crew members faced each other or the direction of the camera, as the projector screen that

displayed point-of-view and over-head pit stop footage was in line with the camera (see Figure 1).

The camera was unobtrusive with respect to the size and setup of the conference room where debriefs took place; the conference room was approximately 900 square feet, and the Go-Pro camera's dimensions (~ 2.5 inches by 2 inches by 1 inch) rivaled that of a large paperclip. Pit crew practice stops are readily recorded and discussed to inform subsequent practice runs, just as pit stops recorded during an actual race might be reviewed for pit strategy adjustments. Pit crews at Triple R are always recorded by camera during all practices and races. The use of a camera to record their debriefs was introduced for the purposes of this study. This camera recorded all debriefs included in this research. Pit crews have no control over the use of cameras in their work and are accustomed to being recorded. The discreet camera setup and pit crews' relative comfort with being video-recorded ensured that participants were not discomfited by the technology to partake in their regularly scheduled meetings. Nonetheless, they were reminded at times by the performance director that they were being recorded for the purposes of this research, and the crews often observed Tom or Nathan setting up and turning on the camera.

Figure 1

Aerial and Point-of-View Representations of Debrief Sessions



Note. Ovals and figures represent debrief participants, including the five pit crew members, the performance director, and the pit operations lead. The camera captured that which occurred in the conference room as participants watched their recorded performance play on the projector screen.

Although race and pit performance are more or less observable as part of an often-televised professional sport, and many pit performance metrics and rankings are shared across competing racing organizations, some pit performance details are proprietary or could be considered unusually sensitive for discussion before an external audience. Therefore, the performance director, pit operations lead, and participating pit crews signed IRB-approved consent forms that ensured their privacy and confidentiality (see Appendix D). The performance director also exercised discretion while recording these debriefs.

To ensure coverage of the entire season, digital video files were downloaded and subsequently removed from the camera's SD card to password-protected file storage in April, June, August, October, and November 2019. The camera was then returned to the performance director for further recording, save for the final date of data retrieval.

Data Summary

In the wake of NASCAR's order to limit pit crews to five members, and just before these data were collected, Triple R narrowed their resource allocation and coaching efforts in order to improve their standing.[3] The resulting convenience sample consisted of 17 Triple R employees: 15 pit crew members nested in three pit crews, the pit operations lead, and the performance director. Two of these three crews would go on to support cars racing in the premier series; the remaining crew served as back-up to those two crews or participated in a more developmental (and, strategically, less imperative) racing league. Both the pit operations lead and the performance director regularly served on pit crews for Triple R within the last 12 years of these data being collected. Whereas the performance director's tenure on pit road had long since ended, the pit operations lead was still regularly listed as a back-up crew member for the more senior of the two groups in the premier series (see Appendix E for a list of research participants).

Approximately 12 hours of viable [4] debrief session video footage were captured, which includes 29 debriefs across the three pit crews during the racing season. Debriefs averaged about 24 minutes in duration (see also Appendix F for a summary of the dataset). The footage represents about 30 percent of debriefs that were scheduled and includes one of three cross-pit crew debriefs (see also Appendix G for an approximate percentage of meetings recorded for the duration of the racing season). The performance director confirmed that those sessions that were not recorded were either not suited for external audiences (i.e., proprietary discussion topics) [5] or were the victim of the performance director's or pit operation lead's busy schedules; camera setup was not

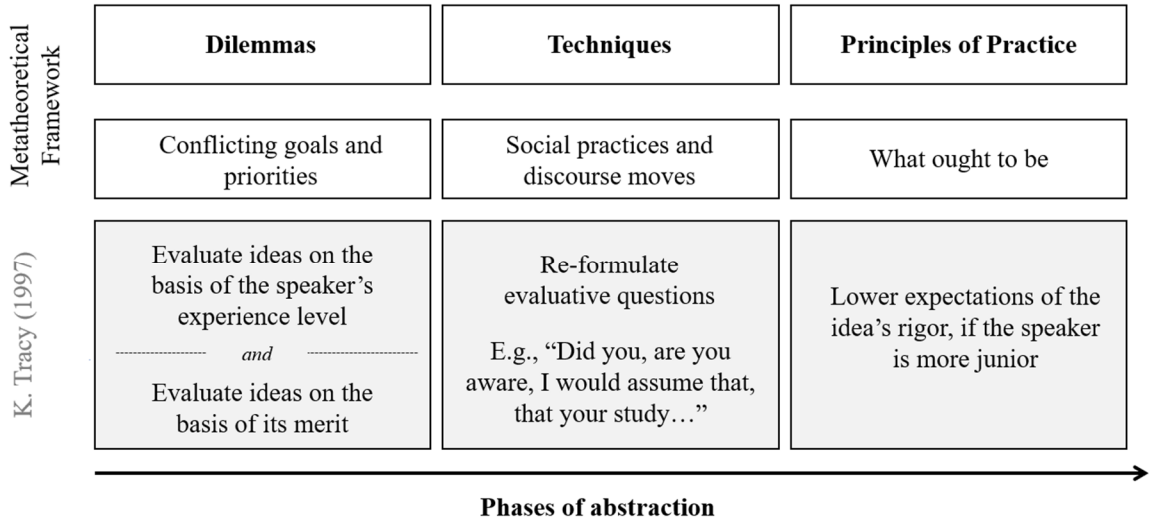
possible if both arrived late to the session. In a few instances, some debriefs did not take place as scheduled. Altogether, the discretion that participants applied to recording debriefs supports the ethnographic analysis of a practice in context, as reflexivity between participants and the data engenders "…retriev[al of] their intentions, their understandings and their knowledge" (Knoblauch & Tuma, 2011, p. 426).

Methodological Position and Analysis

Grounded practical theory (GPT) is a framework for developing, extending, or revising mid-range theories of how interactions result in a practice (Craig & Tracy, 1995); that is, "how practitioners recognize, produce, and formulate the scenes and regulations of everyday affairs" (Corradi, Gherardi, & Verzelloni, 2008, p. 3). GPT maintains that the assumptions held about how one ought to act within a practice emerge through and are sustained by talk (K. Tracy & Craig, 2010). For example, Karen Tracy's (1997) study of academic colloquia derived participants' shared purposes, goals, and expectations from their criticisms of and comparisons to one another (see Figure 2). Pre-meeting talk (Mirivel & Tracy, 2005), cosmetic surgery consultations (Mirivel, 2008), and school board meetings (K. Tracy & Muller, 2001) are other examples of talk-rich practices that have been evaluated through this lens.

Figure 2

GPT Metatheory and an Example Reconstruction



Note. Karen Tracy (1997) posited that the academics under study expected one another to both evaluate ideas presented in colloquia (1) on the basis of the speaker's experience level and (2) on the basis of the idea's merit alone. These expectations – derived from stated and inferred dilemmas inherent to the practice – informed abstractions towards a theory of colloquia.

Like grounded theory (Glaser & Strauss, 1967), GPT is committed to studying the social world and to developing relevant theories. A grounded practical approach can reveal a practice's multiple, competing, and legitimate goals; for example, the rigorous criticism of ideas and the maintenance of supportive interpersonal relationships in intellectual discussions (K. Tracy, 1997), students' engagement with course material and with each other in classroom discussion (Muller, 2014), directing supportive and challenging environments for undergraduate course lectures (Goodman, Bailey Murphy, & Linquist D'Andrea, 2012), or meeting demands of social justice and other organizational priorities (Mease, 2016).

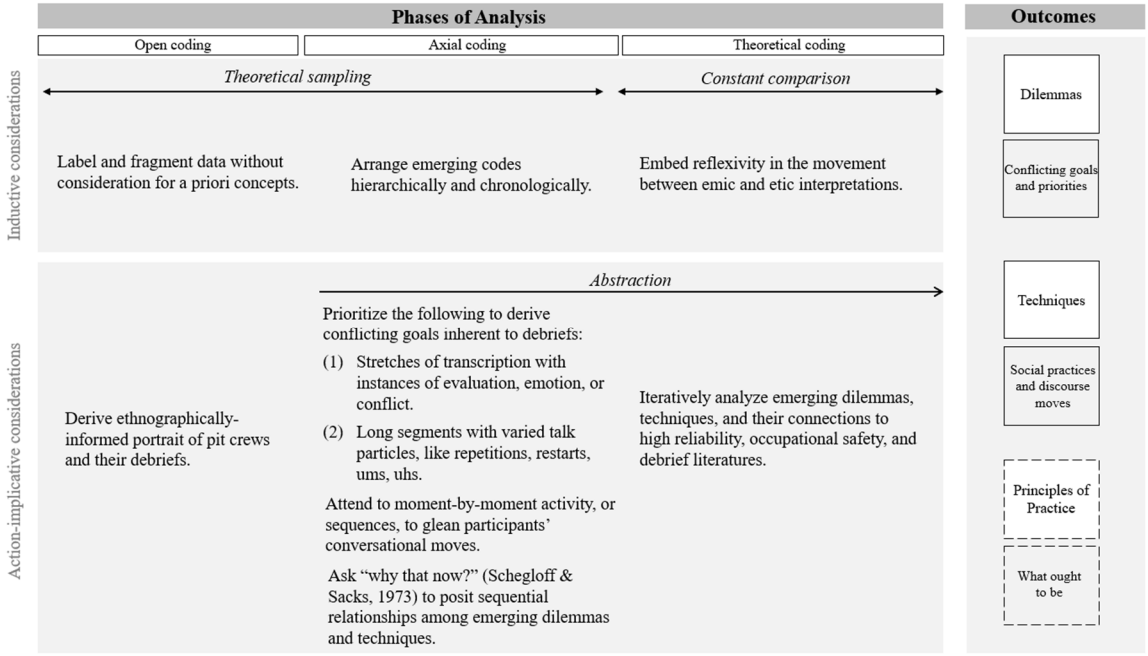
However, GPT's aim is to create a reasoned basis for "good practice" (Craig & Tracy, 1995, p. 252) by conceptualizing how the practice ought to be conducted and by deriving implications about how conflicting goals and priorities might be transformed in

current and similar situations. Koenig and colleagues (2014), for example, investigated the interaction between physicians and patients during consultations for the treatment of Type 2 diabetes and found that physicians' empathy is integral to consultations for the treatment of other chronic illnesses. Thus, a grounded practical approach generates theory of how the practice actually ought to be conducted so that situational problems might be transformed; a traditional grounded approach, on the other hand, generates theory of social process.

To best examine a practice such as a debrief, its implicit values need to be made explicit for critical evaluation. Therefore, action-implicative discourse analysis (AIDA) (K. Tracy, 2005) and complementary inductive techniques guided interpretation of the 29 debriefs. As the methodological arm of GPT, AIDA's inductive approach posits that talk is meaningful at the sociocultural level and is shaped by the values and practical constraints of its environment, such as time, money, and energy (K. Tracy, 2003). Such a pragmatic lens, though, still attends to complex organizational environments and multiple, conflicting priorities therein (Craig & Tracy, 2014). Analysis of Triple R's debriefs moved through open, axial, and theoretical coding toward mid-range propositions (Barge & Craig, 2009), as summarized in Figure 3.

Figure 3

Examining the Practice of Debriefs



Note. Arrows convey a general direction of the analytical activities in italics (i.e., theoretical sampling, constant comparison, and abstraction). Strauss and Corbin (2008) recommend that codes and the posited relationships among them be constantly revised; arrows conveying "theoretical sampling" and "constant comparison" are thus double-sided. Craig and Tracy (2010) aim for the implicit values of a practice to be made explicit, and "abstraction" is assumed to proceed more or less linearly. For example, the values that govern a practice emerge for critical evaluation *after* its conflicts are closely examined. Grounded techniques, like theoretical sampling and constant comparison, aided in abstraction, which began in earnest after open codes became redundant. "Principles of Practice" are enclosed by dotted lines to convey that these are not (unlike "Dilemmas" and "Techniques," enclosed by solid lines) directly addressed by a research question in this dissertation.

Developing the Data Catalog and Open Coding

The first phase of analysis consisted of organizing the data and gaining some familiarity with them, including preliminarily viewing the video-recorded material and developing ways of classifying and capturing pending analytical moves. Following the verbatim transcription of the recorded debriefs, I revised 998 pages of single column transcripts (40 to 45 lines per page) for speaker aliases, accuracy of speech and interchanging speakers, racing and pit stop-related jargon, and any long segments

consisting of, for example, repetition, phrase restarts, word repairs, cut-offs, and vocal sounds like ‘uhm’ and ‘uh.’ It is in these instances of talk – such as when stumbling through a point – where normative expectations emerge (K. Tracy, 2005). These and a few other conventions for transcription (e.g., adding punctuation for readability and accuracy of interpretation) are appropriate for this research and are consistent with conventions in extant action-implicative research (e.g., K. Tracy & Hodge, 2018).

Next, I reviewed all video-recorded material once again and began open coding with support from Nvivo software. I also drafted memos for each of the meetings captured (see Appendix H). As written records of “ongoing, developmental dialogue” (Schatzman & Strauss, 1973, p. 9), memos enable theory development by magnifying concepts that may otherwise remain dormant, inform the coding process, generate meaning by documenting questions about the data, and enable theoretical saturation. At first, memos primarily featured descriptions of discussion topics and the actions that participants engaged in. These memos also reflected the initial conversations among extant and emerging frameworks, myself, and the data. Capturing interpretations in this way created trustworthiness, supported my own reflexivity with the data, and captured methodological decisions (Rodgers & Cowles, 1993).

Table 3

Memo Types Used During Analysis

Memo Type	Definition and Purpose
Contextual memos (*n*=29)	Notes about topics debrief session and analytical thinking
Coding memos (*n*=180)	Notes to record analytical thinking about selected stretches of discourse and define (and redefine) emergent codes
Diagrams and theoretical memos (*n*=8)	Visual representations of relationships among categories, including (1) higher order notes for evolving theory at a more abstract level and (2) possible sequential relationships among dilemmas and techniques

Having gleaned the routine nature of the focal practice from the "good number of hours" (K. Tracy & Craig, 2010, p. 149) of recorded debrief footage, and having reviewed other available formats (e.g., field notes, interviews, institutional documents, publicly available performance data), I then reduced the data to focus on participants' talk that displayed or characterized conflict or contradiction among goals or priorities. A data catalog emerged containing accounts of the debriefs and time stamps of the duration of the selected stretches of discourse, in keeping with the action-implicative tradition.

Typified by emotion, discomfort, tension, and contradiction, the discourse selected serves as the platform upon which participants unveil their competing institutional and personal goals (K. Tracy, 2005). Closer scrutiny also accomplishes the goal of AIDA: to illustrate normative expectations that enable and constrain a practice. For example, cosmetic surgeons' expressions of discomfort during consultations illustrate a dilemma: the surgeon is both a gatekeeper of surgical candidates and a businessperson driven by the bottom line (Mirivel, 2008). Identifying instances of contradiction in talk also supports the aforementioned goal of AIDA, including expressions of evaluations of

others' actions or expressions that seem at odds with how an individual or an institution describes their aims and future actions.

An updated data catalog and new open codes emerged as I evaluated the 29 transcripts according to debrief participants' expressions of (1) emotion, discomfort, or tension; (2) evaluation of other's actions; and (3) conflict (Craig & Tracy, 2005; see also Table 4). This decision was based on action-implicative assumptions; that is, analysis is a theoretically shaped activity, with not all moments of interaction being equally promising for reconstruction (Ochs, 1979). I recognized evaluative, emotional, or conflict-rich stretches as they naturally occurred. Such focused, well-facilitated talk meant that participants were unpacking stressful moments of their performance; most of what pit crews discussed met these three criteria. I then reduced data further by removing the following: stretches of silence lasting more than one minute, unintelligible exchanges lasting under 15 seconds, and discussion off-topic from the expressed purpose of the meeting lasting more than two minutes.

I also examined participants' talk when it necessarily varied from the aims of Triple R or NASCAR. For instance, NASCAR hosts an annual Safety and Operations Summit to recognize individuals, racing organizations, and speedways for their commitment to the safety and well-being of drivers and pit crews. Thus, any contradiction in the talk of pit crew members about their safety would be noteworthy of interpretation. One hundred eighty-two stretches (M=2 minutes, 12 seconds) of evaluative, emotional, or conflict-rich discourse emerged from the transcripts, substantiating the catalog reflecting dilemmas and discursive techniques.

Table 4

Data Reduction Criteria, Descriptions, and Examples

Criterion	Description	Prior Research Example	Sample Example
Evaluation	Speaker evaluates others' actions	"Personal growth" and "genuine learning" as terms used to comment on students' disappointing academic grades (Sanders & Anderson, 2010).	Predicting possible pit performance outcomes for the upcoming race according to previous race's metrics.
Emotion	Speaker expresses emotion, tension, or discomfort	Offering an irrelevant or unhelpful recommendation when expressly prohibited from giving advice (K. Tracy & Agne, 2002).	Speaking poorly of one's own performance during a pit stop.
Conflict	Speaker incites or manages conflict	Jokingly restating another's racist comment in a more extreme way during an exchange (Robles, 2015).	Posing rhetorical questions to encourage others to improve (e.g., "Do we still have work to do? Absolutely.").

Moving Through Interpretive Frames

The methodological position taken here and the naturalistic data form a reflexive partnership; data are amenable to multiple, iterative readings and successive interpretations build critical reflection about the fit between data and theory and support eventual theoretical saturation (Corbin & Strauss, 2015; Cronbach, 1975; Wolcott, 1995). I returned to emerging codes and to previous memos to reflect on the interpretations I was drawing and to consider such questions as: (1) what attribution, whether about this participant or about the situation, is likely if the participant talks in this way? (2) what communicative act is being performed by participants' talking in that particular way? (3) what attitudes are assumed about a participant or a topic based on the way that participants address some other topic? (4) how are certain, or routine, utterances treated by participants? and (5) what is the function of a participant's action, such as

compliments? (Craig & Tracy, 2021). This moved analysis toward researcher-induced concepts that reflected emerging theoretical concepts (Van Maanen, 1979), a feature of grounded methodologies (Corley & Gioia, 2011; Gehman et al., 2018; Gioia, Corley, & Hamilton, 2012).

To address participants' contributions via these reflexive questions, I delineated sequences within the stretches of selected discourse, thus achieving better familiarity with the data. By asking "why that now?" (Schegloff & Sacks, 1973), analysis revealed dilemmas and identified the techniques that participants used in response. I determined sequence start- and end-points based on the interaction and then by discursive moves, such as the start of a new topic, (e.g., a pit crew member asks "What if...?"), direction to shift attention (e.g., the pit operations lead points out a mistake in pit choreography), or a shift in discussion intensity, suggesting conflict. 436 sequences (M= 53 seconds) of discourse emerged for more granular interpretation.

I scrutinized sequences for terms of speech (i.e., intervals between utterances, simultaneous and overlapping utterances, and contiguous utterances) and observable actions (i.e., gaze, gesture, and postural movements) using multimodal and co-operative frames of reference (Katila & Raudaskoski, 2020). Multimodal blends talk, gesture, gaze, and body movement as they pertain to "participants and their simple coordination, but also […] the interactional space they visibly, dynamically, and specifically design and configure within the ongoing course of action" (Mondada, 2019, p. 64); and co-operative assumes that a group co-orchestrates its members' speech and actions through behavior (Goodwin, 1979, 2000, 2013, 2018). From these ordered, moment-by-moment instances of activity, or, by "zooming in" (Jarrett & Liu, 2018), patterns of participants' talk

emerged. The systematic codebook also expanded to include 1,010 open codes, including in vivo codes (e.g., “I’m not afraid of the competition”; “It’s going to look a lot worse than it actually is”).

Theoretical sampling continued with the segmentation of select sequences such that nonverbal communication cues, if observable, could be transcribed alongside participants’ talk, a valuable analytical exercise to examine the context of those interactions (Knoblauch & Schnettler, 2012). I preliminarily captured visual cues (e.g., gesture) and embedded them in parentheses alongside corresponding talk (e.g., Liu, Jarrett, & Maitlis, 2022). However, this did not ultimately serve action-implicative ends; adding the cues did not clearly portray how participants’ discursive moves built upon their respective contributions to the scene. Moreover, the grounded practical stance of AIDA limits details to those that can create a useful reconstruction of the relevant practice. Consideration of visual elements for transcription and coding ended shortly thereafter.

Organizing Dilemmas and Discursive Techniques

In addition to comparing open codes against each other so that unique data had discrete, descriptive labels, I unpacked and reconstructed axial codes to identify potential relationships among open codes (e.g., hierarchical, causal, chronological, enabling, constraining), which first emerged during the examination of talk sequences. I framed these preliminary relationships – such as that between participants’ positing hypothetical performance outcomes and the tension of having just been slapped with a penalty – in memos and later created rudimentary diagrams to visually depict connections between emerging concepts (Corbin & Strauss, 2015) (see Appendix I for a sample list of codes).

The final results are based on the most salient categories developed; I excluded some codes (e.g., “talent composition”) to better focus the analysis. Altogether, the categories that emerged organized and synthesized participants’ dilemmas and discursive techniques in response to them.

Analysis then alternated between existing theories and research questions on the one hand and emergent insights from data on the other, in keeping with action-implicative assumptions, where analysis ought to straddle inductive and deductive processes to maintain a “theoretically-informed induction” (Corley & Gioia, 2011; Shah & Corley, 2006; K. Tracy, 2005). An iterative approach set up axial codes for comparison to concepts relevant to the extant debrief, occupational safety, and high reliability literatures (Srivastava & Hopwood, 2009), while a constant comparative approach integrated details of the practice’s problems into concepts predicated on useful, wise action (Craig & Tracy, 2021; Strauss & Corbin, 1990). I also used the philosophical orientations of safety and reliability as sensitizing concepts (Blumer, 1954) to further explore participants’ discursive techniques. Movement between theory and practice (Craig & Tracy, 1995) progressively refined emerging dilemmas and techniques and resulted in problem-level and technical-level insights about debriefs in context (Craig, 2015).

Movement between emic readings of the data and etic use of existing models and theories clarified the active interests and priorities brought to these data (cf., S. J. Tracy, 2013). Data sessions (Heath, Hindmarsh, & Luff, 2010; Knoblauch, Tuma, & Schnettler, 2014; Meier zu Verl & Tuma, 2021) with doctoral-level researchers were held to review selected sequences and stretches and to refine interpretations about what was occurring

onscreen (Tutt & Hindmarsh, 2011).[6] Discussion revolved around questions such as: (1) can the data be constructed or made sense of in another way than suggested by the preferred perspective/vocabulary?; (2) can I let myself be surprised by these data?; and (3) can theory be newly constructed in a way that looks to the emergent framework and to how my research community typically sees and interprets things? (Alvesson & Kärreman, 2011, p. 1270). Much like the memos that guided coding and interpretation, data sessions encouraged reflexivity with the data to improve trustworthiness and ensured that the resulting interpretations represented multiple viewpoints toward theoretical saturation (Creswell & Poth, 2018). Notably, applying traditional interrater reliability tests are neither recommended nor meaningful when analysis is inductive, iterative, and inclusive of multiple perspectives (cf., Kreiner, Hollensbe, & Sheep, 2009; Petriglieri, Ashford, & Wrzesniewski, 2019).

Inductive and action-implicative analysis of talk made multiple norms inherent to debriefs explicit for evaluation. In these findings, the tensions inherent to debriefs (i.e., dilemmas) are linked with particular discourse that reflects those tensions (i.e., techniques). Results also support abstraction from exemplars and ethnographic insights, yielding implications that might guide future research and practice.

Evaluative Criteria for Qualitative Research

This research attended to the expectations for conducting high-quality qualitative research (Johnson, 1999; S. J. Tracy, 2010). The steps taken to achieve credibility, or plausibility, are illustrated throughout this chapter and referenced more concertedly here. This research is particularly credible by way of rich description and detail. For instance, several in vivo codes were integral to the final coding scheme, including “noise.”

Moreover, reflexivity across multiple phases of interpretation avoided over-influence on the research process and conclusions. For instance, a round of coding that identified whether participants themselves were introducing the observed themes afforded new insight into topics such as “racing IQ.” Negative case analysis also questioned assumptions about the data, allowing for more nuance about tensions and discursive moves between different pit crews as well as over time.

This research also adheres to expectations for originality, such that its contribution might extend our grasp of social life. The inductive, action-implicative approach reconstructed experiences in a unique, complex, and dynamic work setting. In addition, the methodology blends techniques that fit research objectives and conveys a thoughtful, appropriate interconnection of literature, analyses, and findings.

Endnotes

[1] Pseudonyms are given in accordance with research protocols approved by my institution's human subjects internal review board.

[2] Debriefs typically took place on the same day for all three pit crews. Debriefs also often proceeded one after another within a two- to three-hour time window. On occasion, debriefs for one pit crew took place on a different day or even a few hours before the next one. The performance director obliged the instruction to place the Go-Pro camera in the conference room at the start of a debrief and to remove it when the session ended.

[3] This strategic operational decision significantly reduced the available sample. This forced the omission of surveys from the research design.

[4] Recordings were considered not viable when they captured that which was clearly unhelpful for the present research, namely, the view of an empty conference.

[5] No further information on the nature of those proprietary discussion topics were given.

[6] Other means of data collection towards theoretical saturation, like member checks, were not possible. Those participants that were recorded are no longer available.

CHAPTER 4: RESULTS AND INTERPRETATIONS

This study examined the interactive dilemmas encountered and techniques applied in response by debrief participants in a high-risk work setting. This chapter first evaluates the features of the institutional site and its debrief (i.e., the "film review"). Following action-implicative interpretations of tensions and talk, analysis generates a model of the communicative practice of debriefs in context.

The results particularly attend to the discursive techniques employed by debrief facilitators, in keeping with the ethnographic lens of the methodology, which enables the practice under study to be portrayed from one party's point of view while in the context of others' actions (Craig & Tracy, 2021; K. Tracy & Hodge, 2018). Altogether, this portrayal or, reconstruction (Craig & Tracy, 2021), of dilemmas and techniques conveys how debrief participants, in general, and their facilitators, in particular, manage tension in post-incident discussions.

This chapter is structured around the research questions (*RQ 1* and *RQ 2*). Exemplars from debriefs and interview transcripts support the problem and technical levels of this reconstruction. A summary of the results, also structured around the research questions, appears at the end of the chapter. Block quotations are from debrief sessions unless otherwise noted (i.e., "Excerpt # [Interview]"). Where they are necessarily connected by the order in which they occurred during the meetings, exemplars are numbered with decimals (i.e., Excerpt 1.2 is contiguous with Excerpt 1.1). Pseudonyms for all participants appear in Appendix E.

A Brief Profile of the Site

Triple R occupies co-located office, practice, and mechanic spaces in a corporate park. Characterized by a minimal aesthetic that is enlivened by the occasional indoor plant, the Triple R offices include: a reception area, private offices for the performance director, strength and conditioning coach, the pit operations lead, and a few other organizational leaders and staff members, and several conference rooms adorned with placards, photos, and trophies that celebrate successes in previous racing series.

Features unique to the sport of stock car racing permeate this otherwise customary office set-up. In addition to an onsite museum dedicated to the organization's history and the performance of its pit crews, drivers, and stock cars, there is a working mechanic garage, weight training and physical rehabilitation facilities, and a kitchenette stocked with protein-rich convenience foods, like pre-packaged peanut butter and jelly sandwiches and granola bars. Motor company-branded trailer trucks line the parking spaces around the office to transfer stock cars and equipment from the garage to the race sites. Last, a truncated race track – equipped with a camera, an overhead television for reviewing captured footage, and racks of pre-set tires – sits a few hundred feet away from the office.

Triple R's pit crews are responsible for changing tires, refueling, and adjusting and repairing critical stock car parts in order to get the driver back on course in a matter of seconds during a race. All pit crew members perform hours of strength and conditioning training, individual or group practice pit stops, and mechanical duties each workweek throughout the racing season. Many of the pit crew members slotted to pit in

the premier series then travel to and from race tracks over the weekend; there are 36 races held on 26 different race tracks, located across 25 states.

In addition to these responsibilities, all pit crew members are expected to take part in a debrief once a week, typically led by the pit operations lead, Nathan, and with the performance director, Tom, in attendance. These "film reviews" (debriefs) of approximately 30 minutes are held for each pit crew and take place two to four days after a race. Pit crew members discuss their most recent performance "over the wall" [1] (i.e., during pit stops) across all positions (i.e., jackman, fueler, front tire changer, rear tire changer, tire carrier; see also Appendix J). The strength and conditioning coach, *Charlie*, distinguished debriefing from other co-occurring regimens: "I increase their force potential, and then Tom and Nathan teach them how to efficiently and effectively apply that to whatever skill they're doing."

To supplement discussion, the pit crew, pit operations lead, and the performance director may review digital recordings ("film") from cameras affixed to pit crew members' helmets or situated above their pit box, or from measured time stamps. Through discussion of successes, failures, and near-misses, and with consideration for the latest regulations, pit crew members interpret particular pit stop incidents and retain some of those interpretations with the next race in view. Practice pit stops then take place on Triple R's nearby, truncated race track with that same pit crew shortly after the session.

The Film Review, Triple R's Debrief

Frequent protocol changes and standardization efforts designate the pit stop as one of the remaining strategic inputs for a racing team to maintain good standing in their series (cf., Tatarevic, 2022). Pit stops leave hundreds of thousands to millions of dollars

in race purse winnings hanging in the balance (Ryan, 2018). The average stock car moving at 150 miles per hour will travel approximately 220 feet per second; a 12 to 15 second pit stop may lag it more than half a mile behind the competition. Triple R's pit crews thus design, implement, and revise choreography (i.e., how a pit crew member performs his role in concert with his team) around this integral input for performance.

Debriefs have been in practice at Triple R for at least 20 years prior to this study. Having served both "over the wall" and administratively for Triple R throughout that time, Tom has seen the practice develop to meet the demands of the sport:

Excerpt 1 (Interview)

> But now it's starting to get so competitive again on pit road. The stop times are very close. There's not a lot of variance [2] between your first and twelfth. You're talking less than a half a second, so it's important now to start breaking those and dissecting to the next level.

Tom interprets some statistics here, alluding to the analytical lens these debriefs have adopted within recent years. Where tracking through VHS tapes was once typical, debrief participants now interpret digital recordings from multiple points of view and accompanying analytics to improve their execution on pit road. According to institutional documents, Triple R captures more than 70 metrics for each race and pit crew, yielding thousands of cross-sectional measurements during the season (see also Appendix K). These data reflect the direction of the sport; NASCAR regularly publishes non-proprietary pit performance statistics and team rankings online during racing series, garnering attention from those competing and from fans alike.

Available analytics have primed Triple R's performance director and pit operations lead to leverage debriefs for the purposes of much-needed "dissection." "I mean we have to dissect everything, break it apart, go over it, and understand what we need to do to get better," Tom explained, even pondering whether the pit crew stumbled "a millimeter over the wall because [they] didn't practice right." After all, "you get graded for what goes on in the rectangular box," Tom commented in reference to the designated space where a pit stop occurs.

From that perspective, Tom and Nathan also evaluate pit crews' interactions with one another, often inspecting instances on the race track or targeting others that occur during travel, practice, and debriefs themselves, where the dynamics among the pit crew thrived or faltered. Tom cited "BCD behavior" (blaming, complaining, and defending) when describing such dynamics: "There's always excuses for things not going well," he explained, "but at the end of the day, did you control what you could control to the best of your ability, regardless of circumstances or involving those circumstances?" By extension, Tom considered debriefs that foster pit crews' members accountability for their performance a success.

Tom and Nathan also dissect to instill some clarity about upcoming races, particularly in terms of the tactical logistics needed to perform in a new location. "Physical preparation, or the pit stall itself prior to the race, or the equipment that are involved in it, you know, is your house in order? All those things are a big deal," Tom recounted. Selection of particular details, like the size of the pit box at Race Track A (which may differ from that at Race Track B), affords pit crews a clear understanding of their responsibilities for race-day preparation and pit stop execution. As Tom recalled

regarding a team's ill-preparedness for a rain delay, "I think they thought that they were going to be staying in the hotel and then racing the next day. That didn't happen and we had mistakes."

Above all, debriefs are a means of sustaining racing IQ, or "understanding the situation that you're in and how you should react" (*Tom*). Racing IQ is a prerequisite that informs how the pit crew evaluates the environment under extraordinary time constraints; for instance, whether to risk a penalty in order to maintain or improve the driver's position among the competition, even if that penalty might cost the driver a lap around the track. From a theoretical standpoint, racing IQ is ultimately a byproduct of the pit crews' collective sense and action on and off of pit road during training, practice, and debriefs. Although pit crews comprehensively assess their environment, they still contend with suboptimal conditions for pit stop decision making.

The Central Dilemma: Conflicting Demands for Regulatory Adherence and Boundary Pushing (*RQ 1*)

The pursuit of efficient, effective pit stops induces tensions in debriefs. After interpreting previous pit stop footage, should a pit crew focus on adhering to regulations (e.g., few to no penalties) to avoid error or push their boundaries (e.g., faster times) to realize their competitive potential? Would confusing (or admitting to having confused) one goal for another convey too low a racing IQ? Would coaching to improve one performance goal infringe on the factors upon which that performance relies (e.g., group morale)? Such questions suggest how susceptible pit crews' debriefs are to the conflicting demands of their environment.

Moreover, this environment is both complex and dynamic. The demands of pit choreography are high, even more so when a pit crew attempts to push beyond current

boundaries to shave a fraction of a second off of their cumulative pit stop time. Triple R's debriefs are replete with references to subtle physical movements and cognitive evaluations that could result in a meaningful – and yet, objectively infinitesimal (e.g., "two thousandths of a second") – performance improvement. For example, as per Nathan's recommendations to *Mason,* a tire changer:

Excerpt 2

1	*Nathan*	You can see over here, on your helmet camera too.
2		That's a really good stop right there.
3		Clean nuts, clean indexes. Just the fundamental stuff.
4		If you didn't know the time
5		You can just look at it and see that it's fast.
6	*Mason*	It's all on that left side.
7	*Nathan*	Because the right side was only three one-hundredths faster
8		Than any other stop so –
9		So, your left side's where your Achilles heel is.
10		You're seven point five, six point five, six point five –

Nathan and Mason's exchange assumes that these times are susceptible to targeted effort (as opposed to random chance). Nathan also effectively implies that Mason ought to push the boundaries of his performance by juxtaposing Mason's achievement of "a really good stop" with his "Achilles heel," suggesting that there is plenty of room to improve.

Pushing the boundaries of performance necessarily comes at the cost of regulatory adherence for pit crews, as Nathan explains to another tire changer:

Excerpt 3

You just got to, you just got to- to do whatever it takes to get that, to get that accuracy. To even, like I said, I want you to slow down getting back to that first lug nut so you know you got your arms right, your wrist right, your gun right. You got a good grasp on it and you can see it. I think you're getting back so fast

> you're not even seeing it. Like your gun is over running your eyes. Your eyes can't focus quick enough.

Tires are heavily regulated by institutional rulebooks (e.g., who carries them, within what physical dimensions they are allowed to be carried, etc.). A particular protocol against loose lug nuts prevents pit crews from reducing their pit stop times by dangerous means (e.g., not securing all five lug nuts on a newly placed tire) that might increase the risk of a crash and result in unacceptable loss (e.g., injury, death). Racing teams can be fined tens of thousands of dollars by NASCAR for such instances (e.g., Walters, 2019). Thus, pit crews' attempts to push boundaries can be interpreted as poor regulatory adherence.

But even the pursuit of regulatory adherence is exacerbated by ever-changing rule books. Citing its steadfast commitment to driver and pit crew member safety, NASCAR issues new race track regulations at its own discretion, not only between racing seasons but, in some cases, during a season. Shortly before data collection began in earnest, NASCAR called for all racing teams to reduce the number of pit crew members:

> Excerpt 4 (Interview)
>
> Everybody's suddenly got new choreography. Who am I keeping? Who's doing what? It changed the positions dramatically for the jackman, and eliminated positions, as well. So, it was a challenge. (*Tom*)

While deemed "anomalous" at the time (*Tom*), this rule change was soon followed by another unanticipated one. About halfway through the data collection period, NASCAR revoked its measure for uncontrolled tires in pit road and then updated how it would subsequently enforce the tire-related penalty for the rest of the season. Emotions run high as Nathan informs the pit crew of unexpected penalties:

Excerpt 5

1	*Nathan*	News flash here, uh, just gonna give you guys -
2	*Daniel*	A penalty.
3	*Nathan*	Yeah.
4	*Mac*	It is?
5	*Brian*	It is now.
6	*Daniel*	This year it is.
7	*Reggie*	Oh, s***! What is that?
8	*Nathan*	Those are the rules.
9	*Mac*	Where did all these damn rules come from?

Pit crews must constantly revise their choreography to accommodate regulations as they are imposed, hence the frustration in Lines 7 and 9. But revisions to this choreography are easier said than done. Previously unseen injuries after the implementation of a new regulation (e.g., OrthoCarolina, 2018) suggest that pit crews must be cautious physically when incorporating these changes in their pit stop execution. Marking the boon that is no new rules, Nathan comments on the interplay of the two competing performance goals as the pit crew pursues "the magic second":

Excerpt 6

> As of right now, there's no rule changes. Um, as far as pit stops are concerned. So that's another positive for us. Um, you know, we can keep building where we're at and, and continue, um, our progression, uh, and you know, our goal this year was to find speed. I think we found speed. Then we – then we took it the next step and tried to take the speed from practice, convert it over to the race track to get rid of that magic second that we've always, uh, been fighting as pit crew members.

Thus, the impetus for debriefing (and, in turn, sustaining racing IQ) is ultimately visceral; pit performance is tightly coupled with physical health. As a consequence of handling heavy (e.g., tires), flammable (e.g., gas cans), and loose (e.g., lug nuts, hoses) equipment

while performing designated roles, orthopedic specialists have noted a sharp rise in injuries to and surgeries for the upper extremities (elbows, hands, and fingers) and hips in pit crew members (Wertman, Gaston, & Heisel, 2016), who also must contend with unexpected maneuvers by the driver (i.e., the stock car), toxic fumes, unnaturally high decibel levels of engines and other machinery, and inadequate hydration. Attempts to safeguard pit crews (e.g., standardized equipment and stock car features, fire-resistant suits and gloves, layered balaclava, and durable helmets and boots) do not eliminate these dangers. According to Charlie, adding strength and conditioning training to these safety measures "does not mean that you're gonna ward off all types of injuries."

Although it is unclear whether pit crews act solely to prevent harm, it is likely that they base their behavior on other goals that may be more valued or salient (cf., Vroom, 1964). In high-risk work settings, employees' behaviors often bend toward what is regularly supervised and managed (Zipf, 1965; Zohar, 2000). This, however, elicits a restraining effect (Perrow, 2014): the more routinized the work, the lesser the flexibility in performing it. Such an effect is suited to achieving safety; hypothetico-deductive models (e.g., Neal & Griffin, 2006; Zohar & Luria, 2005) measure the relative priority of such static safety goalposts as using and promoting correct procedure or emphasizing safety procedure under pressure. Yet a restraining effect may not achieve the conditions that enable reliability, namely, continually talking about mistakes and how to learn from them, discussing alternatives to one's routinized activities, or supporting and then pooling others' expertise to affect performance outcomes (Vogus & Sutcliffe, 2007b). As pit crews perform towards static goalposts and jointly explore – and push beyond – their limitations, conflict between expectations for safety and reliability emerges. That is, pit

crews' commitment to achieving certain regulatory benchmarks may calcify into error avoidance, and it is from this hardened position that they may struggle to learn and adapt in response to their environment (cf., Frese & Keith, 2015; Oliver, Calvard, & Potočnik, 2019).

Altogether, changes to pit choreography geared toward efficient, effective pit stops readily infringe upon pit crews' safety just as amendments to regulations (often in the name of safety) obligate changes to pit choreography. Tire changer, *Mac,* demonstrates the difficulty of executing at expected performance levels amid this tension:

Excerpt 7

> I think this week's gonna be a big week, and they're gonna expect us to be 187% perfect. I still think we need to be conservative, just because we are doing so much work, um, outside, putting tires on the car, fueling it up. Um, it's a little bit of a slippery slope trying to be real fast and also getting all our work done, too.

To further grasp Mac's ambivalence and the conflicting demands it suggests, consider the challenge of acting under directives to both avoid and learn from mistakes. Whereas avoiding a mistake seems logical enough, the challenge is to learn from that same mistake; learning is a prerequisite for sought-after progress. Seeking to avoid a mistake imposes a boundary on what and how to interpret the events that preceded it, which positions the target of learning to what lies within that imposed boundary. The ultimate challenge is then to incorporate feedback and other plausible interpretations of events that preceded the mistake. Modifying bounded interpretations of that mistake becomes unlikely, thereby diminishing the purpose and outcomes of learning from it.

In sum, the central dilemma of Triple R's debriefs is that its participants are expected to sustain their racing IQ in the midst of two competing performance expectations (i.e., regulatory adherence and boundary pushing), such that meeting one goal infringes upon the execution of the other. Tension between these goals, one that connotes stability and the other flexibility, constrains pit crews' attempts to interpret and act in accordance with perceived organizational priorities and calls for ongoing management during debriefs.

Techniques for Managing the Central Dilemma (*RQ 2*)

Here I emphasize excerpts from the dataset to depict interactions that characterize Triple R's practice of debriefs. After describing the meeting's typical structure, I introduce two general categories of interactions – *dwelling on the details* and *blocking out the noise* – to frame how participants orient their talk during discussions. I refer to these two categories as *interactional moments* going forward.

I then reconstruct three techniques – *narrating*, *protecting*, and *priming* – through which debrief participants interpreted their environment to manage the central dilemma. Notably, interactional moments are not perfectly dichotomous. Illustrating them demonstrates the nuance of the techniques as participants address their performance priorities (i.e., regulatory adherence and boundary pushing). I note the functions these techniques served, rather than derive participants' intentions. Tables 5 and 6 summarize the features and functions of each technique.

Meeting Structure

At Triple R, debriefs adhere to a rote agenda. Nathan recaps the pit crew's latest performance, often by highlighting statistics and distributing paper handouts to the participants. Although pit crews do not scrutinize every value that is recorded from a race's pit stops, they readily form points of view from a few data and discuss their implications.

Next, as digital recordings play on a pull-down projector screen, the facilitators and any and all pit crew members voice their actions and assumptions aloud; for example, "I was behind this time, getting off my tire – I can't remember why" or "I was like, 'Oh, I wonder if [the driver] felt that?'" As film continues to play, Nathan and Tom may offer feedback or recommendations. Controlling the laptop that hosts and plays the latest video, Nathan also occasionally pauses or navigates to other selected film as prompted by discussion or at the request of a pit crew member. As the debrief draws to a close, Nathan and pit crew members reaffirm their goals for practice pit stops to occur within the next half hour. Nathan and Tom typically assign priority to speed, technique, safety, or even self-confidence in an effort to improve or maintain the pit crews' performance rankings among others competing in their racing series. Last, Nathan and Tom reify performance expectations and goals for upcoming races.

Nathan primarily facilitated the debriefs observed. Tom filled in as the lead discussant once. Tom nonetheless attended most all debriefs captured and offered comments and critiques as Nathan did; Tom led these debriefs for Triple R's pit crews during previous racing seasons. Whether guided by either senior member, debriefs only varied from the aforementioned agenda topics occasionally, if at all. Even the one

recorded debrief during which members of all three pit crews attended maintained a similar structure to that described above.

Interactional Moments and Techniques Therein

Participants used three techniques – *narrating*, *protecting*, and *priming* – to balance the tension between regulatory adherence and boundary pushing during debriefs. Debrief participants particularly contended with two types of interactional moments when using these techniques. Noteworthy for how they enable contrasting communicative goals, *dwelling on the details* and *blocking out the noise* framed how participants guided one another toward performance metrics (see Appendix K) and recognized the implications of their tightly coupled choreography. Much like Thackaberry's (2004) concept of "discursive openings," where participants were encouraged to think rather than just obey a set of rules, *dwelling on the details* represents interactions where participants apply the discursive techniques to derive plausible interpretations from a wealth of multiple, available interpretations. Alternatively, debrief participants attempt to *block out the noise,* or move toward discursive closure, when those otherwise valuable details are overabundant or constraining for performance. Altogether, these techniques are valuable to debrief participants' interpretations from which to draw at the next race.

Technique 1: Narrating. Both facilitators began sessions by focusing on certain details for closer examination, such as pit crew members' timing through each successive pit stop or the team's standing among the competition (i.e., "rank"). Initial perceptions were not typically questioned, particularly if supported by performance metrics, which were treated as objective, albeit requiring interpretation. In a few instances, interpretations of data were often framed as a favor ("I went through and did all the math

for you"). These sessions were hardly ever mere read-outs of performance metrics; reactions to and interpretations of recorded pit stops were just as valuable for how pit crews ascribed provisional sense to their latest performance.

In one representative instance, Nathan kicks off a session by citing certain metrics and deriving their implication:

Excerpt 8.1

> All in all, good weekend. You guys did an adjustment six out of seven stops. Real consistent right sides. No – your first one was a five point four, second one was six point two, third one was five point five. Fourth one was six flat, then five point five, five point five, five point four. So, you know, we've been working on that down there the past couple weeks – is really impacting and getting off that right side. So, props to you on that.

Where metrics (e.g., tire exchange times) convey fast, effective pit stop times, Nathan frames the data as praise; he catches himself ("No – your first one…") to ensure the fastest time ("five point four") comes after the "good weekend" comment. Notably, Nathan and Tom appeared to regularly frame less desirable outcomes by citing data matter-of-factly, yet inducing some levity (e.g., "You guys asked for the [team performance metric] to be modified, so we went through the work and got it modified for you. So, we threw out stop one, stop four, stop six, stop seven, stop eight, stop nine – (*laughter from the pit crew)* –and stop twelve") (*Nathan*). In another deliberate affirmation from Nathan, he directs the implications of the scene toward performance improvement:

Excerpt 8.2

> Pretty consistent day. All in all, not a super clean day, that last, that last stop was really nice. And when I mean clean, you know we've been preaching for tire changers to go fast. That was our goal in the beginning, still our goal is to have that speed. But along with that speed we have still got to have the accuracy. The accuracy increases, the speed's going to increase, right? We are comfortable now playing in an uncomfortable zone. Now we just got to clean our nuts back up.

Again, Nathan catches himself, here in reference to "that last stop." The "really nice" outcome affirmation directly contrasts with the other referenced outcomes ("not a super clean day"). Nathan also reinforces that "consistent," "clean," and "accurate" outcomes are not mutually exclusive, implying that this team ought to understand their nuanced interrelationships well enough to make improvements. Nathan's validating comments stand out because of their proximity to his interpretations of the pit crew's past and prospective performance trajectory. These details (e.g., time stamps) lend credence to the "pretty consistent day" comment as well as suggest an expectation about targeting performance to achieve faster pit stop times. Last, these details impose a shelf life on how "nice" that last stop might have actually been; Nathan suggests that there is more work to be done for the team to realize its competitive potential.

Narrating, or ascribing provisional sense, aligns well with Weick and colleagues' (2005) notions of enactment and selection for processes of organizing. Participants bracketed a portion of their environment to focus on their previous performance, as initiated by the facilitators. Participants guided others' attention to particular details and readily imposed finite interpretations on their actions. But when debrief facilitators

narrated at the start of the session, participants treated that as provisional; that is, they did not appear to immediately adopt facilitators' initial interpretations of their performance but interpreted for themselves by way of film playback.

While viewing pit stops on screen, participants voiced aloud the circumstances they faced and the assumptions they harbored, thus moving discussion toward performance goals (e.g., "Now we just got to clean up our nuts"; Excerpt 8.2). "Seeing" the pit stops was regularly equated with interpreting performance metrics (e.g., "You can just look at it and see that it's fast"; Excerpt 2), inviting statistics to be contradicted by the film record. Any misperceptions of performance that Nathan or Tom may have framed did not necessarily curtail debrief participants from *narrating.*

Several instances afford further insight into what is uniquely normative about *narrating*, namely, admitting mistakes. Without any probing from other participants, a jackman, *Blake*, admits to an error about how he interpreted timing:

Excerpt 9

> That's definitely my fault, the break run. I was lined up, I still can't figure out why I missed like that because my right fronts were good all day. I feel like I was so far away of it. I guess I got too comfortable with how things were going until then.

Notably, this excerpt is sandwiched between stretches of relative silence from debrief participants, who were otherwise watching the film. In his interview, Tom commented on his and Nathan's occasional reticence as film plays:

Excerpt 10 (Interview)

> I think the key to running any meeting is listening [and] having those guys talk about stops. You know, I listen, we listen to them because if you notice, they'll talk about a stop and when they admit what they did wrong, we'll listen to it. We may listen to that and carry it over to the next meeting and in the back of our minds and go, and look for something in the next meeting to try to make the overall program better.

While *narrating*, Nathan and Tom were nonetheless attuned to what the pit crew jointly enacted and selected, or *narrated*, themselves. This also reinforces that debrief facilitators varied their use of *narrating* in response to the reactions of others during the session; that is, Nathan and Tom listened as well as spoke to nurture normative expectations. Finally, Blake's concluding statement affirms how difficult it is to derive a veritable rationale or implication from his error ("I still can't figure out why…"). To relieve the tension an open-ended admission of error poses, Blake offers a tentative interpretation of his actions.

In a more interactive instance, Nathan focuses on *Walker*'s, a tire carrier, experience. Walker responds quickly:

Excerpt 11

1	*Nathan*	Put your hand there, Walker.
2		Got there a little late.
3	*Walker*	Yeah, I think it's loose a little, just looking at it now.
4	*Nathan*	Coming back for that tire?
5	*Walker*	Yeah. I just didn't –
6		I need to stop assuming and just look.

Walker agrees with Nathan, but "just" looks at it now (Line 3) to afford himself the space to derive his own interpretation. Nathan's question attempts to assign meaning to what

appears on the film. Walker concedes to Nathan's interpretation in Line 5, though he constructs his own recommendation on how to improve. That Walker re-frames "I just didn't" to "I need to" (Lines 5 through 6) suggests that *narrating* ought to serve constructive ends for performance.

Still, pit crews' admissions of error can be somewhat fraught. A new member, Mason refers to the stock car driver (*Bear*) to frame his own missteps in a supposedly praise-worthy scene:

Excerpt 12

1	*Mason*	I don't know if you guys saw that
2		But *Bear* did this a couple times
3		I wanted to really kind of praise him.
4		But I was going to wait til the end.
5		But since we're watching this specific one,
6		He did a really good job with racing IQ this weekend,
7		Um, I was behind this time, getting off my tire,
8		I can't remember why, but *Bear* –
9	*Nathan*	– Your pit stop record, so you were late getting to the right front –
10	*Mason*	*Bear* could have just plowed me but he didn't.
11		He saw that I was a little behind,
12		Took the time to just analyze the situation
13		Didn't plow me, and the stop was still pretty good.
14		He did that a couple other times,
15		Not with the same deal but all day,
16		Just racing like he was there for me.
17		So, I just wanted to bring that up.
18	*Tom*	Good job, *Bear.*
19	*Nathan*	12 races in, it's about time. I'm just kidding.

Mason begins as if to excuse his comments to follow ("I don't know …"); his insecurity remains in Lines 4 and 5 ("I was going to wait…"). Although Mason admits to being behind (Line 7), he supersedes Nathan's constructive comments by acknowledging good racing IQ (Lines 11 through 15), or the "ability to understand the situation you're in"

(*Tom*). In turn, Mason subverts accountability by putting the onus of the "pretty good" stop on the driver; if the driver hadn't performed as well as he had, Mason would have been "plowed" – a term he repeats to belabor the implication of this mistake. Nathan's sarcasm in Line 19 demonstrates that, good situational awareness or not, there is more within this team's control to target for better performance.

Narrating also gives way to the noise that persists as participants ascribe provisional sense. Synonymous with distraction, noise is an interruption to be avoided. Noise can emerge as bickering between the crew chief and the driver, which pit crews are privy to during a race, amid travel to and from race tracks, and within the debriefs themselves. Nathan reflects on *narrating* as he concludes a session:

> Excerpt 13
>
> I think we get overwound sometimes when we leave film and watch the previous weekend, and everything runs in your head. I think we try to overthink. And I know I do on this side of it. I, I want to try to make you guys better and not over-think it. So, I know you guys do too.

Nathan's comment about "everything run[ing] in your head" suggests a constraint that *narrating* imposes. Nathan affirms that *narrating* invites noise, which then constrains pit performance; concentration is "the key to success…to minimizing [pit crews'] mistakes." In his interview, Tom voiced his concern about pit crews' concentration during debriefs, reinforcing this implication for performance: "You know, where are they at? Are, are their heads in the game?"

The noise that persists in debriefs is perhaps most salient when discussing multiple, available details yields unproductive ends, such as a tense team dynamic. How

pit crew members relate to one another during debriefs is also integral for performance, as addressed by Tom's concerns: "How's the team chemistry going? …Where are they hurting, or where are the deficiencies? Not necessarily on the performance over the wall, other deficiencies that are going on within the team." As *narrating* constrains the team dynamic, Nathan pushes *Bruno*, a jackman, toward an interpretation of their pit stops, of which there are multiple details to enact (e.g., the number of adjustments made to the stock car during the race, the implications of several tenths of a second lost to each of those adjustment stops). Yet, Nathan's attempts to summarize are met with frustration, as Bruno responds with aggression and sarcasm:

Excerpt 14

1	*Nathan*	What I'm getting at is –
2	*Bruno*	I'd say we did 10 stops with adjustments
3		10 stops without adjustments.
4		So, without adjustment, stops on average
5		It would be about two to three tenths faster.
6	*Nathan*	Yeah. For sure. And then –
7	*Bruno*	Just off the right side.
8	*Nathan*	And then three to four tenths minus the pitability of the car.
9	*Bruno*	Yeah.
10		So, yeah we're, we're right there in the ballpark where the –
11	*Bruno*	I ain't scared of the competition.
12		I mean where, where they play and where we practice all F***ing day long
13	*Nathan*	I'm just making sure that –
14	*Bruno*	The problem is, is they're not battling near the battles we are.
15	*Nathan*	So, I –, me – , I've – , it's just clarifying that
16		We're doing our job the best we can with what we got –
17		Is what I'm saying.
18		So, when you when you compare that, you see those –
19		And it says [competing pit crew] this and [our pit crew] that
20		But when you go to compare apples to apples,
21		It's apples to peas.

22	*Bruno*	Yeah. We're hitting off the black tees
23		And they're hitting off the ladies' tees.
24		If you want to f***ing paint a picture.

Nathan's repeated attempts to arrive at his point (Lines 1, 6, 13, and 15) are misdirected by Bruno's comments, which attempt to deflect further frustration about unrealized competitive potential; after all, the competition is not working as hard as his team is (Lines 14 and 22 to 23). Bruno's interruptions accelerate and position Nathan's *narrating* as redundant and clumsy (e.g., Line 15). Bruno's concluding remark (Line 24) is not only aggressive, but seemingly mocks Nathan's use of analogy ("apples to peas" versus "hitting off ladies' tees").

Narrating then also served dismissive ends, in addition to creating a plausible story, by eliminating a portion of the environment that was bracketed off for attention. Nathan at times framed his remarks with cues for the pit crew to ignore them (e.g., "I don't want to spend much time on this, because we've got, uh, more important things to do"). In other instances, that which was selected for attention was relegated to "business as usual," requiring no further examination. Participants were keen to enact details for their dismissal, as this excerpt illustrates:

Excerpt 15

1	*Reggie*	Can you slow where that brake fell off there?
2	*Nathan*	Yep.
3	*Reggie*	(*laughs)*
4	*Mac*	He made it in.
5	*Tom*	Looks not even a little right.
6	*Mac*	I mean, and when you see that nut come off like that
7		Or at least – I go to pull, I don't even look at –
8		Unless I really recognize it.
9	*Reggie*	Well, I was confused because I didn't hear it change
10		Because it changed when I hit the first one, and it buzzed off.

11		And then it just started ratcheting on
12		I was like, “Oh boy, here we go.”
13		Then that happened.
14	*Mac*	You sat the tire and it rolled over a lug nut and took off?
15	*Reggie*	Yeah. That fifth nut, too, that I couldn’t hit off.
16	*Nathan*	Finger pulled the trigger –
17	*Reggie*	The first time I had my middle finger down on that.
18	*Mac*	What was that? (*laughs)*
19	*Tom*	Is that me operating that thing? (*laughs)*
20	*Nathan*	I don’t know. Maybe it’s a trick computer. (*laughs)*
21	*Mac*	Fair enough.
22	*Nathan*	Watch some of this.
23	*All*	(*laughs)*
24	*Reggie*	Oh s***.
25	*Nathan*	Came in first and pushed him out of the box.
26	*Mac*	Awesome.
27	*Tom*	No, he entered way out. On the outer part of pit road.
28	*Nathan*	Yeah. And they got to come around the back –
29		Alright, [Race Track Name], we’re [Sponsor Name] this weekend –

Participants *narrate* here in brief comments and questions about their performance (e.g., the way the equipment performed in drilling lug nuts during a tire exchange). Despite having bracketed what occurs on the screen, tire changers Mac and *Reggie* do not move toward much closure or action between their first (Lines 1 through 15) and second (Lines 15 through 18) exchanges. In lieu of deeper meaning, participants turn to laughter and profanity; this dismissive approach was sanctioned by Nathan and Tom’s glib interjections. In turn, the presumed noise that comes from reviewing the footage of these near-misses decreases with each successive comment. Within moments, Nathan casually moves on to travel logistics (Line 30). *Narrating* here essentially slowed in their tracks the attributions that participants otherwise would have posited for why an event occurred as it had. These instances of *narrating*, in particular, contrast with others that appear in-text, as a presumed cause and effect are neither deliberated nor ordered.

In sum, *narrating* managed normative performance expectations by enacting and selecting portions of the environment for attention. Debrief participants prescribed meaning according to criteria (e.g., "consistency," "racing IQ") and behavior (e.g., admitting mistakes) that are reinforced as valuable. Although the interpretive value afforded by *narrating* is a mainstay feature, this technique can also overwhelm. Thus, *narrating* also involves deliberate exclusion from what would otherwise be attended to during discussion.

Technique 2: Protecting. That Nathan often reframes his speech (e.g., Excerpts 1.1, 1.2) suggests another technique, namely, *protecting,* or shifting attention. Tom's interaction with the most junior of Triple R's pit crews clarifies this technique further. While the team is dismayed by their less-than-desirable performance, Tom cites details such as time stamps and performance criteria (i.e., "consistency") to safeguard the group's morale:

Excerpt 16

1	*Tom*	Uh, you ranked twenty second on mean and standard deviation.
2		I'll tell you this, you take away the sham stop
3		And you take away the left side,
4		Where we had the issue with the set,
5		You would be around twelfth on pit road.
6	*Gabe*	[Inaudible]
7	*Tom*	And, uh – what's that?
8	*Gabe*	I said, "well, that sucks."
9		Yeah, but I mean – I think
10		If you can look at your consistency.
11		I mean, we'll see it here in a minute.
12		I mean, yes –
13		Competitive stops in the thirteens, point blank.
14		And if you can just go to the race track and put that together
15		And not have the anomaly,

16 That one anomaly,
17 I mean, you race.
18 You race top ten – top five, if you do that.
19 On [Race Track Name], you ranked top ten in, I believe,
20 Three out of four stops, or four out the five.

Just as Tom delivers the presumably mediocre statistics to the team, he no later counters those objective outcomes with a set of hypothesized ones. What Tom proposes be "taken away" in Lines 2 through 4 suggests his preparedness for the debrief session. That is, he offers targeted areas for improvement that suggest some premeditation. This also resonates with what Tom shares in his interview, suggesting that Triple R may revisit recordings of pit stops on race day (i.e., a few days prior to the debrief): "I just, I think honestly it makes the meeting more targeted because by then they know the mistake that's been made, right? And then, we can address it." In turn, debrief facilitators may equip themselves with certain details prior to the debrief to better perform this discursive move.

Despite how obvious they are to Tom, his forecasted outcomes are made to seem less attainable by Gabe's comment in Line 8. That is, either the performance targets are easily accomplished, meaning that the team is ineffective, or the targets are actually out of reach, and the team is not yet able to close that gap. Tom creates distance between the level of performance that has been achieved and the level that is desired. By framing a sense of anticipation around the team seeing their ability to perform at level in Lines 10 and 11, Tom diminishes the presumed cause of their performance below level in Lines 15 and 16 (i.e., "an anomaly") and pivots to other details (Lines 13, 19 and 20). In a nod to team dynamics, Tom shifts attention to nip low morale in the bud and readies the team to realize their potential in Lines 17 and 18. Thus, he *protects* the team from low morale

that might otherwise hinder faster pit stops at the next race.

Protecting, however, differs from *narrating* in managing the dilemma imposed by expectations for regulatory adherence and boundary pushing. Debrief facilitators focus on "face" (Goffman, 1967), or reputation, to prevent pit crew members from experiencing a loss of dignity (P. Brown & Levinson, 1978) before teammates, members of the broader racing team (e.g., crew chief), and the institution. *Protecting* preserves the integrity of the team, fortifying it against the tensions imposed by conflicting performance expectations. As Bruno notes in the wake of another penalty, which caused a great deal of churn among the rest of the team but not among his pit crew (e.g., "s*** happens," "we're human"), the team is a critical resource amid complex, dynamic work:

> Excerpt 17
>
> Everything's working against us. The pit box is a mother******. You know, we get, we get all this s*** that's just f***ing thrown against the grain on us. At the end of the day, we complain about it, but we f***ing handle it. You know what I'm saying? Where mostly these guys working on pit road, with these mother******s, they couldn't do it, and they ain't a f***ing team. You know what I'm saying?

Repeated phrases and use of profanity emphasize Bruno's message: where pressure to perform "187% perfect" (*Mac*; Excerpt 7) is high, and change seems inevitable ("all this s*** that's just f***ing thrown against the grain on us"), it is critical that the team weather the scrutiny and setbacks that the environment imposes.

It came as little surprise, then, that *protecting* became more prevalent for Nathan and Tom as pressure to improve performance set in, particularly for the more junior pit

crew, who increasingly cited the number of races left (e.g., “there’s only six to go,” “four to go”) to invoke some stamina. Nathan asks a pointed question of *Wyatt*, a tire changer:

Excerpt 18.1

1	*Nathan*	What’d you come with?
2	*Wyatt*	It’s all running.
3		Every time I [inaudible], it’s a matter of them coming off.
4		It’s a matter of how I hit them when I have to go back.
5		And it’s just –
6		It’s usually always the top lug nut
7		And it’s always cause I’m coming at it.
8		When I come off that one, I come at it like at an angle, sideways.
9	*Nathan*	I told you to stop [inaudible].
10	*Wyatt*	I know.
11	*Tom*	[inaudible] sideways short stroking.
12	*Wyatt*	Yes, I’m not coming off it enough to get back at it.
13		So, like I said, I watched, I watched everybody else’s.
14		I watched *Brian*, *Mike*, and *Mason*.
15		I watched them all
16		To see what difference there was with how they come off of them.

Having struggled to perform at level during the latest race, Wyatt recounts how he removes lug nuts from rear tires. This procedure needs to be performed correctly, not only to enable effective tire exchange times, but also to adhere to institution-wide safety regulations. Wyatt notes his procedure in Lines 3 through 6 and elaborates in Lines 7 and 8 to frame a rationale. Nathan and Tom not only rebuke Wyatt’s rationale in Lines 9 and 11, they distance Wyatt’s performance from that of more senior pit crews (*Brian*, *Mike*, and *Mason*). Wyatt assumes responsibility for what he can control (i.e., closer study of senior pit crew members’ choreography) and vows to adhere more carefully to mandated regulations. Though pressure mounts, Nathan and Tom move to *protect* when *Felix*, a jackman, chimes in:

Excerpt 18.2

17	*Felix*	So, and you know how to fix it?
18	*Nathan*	All right, enough picking on *Wyatt*.
19		We pick on him every week
20		But he deserves it.
21		One of these weeks we won't pick on you.
22	*Tom*	It will just make you stronger.
23	*Wyatt*	Oh, thanks.
24		Can anybody sing that song?
25	*Felix*	"Whatever makes you stronger –"
26	*Ian*	That one.
27	*Wyatt*	That's pretty good.
28	*Nathan*	Thanks. I never heard it.
29	*Felix*	It wasn't that good.

Excerpts 18.1 and 18.2, in contrast, suggest a sense of closure about Wyatt's performance via the three-way interaction. By the end of Excerpt 18.1, Tom and Nathan accept Wyatt's proposed actions to improve. As Felix's comment (Line 17) incidentally unravels this closure, Nathan shifts attention. Moreover, Lines 18 through 21 suggest a threshold for Wyatt for *narrating* in debriefs. After Nathan moves to *protect*, Wyatt's pivot in Lines 23 through 24 demonstrates that his threshold has indeed been reached; the tension diffuses as participants muse on a pop music reference.

Protecting is also valuable in the wake of unexpected performance outcomes, such as penalties. Having failed to execute according to the new uncontrolled tire rule, the pit crew bemoans the lack of uniformity among race track pit boxes:

Excerpt 19

Uh, definitely not an easy place to pit a car. Um, cars are hard to pit, um, it makes it even worse. Uh, you know, we, we all know about the penalty and it – Yes, it's a b***s*** penalty. But it's NASCAR's rules, and we're, you gotta follow em.

> So, uh, it just sucked. It was probably six inches away from *Ian*'s arm span. Uh, but as long as they're calling it fair, which they're not, we will, uh, we will continue to do our best to, uh, not have penalties. Um, so, that's enough about the penalties and enough about the lug nuts. Really good job on the lug nuts. (*Nathan*)

Because penalties are costly – both implicitly (e.g., the driver is held back a lap, forgoing good standing) or explicitly (i.e., the racing team or driver is issued a fine) – debriefs are inherently tense. Nathan's move to *protect*, however, resolves this tension. By elevating the challenge of the race day logistics (e.g., the pit box, the car) from "not easy" to "hard," he establishes that when something is out of the pit crew's control, mistakes are bound to follow and, moreover, are acceptable.

Nathan then continues to *protect* by buttressing himself between the institution and the pit crew, oscillating between "we" and "you" in his confrontation with "they" (i.e., NASCAR). When he empathizes with the pit crew about their performance ("a b***s*** penalty" and "it just sucked"), he essentially takes the hit alongside the team. Later, Nathan explicitly *protects* the pit crew member who likely earned the penalty (*Ian*) by highlighting NASCAR's supposedly arbitrary decision making. Nathan seals his membership with the pit crew when he acts to overcome this challenge jointly with the rest of the team. Last, Nathan quickly moves away from the topic of the penalty by affirming progress on another aspect of performance (i.e., lug nuts percentages) to encourage cohesion after the setback. The pit crew moves on from the topic immediately thereafter.

In sum, *protecting* managed normative performance expectations by preserving the team's integrity, the foundation of the highly coordinated performance demanded in

this sport. Debrief facilitators used protecting to enable others' closure about actions taken to affect performance and to shift responsibility from the pit crew to exogeneous factors (e.g., the institution's decision making) beyond the group's control.

Technique 3: Priming. As suggested by the technique of *narrating*, debrief facilitators respond to the sense being made by others during the session. This implies the technique of priming; that is, awareness of prospective events, as *narrating* reaches its natural conclusion as a mode of organizing (cf., Weick & Sutcliffe, 2006). *Priming* suggests a plausible interpretation be retained for future action as it relates to past experience through enactment and threads together several plausible accounts through selection.

For example, in a debrief with a more senior pit crew, Nathan has an exchange with the jackman (*Blake*), the fueler (*Vince*), and the tire changer (*Mason*)*:*

Excerpt 20.1

1	*Blake*	You could have done that last week
2		And we would have had some shake and bake.
3	*Vince*	Well, what about the plug in, man?
4		I should have just kept pushing through.
5	*Nathan*	The new shop guy admitted that he, uh, [inaudible].
6	*Mason*	I know – but I still shouldn't have forgot.
7	*Nathan*	Yeah…That's my next exact sentence.

After entertaining a hypothesized performance outcome, Blake, Vince, and Mason are shielded by Nathan in Line 5. Although Nathan *protects* the team from assuming the responsibility of another actor's failing (i.e., "the new shop guy"), he is otherwise anticipating more discussion from these senior team members. In Lines 1 through 6, the interconnectedness of Blake, Vince, and Mason's performances remains subtle; we infer

the relationship when their parts in the story are voiced. But Nathan is quick to portray a more detailed scene:

Excerpt 20.2

> Uh, across the board, we, we weren't minimally strong at all this weekend. *Vince*, you did a great job with fuel and all that stuff. And making sure we had it full, and with damage repair and all that. Um, did a really good job. Uh, you know, just looking at this stuff, too, with the...And I'm, I mentioned it to, to *Mike* at the race track...You know, you're supposed to be a left side shim, so why, why did, when do in a pit stop we get up and walk around? You know what I mean? Um... And then, you know, obviously, you pulled the wrong shim. So not, not really good, uh, uh, fundamentally it was fine. I mean, you pulled the shims. And you put the wheels and tires back on and lug nuts on and jacked the car up. But we can't have that mistake. We got away with it here because it's [Race Track Name]. That we talked about at the race track, too. Um, that's just part of staying in tune with what's going on with the race. Um, a normal four-tire stop with eighteen gallons, they're probably not light on fuel anyhow. Um, especially twenty laps after the car was pitted, we're definitely not waiting on fuel. Yeah, *Vince* didn't shake his head. So I'll – you know, get on *Vince* a little bit. He's gotta shake his head, but we gotta be smarter than that. We gotta be smarter than that. Yeah, that cost us a second.

Whereas in Excerpt 20.1 Nathan tempers performance expectations, here he frames a more striking performance benchmark ("we weren't minimally strong at all"): the pit stop in question was just ineffective enough to have likely yielded an even slower time at

another race track. What's more, "shimming" – adding or removing thousandths-of-an-inch spacers to a stock car to influence its suspension and, consequently, its ability to travel – is subject to NASCAR regulations. Nathan refers to several details, such as the fuel gauge of the stock car under certain pit stop conditions ("a normal four-tire stop…") and how that fuel amount would likely have been affected by the number of laps around the track, and implores the team to retain them, presumably to enforce the consequence of misaligned shims (i.e., a penalty). What's more, by repeating "we gotta be smarter than that," Nathan conveys his expectation that this episode is a source of guidance for the future.

Notably, as Nathan transitions his focus (i.e., from the team, to Mike, to Vince, and then back to the team), his evaluations of performance change. For instance, Vince has done a "great job" relative to a "fundamentally fine" performance by the team, although this "great job" then becomes just a "part" of what else occurred. Soon after, Nathan "get[s] on *Vince* a little bit" for even closer scrutiny. The use of filler words and phrases (e.g., "Um... and then, you know…") suggests some discomfort in distilling implications from the details that are constructive for multiple audiences (i.e., the fueler, individually, and the team, as a whole). While *priming*, Nathan proposes that details of the fueler's experience be generalized for the rest of the team. His restatement from "he's gotta" (in reference to Vince) to "we gotta" (in reference to the pit crew), in particular, resolves this tension.

In another instance, Nathan admonishes the team on the basis of poor communication; he targets Blake, who neglected to hear the call for a certain kind of pit stop execution (i.e., a right-side adjustment) and, as a result, was almost run over by the

stock car as it pulled out of the pit box. Again, Nathan uses “you gotta” as a source of guidance for safer pit execution and reinforces the issue for the rest of the team (“we gotta”) by citing racing IQ. While understood by Triple R pit crews for its contribution to slower pit stops, poor racing IQ also necessarily implies physical danger. Nathan reminds the pit crew of this when he proposes that they all improve “being there mentally”:

Excerpt 21

> All right, so, uh, you know, [Race Track Name A] is hard to get excited for as a pit crew. I get it. But uh, you know, like we said, this whole meeting, we gotta be...We gotta be mentally, uh, into the race the whole time. The whole race, we can’t take a, a lap off. We can’t take a, a stop off. Um, so uh, now we’re going to tracks that we actually matter at. You know, we can, we can claim spots and that’s, that’s our job, maintain our game. So let’s, let’s come in this week practice-wise and grace-wise with a little bit more focus, a little bit more, uh racing IQ.

Nathan’s repetition of directives (“The whole race, we can’t take a, a lap off. We can’t take a, a stop off”) aligns what has been observed in the session with a clear and present implication for the pit crew’s next performance. Moreover, he affirms the interplay of regulatory adherence and boundary pushing; the pit crew can “claim spots” by enacting bounded interpretations of their environment (racing IQ), which were gleaned from discussion about the near-miss.

In another instance, Nathan calls for awareness in a matter that is more dismissive of the multiple details at hand. After 30 minutes of viewing recordings of otherwise mediocre pit stops – the presumed outcome of the lack of physical space in the pit boxes

unique to this race track – Nathan comments on the communication among the pit crew's members ("the five gears") and *primes* for future action:

> Excerpt 22
>
> Uh [Race Track Name A], uh, cars weren't very good but, uh, we did what we had to do in the – in the [pit] box. Um, you know, the –, um, the driver and crew chief been bickering and we're just kind of ignoring that and doing what we gotta do. Um, *Brian* brought up a really good point in our, uh, captain's meeting, just that communications between the – the five gears is awesome. Um, so keep that up, uh, so yeah. Hopefully we continue on with getting the cars better. You know, they're changing all that s*** around for [Race Track Name B] and [Race Track Name C], which I mean, at least we're trying something. Um, at least we're trying something.

The implied directive to "ignore" – a tactic that was successful at the last race – suggests a conflict with what "good communication" or "being in tune" should look like; that is, it would be a challenge to do "what we gotta do," namely, execute pit choreography without "being there mentally" (*Tom*; Excerpt 21). Closer examination, however, reveals Nathan's preference to attend to what is within one's own control by recasting the remaining ambiguity into a resource, repeating the message ("at least we're doing something") for a mobilizing effect.

In sum, *priming* managed normative performance expectations by calling for pit crews' awareness of prospective events. Debrief facilitators applied this technique toward retention, either to propose what is enacted to guide future action or to move on from what is enacted to focus on one's own domain of influence. This technique calls for pit

crews to update their collective understanding and assumptions of their complex, dynamic environment.

Summary of Results

Having examined talk as it actually occurs in "film reviews," this study resulted in a reconstruction of the interactive dilemmas and techniques inherent to the practice of debriefs. The following summary is structured around the research questions (*RQ 1* and *RQ 2*) and sheds light on the "what" and "why" this practice is and the contradictions therein (Craig & Tracy, 1995).

The Central Dilemma (RQ 1)

In response to *RQ 1*, the results illustrate a central dilemma as it emerged through talk in debriefs, namely, that of the conflicting demands for regulatory adherence and boundary pushing. The talk among the site's leadership (i.e., pit operations lead and performance director) and its pit crews in these sessions revealed that the pursuit of efficient, effective pit stops induces tension: should pit crew members adapt their choreography to adhere to institutional regulations and, thereby, avoid error, or should they push their boundaries to realize their competitive potential?

Pit stops represent athletic, mechanically-oriented choreography that is highly complex and, in turn, susceptible to error. The pit operations lead and performance director – referred to throughout as the "debrief facilitators" for their roles in this meeting – used much of the session to focus pit crews' attention on the latest regulations for pit choreography. Although these regulations were regularly, intermittently changed by the institution, facilitators still emphasized regulatory adherence to promote pit crews' safety. At the request of the debrief facilitators (e.g., "no helmet, no wall"), pit crews' sought to

adhere to these regulations during pit stops and, moreover, to avoid costly penalties. This reveals that pit crews must revise their choreography to accommodate regulations as they are imposed.

Debrief facilitators also balanced discussion with directions for pit crews to target the weaknesses in their performance as individuals and as a team (e.g., "find the uncomfortable zone and push it"). To 'push' in this competitive sport effectively calls for pit crews to stress test their pit choreography under a variety of exogenous, compromising conditions and, thus, target their reliability. As debriefs concluded, all participants (inclusive of the facilitators and pit crew members) expressed their goals for practice pit stops to immediately follow the session and for the upcoming race. This talk, in particular, framed the balance between the two competing directives. In some instances, practice would be dedicated to moving through the choreography slowly ("don't worry about speed at practice today"). Compared to directives to 'push,' those that called for maintaining, or slowing, pit stop speed illustrated that pushing the boundaries of performance necessarily comes at the cost of regulatory adherence for pit crews ("If I run right over there and plug my gas can in too, it'll spill all over and I blow up").

Techniques for Managing the Central Dilemma (RQ 2)

In response to *RQ 2*, the results identify and illustrate the discursive moves with which debrief participants resolved the central dilemma. These techniques occurred along two categories of talk – *dwelling on the details* and *blocking out the noise* – and were identified as: *narrating*, *protecting*, and *priming*.

The data reveal two general categories of interactional moments, or instances of talk at a point in time during a debrief. *Dwelling on the details* frames how participants derive plausible interpretations from a variety of multiple, available performance details (e.g., from time stamps; "you're seven point five, six point five, six point five"), while *blocking out the noise* frames how participants move towards discursive closure, especially amid tension ("Um, we, we got to put that behind us, and, and go on").

These two interactional moments are not perfectly dichotomous within the talk observed. The purpose of illustrating them is to demonstrate their nuances as participants interactively negotiated their performance priorities of regulatory adherence and boundary pushing. How participants addressed these priorities, or managed the central dilemma, through their talk is reconstructed as three techniques – *narrating*, *protecting*, and *priming* – and is summarized in Table 5.

Table 5

Summary of Discursive Techniques

	Function	Outcome
Narrating	Ascribe provisional sense of past events	Generated productive, actionable accounts of past attempts at boundary pushing and regulatory adherence.
Protecting	Preserve the integrity of the team	Preserved the unit (i.e., the team) that generates safe, reliable performance.
Priming	Update collective understanding and assumptions	Prompted the pursuit of regulatory adherence and boundary pushing in light of new insights.

Narrating. Aligning with Weick and colleagues (2005) notions of enactment and selection, *narrating* saw participants ascribe provisional understanding to past pit stops.

In particular, participants *narrated* to interpret circumstances they faced and the assumptions they harbored in the moment. Participants guided others' attention to particular details as well as imposed finite interpretations on what was enacted, moving what was discussed towards the two performance goals in tension ("If we had to pick something, that's what I would pick"). *Narrating* also served dismissive ends, where something was bracketed for attention for its dismissal ("I don't want to spend much time on this"). The facilitators, in particular, varied their use of *narrating* in this way, adapting their talk to how pit crew members were themselves interpreting "film" and performance metrics.

Protecting. *Protecting* prompted a shift of attention during discussion. Debrief facilitators particularly used this technique to enable others' closure about actions previously taken ("I'll take that on me… in not preparing you guys as best that I could've"). *Protecting* affected future action towards regulatory adherence and boundary pushing by preserving the integrity of the team. This was important because the team serves as the foundation of the highly coordinated performance demanded in this sport. This technique focused largely on saving "face," or reputation, (Goffman, 1967; P. Brown & Levinson, 1978), suggesting that debrief facilitators *protected* to prevent pit crew members from experiencing a loss of dignity in front of other teammates, members of the broader racing organization, and the institution.

Priming. Priming called for pit crews' awareness of prospective events; that is, to update their collective understanding and assumptions of their complex, dynamic environment. Like retention (Weick et al., 2005), this technique manages the central dilemma by bringing together several interpretations under a common directive

("Remember about tomorrow's practice, so get together as a group and let's follow-up with the plan."). Facilitators regularly applied this technique to propose that what pit crews' broadly enacted serve as a source of guidance for action. Where the complex, dynamic environment was overwhelming, though, *priming* was also used in a manner that was dismissive of the many details that were enacted. Thus, facilitators also *primed* to encourage pit crews to narrow their scope and focus action on their own locus of control.

Participants used *narrating*, *protecting*, and *priming* during debriefs to balance the tension between regulatory adherence and boundary pushing. Instances of *dwelling on the details* and *blocking out the noise* framed how participants oriented these techniques during discussion. Table 6 summarizes the features and functions of each technique.

Table 6

Techniques for Managing the Regulatory Adherence / Boundary Pushing Dilemma

		Narrating	**Protecting**	**Priming**
Description		Enact and select portions of the environment	Shift attention	Call for awareness of prospective events
Regulatory adherence / boundary pushing framed by…	Dwelling on the details	Align what is observed toward a plausible story of performance	Enable closure about certain actions taken	Propose what is enacted to serve as a source of guidance for future action
	Blocking out the noise	Bracket a portion of the environment to then dismiss	Shift responsibility to exogenous factors	Propose to move on from what is enacted for closer attention to one's own domain

Function	Ascribe provisional understanding of past events	Preserve the integrity of the team	Update collective understanding and assumptions

Note. This table illustrates the technical level of the grounded practical reconstruction. Interactional moments, *dwelling on the details* and *blocking out the noise*, are not perfectly dichotomous. The purpose of illustrating them is to demonstrate the nuance of the techniques as participants use them to interactively negotiate their performance priorities (i.e., regulatory adherence and boundary pushing).

A Model of Dilemmatic Talk in Debriefs

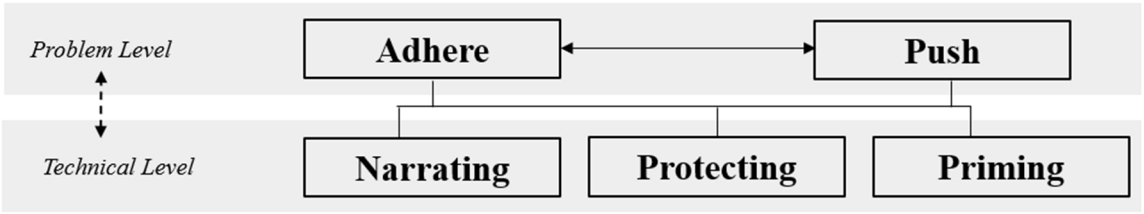
The analytical framework of this research suggests that communication contends with multiple, competing expectations; the tensions therein influence how we attempt to manage them during those interactions (Craig & Tracy, 2005). Previous discourse analytic works in the grounded practical tradition demonstrate the sensitivity of interactional contexts. For instance, Tracy (2002) revealed how face-threatening an emergency dispatcher's questions can be for the caller; though such questioning is expected, this act may breech acceptable levels of politeness. The author's analysis suggests that a dispatcher must consider whether their information-gathering questions are misconstrued by the caller.

The present results cultivate our understanding of debriefs by supporting a model that targets reflection about of how that talk occurs (Craig, 2013). The debrief is reconstructed across two interconnected levels of reconstruction: problem and technical (Craig & Tracy, 1995). The most concrete level of the two (technical) reflects the discursive techniques that were observed among participants (i.e., *narrating*, *protecting*, and *priming*). The problem level focuses on the dilemmas that participants appear to experience in and through their interaction with one another during debrief sessions. Interpretation at the problem level frames the multiple, competing goals at play during participants' interactions (i.e., regulatory adherence and boundary pushing). This model

suggests that debrief participants, in general, frame their talk (at the technical level) toward improved regulatory adherence or boundary pushing (at the problem level). Figure 4 illustrates this reconstruction.

Figure 4

A Model of Dilemmatic Talk in Debriefs



Note. Dotted-lined arrows represent analytical moves towards theoretical reconstruction, as performed by the researcher. Solid-lined arrows represent the reconstructed relationships among outcomes of analysis at problem and technical levels.

Analysis identified dysfunctional interactions between independent circumstances to support regulatory adherence and boundary pushing, such as suggestions from debrief facilitators to slow down in order to avoid a penalty or the recurrence of a near-miss (e.g., being "plowed" by the stock car). Moreover, the problem level of reconstruction suggests that debriefing manages not only counterproductive outcomes, but also impermanent ones. By debriefing, pit crews' capacity to accomplish particular outcomes repeatedly (i.e., reliability) influenced (and possibly diminished) their freedom from unacceptable loss (i.e., safety). Similarly, unanticipated, sweeping amendments to safety regulations obligated pit crews to debrief to re-establish their capacity for effective, consistent pit stop execution.

As the model also suggests, debriefs can be framed more tangibly at the technical level of reconstruction, when participants engaged in *narrating*, *protecting,* and *priming*. In particular, these techniques demonstrated interdependent patterns as talk ebbed and

flowed in its directedness and detail. While *narrating* enacted portions of the environment for meaningful discussion, it also bracketed others for immediate dismissal. *Protecting* offered participants certain closure about their actions just as it chalked up observed performance to factors beyond their immediate influence. *Priming* proposed retention for joint, coordinated action just as it narrowed participants' focus to their individual locus of control.

While all three techniques elicited succinct formulas for action, namely, standards for accountability and certainty (cf., Browning, 1992), debrief facilitators were quick to shift techniques, particularly when formulas for performance (e.g., concentration, team dynamics) were constrained. This often occurred when certain situations (e.g., the driver's performance, regulations and penalties, pit box and race track logistics, equipment and stock car damage) were discussed in terms of their dynamism (e.g., "no new rule changes") and complexity (e.g., "as long as they're calling it fair, which they're not"). Altogether, the model posits that debriefs may actively mitigate perceptions of the overwhelming potential for loss in this high-risk work setting.

Endnotes

[1] "Over the wall" is a defining characteristic of pit stops. A waist-high wall separates the pit crew and supporting team members on pit road, a lane connected to, but separate from, the oval race track. The Talladega Superspeedway in Lincoln, Alabama, for instance, features a 1730-foot pit road with 44 30 x 64 stalls, one for each stock car and their pit crew to undergo pit stops. In the wake of many injuries and deaths from the sport, NASCAR carefully governs what takes place "over the wall," from the number of pit crew members from a team allowed to jump over that wall and perform a pit stop to stock car speed limits when entering and exiting pit road.

[2] Reference to statistics like "standard deviation" and "variance" in-text are not meant to necessarily invoke existing theories of probability and statistics. As this study continued, it became clear that these terms were mostly used to characterize values (e.g., time to remove the front tire) that varied across a few pit stops.

CHAPTER 5: DISCUSSION

The purpose of this research was to reconstruct talk as it actually occurs among debrief participants in a high-risk work setting. The primary objective of this work was to directly examine strategic retrospective talk, a means of interpreting one's complex, dynamic environment (Weick et al., 2005). To accomplish both this and the comprehensive objective of theory development, this research addressed the following questions: what dilemmas do participants face during debrief sessions? (*RQ 1*); and, what techniques do participants employ during these debrief sessions to manage those dilemmas? (*RQ 2*).

Using a blend of inductive and action-implicative approaches to examine talk among NASCAR pit crews during their weekly "film review," a model of dilemmatic talk in debriefs emerged. The central dilemma of debriefs, which occurred at the problem level of grounded practical reconstruction, consisted of two competing expectations: to adhere performance to regulations (to avoid unacceptable loss) and to push the boundaries of that performance (to maintain or exceed a certain quality of outcome). This tension was explicitly enacted at the technical level of reconstruction through debrief participants' use of several discursive techniques.

RQ 1 and *RQ 2* are addressed through a portrayal of pit crews' talk. The results address *RQ 1* by revealing that the pursuit of efficient, effective pit stops induced tensions in debrief participants. This study particularly defined a central dilemma as it occurred in these sessions, namely, that of the conflicting demands for regulatory adherence and boundary pushing. The results convey that the central dilemma was explicitly enacted through debrief participants' use of several discursive techniques. The

results also address *RQ 2* by identifying and illustrating discursive moves with which debrief participants resolved the central dilemma. In particular, the study revealed two general categories of interactions – *dwelling on the details* and *blocking out the noise* – by which participants oriented their talk during discussions. Multiple, iterative readings of naturalistic data (Barge & Craig, 2009; Craig, 2013) enabled successive interpretations and critical reflection about their fit with theory (Wolcott, 1995). The techniques that then emerged during these interactional moments were identified as: *narrating*, *protecting,* and *priming*.

The analytical perspective of this study suggests that communication involves conflicting expectations, which create tensions that, in turn, affect how we navigate our interactions with others (Craig & Tracy, 2005). Thus examining tensions as they naturally occurred and were managed through talk extends theory by making what is implicit about debriefs explicit for critical evaluation (Craig & Tracy, 2021). The conceptual model of dilemmatic talk in debriefs summarizes the findings and reconstructs the debrief across two interrelated levels of grounded practical reconstruction (i.e., problem and technical), enhancing our understanding of talk as it actually occurs.

Theoretical Implications

This research broadly contributes to how debriefs represent communicative accomplishments; it illustrates a set of discursive techniques that guide interpretation, improvisation, and action. The techniques identified not only supported debrief participants to unpack the aftermath of penalties and address near-misses, they also complemented participants' interpretation of objective accounts of their performance

(i.e., recordings and time stamps). The implications to follow suggest a few areas where the study of debrief participants' interpretation and coordinated action may be furthered.

First, research on video-assisted debriefing may consider the social and material elements of discussion. At Triple R, "film" and performance metrics alike needed to be "dissected," instantiating the purpose of "film reviews." Pit crews were coached to adapt their choreography to better accommodate the physical set-up of the next race track, the temperament and skill of the stock car driver, or an existing or new safety rule. This suggests that even when pit crew members could see their performance onscreen or read associated timestamps on paper handouts, what their last performance actually meant for the team going forward was not immediately clear. This aligns with extant work that suggests that material objects circulated or displayed need to be discussed in order to affect what about them is enacted, selected, and retained (Vikkelsø, 2007) and that that which is displayed on a screen and discussed in a group informs shared understanding (Tuma, 2012). In addition, pit crews participated in these sessions to examine how their pit choreography fared from week to week, suggesting that that which pit crews retained for action from one session was, ultimately, transformed in to new recordings and performance metrics for the next discussion. Research that examines other settings that employ video-assisted debriefs, such as in healthcare or police work, may further explore how the iterative interpretation of objective accounts of performance compound for collective sense.

Second, research should further account for how debrief facilitators support and guide session participants' interpretations. The debriefs observed were typically bookended by the pit operations lead and the performance director's talk (e.g., citing

performance metrics at the start, planning for upcoming travel at the end), implying regular facilitator-led negotiation of meaning in these sessions. In addition, two of three identified discursive techniques (i.e., *protecting* and *priming*) were primarily reconstructed from facilitators' talk. This suggests that the conceptual model may be interpreted as how debrief facilitators, in particular, use talk to mitigate tensions imposed by multiple goals.

Although theory posits that interpretation is a collective effort, where a group jointly negotiates which goals it aims to accomplish (Roberts, 1993), this research suggests that debrief facilitators may guide provisional sense about events. These findings contribute to the emerging discussion about how individuals' (e.g., supervisors) attention elevates towards groups' mindful communication patterns and proactive behaviors (Fraher, Branicki, & Grint, 2017; Renecle, Curcuruto, Lerín, & Marco, 2021). This may be further examined by measuring perceptions of supervisor communication (Nembhard & Edmondson, 2006) and facilitation (Jahn & Black, 2017) in debriefs.

Third, safety and reliability should be further treated as distinct, albeit related communicative goals. Because pit crews' capacity to accomplish particular outcomes repeatedly (i.e., reliability) might have impacted their freedom from unacceptable loss (i.e., safety) – and vice versa –, efforts to better meet those expectations were constrained. Debriefs in this unique high-risk work setting allowed their participants to interpret their environment towards coordinated action that affected their organization's viability, namely, better regulatory adherence and pushing the boundaries of pit stop performance. Moreover, the conceptual model suggests that debrief participants used particular discursive techniques to manage the tension of conflicting expectations for

their performance. Because these tensions may give rise to multiple perceptions of desired role behavior (Beus, Taylor, & Solomon, 2021; Kuenzi & Schminke, 2009; Schneider, Gonzalez-Roma, Ostroff, & West, 2017), researchers might apply measures of context-appropriate, facet-specific work climates, such as that of justice (Naumann & Bennett, 2000), service (Schneider, White, & Paul, 1998), diversity (McKay, Avery, & Morris, 2008), or work ownership (Van Dyne & Pierce, 2004), to models of debriefs to evaluate the relationships among multiple, shared perceptions of what is rewarded and supported. This may be particularly appropriate when hypotheses about debriefing are framed according to sensemaking theory (e.g., Dunn et al., 2016) or similar sociocognitive processes (e.g., symbolic interactionism; Blumer, 1969). Moreover, assessments of more than one context-appropriate, facet-specific work climate may hold significant adaptive value for complex, dynamic organizations (Beus et al., 2020, 2021).

Fourth, attention to interactions – particularly their order – is meaningful for the study of talk in debriefs. This implication is derived from the theoretical orientation of action-implicative discourse analysis: actors make decisions about how and why they communicate as they do, as they are communicating (K. Tracy, 2005). From this perspective, attention to interaction reveals much about the actors in the scene, such as their preferences (e.g., the response to a preferred offer is a straightforward "yes," whereas the response to a nonpreferred one has pauses and restarts). Thus interactions are a resource for interpreting tensions (i.e., what comes first) and resolutions (i.e., what comes second), and they can be the foundation of how we suggest that meaning is made. This is important for the study of debriefs because it makes shared understanding, an

integral part of sociocognitive theories, more explicit (Garfinkel, 1967; Mondada, 2011) and, therefore, readily interpretable for researchers. In the case of this dissertation, asking "why that *now*?" (Schegloff & Sacks, 1973) of the data resulted in a model that reconstructed the talk that debrief participants' chose in order to resolve tensions imposed by multiple, conflicting goals. This implication may be extended to the growing body of evidence-based illustrations of interactions (Hemshorn de Sanchez, Gerpott, & Lehmann-Willenbrock, 2022) by examining how talk supported by one or more conversational structures (Sawyer, Eppich, Brett-Fleegler, Grant, & Cheng, 2016) maintains shared understanding.

Last, researchers might consider racing organizations to be high reliability organizations, as suggested by how members of these teams communicate with each other. Vogus and Sutcliffe (2007b) operationalize the five principles of high reliability organizing (Weick & Sutcliffe, 2015) as communicative patterns, including co-constructing a vision of how members want a situation to progress, voicing anticipated problems, taking ownership of one's competencies, and trusting the competencies of others. Analysis of the dataset evoked many of these communicative patterns, as particularly evinced by the descriptions and functions of *narrating, protecting,* and *priming*. For improved explanatory depth and breadth, researchers should examine stock car racing and pit crews more readily and extend theory about the sociocognitive mechanisms that enable performance under high-risk conditions.

Practical Implications

First, debrief facilitators may consider how to support participants' interpretation of objective, available metrics, especially when those data are the foundation of formative

feedback and continuous learning. Although routinely discussed and interpreted to assess progress (Stobierski, 2019), data do not always lead to process improvements (Levenson & Fink, 2017). As data are often collected outside of key questions or investments (Mohrman & Lawler, 2011), their interpretation for employee development and key business decisions is subject to our natural cognitive limitations (Korpal & Stachowiak-Szymczak, 2018) and wanting analytical skills (Murray, 2013). In turn, actionable insights derived from data can be limited, no matter how abundant these data are.

During debriefs, participants sparingly referred to the data available. This was most salient when handouts, which summarized performance statistics for pit crews' reference, were left untouched on the conference table. Pit crew members did not initiate discussions of available, objective data until prompted by the pit operations lead, who "did the math" to create the handouts. The pit operations lead and the performance director indicated (*narrated*) what any single metric (e.g., lug nut percentages) implied for the teams' competitive standing and proposed (*primed*) that these implications guide performance at the next race.

Together, *narrating* and *priming* may reinforce the connection between what is measured and how actions affect team members. In addition, when pit crews misconstrued performance metrics, the pit operations lead and the performance director shifted attention (*protected*); for example, to "consistency" (i.e., standard deviation or variance), to facilitate some closure about how participants' actions stand out among patterns in the data. *Protecting* may be meaningful to debrief participants given our natural limitations; we cannot interpret data without understanding the process that

generated them (Shaw, 2015). That facilitators interpreted objective, available data suggests their important role in elevating what is measured to what is actionable.

Second, debrief facilitators may consider visual media, such as recordings, to supplement discussion for continuous learning. The research revealed Triple R's long-standing practice of recording performance, namely, pit stops, to examine pit choreography (e.g., twisting, stepping, spacing) for closer observation and improvement. Several instances of *narrating* suggested that speaking up and admitting mistakes were common occurrences. Without any probing from others, pit crew members recounted how they had interpreted a scene *as that scene played back to them*. This is consistent within the organizational sciences, where replaying videos to managers of their discussions generated their unprompted thoughts on what they learned and what they might do differently (Jarrett & Liu, 2018). Thus, the disclosure and assumption-testing prompted by visual media may serve as a springboard to learning, where all debrief participants are encouraged to assume the role of "storyteller" during meetings (Hindmarsh & Llewellyn, 2016; Senge, 1990).

Third, debrief facilitators should actively steer discussion away from topics of failure or fault. In the wake of undesirable or unexpected performance outcomes, such as penalties, the pit operations lead and the performance director were quick to *protect*, thereby preventing pit crew members from a loss of dignity. This technique not only preserved the integrity of the team and the courage to confront their mistakes during debriefs, it also elevated that which pit crews learned to that which they could later apply; that is, away from accounts of "who did it?" toward "what happened?" and, thus, "what's next?". These outcomes suggest that the group's leaders are "guardians" who work

together to interpret events (Edmondson & Verdin, 2018, p. 99) and that open, blameless facilitation is central to affecting change (D. Brown & McCormack, 2016).

This research captured participants' frequent admission of mistakes in a highly competitive setting, which may have supported the pit operations lead and the performance director to neither discourage the reporting of problems nor to create an environment in which anything goes (Edmondson, 2011). Debrief facilitators should enable regular opportunities for critical, albeit blameless reflection during sessions to demonstrate that one's team is safe for interpersonal risk taking (Edmondson, 1999) as well as sustain participants' confidence to report, discuss, and learn from error (Edmondson & Bransby, 2023; Wang, Guchait, & Pasamehmetoglu, 2020).

Fourth, debrief facilitators might adapt their facilitation style according to organizational tenure. In this research, attention to tenure primarily offered negative case examples against which to check the accuracy of analysis (Denzin & Lincoln, 2005). For instance, junior pit crew members *narrated* alongside questions and comments from the pit operations lead and the performance director, whereas senior pit crew members did not offer such frequent input, thus illustrating participants' belief that interpreting their environment and performing as expected would improve with time (e.g., Excerpt 18.2). That is, through weekly debriefs, pit crews would be regularly exposed to multiple, plausible scenarios and guided to interpret them, as needed, by those with more experience.

These observations align with research that suggests that organizational tenure affects perceptions of performance expectations. For instance, an evaluation of safety climate strength – where less within-group variability suggests stronger climate (Chan,

1998; Schneider, Salvaggio, & Subirats, 2002) – revealed that higher levels of average organizational tenure improved climate strength to a greater extent than did lower levels (Beus, Bergman, & Payne, 2010). Thus, the tenure of the debriefing group may be pertinent to how facilitators plan and manage sessions that set or reinforce performance goals.

Last, all debrief participants should engage in discussion that tempers the group's preoccupation with failure. Weick and colleagues (1999) imply that "worries about failure" (p. 39) enable performance in complex, dynamic environments. Yet pit crews' frustrations (e.g., Excerpt 14) suggest the emotional impact of regularly scrutinizing and extrapolating failures and near-misses for performance improvement. Moving on from failures enables more effective coping skills and greater motivation to compete than does dwelling on failures (Mouratidis & Michou, 2011). Pit crews' preference to avoid noise during debriefs implies that some compartmentalization during discussion may be warranted. Notably, pit crews still managed to remain competitive throughout the racing season despite dismissing certain details about the environment, shifting responsibility, and calling for members to focus on what they could control. Allowing participants to move on from errors rather than dwell on negative experiences or emotions during debriefs may be appropriate for particularly intense, high-risk work settings (e.g., policing, firefighting) where the consequences of failure could be immobilizing.

Limitations and Future Directions

First, this research does not extrapolate to the philosophical level of grounded practical reconstruction; the research questions target only the problem and technical levels. Most research in this tradition reconstructs dilemmas and techniques and leaves

this final level to be addressed in subsequent work (Craig & Tracy, 2021). For instance, the philosophical-level reconstruction of school board meetings via GPT (e.g., Tracy & Muller, 2001) was developed over time (e.g., Craig & Tracy, 2005). Although no single grounded practical reconstruction produces a complete theory of a complex practice, this research revealed dilemmas that debrief participants confront, the talk that enables or constrains those dilemmas, and the multiple goals at play in seeking resolution.

Researchers may re-examine the central dilemma, the three stated techniques, and the broader dataset through a grounded practical lens to investigate the rationale used by debrief participants; for instance, that pit crews, in general, act according to the impermanence of their team's performance (at the philosophical level) when framing their talk (at the technical level) to achieve regulatory adherence or boundary pushing (at the problem level). That is, subtle inputs (e.g., the angle at which the stock car arrives for a pit stop) affecting overt performance outputs (e.g., injury, penalties, time stamps) may determine how pit crews debrief. The result of such grounded practical reconstruction would establish grounds for deciding how to participate or make evaluative judgments of how others participate in debriefs and could also reveal how discussion of fragile, fleeting performance outcomes influence expectations of safety and reliability in certain high-risk work settings.

Second, this research was limited by how the focal practice was "unitized," or named. Analysis by way of grounded practical theory proceeds with one unitization at a time, each revealing certain tensions and hiding others (Craig & Tracy, 1995). For instance, the study of academic colloquia from the perspective of "scientific talk" would evoke different assumptions than if interpreted from the perspective of "professional

socialization" (K. Tracy, 2005). Themes in the data suggest that pit crew members' talk might be reconstructed as "performance evaluation," "coaching," or "problem solving." Such talk might also be considered "ventriloquizing" (Jahn, 2016), which could illustrate the tensions and discursive techniques inherent to adapting safety rules. Altogether, a grounded practical examination under a different name would help to derive commitments, concerns, and discursive techniques from a broader set of debrief communication activities.

Third, the outcomes from this research are not formally generalizable. The dataset was neither representative of all racing organizations that staff pit crews for NASCAR's premier racing series nor did participants enact a particular experimental design. Moreover, the debriefs included in the dataset were not selected for analysis according to probability sampling methodology.

There is little consensus on the number of audio/visual fragments or scenes necessary to adequately create a grounded practical reconstruction. For example, Mirivel and Tracy's (2005) reconstruction of pre-meeting talk was based on six 15-minute video-recorded segments across nine months, and Robles' (2017) reconstruction of misunderstandings in collaborative work was based on an undisclosed subset of 62 seconds-long fragments from over 50 hours of video recordings. The present sample size of recorded meetings (n=29) suggests enough representativeness (i.e., 30 percent of all sessions scheduled across 10 months) for the model to resonate with how these pit crews talk in this context (Craig & Tracy, 2021). The remaining 70 percent of sessions were essentially unavailable for study; the performance director excluded these sessions on the basis of proprietary topics or random camera and meeting logistics issues.

A grounded theory approach would capture more complexity and richness about what has already been observed and could explore dilemmas and techniques according to the experiences of those who confront or use them. Interviews with a wider range of pit crews across multiple racing organizations, pit crew positions, and tenure might enrich our understanding of how pit crews assign meaning to performance outcomes or maintain a shared sense of identity under uniquely competitive and high-risk pressures. A grounded approach could also examine how such practices as the ubiquity of cameras or strength and conditioning regimens enable and constrain norms for safety and reliability under competitive pressure. This approach is particularly worthwhile, as current accounts of stock car racing and pit crews are housed in disciplines that focus on practical applications (e.g., sports management; Ferguson, 2019) rather than on nuanced social processes.

Fourth, the majority of the data were limited to that which the performance director recorded, a consequence of the research design intended to capture debriefs in the least obtrusive manner possible (Smets, Burke, Jarzabkowski, and Spee, 2014). Researchers suggest that within a short time, a recording device is barely noticed by participants (Heath, Hindmarsh, & Luff, 2010). This limitation was further mitigated by examining teams that are uniquely accustomed to being monitored and observed in a high-risk setting. To mitigate the possibility of distortion or bias, recordings were collected at regular intervals for all of Triple R's pit crews for the duration of the racing season so that analysis and interpretation could account for potential fluctuations. Anomalies such as curtailed or omitted meetings were brought to the performance director's attention for clarification.

The richness of these video data was also leveraged at several points during analysis to improve its ethnographic depth as well as its trustworthiness. For instance, recordings were interpreted as a reflection of participants' discretion, which was included in the multiple, iterative readings of the data (Knoblauch & Tuma, 2011). In addition, data sessions (Heath et al., 2010; Knoblauch, Tuma, & Schnettler, 2014), where scenes were (re)played and discussed with doctoral-level researchers, ensured that these interpretations represented multiple viewpoints.

Qualities unique to these data not only mitigated this limitation, they may also establish a methodological direction for debrief research. As video-recorded data can be repeatedly viewed and interpreted, they are amenable to the study of social interactions, particularly those that are difficult to capture through interviews or observations, such as those between the social and the material (Orlikowski, 2007; Tutt & Hindmarsh, 2011). This interaction is increasingly pertinent to high-risk work settings, such as healthcare (Stephanian et al., 2015) and policing (van Dalen, van Haperen, Swinkels, Grantcharov, & Schijven, 2021). Because film here was interpreted (and not just played), a dataset of replayable accounts of technology-assisted debriefs may help unpack how the social and the material come together to support debrief participants' continuous learning.

A way to further mitigate the likelihood of inauthentic talk and behaviors in the dataset might involve repurposing additional, existing video. Video repurposing is an emergent research approach that integrates preexisting videos from publicly available sources (e.g., television broadcasts, online streaming platforms) into analysis. This approach allows the researcher to examine participants in a presumably more natural setting; the researcher's presence suggests an unnatural one, as it presents the potential

for observer bias. This approach was most recently used to examine how high-risk training environments support Navy SEALs to sustain individual and collective mindful behaviors (Fraher et al., 2017). Future research about talk among pit crews might then incorporate televised broadcasts of their performance, for example, to enrich ethnographic depth as well as support triangulation (Denzin & Lincoln, 2005).

Conclusion

Debriefs are meetings that are often implemented in high-risk work settings to enable safe, reliable outcomes. Although research presumes that debriefs support teams to pursue safety and reliability simultaneously and without contradiction, this research revealed that conflicting expectations for these outcomes constrain employees' attempts to interpret and act accordingly. The central dilemma of debriefs consisted of two competing expectations: to adhere performance to regulations (to avoid unacceptable loss) and to push the boundaries of that performance (to maintain or exceed a certain quality of outcome). This tension was explicitly enacted through debrief participants' use of several discursive techniques, which varied according to whether participants sought to derive plausible interpretations from a variety of multiple, available performance details or to move towards discursive closure. This grounded practical reconstruction also has important implications for the theory and practice of debriefs, including how video-assisted debriefing in other high-risk work settings might be studied and how debrief facilitators may supplement group-based strategic retrospective discussions.

This research took particular care to examine talk as it occurred. In their "Manifesto for Reality-Based Safety Science," Rae and colleagues (2020) call researchers to action, imploring them to turn their attention to that which actually occurs

in high-risk work settings. In turn, they offer a salient, encouraging point amid their valid criticisms of this multidisciplinary field: “Not every piece of work will be successful in creating lasting change – but every piece of work must genuinely try to advance current theory.” This dissertation heeded this call, making what was presumed about debriefs, a crucial resource to high-risk organizations, explicit for investigation. This research reconstructed the tensions inherent to a unique, complex, and dynamic work setting and a supporting debrief practice, revealing that a conflict of expectations for safety and reliability constrains what and why this practice is and the contradictions therein. Moreover, talk as it actually occurred was integral to how these contradictions were managed.

Thus, while presented here as an academic work, it may then be only fitting to conclude with how members of this uniquely high-risk work setting actually address what they accomplish and why strive for it. In the pit operation lead’s own words, pit crews work tirelessly to “capture that magic second.” Achieved only by balancing safety with speed, the “magic second” refers to a reduction in pit stop time that grants pit crews and their drivers a competitive edge. The “magic second” is, however, elusive; even if the pit crew achieves it, it may fall off of their time sheets and vanish by the next pit stop. But as the season progresses, the “magic second” might not be enough to affect the teams’ standing in desired ways – especially as competition get tighter or as institutional regulations inevitably change. Pit crews’ pursuit of safety and reliability is then always in motion because the “magic second” is a promising target, however fleeting.

By focusing on context, this research establishes grounds for new, rich extensions, such as rationales for why we debrief, and, moreover, why we seek continuous

improvement. In fact, a second-look at the excerpts and interpretations in this work might already give way to this: the features of our organizational life, such as what we accomplish, are fragile.

REFERENCES

Adler, P. S., Goldoftas, B., & Levine, D. I. (1999). Flexibility versus efficiency? A case study of model changeovers in the Toyota production system. *Organization Science, 10*(1), 43-68.

Albert, Z. (2018, January 24). With new pit-stop rules in place, NASCAR teams in development mode. Retrieved from https://www.nascar.com/

Allen, J. A., Baran, B. E., & Scott, C. W. (2010). After-action reviews: A venue for the promotion of safety climate. *Accident Analysis & Prevention, 42*(2), 750-757.

Allen, J. A., & Lehmann-Willenbrock, N. (2014). Linking pre-meeting communication to meeting effectiveness. *Journal of Managerial Psychology, 29*(8), 1064-1081.

Allen, J. A., Reiter-Palmon, R., Crowe, J., & Scott, C. W. (2018). Debriefs: Teams learning from doing in context. *American Psychologist, 73*(4), 504-516.

Allen, J. A., Reiter-Palmon, R., Kennel, V., & Jones, K. J. (2018). Group and organizational safety norms set the stage for good post-fall huddles. *Journal of Leadership & Organizational Studies*, 1-11.

Allen, J. A., Sands, S. J., Mueller, S., L., Frear, K. A., Mudd, M., & Rogelberg, S. G. (2012). Employees' feelings about more meetings: An overt analysis and recommendations for improving meetings. *Management Research Review, 35*(5), 405-418.

Alvesson, M., & Kärreman, D. (2011). *Qualitative Research and Theory Development*. Thousand Oaks: Sage.

Ardts, J., Jansen, P., & van der Velde, M. (2001). The breaking in of new employees: Effectiveness of socialisation tactics and personnel instruments. *Journal of Management Development, 20*(2), 159-167.

Axley, S. R. (1984). Managerial and organizational communication in terms of the conduit metaphor. *Academy of Management Review, 9*(3), 428-437.

Baran, B. E., & Scott, C. W. (2010). Organizing ambiguity: A grounded theory of leadership and sensemaking within dangerous contexts. *Military Psychology, 22*(Suppl. 1), S42-S69.

Baran, B. E., Shanock, L. R., Rogelberg, S. G., & Scott, C. W. (2012). Leading group meetings: Supervisors' actions, employee behaviors, and upward perceptions. *Small Group Research, 43*(3), 330-335.

Barbour, J. B., & Gill, R. (2017). Questioning as regulatory work practice: The communicative accomplishment of reliability and safety in the oversight of nuclear power plants. *Communication Monographs, 84*(4), 466-487.

Barge, J. K., & Craig, R. T. (2009). Practical theory in applied communication scholarship. In L. R. Frey & K. N. Cissna (Eds.), *Routledge Handbook of Applied Communication Research* (pp. 55-78). New York: Routledge.

Beus, J. M., Bergman, M. E., & Payne, S. C. (2010). The influence of organizational tenure on safety climate strength: A first look. *Accident Analysis & Prevention, 42*(5), 1431-1437.

Beus, J. M., Lucianetti, L., & Arthur, W. (2020). Clash of the climates: Examining the paradoxical effects of climates for promotion and prevention. *Personnel Psychology, 73*(2), 241-269.

Beus, J. M., McCord, M. A., & Zohar, D. (2016). Workplace safety: A review and research synthesis. *Organizational Psychology Review, 6*(4), 352-381.

Beus, J. M., Payne, S. C., Bergman, M. E., & Arthur, W. (2010). Safety climate and injuries: An examination of theoretical and empirical relationships. *Journal of Applied Psychology, 95*(4), 713-727.

Beus, J. M., Smith, J. H., & Taylor, E. C. (2018). A theory of climate: Explaining the formation and function of organizational climates. *Academy of Management Proceedings, 2018*(1), 11524.

Beus, J. M., Taylor, E. C., & Solomon, S. J. (2021). Climate-context congruence: Examining context as a boundary condition for climate-performance relationships. *Journal of Applied Psychology, 106*(9), 1332-1356.

Bigley, G. A., & Roberts, K. H. (2001). The incident command system: High-reliability organizing for complex and volatile task environments. *Academy of Management Journal, 44*(6), 1281-1299.

Billig, M., Condor, S., Edwards, D., Gane, M., Middleton, D., & Radley, A. (1988). *Ideological Dilemmas*. London: Sage.

Bisbey, T. M., Kilcullen, M. P., Thomas, E. J., Ottosen, M. J., Tsao, K., & Salas, E. (2021). Safety culture: An integration of existing models and a framework for understanding its development. *Human Factors, 63*(1), 88-110.

Blatt, R., Christianson, M. K., Sutcliffe, K. M., & Rosenthal, M. M. (2006). A sensemaking lens on reliability. *Journal of Organizational Behavior, 27*(7), 897-917.

Blumer, H. (1954). What is wrong with social theory? *American Sociological Review, 18*, 3-10.

Blumer, H. (1969). *Symbolic Interactionism: Perspective and Method*. Englewood Cliffs: Prentice Hall.

Brown, D., & McCormack, B. (2016). Exploring psychological safety as a component of facilitation within the promoting action on research implementation in health services framework. *Journal of Clinical Nursing, 25*(19-20), 2921-2932.

Brown, K. W., & Ryan, R. M. (2003). The benefits of being present: Mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology, 84*(4), 822-848.

Brown, K. W., Ryan, R. M., & Creswell, J. D. (2007). Mindfulness: Theoretical foundations and evidence for its salutary effects. *Psychological Inquiry, 18*, 211-237.

Brown, P., & Levinson, S. (1978). Universals in language usage: Politeness phenomena. In E. N. Goody (Ed.), *Questions and politeness: Strategies in social interaction* (pp. 56-289). Cambridge: Cambridge University Press.

Browning, L. (1992). Lists and stories as organizational communication. *Communication Theory, 2*(4), 281-302.

Browning, L., & Boudès, T. (2005). The use of narrative to understand and respond to complexity: A comparative analysis of the Cynefin and Weickian models. *Emergence: Complexity and Organization, 7*(3-4), 32-39.

Burke, M. J., Sarpy, S. A., Tesluk, P. E., & Smith-Crowe, K. (2002). General safety performance: A test of a grounded theoretical model. *Personnel Psychology, 55*(2), 429-457.

Busby, J. S. (1999). The effectiveness of collective retrospection as a mechanism of organizational learning. *Journal of Applied Behavioral Science, 35*(1), 109-129.

Callari, T. C., McDonald, N., Kirwan, B., & Cartmale, K. (2019). Investigating and operationalising the mindful organising construct in an air traffic control organisation. *Safety Science, 120*, 838-849.

Casey, T., Griffin, M. A., Flatau Harrison, H., & Neal, A. (2017). Safety climate and culture: Integrating psychological and systems perspectives. *Journal of Occupational Health Psychology, 22*(3), 341-353.

Chan, D. (1998). Functional relations among constructs in the same content domain at different levels of analysis: A typology of composition models. *Journal of Applied Psychology, 83*, 234-246.

Cheng, A., Eppich, W., Kolbe, M., Meguerdichian, M., Bajaj, K., & Grant, V. (2020). A conceptual framework for the development of debriefing skills: A journey of discovery, growth, and maturity. *Simulation in Healthcare, 15*(1).

Chiu, M. M., & Lehmann-Willenbrock, N. (2016). Statistical discourse analysis: Modeling sequences of individual actions during group interactions across time. *Group Dynamics: Theory, Research, and Practice, 20*(3), 242-258.

Christian, M. S., Bradley, J. C., Wallace, J. C., & Burke, M. J. (2009). Workplace safety: A meta-analysis of the roles of person and situation factors. *Journal of Applied Psychology, 94*(5), 1103-1127.

Clarke, S. (2000). Safety culture: Under-specified and overrated? *International Journal of Management Reviews, 2*(1), 65-90.

Clarke, S. (2010). An integrative model of safety climate: Linking psychological climate and work attitudes to individual safety outcomes using meta-analysis. *Journal of Occupational and Organizational Psychology, 83*(3), 553-578.

Cleirigh, D. O., & Greaney, J. (2015). Mindfulness and group performance: An exploratory investigation into the effects of brief mindfulness intervention on group task performance. *Mindfulness, 6*, 601-609.

Collinson, D. L. (1999). `Surviving the rigs': Safety and surveillance on north sea oil installations. *Organization Studies, 20*(4), 579-600.

Corbin, J., & Strauss, A. (2008). *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory* (3rd ed.). Los Angeles: Sage.

Corbin, J., & Strauss, A. L. (2015). *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory* (4th ed.). Thousand Oaks: Sage.

Corley, K. G., & Gioia, D. A. (2011). Building theory about theory building: What constitutes a theoretical contribution? *Academy of Management Review, 36*(1), 12-32.

Corradi, G., Gherardi, S., & Verzelloni, L. (2008). *Ten good reasons for assuming a 'practice lens' in organization studies.* Paper presented at the OLKC Conference.

Couper, K., Salman, B., Soar, J., Finn, J., & Perkins, G. D. (2013). Debriefing to improve outcomes from critical illness: A systematic review and meta-analysis. *Intensive Care Medicine, 39*, 1513-1523.

Craig, R. T. (2006). Communication as a practice. In G. J. Shepherd, J. St. John, & T. Striphas (Eds.), *Communication as ...: Perspectives on Theory* (pp. 38-47). Thousand Oaks: Sage.

Craig, R. T. (2013). Constructing theories in communication research. In P. Cobley & P. J. Schulz (Eds.), *Theories and Models of Communication* (Vol. 1, pp. 39-57). Berlin: De Gruyter.

Craig, R. T. (2015). Grounded Practical Theory. In K. Tracy, T. Sandel, & C. Ilie (Eds.), *The International Encyclopedia of Language and Social Interaction* (pp. 1-11).

Craig, R. T. (2018). For a practical discipline. *Journal of Communication, 68*(2), 289-297.

Craig, R. T., & Tracy, K. (1995). Grounded practical theory: The case of intellectual discussion. *Communication Theory, 5*(3), 248-272.

Craig, R. T., & Tracy, K. (2005). The "issue" in argumentation practice and theory. In F. H. van Eemeren & P. Houtlosser (Eds.), *Argumentation in Practice* (pp. 11-28).

Craig, R. T., & Tracy, K. (2014). Building grounded practical theory in applied communication research: Introduction to the special issue. *Journal of Applied Communication Research, 42*(3), 229-243.

Craig, R. T., & Tracy, K. (2021). *Grounded Practical Theory: Investigating Communication Problems*. San Diego: Cognella.

Creswell, J. W., & Poth, C. N. (2018). *Qualitative Inquiry and Research Design: Choosing Among Five Approaches*. Los Angeles: Sage.

Cronbach, L. J. (1975). Beyond the two disciplines of scientific psychology. *American Psychologist, 30*, 671-684.

Cronbach, L. J., & Meehl, P. E. (1955). Construct validity in psychological tests. *Psychological Bulletin, 52*(4), 281-302.

Crowe, J., Allen, J. A., Scott, C. W., Harms, M., & Yoerger, M. (2017). After-action reviews: The good behavior, the bad behavior, and why we should care. *Safety Science, 96*, 84-92.

Curcuruto, M., Griffin, M. A., & Hodkiewicz, M. R. (2017). Dynamic safety capability and organizational management systems: An assessment tool to evaluate the "fitness-to-operate" in high-risk industrial environments. *Chemical Engineering Transactions, 57*, 289-294.

Dane, E. (2011). Paying attention to mindfulness and its effects on task performance in the workplace. *Journal of Management, 37*(4), 997-1018.

Dekker, S. (2014). *Safety Differently: Human Factors for a New Era*. Boca Raton: CRC Press.

Denison, D. R. (1996). What is the difference between organizational culture and organizational climate? A native's point of view on a decade of paradigm wars. *Academy of Management Review, 21*(3), 619-654.

Denzin, N. K., & Lincoln, Y. S. (2005). *Handbook of Qualitative Research* (3rd ed.). Thousand Oaks: Sage.

Didla, S., Mearns, K., & Flin, R. (2009). Safety citizenship behaviour: A proactive approach to risk management. *Journal of Risk Research, 12*(3-4), 475-483.

Dunn, A. M., Scott, C. W., Allen, J. A., & Bonilla, D. (2016). Quantity and quality: Increasing safety norms through after action reviews. *Human Relations, 69*(5), 1209-1232.

Eddy, E. R., Tannenbaum, S. I., & Mathieu, J. E. (2013). Helping teams to help themselves: Comparing two team led debriefing methods. *Personnel Psychology, 66*, 975-1008.

Edmondson, A. C. (1999). Psychological safety and learning behavior in work teams. *Administrative Science Quarterly, 44*(2), 350-383.

Edmondson, A. C. (2011). Strategies for learning from failure. *Harvard Business Review*, *89*(4), 48-55.

Edmondson, A. C., & Bransby, D. P. (2023). Psychological safety comes of age: Observed themes in an established literature. *Annual Review of Organizational Psychology and Organizational Behavior, 10*(1), 55-78.

Edmondson, A. C., & Verdin, P. J. (2018). The strategic imperative of psychological safety and organizational error management. In J. U. Hagen (Ed.), *How Could This Happen?: Managing Errors in Organizations* (pp. 81-104). Basingstoke: Palgrave Macmillan.

Ehrhart, M. G., & Naumann, S. E. (2004). Organizational Citizenship Behavior in Work Groups: A Group Norms Approach. *Journal of Applied Psychology, 89*(6), 960-974.

Eikeland, O., & Nicolini, D. (2011). Turning practically: Broadening the horizon. *Journal of Organizational Change Management, 24*(2), 164-174.

Eisenberg, E. M. (1984). Ambiguity as strategy in organizational communication. *Communication Monographs, 51*(3), 227-242.

Eisenberg, E. M. (1990). Jamming: Transcendence through organizing. *Communication Research, 17*(2), 139-164.

Ellis, S., & Davidi, I. (2005). After-event reviews: Drawing lessons from successful and failed experience. *Journal of Applied Psychology, 90*(5), 857-871.

Emerson, R. M., Fretz, R. I., & Shaw, L. L. (2011). *Writing Ethnographic Fieldnotes*. Chicago and London: The University of Chicago Press.

Engemann, K. N., & Scott, C. W. (2020a). Toward the exploitative potential of practices in American stock car racing for safety and reliability. In E. B. Abrahamsen (Ed.), *Safety Risk Management: Integrating Economic and Safety Perspectives* (pp. 141-154). Berlin: De Gruyter.

Engemann, K. N., & Scott, C. W. (2020b). Voice in safety-oriented organizations: Examining the intersection of hierarchical and mindful social contexts. *Human Resource Management Review, 30*(1), 100650.

Erev, I., Ingram, P., Raz, O., & Shany, D. (2010). Continuous punishment and the potential of gentle rule enforcement. *Behavioral Processes, 84*, 366-371.

Fairhurst, G. T. (2005). Reframing the art of framing: Problems and prospects for leadership. *Leadership, 1*(2), 165-185.

Ferguson, D. P. (2019). *The Science of Motorsport*. New York: Routledge.

Fiol, M., & O'Connor, E. J. (2003). Waking up! Mindfulness in the face of bandwagons. *Academy of Management Review, 28*, 54-70.

Flatau-Harrison, H., Griffin, M. A., & Gagne, M. (2021). Should we agree to disagree? The multilevel moderated relationship between safety climate strength and individual safety motivation. *Journal of Business and Psychology, 36*(4), 679-691.

Flatau-Harrison, H., Griffin, M. A., & Gagné, M. (2020). Trickling down: The impact of leaders on individual role clarity through safety climate strength across time. *Safety Science, 121*, 485-495.

Fraher, A. L., Branicki, L. J., & Grint, K. (2017). Mindfulness in action: Discovering how U.S. Navy Seals build capacity for mindfulness in high-reliability organizations (HROs). *Academy of Management Discoveries, 3*(3), 239-261.

Frese, M., & Keith, N. (2015). Action errors, error management, and learning in organizations. *Annual Review of Psychology, 66*(1), 661-687.

Fugas, C. S., Meliá, J. L., & Silva, S. A. (2011). The "is" and the "ought": How do perceived social norms influence safety behaviors at work? *Journal of Occupational Health Psychology, 16*(1), 67-79.

Garfinkel, H. (1967). *Studies in Ethnomethodology*. Englewood Cliffs: Prentice Hall.

Gehman, J., Glaser, V. L., Eisenhardt, K. M., Gioia, D., Langley, A., & Corley, K. G. (2018). Finding theory–method fit: A comparison of three qualitative approaches to theory building. *Journal of Management Inquiry, 27*(3), 284-300.

Gherardi, S. (2015). How the turn to practice may contribute to working life studies. *Nordic Journal of Working Life Studies, 5*, 13-25.

Gherardi, S. (2018). A practice-based approach to safety as an emergent competence. In C. Bieder, C. Gilbert, B. Journé, & H. Laroche (Eds.), *Beyond Safety Training: Embedding Safety in Professional Skills* (pp. 11-21). Cham: Springer.

Gherardi, S., & Nicolini, D. (2002). Learning the trade: A culture of safety in practice. *Organization, 9*(2), 191-223.

Ghezzi, V., Probst, T. M., Pettita, L., & Barbaranelli, C. (2020). Multilevel job demands and resources: Cross-level effects of competing organizational facet-specific climates on risky safety behaviors. *International Journal of Environmental Research and Public Health, 17*, 3496.

Giddens, A. (1984). *The Constitution of Society*. Berkeley: University of California Press.

Gioia, D. A., Corley, K. G., & Hamilton, A. L. (2012). Seeking qualitative rigor in inductive research. *Organizational Research Methods, 16*(1), 15-31.

Glaser, B. G., & Strauss, A. L. (1967). *The Discovery of Grounded Theory: Strategies for Qualitative Research*. London: Wiedenfeld and Nicholson.

Goffman, E. (1967). *Interaction Ritual: Essays in Face-to-Face Behavior*. New York: Pantheon Book.

Good, D. J., Lyddy, C. J., Glomb, T. M., Bono, J. E., Brown, K. W., Duffy, M. K., . . . Lazar, S. W. (2016). Contemplating mindfulness at work: An integrative review. *Journal of Management, 42*(1), 114-142.

Goodman, S. B., Bailey Murphy, K., & Linquist D'Andrea, M. (2012). Discussion dilemmas: An analysis of beliefs and ideals in the undergraduate seminar. *International Journal of Qualitative Studies in Education, 27*(1), 1-22.

Goodwin, C. (1979). *Conversation Organization: Interaction between Speakers and Hearers*. New York: Academic Press.

Goodwin, C. (2000). Action and embodiment within situated human interaction. *Journal of Pragmatics, 32*, 1489-1522.

Goodwin, C. (2013). The co-operative, tranformative organization of human action and knowledge. *Journal of Pragmatics, 46*(1), 8-23.

Goodwin, C. (2018). *Co-operative Action*. Cambridge: Cambridge University Press.

Grabowski, M., & Roberts, K. H. (2016). Reliability seeking virtual organizations: Challenges for high reliability organizations and resilience engineering. *Safety Science*.

Griffin, M. A., Cordery, J., & Soo, C. (2016). Dynamic safety capability: How organizations proactively change core safety systems. *Organizational Psychology Review, 6*(3), 248-272.

Griffin, M. A., & Curcuruto, M. (2016). Safety climate in organizations. *Annual Review of Organizational Psychology and Organizational Behavior, 3*(1), 191-212.

Griffin, M. A., & Neal, A. (2000). Perceptions of safety at work: A framework for linking safety climate to safety performance, knowledge, and motivation. *Journal of Occupational Health Psychology, 5*(3), 347-358.

Grote, G. (2015). Promoting safety by increasing uncertainty – Implications for risk management. *Safety Science, 71*, 71-79.

Grote, G. (2016). Managing uncertainty in high-risk environments. In S. Clarke, T. M. Probst, F. Guldenmund, & J. Passmore (Eds.), *The Wiley Blackwell Handbook of the Psychology of Occupational Safety and Workplace Health* (pp. 485-505). West Sussex: John Wiley & Sons Ltd.

Grote, G. (2020). Safety and autonomy: A contradiction forever? *Safety Science, 127*, 104709.

Grote, G., Zala-Mezö, E., & Grommes, P. (2003). Effects of standardization on coordination and communication in high workload situations. *Linguistische Berichte, Sonderheft, 12*, 127-155.

Hackman, J. R. (1990). *Groups that Work (and Those That Don't)*. San Francisco: Jossey-Bass.

Hale, A. R., & Borys, D. (2013). Working to rule, or working safely? Part 1: A state of the art review. *Safety Science, 55*, 207-221.

Hallgren, M., Rouleau, L., & de Rond, M. (2018). A matter of life or death: How extreme context research matters for management and organization studies. *Academy of Management Annals, 12*(1), 111-153.

Heath, C., Hindmarsh, J., & Luff, P. (2010). *Video in Qualitative Research*. London: Sage.

Heimbeck, D., Frese, M., Sonnentag, S., & Keith, N. (2003). Integrating errors into the training process: The function of error management instructions and the role of goal orientation. *Personnel Psychology, 56*, 333-361.

Hemshorn de Sanchez, C. S., Gerpott, F. H., & Lehmann-Willenbrock, N. (2022). A review and future agenda for behavioral research on leader–follower interactions at different temporal scopes. *Journal of Organizational Behavior, 43*(2), 342-368.

Heritage, J. (1987). Ethnomethodology. In A. Giddens & J. Turner (Eds.), *Social Theory Today* (pp. 224-272). Cambridge: Polity Press.

Hindmarsh, J., & Llewellyn, N. (2016). Video in sociomaterial investigations. *Organizational Research Methods, 21*(2), 412-437.

Hofmann, D. A., Burke, M. J., & Zohar, D. (2017). 100 years of occupational safety research: From basic protections and work analysis to a multilevel view of workplace safety and risk. *Journal of Applied Psychology, 102*(3), 375-388.

Hofmann, D. A., Jacobs, R., & Landy, F. (1995). High reliability process industries: Individual, micro, and macro organizational influences on safety performance. *Journal of Safety Research, 26*(3), 131-149.

Hofmann, D. A., & Stetzer, A. (1998). The role of safety climate and communication in accident interpretation: Implications for learning from negative events. *Academy of Management Journal, 41*(6), 644-657.

Hollnagel, E. (2014). *Safety-I and Safety–II: The Past and Future of Safety Management*. Farnham: Ashgate.

Horvath, D., Keith, N., Klamar, A., & Frese, M. (2022). How to Induce an Error Management Climate: Experimental Evidence from Newly Formed Teams. *Journal of Business and Psychology, 38,* 763-775.

Huang, D. T., Clermont, G., Sexton, B. J., Karlo, C. A., Miller, R. G., Weissfeld, L. A., . . . Angus, D. C. (2007). Perceptions of safety culture vary across the intensive care units of a single institution. *Critical Care Medicine, 35*(1), 165-176.

Ishak, A. W., & Williams, E. A. (2017). Slides in the tray: How fire crews enable members to borrow experiences. *Small Group Research, 48*(3), 336-364.

Jahn, J. L. S. (2016). Adapting safety rules in a high reliability context. *Management Communication Quarterly, 30*(3), 362-389.

Jahn, J. L. S. (2019). Shifting the safety rules paradigm: Introducing doctrine to US wildland firefighting operations. *Safety Science, 115*, 237-246.

Jahn, J. L. S. (2022). High reliability reflexivity. In K. N. Engemann, K. J. Engemann, & C. W. Scott (Eds.), *Organizational Risk Management: Managing for Uncertainty and Ambiguity* (pp. 81-96). Berlin: De Gruyter.

Jahn, J. L. S., Myers, K. K., & Putnam, L. L. (2020). *Metaphors of Communication in High Reliability Organizations*: Stanford University Press.

Jarrett, M., & Liu, F. (2018). ‘‘Zooming with’’: A participatory approach to the use of video ethnography in organizational studies. *Organizational Research Methods, 21*(2), 366-385.

Jarzabkowski, P., Lê, J. K., & Van de Ven, A. H. (2013). Responding to competing strategic demands: How organizing, belonging, and performing paradoxes coevolve. *Strategic Organization, 11*(3), 245-280.

Jiang, L., & Probst, T. M. (2015). The relationship between safety–production conflict and employee safety outcomes: Testing the impact of multiple organizational climates. *Work & Stress, 29*(2), 171-189.

Johnson, R. B. (1999). Examining the validity structure of qualitative research. In F. Pyrczak (Ed.), *Evaluating Research in Academic Journals* (4th ed., pp. 139-145). Glendale: Pyrczak Publishing.

Katila, J., & Raudaskoski, S. (2020). Interaction analysis as an embodied and interactive process: Multimodal, co-operative, and intercorporeal ways of seeing video data as complementary professional visions. *Human Studies, 43*(3), 445-470.

Kauffeld, S., & Lehmann-Willenbrock, N. (2012). Meetings matter: Effects of team meetings on team and organizational success. *Small Group Research, 43*(2), 130-158.

Keiser, N. L., & Arthur, W. (2022). A meta-analysis of task and training characteristics that contribute to or attenuate the effectiveness of the after-action review (or debrief). *Journal of Business and Psychology, 37*(5), 953-976.

Keiser, N. L., & Arthur, W., Jr. (2021). A meta-analysis of the effectiveness of the after-action review (or debrief) and factors that influence its effectiveness. *Journal of Applied Psychology, 106*(7), 1007-1032.

Khazanchi, S., Lewis, M. W., & Boyer, K. K. (2007). Innovation-supportive culture: The impact of organizational values on process innovation. *Journal of Operations Management, 25*(4), 871-884.

Knoblauch, H., & Schnettler, B. (2012). Videography: Analysing video data as a 'focused' ethnographic and hermeneutical exercise. *Qualitative Research, 12*(3), 334-356.

Knoblauch, H., & Tuma, R. (2011). Videography: An interpretative approach to video-recorded micro-social interaction. In E. Margolis & L. Pauwels (Eds.), *The Sage Handbook of Visual Research Methods* (pp. 414-430). London: Sage.

Knoblauch, H., Tuma, R., & Schnettler, B. (2014). *Videography: Introduction to Interpretive Videoanalysis of Social Situations*. Wiesbaden: Peter Lang.

Koenig, C. J., Wingard, L. M., Sabee, C., Olsher, D., & Vandergriff, I. (2014). Managing patient-centered communication across the Type 2 diabetes illness trajectory: A grounded practical theory of interactional sensitivity. *Journal of Applied Communication Research, 42*(3), 244-267.

Kontogiannis, T., & Malakis, S. (2013). Remaining safe by working at the edge of compliance and adaptation: Reflective practices in aviation and air traffic control. *Theoretical Issues in Ergonomics, 14*(6), 565-591.

Korpal, P., & Stachowiak-Szymczak, K. (2018). The whole picture: Processing of numbers and their context in simultaneous interpreting. *Poznan Studies in Contemporary Linguistics, 54*(3), 335-354.

Kramer, M. W. (1999). Motivation To reduce uncertainty: A reconceptualization of uncertainty reduction theory. *Management Communication Quarterly, 13*(2), 305-316.

Kreiner, G. E., Hollensbe, E. C., & Sheep, M. L. (2009). Balancing borders and bridges: Negotiating the work-home interface via boundary work tactics. *Academy of Management Journal, 52*(4), 704-730.

Krieger, J. L. (2005). Shared mindfulness in cockpit crisis situations: An exploratory analysis. *Journal of Business Communication, 42*(2), 135-167.

Kruglanski, A. W. (1989). The psychology of being 'right': The problem of accuracy in social perception and cognition. *Psychological Bulletin, 106*(3), 395-409.

Kruglanski, A. W., Peri, N., & Zakai, D. (1991). Interactive effects of need for closure and initial confidence on social information seeking. *Social Cognition, 9*(2), 127-148.

Kuenzi, M., & Schminke, M. (2009). Assembling fragments into a lens: A review, critique, and proposed research agenda for the organizational work climate literature. *Journal of Management, 35*(3), 634-717.

Langfred, C. W. (2004). Too much of a good thing? Negative effects of high trust and individual autonomy in self-managing teams. *Academy of Management Journal, 47*(3), 385-399.

Langfred, C. W., & Moye, N. A. (2004). Effects of task autonomy on performance: An extended model considering motivational, informational, and structural mechanisms. *Journal of Applied Psychology, 89*(6), 934-945.

LaPorte, T. R., & Consolini, P. M. (1991). Working in practice but not in theory: Theoretical challenges of "high-reliability organizations". *Journal of Public Administration Research and Theory, 1*(1), 19-48.

Larson, J. R., Christensen, C., Abbott, A. S., & Franz, T. M. (1996). Diagnosing groups: Charting the flow of information in medical decision-making teams. *Journal of Personality and Social Psychology, 71*, 315-330.

Lee, S., & Dalal, R. S. (2016). Climate as situational strength: Safety climate strength as a cross-level moderator of the relationship between conscientiousness and safety behaviour. *European Journal of Work and Organizational Psychology, 25*(1), 120-132.

Lehmann-Willenbrock, N., & Allen, J. A. (2018). Modeling temporal interaction dynamics in organizational settings. *Journal of Business and Psychology, 33*(3), 325-344.

Leonardi, P. M. (2015). Studying work practices in organizations: Theoretical considerations and empirical guidelines. *Annals of the International Communication Association, 39*, 253-273.

Leroy, H., Anseel, F., Dimitrova, N. G., & Sels, L. (2013). Mindfulness, authentic functioning, and work engagement: A growth modeling approach. *Journal of Vocational Behavior, 82*(3), 238-247.

Leveson, N., Dulac, N., Marais, K., & Carroll, J. (2009). Moving beyond normal accidents and high reliability organizations: A systems approach to safety in complex systems. *Organization Studies, 30*(2-3), 227-249.

Levenson, A., & Fink, A. (2017). Human capital analytics: Too much data and analysis, not enough models and business insights. *Journal of Organizational Effectiveness: People and Performance*, *4*(2), 145-156.

Liang, H., Shi, X., Yang, D., & Liu, K. (2022). Impact of mindfulness on construction workers' safety performance: The mediating roles of psychological contract and coping behaviors. *Safety Science, 146*, 105534.

Liu, F., Jarrett, M., & Maitlis, S. (2022). Top management team constellations and their implications for strategic decision making. *The Leadership Quarterly, 33(3),* 101510.

Locke, E. A. (2007). The case for inductive theory building. *Journal of Management, 33*(6), 867-890.

Luria, G. (2010). The social aspects of safety management: Trust and safety climate. *Accident Analysis & Prevention, 42*(4), 1288-1295.

Marias, K., Dulac, N., & Leveson, N. (2004). *Beyond normal accidents and high reliability organizations: The beed for an alternative approach to safety in complex systems*. Paper presented at the Engineering Systems Division Symposium, Cambridge, Massachusetts.

Martínez-Córcoles, M., & Vogus, T. J. (2020). Mindful organizing for safety. *Safety Science, 124*, 104614.

Maslow, A. H. (1943). A theory of human motivation. *Psychological Review, 50*(4), 370-396.

McKay, P. F., Avery, D. R., & Morris, M. A. (2008). Mean racial-ethnic differences in employee sales performance: The moderating role of diversity climate. *Personnel Psychology, 61*, 349-374.

Mease, J. J. (2016). Embracing discursive paradox: Consultants navigating the constitutive tensions of diversity work. *Management Communication Quarterly, 30*(1), 59-83.

Meier zu Verl, C., & Tuma, R. (2021). Video analysis and ethnographic knowledge: An empirical study of video analysis practices. *Journal of Contemporary Ethnography, 50*(1), 120-144.

Mirivel, J. C. (2008). The physical examination in cosmetic surgery: Communication strategies to promote the desirability of surgery. *Health Communication, 23*(2), 153-170.

Mirivel, J. C., & Tracy, K. (2005). Premeeting talk: An organizationally crucial form of talk. *Research on Language and Social Interaction, 38*(1), 1-34.

Mohrman, S. A., & Lawler, E. E. (2011). *Useful Research: Advancing Theory and Practice*. San Francisco: Berrett-Koehler.

Mondada, L. (2011). Understanding as an embodied, situated and sequential achievement in interaction. *Journal of Pragmatics*, *43*(2), 542-552.

Mondada, L. (2019). Practices for showing, looking, and videorecording: The interactional establishment of a common focus of attention. In E. Reber & C.

Gerhardt (Eds.), *Embodied activities in face-to-face and mediated settings: Social encounters in time and space* (pp. 63-106). Cham: Palgrave MacMillan.

Morgeson, F. P., & Humphrey, S. E. (2006). The work design questionnaire (WDQ): Developing and validating a comprehensive measure for assessing job design and the nature of work. *Journal of Applied Psychology, 91*(6), 1321-1339.

Mouratidis, A., & Michou, A. (2011). Perfectionism, self-determined motivation, and coping among adolescent athletes. *Psychology of Sport and Exercise*, *12*(4), 355-367.

Muller, H. L. (2014). A grounded practical theory reconstruction of the communication practice of instructor-facilitated collegiate classroom discussion. *Journal of Applied Communication Research, 42*(3), 325-342.

Murray, J. (2013). Critical issues facing school leaders concerning data-informed decision-making. *School Leadership & Management*, *33*(2), 169-177.

Naumann, S. E., & Bennett, N. (2000). A case for procedural justice: Development and test of a multilevel model. *Academy of Management Journal, 43*, 881-889.

Neal, A., & Griffin, M. A. (2006). A study of the lagged relationships among safety climate, safety motivation, safety behavior, and accidents at the individual and group levels. *Journal of Applied Psychology, 91*(4), 946-953.

Niemiec, C. P., Brown, K. W., Kashdan, T. B., Cozzolino, P. J., Breen, W. E., Levesque-Bristol, C., & Ryan, R. M. (2010). Being present in the face of existential threat: The role of trait mindfulness in reducing defensive responses to mortality salience. *Journal of Personality and Social Psychology, 99*(2), 344-365.

Ochs, E. (1979). Transcription as theory. In E. Ochs & B. B. Schieffelin (Eds.), *Developmental pragmatics* (pp. 43-72). New York: Academic Press.

Oliver, N., Calvard, T., & Potočnik, K. (2019). Safe limits, mindful organizing and loss of control in commercial aviation. *Safety Science, 120*, 772-780.

Orlikowski, W. J. (2007). Sociomaterial practices: Exploring technology at work. *Organization Studies, 28*(9), 1435-1448.

OrthoCarolina. (2018). Bill Heisel, Director of OrthoCarolina Motorsports, Seeks to Minimize Injuries on NASCAR's Pit Road. Retrieved from https://www.orthocarolina.com/media-center/

Ostrom, E. (2000). Collective action and the evolution of social norms. *Journal of Economic Perspectives, 14*, 137-158.

Paolillo, A., Silva, S. A., Carvalho, H., & Pasini, M. (2020). Exploring patterns of multiple climates and their effects on safety performance at the department level. *Journal of Safety Research, 72*, 47-60.

Parker, S. K., Morgeson, F. P., & Johns, G. (2017). One hundred years of work design research: Looking back and looking forward. *Journal of Applied Psychology, 102*(3), 403-420.

Perrow, C. (1984). *Normal Accidents: Living with High-Risk Technologies*. New York: Basic Books.

Perrow, C. (2014). *Complex Organizations: A Critical Essay*. Brattleboro: Echo Point Books & Media.

Petitta, L., & Martínez-Córcoles, M. (2022). A conceptual model of mindful organizing for effective safety and crisis management. The role of organizational culture. *Current Psychology*.

Petriglieri, G., Ashford, S. J., & Wrzesniewski, A. (2019). Agony and ecstasy in the gig economy: Cultivating holding environments for precarious and personalized work identities. *Administrative Science Quarterly, 64*, 124-170.

Probst, T. M. (2015). Organizational safety climate and supervisor safety enforcement: Multilevel explorations of the causes of accident underreporting. *Journal of Applied Psychology, 100*(6), 1899-1907.

Probst, T. M., Brubaker, T. L., & Barsotti, A. (2008). Organizational injury rate underreporting: The moderating effect of organizational safety climate. *Journal of Applied Psychology, 93*(5), 1147-1154.

Rae, A. (2015). *Open questions and closed minds: mapping the gaps and divisions in the safety body of knowledge.* Paper presented at the Australian Safety Critical Systems Conference.

Rae, A., Provan, D., Aboelssaad, H., & Alexander, R. (2020). A manifesto for reality-based safety science. *Safety Science, 126*, 104654.

Rasmussen, J., & Svendung, I. (2000). *Proactive Risk Management in a Dynamic Society*. Swedish Rescue Services Agency.

Ray, J. L., Baker, L. T., & Plowman, D. A. (2011). Organizational mindfulness in business schools. *Academy of Management Learning & Education, 10*(2), 188-203.

Reason, J. (1995). A systems approach to organizational error. *Ergonomics, 39*, 1708-1721.

Reason, J. (2004). Beyond the organisational accident: The need for "error wisdom" on the frontline. *Quality & Safety Health Care, 13*, 28-33.

Reiter-Palmon, R., Leone, S., Murugavel, V., & Allen, J. A. (2020). Fostering effective debriefs: The integral role of team reflexivity. In A. L. Meinecke, J. A. Allen, & N. Lehmann-Willenbrock (Eds.), *Managing Meetings in Organizations* (Vol. 20, pp. 93-109). Emerald Publishing Limited.

Renecle, M., Curcuruto, M., Lerín, F. J. G., & Marco, I. T. (2021). Enhancing safety in high-risk operations: A multilevel analysis of the role of mindful organising in translating safety climate into individual safety behaviours. *Safety Science, 138*, 105197.

Ritchie-Dunham, J. L. (2014). Mindful leadership. In A. Ie, C.T. Ngnoumen, & E. J. Langer (Eds.), *The Wiley Blackwell Handbook of Mindfulness* (pp. 443-457). Chichester: Wiley.

Roberts, K. H. (1990). Some characteristics of one type of high reliability organization. *Organization Science, 1*(2), 160-176.

Roberts, K. H., & Bea, R. (2001). Must accidents happen? Lessons from high-reliability organizations. *The Academy of Management Executive, 15*(3), 70-78.

Roberts, K. H., Stout, S. K., & Halpern, J. J. (1994). Decision dynamics in two high reliability military organizations. *Management Science, 40*, 614-624.

Robson, L. S., Clarke, J. A., Cullen, K., Bielecky, A., Severin, C., Bigelow, P. L., . . . Mahood, Q. (2007). The effectiveness of occupational health and safety

management system interventions: A systematic review. *Safety Science, 45*(3), 329-353.

Rochlin, G. I. (1989). Informal organizational networking as a crisis avoidance strategy: U.S. naval flight operations as a case study. *Industrial Crisis Quarterly, 3*, 159-176.

Rochlin, G. I. (1993). Defining high reliability organizations in practice: A taxonomic prologue. In K. H. Roberts (Ed.), *New Challenges to Organization Research: High Reliability Organizations* (pp. 11-32). New York: Macmillan.

Rochlin, G. I., LaPorte, T. R., & Roberts, K. H. (1987). The self-designing high reliability organization: Aircraft carrier flight operation at sea. *Naval War College Review, 40*, 76-90.

Rodgers, B. L., & Cowles, K. V. (1993). The qualitative research audit trail: A complex collection of documentation. *Research in Nursing & Health, 16*(3), 219-226.

Ruedy, N. E., & Schweitzer, M. E. (2010). In the moment: The effects of mindfulness on ethical decision making. *Journal of Business Ethics, 95*(1), 73-87.

Ryan, N. (2018, March 22). Rare peek into race purses, payouts under charter system. Retrieved from https://nascar.nbcsports.com/

Sawyer, T., Eppich, W., Brett-Fleegler, M., Grant, V., & Cheng, A. (2016). More than one way to debrief: A critical review of healthcare simulation debriefing methods. *Simulation in Healthcare*, *11*(3), 209-217.

Schatzman, L., & Strauss, A. L. (1973). *Field Research*. Englewood Cliffs: Prentice-Hall.

Schegloff, E. A. (1992). Repair after next turn: The last structurally provided defense of intersubjectivity in conversation. *American Journal of Sociology, 97*(5), 1295-1345.

Schegloff, E. A., & Sacks, H. (1973). Opening up closings. *Semiotica, 8*(4), 289-327.

Schippers, M. C., Edmondson, A. C., & West, M. A. (2014). Team reflexivity as an antidote to team information-processing failures. *Small Group Research, 45*(6), 731-769.

Schmidt, A. M., & DeShon, R. P. (2009). Prior performance and goal progress as moderators of the relationship between self-efficacy and performance. *Human Performance, 22*(3), 191-203.

Schneider, B., Ehrhart, M. G., & Macey, W. H. (2011). Perspectives on organizational climate and culture. In *APA Handbook of Industrial and Organizational Psychology, Vol 1: Building and Developing the Organization* (pp. 373-414). Washington: American Psychological Association.

Schneider, B., Gonzalez-Roma, V., Ostroff, C., & West, M. A. (2017). Organizational climate and culture: Reflections on the history of the constructs in the Journal of Applied Psychology. *Journal of Applied Psychology, 102*(3), 468-482.

Schneider, B., Salvaggio, A. N., & Subirats, M. (2002). Climate strength: A new direction for climate research. *Journal of Applied Psychology, 87*(2), 220-229.

Schneider, B., White, S., & Paul, M. (1998). Linking service climate and customer perceptions of service quality: Test of a causal model. *Journal of Applied Psychology, 83*, 150-163.

Schulman, P. R. (1993). The negotiated order of organizational reliability. *Administration and Society, 25*, 353–372.

Scott, A. L., Howe, W. T., & Bisel, R. (2023). Reviewing high reliability team (HRT) scholarship: A 21st century approach to safety. *Small Group Research*, 1-38.

Scott, C. W., Allen, J. A., Bonilla, D., & Baran, B. E. (2013). Ambiguity and freedom of dissent in post incident discussion. *Journal of Business Communication, 50*(4), 383-402.

Scott, C. W., Allen, J. A., Rogelberg, S. G., & Kello, A. (2015). Five theoretical lenses for conceptualizing the role of meetings in organizational life. In J. A. Allen, N. Lehmann-Willenbrock, & S. G. Rogelberg (Eds.), *The Cambridge Handbook of Meeting Science* (pp. 20-46): Cambridge University Press.

Scott, C. W., & Trethewey, A. (2008). Organizational discourse and the appraisal of occupational hazards: Interpretive repertoires, heedful interrelating, and identity at work. *Journal of Applied Communication Research, 36*(3), 298-317.

Seifert, C., & Hutchins, E. (1992). Error as opportunity: Learning in a cooperative task. *Human-Computer Interaction, 7*, 409-435.

Senge, P. (1990). *The Fifth Discipline: The Art and Practice of the Learning Organization*. New York: Doubleday/Currency.

Shah, S. K., & Corley, K. G. (2006). Building better theory by bridging the quantitative–qualitative divide. *Journal of Management Studies, 43*(8), 1821-1835.

Shaw, R. (2015). Big data and reality. *Big Data and Society, 2*(2).

Shea, T., De Cieri, H., Vu, T., & Pettit, T. (2021). How is safety climate measured? A review and evaluation. *Safety Science, 143*, 105413.

Simon, H. A. (1991). Bounded Rationality and Organizational Learning. *Organization Science, 2*(1), 125-134.

Sitkin, S. B., & Sutcliffe, K. M. (1994). Distinguishing control from learning in total quality management: A contingency perspective. *Academy of Management Review, 13*(3), 537-564.

Smets, M., Burke, G., Jarzabkowski, P., & Spee, P. (2014). Charting new territory for organizational ethnography: Insights from a team-based video ethnography. *Journal of Organizational Ethnography*, *3*(1), 10-26.

Srivastava, P., & Hopwood, N. (2009). A practical iterative framework for qualitative data analysis. *International Journal of Qualitative Methods, 8*(1), 76-84.

Stephanian, D., Sawyer, T., Reid, J., Stone, K., Roberts, J., Thompson, D., & Pendergrass, T. (2015). Synchronous mobile audiovisual recording technology (SMART) cart for healthcare simulation debriefing. *Simulation & Gaming, 44*(6), 857-867.

Sterman, J. J. (2000). *Business Dynamics: Systems Thinking and Modeling for a Complex World*. New York: McGraw Hill.

Stobierski, T. (2019). The advantages of data-driven decision-making. Retrieved from https://online.hbs.edu/

Strauss, A. L., & Corbin, J. (1990). *Basics of Qualitative Research: Grounded Theory Procedures and Techniques*. London: Sage.

Sutcliffe, K. M. (2011). High reliability organizations (HROs). *Best Practice & Research Clinical Anaesthesiology, 25*(2), 133-144.

Sutcliffe, K. M. (2018). Mindful organizing. In R. Ramanujam & K. H. Roberts (Eds.), *Organization for Reliability: A Guide for Research and Practice*. Stanford: Stanford University Press.

Sutcliffe, K. M., Vogus, T. J., & Dane, E. (2016). Mindfulness in organizations: A cross-level review. *Annual Review of Organizational Psychology and Organizational Behavior, 3*(1), 55-81.

Szulanski, G., Cappetta, R., & Jensen, R. J. (2004). When and how trustworthiness matters: Knowledge transfer and the moderating effect of causal ambiguity. *Organization Science, 15*(5), 600-613.

Tannenbaum, S. I., & Cerasoli, C. P. (2013). Do team and individual debriefs enhance performance? A meta-analysis. *Human Factors, 55*(1), 231-245.

Tatarevic, B. (2022, April 5). Next-gen analysis: Hamlin's Richmond victory comes into focus by examining pit strategies, new choreography. Retrieved from https://sports.yahoo.com/

Thackaberry, J. A. (2004). "Discursive opening" and closing in organisational self-study. *Management Communication Quarterly, 17*(3), 319-359.

Thomas, G. (2010). Doing case study: Abduction not induction, phronesis not theory. *Qualitative Inquiry, 16*(7), 575-582.

Thompson, J. D. (1967). *Organizations in Action: Social Science Bases of Administrative Theory*. New York: McGraw-Hill.

Tracy, K. (1995). Action-implicative discourse analysis. *Journal of Language and Social Psychology, 14*(1-2), 195-215.

Tracy, K. (1997). *Colloquium: Dilemmas of Academic Discourse*. Norwood: Ablex.

Tracy, K. (2003). *Action-implicative discourse analysis: A communication approach to analyzing talk.* Paper presented at the Annual Symposium about Language and Society, Austin, Texas.

Tracy, K. (2005). Reconstructing communicative practices: Action-implicative discourse analysis. In K. L. Fitch & R. E. Sanders (Eds.), *Handbook of Language and Social Interaction*. Mahwah: Erlbaum.

Tracy, K., & Anderson, D. L. (1999). Relational Positioning Strategies in Police Calls: A Dilemma. *Discourse Studies, 1*(2), 201-225.

Tracy, K., & Craig, R. T. (2010). Studying interaction in order to cultivate communicative practices: Action-implicative discourse analysis. In J. Streeck (Ed.), *New Adventures in Language and Interaction* (pp. 145-166). Philadelphia: John Benjamins.

Tracy, K., & Hodge, D. (2018). Judge discourse moves that enact and endanger procedural justice. *Discourse & Society, 29*(1), 63-85.

Tracy, K., & Muller, H. (2001). Diagnosing a school board's interactional trouble: Theorizing problem formulating. *Communication Theory, 11*(1), 84-104.

Tracy, S. J. (2002). When questioning turns to face threat: An interactional sensitivity in 911 call taking. *Western Journal of Communication, 66*(2), 129-157.

Tracy, S. J. (2010). Qualitative quality: Eight “big-tent” criteria for excellent qualitative research. *Qualitative Inquiry, 16*(10), 837-851.

Tracy, S. J. (2013). *Qualitative Research Methods: Collecting Evidence, Crafting Analysis, Communicating Impact*. Malden: Wiley-Blackwell.

Tuma, R. (2012). The (re)construction of human conduct: “Vernacular video analysis”. *Qualitative Sociology Review, 8*(2), 152-163.

Tutt, D., & Hindmarsh, J. (2011). Reenactments at work: Demonstrating conduct in data sessions. *Research on Language and Social Interaction, 44*(3), 211-236.

Van de Ven, A. H., Ganco, M., & Hinings, C. R. (2013). Returning to the frontier of contingency theory of organizational and institutional designs. *The Academy of Management Annals, 7*(1), 393-440.

van Dalen, A. S. H. M., van Haperen, M., Swinkels, J. A., Grantcharov, T. P., & Schijven, M. P. (2021). Development of a model for video-assisted postoperative team debriefing. *Journal of Surgical Research, 257*, 625-635

van Dyck, C., Frese, M., Baer, M., & Sonnentag, S. (2005). Organizational error management culture and its impact on performance: A two-study replication. *Journal of Applied Psychology, 90*, 1228-1240.

Van Dyne, L., & Pierce, J. L. (2004). Psychological ownership and feelings of possession: Three field studies predicting employee attitudes and organizational citizenship behavior. *Journal of Organizational Behavior*, *25*(4), 439-459.

Van Maanen, J. (1979). The fact of fiction in organizational ethnography. *Administrative Science Quarterly, 24*, 539-550.

Vendelø, M. T., & Rerup, C. (2020). Collective mindfulness in a regenerating organization: Ethnographic evidence from Roskilde festival. *Safety Science, 123*, 104537.

Vikkelsø, S. (2007). Description as intervention: Engagement and resistance in actor-network analyses. *Science as Culture*, *16*(3), 297-309.

Vilela, J., Castro, J., Martins, L. E. G., & Gorschek, T. (2017). Integration between requirements engineering and safety analysis: A systematic literature review. *Journal of Systems and Software, 125*, 68-92.

Vogus, T. J., Cooil, B., Sitterding, M., & Everett, L. Q. (2014). Safety organizing, emotional exhaustion, and turnover in hospital nursing units. *Medical Care, 52*(10), 870-876.

Vogus, T. J., & Sutcliffe, K. M. (2007a). The impact of safety organizing, trusted leadership, and care pathways on reported medication errors in hospital nursing units. *Medical Care, 45*(10), 997-1002.

Vogus, T. J., & Sutcliffe, K. M. (2007b). The safety organizing scale: Development and validation of a behavioral measure of safety culture in hospital nursing units *Medical Care, 45*(1), 46-54.

Vogus, T. J., & Sutcliffe, K. M. (2012). Organizational mindfulness and mindful organizing: A reconciliation and path forward. *Academy of Management Learning & Education, 11*(4), 722-735.

Vogus, T. J., & Welbourne, T. M. (2003). Structuring for high reliability: HR practices and mindful processes in reliability-seeking organizations. *Journal of Organizational Behavior, 24*(7), 877-903.

Vroom, V. H. (1964). *Work and Motivation*. Oxford: Wiley.

Wall, T. D., Cordery, J. L., & Clegg, C. W. (2002). Empowerment, performance, and operational uncertainty: A theoretical integration. *Applied Psychology: An International Review, 51*(1), 146-169.

Walters, S. (2019, August 21). Bristol motor speedway penalty report: August 2019. Retrieved from https://racingnews.co/

Wang, X., Guchait, P., & Pasamehmetoglu, A. (2020). Tolerating errors in hospitality organizations: relationships with learning behavior, error reporting and service recovery performance. *International Journal of Contemporary Hospital Management, 32*(8), 35-55.

Weick, K. E. (1976). Educational organizations as loosely coupled systems. *Administrative Science Quarterly, 21*(1), 1-19.

Weick, K. E. (1979). *Social Psychology of Organizing*. Reading: Addison Wesley.

Weick, K. E. (1987). Organizational culture as a source of high reliability. *California Management Review, 29*(2), 112-127.

Weick, K. E. (1988). Enacted sensemaking in crisis situations. *Journal of Management Studies, 25*(4), 305-317.

Weick, K. E. (1990). The vulnerable system: An analysis of the Tenerife Air Disaster. *Journal of Management, 16*(3), 571-593.

Weick, K. E. (1993). The collapse of sensemaking in organizations: The Mann Gulch disaster. *Administrative Science Quarterly, 38*(4), 628-652.

Weick, K. E. (1995). *Sensemaking in organizations*. Thousands Oaks: Sage.

Weick, K. E. (2011). Organized sensemaking: A commentary on processes of interpretive work. *Human Relations, 65*(1), 141-153.

Weick, K. E., & Roberts, K. H. (1993). Collective mind in organizations: Heedful interrelating on flight decks. *Administrative Science Quarterly, 38*(3), 357-381.

Weick, K. E., & Sutcliffe, K. M. (2001). How to manage mindfully. In *Managing the Unexpected: Assuring High Performance in an Age of Complexity* (pp. 149-173). New York: Jossey-Bass.

Weick, K. E., & Sutcliffe, K. M. (2006). Mindfulness and the quality of organizational attention. *Organization Science, 17*(4), 514-524.

Weick, K. E., & Sutcliffe, K. M. (2007). *Managing the Unexpected: Resilient Performance in an Age of Uncertainty*. San Francisco: Jossey-Bass.

Weick, K. E., & Sutcliffe, K. M. (2015). *Managing the Unexpected: Sustained Performance in a Complex World*. Hoboken: John Wiley & Sons.

Weick, K. E., Sutcliffe, K. M., & Obstfeld, D. (1999). Organizing for high reliability: Processes of collective mindfulness. In R. S. Sutton & B. M. Staw (Eds.), *Research in Organizational Behavior* (pp. 81-123). Stanford: Jai Press.

Weick, K. E., Sutcliffe, K. M., & Obstfeld, D. (2005). Organizing and the process of sensemaking. *Organization Science, 16*(4), 409-421.

Weick, K. E., Sutcliffe, K. M., & Obstfeld, D. (2008). Organizing for high reliability: Processes of collective mindfulness. *Crisis Management, 3*, 81-123.

Wertman, G., Gaston, R.G., & Heisel, W. (2016). Upper extremity injuries in NASCAR drivers and pit crew: An epidemiological study. *Orthopaedic Journal of Sports Medicine*, *4*(2).

Williams, E. A., & Ishak, A. W. (2017). Discourses of an organizational tragedy: Emotion, sensemaking, and learning after the Yarnell Hill fire. *Western Journal of Communication*, 1-19.

Wilson, D. S., Talsma, A., & Martyn, K. (2011). Mindful staffing: A qualitative description of charge nurses' decision-making behaviors. *Western Journal of Nursing Research, 33*(6), 805-824.

Wolcott, H. (1995). Making a study "more ethnographic". In J. Van Maanen (Ed.), *Representation in Ethnography* (pp. 79-111). Thousand Oaks: Sage.

Yin, R. K. (2003). *Case Study Research: Design and Methods*. Los Angeles: Sage.

Yoerger, M., Allen, J. A., & Crowe, J. (2018). The impact of premeeting talk on group performance. *Small Group Research, 49*(2), 226-258.

Zhang, J., & Wu, C. (2014). The influence of dispositional mindfulness on safety behaviors: A dual process perspective. *Accident Analysis & Prevention, 70*, 24-32.

Zhang, Y., Waldman, D. A., Han, Y. L., & Li, X. B. (2015). Paradoxical leader behaviors in people management: Antecedents and consequences. *Academy of Management Journal, 58*(2), 538-566.

Zipf, G. K. (1965). *Human Behavior and the Principle of Least Effort*. New York: Hafner Publishing.

Zohar, D. (1980). Safety climate in industrial organizations: Theoretical and applied implications. *Journal of Applied Psychology, 65*(1), 96-102.

Zohar, D. (2000). A group-level model of safety climate: Testing the effect of group climate on microaccidents in manufacturing jobs. *Journal of Applied Psychology, 85*(4), 587-596.

Zohar, D. (2008). Safety climate and beyond: A multi-level multi-climate framework. *Safety Science, 46*(3), 376-387.

Zohar, D. (2010). Thirty years of safety climate research: Reflections and future directions. *Accident Analysis & Prevention, 42*(5), 1517-1522.

Zohar, D., & Erev, I. (2007). On the difficulty of promoting workers' safety behaviour: Overcoming the underweighting of routine risks. *International Journal of Risk Assessment and Management, 7*(2), 122-136.

Zohar, D., & Hofmann, D. A. (2012). Organizational culture and climate. In S. W. J. Kozlowski (Ed.), *The Oxford Handbook of Industrial and Organizational Psychology*. Oxford: Oxford University Press.

Zohar, D., Huang, Y.-h., Lee, J., & Robertson, M. M. (2015). Testing extrinsic and intrinsic motivation as explanatory variables for the safety climate-safety performance relationship among long-haul truck drivers. *Transportation Research Part F: Traffic Psychology and Behaviour, 30*, 84-96.

Zohar, D., & Luria, G. (2003). The use of supervisory practices as leverage to improve safety behavior: A cross-level intervention model. *Journal of Safety Research, 34*(5), 567-577.

Zohar, D., & Luria, G. (2004). Climate as a social-cognitive construction of supervisory safety practices: Scripts as proxy of behavior patterns. *Journal of Applied Psychology, 89*(2), 322-333.

Zohar, D., & Luria, G. (2005). A multilevel model of safety climate: Cross-level relationships between organization and group-level climates. *Journal of Applied Psychology, 90*(4), 616-628.

Zohar, D., & Luria, G. (2010). Group leaders as gatekeepers: Testing safety climate variations across levels of analysis. *Applied Psychology, 59*(4), 647-673.

Zohar, D., & Polachek, T. (2014). Discourse-based intervention for modifying supervisory communication as leverage for safety climate and performance improvement: A randomized field study. *Journal of Applied Psychology, 99*(1), 113-124.

Zohar, D., & Tenne-Gazit, O. (2008). Transformational leadership and group interaction as climate antecedents: A social network analysis. *Journal of Applied Psychology, 93*(4), 744-757.

APPENDIX A: SEMI-STRUCTURED INTERVIEW PROTOCOL

Protocol 1: Triple R Strength and Conditioning Coach

1. How long have you worked for Triple R?
    a. What did you do before?
    b. How did you become involved in strength and conditioning?

2. How frequently are you training/interacting with pit crew members?

3. How would you describe the goals of the strength and conditioning program at Triple R?

4. Given these goals, how would you say you motivate others to meet them?
    a. What challenges do you believe your trainees face?
    b. What challenges do you believe you face in motivating others to meet these goals?
    c. What approaches, if any, do you use to manage these challenges?

5. Given your goals and your strategies to manage and motivate others to achieve them, how do you measure success?
    a. How do you measure failure?
    b. How would you say success and failure in your terms align with those in, say, Tom's terms?

6. Are there other feedback loops about training and performance that you share with those like Tom?

7. Tell me about "durability." How do you define this?
    a. How do you relay to your trainees the importance of durability?
    b. Does anything in pit crew members' training and performance compete with durability? If so, how do you combat that?

8. Would you say there are common risks that might be over-tolerated in fitness and conditioning in this sport?

9. Do respect and trust play a role in anything you've discussed today?

10. Is there anything else you want to tell us that I've not thought to ask you about?

Protocol 2: Triple R Performance Director

1. How long have you worked for Triple R?
    a. What did you do before?

2. Can you tell me about the history of film reviews at Triple R?
    a. How did you become involved in running film reviews?

3. When do you, as a facilitator, know that you have succeeded in running the meeting well?

4. What would you say are the most important goals you have for these meetings?
    a. Why do you think these goals are so important?
    b. Do these goals ever conflict? If so, how?
    c. What do you see as some common barriers to success in running good film reviews that accomplish these goals?
    d. How would I, as an observer, recognize these barriers? What do they look and sound like?
    e. What do you try to do to overcome the barriers? How successful is that tactic?

5. Are misunderstandings an issue in these meetings?
    a. What do you think are the most important factors contributing to these misunderstandings?
    b. Do you think others see these misunderstandings in a similar way?

6. We've noticed that pit crew members don't seem to hesitate to admit mistakes. We've also seen little or no blaming or finger pointing in the meetings. Are those accurate observations?
    a. How do you want pit crew members to talk about mistakes in film review meetings?
    b. How do you not want them to talk about mistakes? Why?

7. In your opinion, what are some ways to be more successful in emphasizing what has been learned from a film review?
    a. What are some ways that may be less successful in emphasizing what has been learned from a film review?

8. When a member of a pit crew wants to put some new solution into place based on a film review discussion, how is that accomplished?

9. How do pit crews deal with unexpected disruptions to their workflow?
    a. What about more dangerous or risky moments? How do they cope?

10. Are there written team rules that pit crew members are expected to live by? Or, are they all unwritten?
    a. Where does each set come from?
    b. How, and when, is each enforced?

11. These pit crews, particularly veteran ones, seem to stay upbeat and focused as a rule. How would you say team members feel about and respond to negativity?

12. Is there a line between types of errors for which individuals on a certain pit crew should take the heat and the types for which the team should take the heat together?

13. When is it important to call a particular pit crew member out, rather than leaving them to take the responsibility themselves?
    a. How does this change as a team matures and gains experience?

14. Is there anything else you want to tell us that we've not thought to ask you about?

APPENDIX B: SAMPLE FIELD NOTES

The meeting started a little late (it's almost 2:40pm), but still relatively close to the expected start time (2:30pm). Six pit crew members (referred to throughout as 1, 2, 3, 4, 5, 6, and later, 7) are already seated at the conference table in the room. Tom introduces me to the group, and I sit down in a chair behind the conference table. In this meeting, the pit crew reviewed about six or seven clipped video recordings of the previous weekend's race. Some videos were from different points of view from some of the others.

Tom sits at the head of the table, with 1 through 6 around the table. 1 through 4 are on one side of the conference table, closer to me, and 5 and 6 are on the opposite side of the conference table. The projector screen is about 20 feet away from me, and a bit closer to all others – I'm in the furthest corner from the front of the room. There are a lot of papers scattered across the table, and 1 through 6 tend to have at least one or two papers that they're referring to as they watch the videos play. Tom has a laptop in front of him, which he uses only to navigate to a new video file to play. For all of the distracting items in front of them, the group maintains attention and focuses discussion rather well. That, and there's only 20 or so minutes left before this group is off to practice. I guess that's what we get for a late start.

As the first video plays, most all are paying attention to the video for a closer look at the technical issues, things that can be improved upon, or things that went well. There's a mixture of subtle laughter, then silence, then back to a little chuckle from time to time as Tom goes through each video.

Tom critiques the behavior of 5 that he sees in the video. "We got to do this *now"* he says, and 5 nods. I figure Tom's emphasis on "now" relays a sense of urgency. This is a sport where timing is everything, after all. 3 chimes in with his comments and observations on what Tom just addressed. As this exchange is taking place, most all others in the room are paying attention to the video on the screen ahead for a closer look at the technical issue in question, and they keep watching this video a few times in silence.

That is, until 2 comments excitedly: "He's throwing at your feet!," perhaps referring to where the tire was going in the recorded video. "See! You pulled instead of pushed," 2 directs his comment more directly at 4. Tom comments on that point and adds that there's no need to throw the tire. 2 and 4 start to resolve the issue. 4 explains why he was kicking some items out of the way, which might explain why he threw what he did. 2 understands, but is still giving some critique that might have improved that problem and 2's behavior in the moment that was recorded.

While all of this takes place, 5 and 6 are quiet – as are 1 and 3. Tom continues to track back the video in question, and then asks everyone if they're ready to move on to the next. This description is rather characteristic of most of the meeting time. 5 and 6 tend to be quieter overall than 1 through 4 on the other side of the table.

At this point, I'm questioning whether some of these members of the pit crew are speaking a little less than usual, or less audibly, for a reason. It seems to me that they're trying to keep things to themselves. I'm unsure as to whether it's my presence, or it's just

how they carry out these meetings. After all, they're having to pay very close attention to what seems to an outsider as minute details – maybe this requires focus and silence.

I have trouble making out exactly the comments and critiques they're making to each other across the table. I'm unsure as to whether it's that I cannot hear well, that they are being purposefully quiet, or that I am that unfamiliar with their lingo at the start of this first observation that nothing is standing out to me as it would if I could "speak their language." Nonetheless, the noise level in the room was still on the low side.

Tom pulls up the next video. This video is a point-of-view of a pit crew member that drills. It's unclear to me at this point which member in the room that this video captures. I'd say that I'm unfamiliar enough at the start of this meeting to not know which videos refer to which members or to know if these videos are just the same performance from different points of view or several performances after the car takes a few more laps. Tom comments on the point-of-view video first with "Be careful of the one arm pull." He's mentioning something to 6, I think. 1 chimes in, but is still off to the side, and turns to Tom, and asks if they've "talked about the stop." Tom says that he doesn't go to those meetings and that he'd follow up.

The silence takes over the room again as Tom tracks the video through a few points, rewinding and fast-forwarding here and there. In that time I notice that 1 through 6 are sitting in very laid back positions in their chairs around the conference table. Some have their arms stretched over their heads, and many of them are taking up as much space as possible without being too far away from the conference table and from whoever they're sitting next to. At the same time, 1 through 6 mumble a few things to each other. It tends to be that 1 and 3, or 2 and 3, or 2 and 4, or 3 or 4 are grumbling a jab or snide comment that amounts to a critique about their own performance, and then 5 and 6 overhear and chuckle. Quick exchanges among 1 through 4 amount to light chuckles here and there, too.

The video comes to an end, and Tom then asks the group "So, how'd we do?" It would seem that this is a rhetorical question, as 4 responds quickly with, "Not good." He says this as he looks down at the statistics reported on the one page he holds in his hand. I do not notice much eye contact among 1 through 6 to anyone at the table.

Before moving on to the next video, 1 confirms with Tom that the next set of videos don't pertain to him. 1 then gets up to leave, but before leaving the conference room asks if there's anything else to be covered in this session that anyone else *not* present already would have to be present for. Tom acknowledges, a couple members gesture that they've heard 1, and someone might have responded to the question – but it wasn't audible.

Tom pulls up the next video from his laptop. 2 through 6 all still glance at the video and their paper handouts. At this point I realize that the members refer to cars by their racing numbers, as they keep talking about one number in particular that I ultimately notice appears on the car in the video. I notice, too, that it's quiet enough in the room to hear the music playing next door in the mechanic garage-like floor psace. Some kind of classic rock. Tom then breaks the silence and mentions "scooping and going" in response to what appears to be happening in the video. The group directs their comments there. At this point, a new member, 7, enters from next door (where the music is coming from). Tom again tracks through the video to look more closely at 3's behavior. I presume 3 is the one whose "scooping and going."

APPENDIX C: RECRUITMENT EMAIL

Hello,

Our contacts at UNC Charlotte would like to learn more about your work with *Roaring Road Racing* and with your team. They are interested in the role of film reviews in your pit crew's performance. What is most integral to this research is *your* perspective.

Participation will involve three components:

- One questionnaire before select film review sessions *(Time commitment: 10 to 15 minutes)*
- One questionnaire directly after select film reviews *(Time commitment: 10 to 15 minutes)*
- Video recordings of select film review sessions *(Time commitment: length of film review)*

Please note that any and all data collected by the research team will remain secure and confidential. This means that the researchers will adhere to strict guidelines for anonymity and protection of *Roaring Road Racing*'s and your rights, and that under no circumstances will they report any specific information that divulges *Roaring Road Racing*'s intellectual property.

If you are interested in participating, you will soon be directed to more information by members of the research team.

Regards,

Tom

Roaring Road Racing Performance Director

APPENDIX D: CONSENT FORM

UNC CHARLOTTE
Belk College of Business and College of Liberal Arts & Sciences
Organizational Science
The University of North Carolina at Charlotte
9201 University City Boulevard
Charlotte, NC 28223-001

CONSENT TO PARTICIPATE IN FILM REVIEW RECORDINGS

"Film Reviews and Pit Crew Performance"

Cliff Scott, PhD

Krista Engemann, Doctoral Candidate

You are being asked to participate in a research study. This form provides you with information about the study. You will also receive a copy of this form to keep for your reference. The Principal Investigators or their representatives will provide you with any additional information that may be needed and answer any questions you may have.

Read the information below and ask questions about anything you do not understand before you decide to take part. Your participation is entirely voluntary, and you can refuse to participate or withdraw at any time without penalty or loss of benefits to which you are otherwise entitled.

What is the purpose of the study? This study will examine the role of film reviews in pit crew performance. Although film reviews likely help pit crew members avoid mistakes during future races, we do not necessarily know if this is true. Not only is there very little research on film reviews, but the focus of this research is of clear importance to your and your pit crew's performance. This study will focus on group norms and other behaviors that may precede and/or result from film review interventions.

What will be done if you agree to participate? Your participation in the research at large will involve three components, including (1) a questionnaire before select film review sessions, (2) a questionnaire directly after select film review session, and (3) video recordings of select film review sessions. ***This document outlines the details of your participation in video recordings only.***

By consenting to participate, you will be recorded participating as usual in select film reviews. A camera will be set up in the conference room where film reviews are held. The

camera will be unobtrusive with respect to the size and set-up of the conference room, but the camera will be visible to you. A red light on the device will also indicate if the camera is recording. Not all film reviews will be recorded during the season.

There is a chance you might be contacted xxxx—xxxx after select film reviews have been recorded to participate in a brief discussion with one of the researchers. This process will allow the researchers to discuss preliminary results with you and to determine whether these results resonate with your experience. This discussion will be conducted in person or over the phone and should last around 15 minutes.

By consenting to being recorded, and pending that you are not selected for a follow-up discussion, you can expect to expend no additional time outside of your workday participating in this portion of the study.

What are the possible discomforts and risks? The likelihood of possible discomfort or risk occurring is rare. Not only is this because of the way that your confidentiality and privacy will be protected (see below), but because the topics of discussion during film reviews are based on publicly viewable performance as well as publicly available performance data. Any discomfort in being recorded during film reviews is also ameliorated by the transparency of the technology; there will be only one camera recording the select film reviews, and the camera will not be present in the room when those select film reviews are not taking place.

How will your privacy and confidentiality be protected? Your participation will not be connected to your identity. All names and likeness of people, departments, places, etc. will be anonymized in transcripts and recordings before analysis. Pseudonyms will also be used for the organization and all participants. All recordings will be destroyed immediately after analysis.

Your research records will not be released without your consent unless required by law or a court order. Your records may be viewed by the Institutional Review Board, but the confidentiality of your records will be protected to the extent permitted by law. The data resulting from your participation may be used in publications and/or presentations, but your identity will never be disclosed.

What are the possible direct benefits? While you may receive the personal satisfaction of having helped to advance organizational science and evidence-based practice, you can anticipate that your participation will help evaluate and support the practices that your organization uses to protect you and your colleagues at work.

Will there be any costs related to the research? None, other than the contribution of your time.

If you do not want to take part in this study, what other options are available to you? Your participation in this study is entirely voluntary. You are free to refuse to be in the study or to withdraw from the study at any time. Your refusal will not influence current or future relationships with UNC Charlotte or your organization.

Who can answer my questions about my rights as a participant? If you have questions about your rights as a research subject, or if you have complaints, concerns, or questions about the research, you may contact the UNCC Institutional Review Board at 704-687-1871 or contact them via email at uncc-irb@uncc.edu.

How can you withdraw from this research study? If you wish to stop your participation for any reason, please contact Krista Engemann at kengeman@uncc.edu or tell the research personnel.

Consent to Participate

You have been informed about this study's purpose, procedures, possible benefits and risks. You have been given the opportunity to ask questions before you decide to participate, and you have been told that you can ask other questions at any time.

Note that this document details information that is specific to video recordings. By signing this document, you are agreeing to be recorded during select film reviews. Be sure that you understand what the study is about before you sign.

You will receive a copy of this document for your records. If you have any questions about the study after you sign this document, you can contact the study team using the information provided above.

I understand what the study is about and my questions so far have been answered.
I agree to take part in this study.

_____

Name (PRINT)

_____

Signature Date

APPENDIX E: PARTICIPANT INFORMATION

Pseudonym	**Position or Role**	**Stock Car**	**Series**
Brian	Fueler	*337*	Premier
Bruno	Jackman	*337*	Premier
Daniel	Tire Carrier	*337*	Premier
Mac	Rear Tire Changer	*337*	Premier
Reggie	Front Tire Changer	*337*	Premier
Blake	Jackman	*408*	Premier
Ian	Front Tire Changer	*408*	Premier
Mike	Rear Tire Changer	*408*	Premier
Vince	Fueler	*408*	Premier
Walker	Tire Carrier	*408*	Premier
Felix	Jackman	*506*	Developmental / Premier Back-up
Gabe	Tire Carrier	*506*	Developmental / Premier Back-up
Liam	Fueler	*506*	Developmental / Premier Back-up
Mason	Front Tire Changer	*506*	Developmental / Premier Back-up
Wyatt	Rear Tire Changer	*506*	Developmental / Premier Back-up
Nathan	Pit Operations Lead	*337* (Back-up)	Premier Back-up
Tom	Performance Director	N/A	N/A
Charlie	Strength and Conditioning Coach	N/A	N/A

Note. Pit crews regularly refer to their team by the number painted on the stock car that they manage. Moreover, their mention of other pit crews is often in reference to the numbers those stock cars carry. To preserve anonymity, the stock car numbers listed in this table or elsewhere in the manuscript do not exist in professional American stock car racing. The strength and conditioning coach was not a participant in the debriefs under study, but he was involved in the ethnographic investigation of the research site.

APPENDIX F: SUMMARY OF THE DATASET

Debriefs		Stretches			Sequences		
ID	Time	#	Time	Average	#	Time	Average
1	32:02	12	21:30	01:47	26	20:55	0:48
2	24:14	6	13:35	02:15	14	12:15	0:52
3	19:46	5	11:20	02:16	10	11:08	01:06
4	22:51	6	14:04	02:20	14	13:58	00:59
5	23:09	5	13:18	02:39	15	13:18	00:53
6	32:51	7	20:33	02:56	21	20:03	00:57
7	32:10	7	23:46	03:23	25	23:29	00:56
8	24:04	7	16:57	02:25	18	16:30	00:55
9	25:38	8	17:58	02:14	19	17:38	00:55
10	30:17	10	20:38	02:03	23	18:35	00:48
11	23:54	6	13:15	02:12	20	12:45	00:38
12	24:55	6	14:04	02:20	15	13:38	00:54
13	13:08	4	07:54	01:58	9	07:54	00:52
14	08:13	4	03:11	00:47	5	03:11	00:38
15	31:52	7	23:17	03:19	22	23:14	01:03
16	23:33	4	06:37	01:39	9	06:37	00:44
17	25:27	8	19:50	02:28	17	19:46	01:09
18	32:49	9	22:13	02:28	26	20:49	00:48
19	06:42	2	02:51	01:25	5	02:51	00:34
20	13:57	4	06:05	01:31	5	06:05	01:13
21	29:32	8	18:27	02:18	20	18:21	00:55
22	26:42	7	13:02	01:51	17	13:00	00:45
23	24:52	4	12:11	03:02	12	10:41	00:53
24	21:31	5	09:11	01:50	9	09:11	01:01
25	24:22	5	16:23	03:16	18	16:15	00:54
26	23:25	5	11:08	02:13	9	11:02	01:13
27	21:30	5	07:34	01:30	6	07:34	01:15
28	13:30	6	10:18	01:43	14	10:04	00:43
29	38:25	10	07:27	00:44	13	07:27	00:34
Average	23:59	182		02:12	436		00:53

Note. Each recorded session has an ID number (1 through 29). The number ("#") of stretches and sequences available for interpretation for that session are listed from left to right. "Time" and "Average" refer to the length of the recorded session, stretch, or sequence in terms of minutes and seconds (MM:SS). For stretches and sequences, "Time" values are cumulative.

APPENDIX G: REPRESENTATION OF DEBRIEFS RECORDED BY PIT CREW ACROSS THE DURATION OF THE RACING SEASON

		Pit Crew		
		337	*408*	*506*
Duration of Racing Season	February through April	22%	20%	33%
	May through June	14%	43%	50%
	July through August	13%	13%	14%
	September through October	22%	22%	33%
	November	100%	100%	100%

Note. Values represent the percentage of debriefs recorded/analyzed of the (approximate) total number of debriefs that took place during the racing season. Refer to Appendix E for participant information according to pit crew (i.e., *337*, *408*, *506*).

APPENDIX H: SAMPLE MEMO

The pit crew is dismayed by their rank in this meeting; their body language also reads as defensive (arms crossed, head down). Tom brings this performance concern up at the start of the meeting, and after some negative talk from the pit crew, he reinforces their performance potential with statistics. “If you can just…” is a phrase Tom keeps using.

I interpret a potential challenge here, at least from Tom’s perspective: he needs to be constructive with this team after relatively mediocre performance *and* he needs to keep spirits up (there are many more races ahead). He tends to point out positive attributes, like “look at your consistency” to inspire better performance from this group.

Expert-talk among pit crew members is prevalent in this film review, as well. The recommendations on wrapping loose radios are something the group volunteers freely. The group also draws on their experiences to one pit crew member make sense of an error that they cannot envision for themselves – at least not at first. I infer this because there are some follow-up questions and re-statements after some initial directions were given to the pit crew member in need. Notably, this error and the recommendations in response to it seem extremely nuanced; a slight twist of the body makes a world of difference when in close proximity to a stock car and other mechanical equipment, wires, and hoses.

Despite Tom’s reminders to “not cut corners,” “you’re going to get hurt” or “safety is important,” I notice a mocking tone when one pit crew member remarked that in response, “safety is very important.” Is this condescension about safety coming through from others because Tom moves on to directives like “push it” or “cut it,” to motivate for faster times, so soon after discussing – for example – a “risk assessment”? If reminders don’t do the trick, at what point is this pit crew conservative about their choreography or even their physicality? I realize this is early in the season, and I’m interested in how call-outs like these from Tom and others develop into discussions of near-misses or lessons learned.

APPENDIX I: SAMPLE LIST OF CODES

Code	Type	Definition	Exemplar
Topics of discussion open to multiple, plausible interpretations (+ discursive move)			
Debrief	Etic	Reference to the debrief (i.e., metadiscourse)	I think we get over-wound sometimes when we leave film and watch the previous weekend, and everything runs in your head. I think we try to over-think.
Race environment, Pit performance + Narrating	Etic	Ascribing provisional understanding of past events	Like those two right sides, I felt like I was, like I had set the wrench on the left.
Pit performance + Managing emotions	Etic	*Protecting*, by way of face-saving, circumventing disappointment	When we're not satisfied, we're going to keep pushing to be better. That's what's going to make us better.
Pit performance + Positing	Etic	*Priming,* by way of suggesting performance outcomes via subtraction or addition of hypothetical circumstances	It just... But it's just that, you know, it's just. If you can eliminate that, you know, one mistake here, one mistake there, and bring it all together, you know.
Pit performance + Diagnosing	Etic	*Narrating*, by way of aligning what is observed towards a plausible story	So, we know what happened there by the right front tire side, led to you being late, or led to you having to take that tire all the way to the wall because it wasn't wrong and then you dove in on that left front.
Race environment, Pit performance + Protecting	Etic	Shifting attention to preserve the integrity of the team	And [the driver] doesn't communicate that, "[X] said he wants...". And in fact, sometimes we don't even know what he wants. So, we just have to keep, keep ourselves together and make sure we communicate so we, we understand what, what he's trying to say.
Race environment, Pit performance + "It's just noise"	Emic	Avoiding disruptions	Um, we, we got to put that behind us, and, and go on.
Race environment, Pit performance + Priming	Etic	Calling for awareness of prospective events to update collective understanding and assumptions	And I will remind you guys of your times again. Um, because I gotta really sneaky suspicion now that I sent out everything the way that they wanted it, that they're gonna change it.
Team + Framing inter-team dependencies	Etic	*Protecting*, by way of directing attention to value of relationships	I think everybody is uh, been a part of this organization, even if it's been a short period of time, has figured out that we're one big team.
Team + Us versus them	Etic	*Protecting,* by way of shifting responsibility to exogenous factors	And you know, we said going in what our goal was this year and, and they're on hands with this. Now, if the crew chief loses time, I can't -

Enacted features of pit performance			
Accuracy	Emic	Correct, though not necessarily fast, pit stop execution	Um, I mean it's there. You just got to, you just got to- to do whatever it takes to get that, to get that accuracy. To even, like I said, I want you to slow down getting back to that first nut so you know you got your arms right, your wrist right, your gun right.
Awareness	Emic	Reference to preferred level of cognizance for effective pit stop execution	If you hear extra chatter going on, make sure that you, you know, that you're looking around.
Cleanliness	Emic	Correct, regularly occurring, and fast pit stop execution; a function of accuracy and consistency; something pit crews can "see"	All in all, not a super clean day, that last, that last stop was really nice. And when I mean clean, you know we've been preaching for tire changers to go fast.
Communication	Emic	Reference to preferred interactions for effective pit stop execution	Communication between the, the five is awesome. Um, so keep that up.
Consistency	Emic	Correct and regular occurring pit stop execution	Um, you know, we talked about it, we say, uh, now we just got to execute it, um, on a regular basis, um, instead of stop here, stop there, you know? We don't want it this way. We want it this way.
Mindset	Emic	Reference to preferred state of mind for effective pit stop execution	And I think that gets in your head. You're thinking about that instead of the job at hand.
Racing IQ	Emic	Bounded interpretations of the racing environment that, when retained, build better awareness; a prerequisite for cleanliness	So let's, let's come in this week practice-wise and grace-wise with a little bit more focus, a little bit more, uh racing IQ.
Safety	Emic	References to physical safety (e.g., near misses)	No, you need to be safe about, though. You can get hurt.
Speed	Emic	References to timing of pit stop execution	Um, is there speed there, yeah, there's still some - there's still some time on the table, you know.
Groove	Emic	A consequence of the pit crew meeting all pit performance criteria during pit stops; a prerequisite for effective, efficient pit stops	We usually have, you know, use up all the tires, so, you know, you're looking at 10, possibly 11, pit stops. So, you have plenty of time to get in your groove, there.
Enacted features of the race environment			
Driver's performance	Emic	References to driver's unpredictability	I was committing to him going long again, and he didn't go long. He went short.
Regulations and penalties	Emic	References to rules and rule changes	So, can I roll my right rear tire to the wall?

Pit box and race track logistics	Emic	References to changes in pit box and race track set-ups	Um, [Race Track Name] is not some place to pit a car at, um, like we were talking. It's wore out, pit road, got good grip, normal size boxes, uh, normal wall.
Equipment and damage	Emic	References to equipment malfunctions and adapting to pit stop needs of the stock car	So, he got me another gun because of the ping that you say is badass, it's a piece of s***. It barely, it barely hit 10,000 RPM.

Note. The inductive approach to analysis enabled meaning to emerge from the interactions and context under study; this resulted in emic codes. Etic codes were introduced when open codes indicated the relevance of existing terms from previous research and theory.

APPENDIX J: PIT CREW POSITIONS AND RESPONSIBILITIES "OVER THE WALL," AS EXAMINED DURING DEBRIEFS

Pit Crew Position	"Over the Wall" Responsibilities
Tire Changers (x 2)	• Attends to the right and left tires at the front or at the rear of the stock car, depending on their role (i.e., "front" tire changer or "rear" tire changer). • Uses air wrenches, or "guns," to remove lug nuts on tires on one side of the stock car at a time. • Removes a worn tire before the tire carrier or the jackman places a new one on the stock car. • Bolts new tires into place with careful attention to well-fastened lug nuts.
Tire Carrier	• Carries new tires over the pit wall and to the tire changers. • Assists the front tire changer with replacement and installation of new tires. • Maintains control of all loose tires.
Jackman	• Manages a 20+ pound airjack and props each side of the stock car up for tire changes. • Assists the rear tire changer and lowers the car once all front and rear tire changes are complete. • Signals to the driver to return to the race.
Fueler	• Fits the fuel nozzle of a 95-pound, 12-gallon gas can to the gas tank opening on the side of the stock car. • Manages multiple gas cans during a pit stops, as needed; a stock car gas tank holds 22 gallons.

Note. The responsibilities outlined here are intended to reflect that which guided participants' performance during the time of data collection. The latest changes to pit crews' performance environment, such as to equipment or to institutional regulations, are likely to affect these responsibilities.

APPENDIX K: SAMPLE OF PERFORMANCE METRICS DISCUSSED DURING DEBRIEFS BY PIT CREW POSITION

Pit Crew Position	Performance Metric (Unit)
Front and/or Rear Tire Changer	Time to Remove Front / Rear, Left / Right Lug Nuts (Seconds)
	Time to Install First Lug Nut after Tire Change (Seconds)
	Time to Transition from Left to Right / Right to Left Side of Car (Seconds)
Front and/or Rear Tire Changer, Tire Carrier	Time to Remove Front / Rear, Left / Right Tire (Seconds)
Jackman	Time to Lift Left / Right Side of the Car (Seconds)
	Time to Release Jack on Left / Right Side of the Car (Seconds)
	Time Between Right Side Lift and Left Side Lift (Seconds)
Jackman, Front and/or Rear Tire Changer, Tire Carrier	Time Between Right / Left Side Lift to Tire Install (Seconds)
	Time to Install New Front / Rear, Left / Right Tire (Seconds)
	Time to Install New Front / Rear, Left / Right Tire, including Lug Nuts (Seconds)
Fueler	Time to Connect First / Second Gas Can to Car (Seconds)
	Time to Disconnect First / Second Gas Can from Car (Seconds)
	Time to Swap Gas Cans (Seconds)
Front and/or Rear Tire Changer	Attempts to Remove 5 Lug Nuts from Front / Rear, Left / Right (Count)
	Attempts to Install 5 Lug Nuts from Front / Rear, Left / Right (Count)

Note. Although metrics for front / rear and right / left tires and their corresponding tire changers are combined above for brevity, distinct measurements are recorded for the front tire changer and the rear tire changer and the actions they make toward the tires for which they are responsible. As a result, the time to remove a front right tire may differ from the time to remove a rear left tire during a pit stop.