NORMALCY BIAS

As a Human Factor in Risk Management

WRITTEN BY

Peter S. Lehmann, Ph.D.

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INSTITUTE FOR HOMELAND SECURITY
SAM HOUSTON STATE UNIVERSITY

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Peter S. Lehmann, Ph.D.

https://orcid.org/0000-0002-5345-4343

Abstract

Normalcy bias is a cognitive distortion in which people tend to downplay or ignore an emerging threat, particularly a low probability / high impact event that deviates significantly from past experience. In the early stages of a crisis, people commonly exhibit characteristic patterns of denial, including delayed threat recognition, poor calculation of risk, and mistrust of warning signs and authority figures. Normalcy bias is therefore a highly relevant “human factor” in critical infrastructure protection, as these psychological mechanisms create a temporal gap between the onset of the threat and the decisive moment that can amplify negative outcomes. An extensive body of social science research has examined how ordinary people process information under extreme stress, but persistent myths about psychological responses to crisis events continue to hinder emergency and disaster response system effectiveness. This report aims to: (1) define the concept of normalcy bias and highlight its consequences for delay, risk miscalculation, and distrust; (2) summarize the existing research on human cognition and behavior when confronted unexpected threats, providing information on the prevalence of normalcy bias and the reasons that it emerges; and (3) discuss some proposed strategies for reducing the influence of normalcy bias among key decision-makers.

Keywords: cognitive bias, disasters, rare events, critical infrastructure, risk management

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Introduction

In Greek mythology, Cassandra was a tragic figure who received the gift of prophecy but was cursed with the fate that her predictions would never be believed. A princess of Troy, she foresaw the deception of the Greeks and the fall of her city, but her desperate attempts to warn others of the impending devastation were ignored. This myth is the origin of the so-called “Cassandra paradox,” where highly knowledgeable executives, whistleblowers, scientists, and analysts accurately predict market crashes and other systemic failures but are powerless to prevent them because their insights are disregarded by the industry at large (Cibulski & de Sales Lima, 2026). There is an innate human tendency to discount or downplay early warning signs of a crisis, and most people initially fail to appreciate indications that the emerging situation is not normal and should be responded to accordingly. Indeed, emergency response systems frequently are designed based on the expectation that people are proactive and will immediately activate “fight or flight” behavior, but the empirical evidence suggests that this assumption is largely inaccurate (Ludovico, 2019; Savage, 2019; Wester, 2011).

Rather than instinctively responding to a looming or emerging crisis with mass panic (e.g., Fritz & Williams, 1957) or by quickly and rationally evaluating potential response options, people often freeze (Bracha, 2004; Leach, 2004; Siligato et al., 2024). Case studies of real-world disasters provide countless examples of people displaying a surprising level of calmness, apathy, or lethargy, engaging in behaviors that outside observers perceive as strange, incoherent, and counterproductive (Gershon et al., 2012; Grimm et al., 2014; Ludovico, 2019). As explored in depth in Amanda Ripley’s (2024) book *The Unthinkable*, the time delay between the activation of an alarm (or other stimuli) and the mobilization of the response can be attributed to *normalcy bias*, which is the propensity to believe that everything is alright because it usually has been before. This concept aligns closely with Kahneman’s (2003, 2011) description of human cognition as a dual processing system, where high-stress situations prompt humans to make decisions based on quick, automatic, and intuitive judgments rooted in prior experience that are highly prone to error (see also Hammond, 2000; Klein, 1996).

Overcoming normalcy bias and taking threat signals seriously is a profoundly difficult task during a crisis, and it is likewise challenging to preempt or prevent misinterpreting a crisis before it occurs in the first place (Kinsey et al., 2019; Murata et al., 2015; Papale, 2026; Savage, 2016). As Ripley (2024) argues, denial is an attractive option, as it gives people time to acquire more information without disregarding previous data points:

Usually, the human brain works by identifying patterns. It uses information from the past to understand what is happening in the present and to anticipate the future. This strategy works elegantly in most situations. But we inevitably see patterns where it doesn't seem to work. In other words, we are slow to recognize exceptions. There is also the peer-pressure factor. All of us have been in situations that looked ominous, and they almost always turn out to be innocuous. If we behave otherwise, we risk social embarrassment by overreacting. So, we err on the side of underreacting. (p. 11)

Ripley argues that decision-making during a disaster involves three stages: denial, deliberation, and decision. Normalcy bias is a characteristic of the initial "denial" phase, and it often involves a combination of a delay in response, a miscalculation of risk, and a lack of trust in early warning signs. Because normalcy bias is closely linked with underreaction, it emerges most clearly in events that are high-impact and extremely rare (Taleb, 2007, 2010).

The concept of normalcy bias is highly relevant for numerous areas of study, although it has particularly noteworthy practical implications for risk management and the protection of critical infrastructure (Kumasaki & King, 2020; Mertzanis, 2021; Papale, 2026). Indeed, the kinds of events that Ripley (2024) highlights as likely to provoke normalcy bias—terrorism, natural disasters, and pandemics—have the potential to cause significant infrastructure failures that can be worsened through inappropriate early-stage response. Mitigating normalcy bias and other cognitive distortions in crisis scenarios necessarily requires understanding how ordinary people behave under extreme stress, and research on the psychology and sociology of disasters can help to dispel persistent myths along these lines (Drury et al., 2013; Omer & Alon, 1994; Quarantelli, 2008; Tierney, 2025). Moreover, for personnel who work directly within critical sectors, the natural tendency to disregard or downplay emerging threats can be addressed by enhancing communication, encouraging a workplace culture where early warning signs are taken seriously, implementing institutional safeguards, and promoting effective training (Roberts & Wernstedt, 2019; Seager et al., 2025). As Oberlin (2018) explains:

Businesses cannot control the environment, or the choices made by others. They can only control their internal processes and training. We cannot foresee every event or combination of events, and we cannot train for every scenario; but when we are aware of how we will think in a crisis, we are less likely to dismiss what does not make sense. We are more likely to interpret warnings correctly and respond appropriately. We are more likely to control the stress that can contribute to bad decisions. (p. 285)

Problem Statement and Research Objective

Integrating scholarship from multiple disciplines, the current report aims to serve as an informational resource for policymakers, professionals, and members of the public on this underappreciated "human factor" in risk management. The report is organized as follows. First, using Ripley's (2024) framework as a guide, I define normalcy bias and provide an overview of its three trademark features that emerge during the "denial" stage of crisis response: *delay, risk miscalculation,* and *distrust*. Second, I highlight research from several social science disciplines on human cognition and decision-making during crisis events, which sheds light on how people rely on heuristic judgments and prioritize familiarity in scenarios that deviate from their normal expectations and experiential frame of reference. Finally, I conclude by discussing some recommendations from experts on how practitioners working in risk management and critical infrastructure protection may anticipate and respond to normalcy bias.

Defining and Understanding Normalcy Bias

Although normalcy bias has been discussed and studied for many decades (see Drabek, 1986), there does not appear to be a single, universally agreed-upon definition of the concept in the literature. For instance, Omer and Alon (1994) state the following:

The typical mistakes of the warning stage result from the normalcy bias and from the tendency of authorities to withhold threatening information even at the very brink of disaster. The most common response to warnings is disbelief. People tend to go on with the business of life and doubt the immediacy and personal relevance of danger. Rather than taking protective action, they usually await repeated confirmations or look to others for guidance. These methods of threat validation are themselves normalcy-biased: People tend to search for business-as-usual messages and to seize upon ambiguities as tokens of the warnings' invalidity. (p. 280)

More recently, Murata and Yoshimura (2015) defined normalcy bias as "our propensity to regard minor abnormalities as normal," which we use to "prevent ourselves from reacting excessively to a variety of changes or novel events and becoming impoverished" (p. 3901). Other experts have invoked the concept of normalcy bias to describe a disregard of warning signs that fall outside the norm of expectation (Ludovico, 2019; Mertzanis, 2021) as well as "the human tendency to underestimate the possibility or impact of a rare threat" (Papale, 2026, p. 6). In their study of legal decision-making among jurors, Prentice and Koehler (2003) also argue that normalcy

bias reflects a natural preference for inaction over action, as people believe that a greater degree of responsibility and blame should be placed on those who violate the status quo:

> To be normal is to be acceptable, right, and "in step" with the world. The bonds between harm and a set of normal conditions are likely to be viewed as tenuous at best. In contrast, to be abnormal is to be different, unacceptable, and perhaps even dangerous. Thus, when harm arises in the presence of abnormal conditions, the mind locks in on those conditions as causal, and the agent who brought about those abnormal conditions is held responsible for the harm. (p. 595)

In her book *The Unthinkable*, Amanda Ripley (2024) provides a thorough treatise on how humans behave during disaster scenarios, and she concludes that people almost invariably follow a predictable pattern—what she refers to as "the survival arc." Its three phases include denial, deliberation, and the decisive moment, with normalcy bias being central to the "denial" stage. According to Ripley, "We have a tendency to believe that everything is OK because, well, it almost always has been before" (p. 10), leading us to deny the severity of a new threat and ignore indicators that do not align with the kinds of routine events that past experience has conditioned us to expect. Ripley notes that, "except in extremely rare cases, we tend to display a surprisingly creative and willful brand of denial" (p. xxxvi), as new information cannot be easily reconciled with old information and is therefore rejected until the cognitive dissonance is overcome (Omer & Alon, 1994; Seager et al., 2025). Ripley describes denial as characterized by three features: (1) response delay, (2) poor risk calculations, and (3) a distrust of warnings.

#1: Delay

Normalcy bias is a chief cause of response delay during crisis scenarios (Joo et al., 2019; Murata et al., 2015; Yamazaki et al., 2017). Ripley (2024) explains that delayed action can have disastrous consequences, but it is also an understandable and, in some ways, rational response to the presentation of novel stimuli. Indeed, she states, "Given time to think, people in disasters need information like they need shelter and water. Their brains lack the patterns they need to make a good decision, so they wisely search for better data" (Ripley, 2024, p. 11). Seager et al. (2025) likewise suggest that delay may not necessarily originate from shock and denial but instead from observation, where an individual "does not resist the contradiction but instead treats it as an opportunity for sensemaking and learning" (p. 5071). However, regardless of whether the delay involves a constructive form of information-seeking or a maladaptive reaction

involving denial or rationalization, freezing remains a defining feature of normalcy bias that is confusing to outside observers. In their study of over 1,400 World Trade Center evacuees, Gershon et al. (2012) found that respondents commonly engaged in delaying behaviors:

> When initiating their evacuation, once respondents had decided to leave but before they actually began, a large proportion (74%) reported performing various activities. These included: gathering items (40%), seeking out friends/co-workers (33%), searching for others (26%), making phone calls (18%), shutting-down computer or other computer-related activity (8%), waiting for directions (7%), gathering safety equipment (5%), changing shoes (3%), and trying to obtain permission to leave (1%). (p. 489)

#2: Risk Miscalculation

While Ripley (2024) notes that normalcy bias-related delay occurs because "it takes us a while to come to terms with our miserable luck" (p. 10), she also points out that "how long the delay lasts depends in large part on how we calculate risk" (p. xxxvi). Risk is evaluated as a calculation involving probability and anticipated consequences, but normalcy bias can render these inputs faulty for two key reasons. First, when confronted with unexpected information, people tend to seek out similarities rooted in previous experiences, even if the assumptions that may be drawn from those experiences are flawed (Kinsey et al., 2019; Oberlin, 2018; Papale, 2026). In his work on "Black Swan" scenarios, Nicholas Nassim Taleb (2007, 2010) considers the inherent problem with this inclination, as preparation for "known unknowns" is inadequate when the most impactful events are "unknown unknowns" with no precedent (see also Ale et al., 2020; Aven, 2013, 2015). The second reason that normalcy bias gives rise to risk miscalculations is that emotions, especially optimism and overconfidence on one hand and fear and dread on the other, can cloud assessments of probability and impact (Glöckner, 2016; Meyer & Kunreuther, 2017; Murata et al., 2015; Savage, 2016).

#3: Distrust

Finally, in addition to delay behaviors and risk miscalculation, a key feature of denial is distrust, which is more than merely the opposite of trust (Bertsou, 2019; Hardin, 2004; Lewicki et al., 1998; Van De Walle & Six, 2014). Saunders et al. (2014) note that "trust is depicted as occurring under conditions of risk that require the trusting party (the 'trustor') to develop favorable expectations of the intentions and behavior of the other party ('trustee')" (p. 640), particularly regarding ability, benevolence, and integrity (see also Mayer et al., 1995). Ripley (2024) clarifies that this form of "cognitive trust" (p. 93) toward leaders, experts, media outlets, and governments is difficult to

establish in general but is even more challenging to foster quickly under stress. Distrust, in contrast, represents a sense of doubt in the face of ambiguity that leads people to seek out alternative ways of achieving their goals (see, e.g., Dunn, 1988; McKnight & Chervany, 2001), which may include preserving normalcy and the status quo. Thus, while trust may seem to reduce complexity and streamline choices, distrust also can accomplish this same goal if trust would involve accepting significant disruption.

The Social Science of Normalcy Bias

The empirical literature on human behavior in crisis and disaster scenarios reveals that normalcy bias is common; about 70% of people display normalcy bias in response to an extreme risk event (Mertzanis, 2021; Omer & Alon, 1994). However, myths persist about how humans typically behave in such situations, particularly regarding the likelihood of proactive “fight or flight” reactions (Leach, 2004; Savage, 2016):

> The observation of human behavior in real emergencies confirms that the widespread use of the “fight or flight” concept is not adequate; in case of an emergency, some people are apathetic and do not take action to save their own lives. (Ludovico, 2019, p. 488)

Additionally, there is a common misconception that most people panic in the face of a new or unexpected threat (see Fritz & Williams, 1957), but a vast body of research from the sociology of disasters suggests that calm, prosocial, and altruistic responses are far more prevalent once the initial shock and delay responses are overcome (Aguirre et al., 1998; Drabek, 1986; Grimm et al., 2014; Quarantelli, 2008; Tierney, 2025). Panic requires very specific criteria to occur, where the circumstances lead antisocial self-interest to override natural inclinations to affiliate with and help others (Fletcher & Aunger, 2024; Quarantelli, 1957). Nonetheless, a misplaced fear of mass panic has been a key driver of vague and misleading communication from officials during disasters, which paradoxically can foster further distrust and exacerbate adverse consequences (Aguirre, 2023; Lowrey et al., 2007; Mawson, 2005). Notwithstanding these myths, overcoming normalcy bias is likely a far more salient concern than preventing panic.

Normalcy bias is closely linked to the “freeze” response (Ludovico, 2019). Although the physiological elements and biological benefits of freezing are beyond the current scope (but see, e.g., Livermore et al., 2021; Löw et al., 2015; Siligato et al., 2024), inaction is an understandable and possibly even advantageous response to new

stimuli (Anderson, 2003; Bracha, 2004). Indeed, freezing can be a form of hypervigilance in response to fear that helps to increase the chance of survival, but it also may reflect cognitive dissonance in the face of new information that has not yet been processed:

> Human responses to unfolding emergencies and the tendency to freeze can be understood in terms of neurocognitive function and the time required to process the several steps between perception and appropriate action. The brain is a multi-channel, limited-capacity signal processor which has built-in temporal constraints that affect its ability to operate in a real-time emergency. Operational information is processed in working memory, which has two important limitations: 1) it can hold only so much information at any given time; and 2) it can process information at a given maximum rate and no faster…The more complex the cognitive task, the more expansive the neural circuitry needed, and the more likely that processing time will exceed the minimum. Non-optimal circumstances, such as danger, may further slow information processing. This helps to explain the slowing or absence of response during the critical impact phase of a disaster. (Leach, 2004, p. 540)

A related concept is “tunnel vision,” where the presentation of novel and cognitively demanding stimuli can induce people to become hyper-focused on certain things while other details become muted or invisible (Tsurushima, 2022; Wickens & Alexander, 2009). Although tunnel vision, like the freezing instinct, is highly adaptive and beneficial, it also can impede response time and restrict awareness of available options, leading to delay and risk miscalculation.

The extent to which specific behaviors in crisis situations should be understood as rational is controversial (see, e.g., Aguirre, 2023; Frey et al., 2011; Henry, 2013; Savage, 2016), but scholars tend to agree that risk perceptions in these scenarios are rooted in heuristic-based judgments (Hao & Peng, 2026; Kinsey et al., 2019; Papale, 2026). According to Kahneman’s (2003, 2011) dual-process framework, human cognition consists of both an analytical system and an intuitive system—analytical thinking is slow, conscious, logical, and pragmatic, whereas intuitive thinking is quick, automatic, and emotionally charged (see also Tversky & Kahneman, 1974). In complex, unfamiliar, uncertain, and time-constrained situations, people have a limited capacity to process available information (i.e., “bounded rationality”), which leads them to make decisions that may appear acceptable but are vulnerable to cognitive biases through which key information is ignored or weighted inappropriately (Korteling et al., 2018; Murata & Yoshimura, 2015; Shirado, 2022). Much scholarship on risk management

situates normalcy bias within this perspective, as denial and procrastination emerge when people perceive unfamiliar cues through a lens of familiarity and make decisions based on faulty assessments of risk (Kinateder et al., 2015; Murata et al., 2015; Roberts & Wernstedt, 2019).

A related and perhaps underappreciated aspect of normalcy bias is that people assign considerable value to what is normal. Because normalcy is routinely encountered and expected, people generally prefer inaction over any action that may be disruptive (Baron & Ritov, 2004; Prentice & Koehler, 2003). Put differently, descriptive norms (i.e., the frequency of something) can easily become conflated with prescriptive norms (i.e., moral judgments about how something should be) such that people come to view abnormal things as undesirable (Bear & Knobe, 2017; Wysocki, 2020). Accordingly, the cognitive dissonance and distrust that characterize normalcy bias may stem from a moral preference for predictability, which ultimately informs heuristic-based judgments. Indeed, while social psychologists describe distrust as a mechanism that should help people block cognitive biases, think more critically, and improve performance (Mayo, 2015, 2019; Posten & Gino, 2021; Schul et al., 2008), these benefits may not emerge if trust would require a substantial deviation from what is ordinary and comfortable. This phenomenon might underlie the “Cassandra’s paradox” experienced by scientists and other experts (Cibulski & de Sales Lima, 2026), whose warnings and recommendations are often met with skepticism because they require significant change.

Mitigating Normalcy Bias in Critical Sectors

For professionals in critical sectors, overcoming normalcy bias and preventing its harmful effects can be challenging for several key reasons. First, normalcy bias is deeply linked to intuitive biological, psychological, and sociological responses to emerging threats, though it is worth noting that this reaction is temporary. Eventually, people are propelled out of the “denial” stage and into the “deliberation” stage in which they weigh available response options (Ripley, 2024), often through “affiliative” behaviors that involve seeking out the perspectives of others (see, e.g., Aguirre, 2023; Mawson, 2018; Yang et al., 2021). Second, training is typically designed to prepare people for scenarios for which previous experience has provided useful data points, but such efforts are often inadequate when new crisis events fall outside the realm of reasonable expectation (Moats et al., 2008; Seager et al., 2025). Third, mitigating normalcy bias cannot be assumed to work via top-down processes, since managers are

themselves susceptible to normalcy bias and other cognitive distortions when making decisions within their areas of expertise (Roberts & Wernstadt, 2019). Finally, merely knowing about cognitive biases is not enough to overcome them—this assumption is known as the “G.I. Joe fallacy” because knowing is not, in fact, half the battle (Kristal & Santos, 2021).

Practitioners in critical sectors whose work involves reacting quickly and decisively to novel threats should be aware of this natural human tendency and explicitly incorporate it into their personnel training (Ceric & Holland, 2019; Oberlin, 2018). As Ripley (2024) notes, “The subconscious mind, cluttered as it is with biases and shortcuts, is only as good as its training” (p. 117), and she highlights that training should be repeated and realistic so that crisis responses can become intuitive and not reliant on slow, conscious thought. For example, “red teaming” is a type of simulation or vulnerability probe where a problem is viewed from the perspective of an adversary or competitor, which can be useful for engaging outside-the-box thinking, identifying blind spots, challenging institutional orthodoxy, and overcoming inertia (Gutzwiller et al., 2024; Hoffman, 2017; Zenko, 2015). Another contrarian analysis technique involves the assignment of a “devil’s advocate” whose task is to develop the best possible case for a conclusion that is unorthodox or opposite to what is normally expected (Baybutt, 2016; Koshinskie, 2022; Lemay & Leblanc, 2018). These kinds of approaches can help decision-makers recognize not only the early warning signs of an emerging threat but also the effects of normalcy bias so that they are better able to flag these issues in real time.

Experts who have explored the consequences of cognitive biases in critical infrastructure protection also emphasize the important role of effective communication and institutional culture, which can worsen delayed reactions to crisis events. Although much of this discussion surrounds how authorities communicate with the public before, during, and after disasters (e.g., Aguirre, 2023; Breakwell, 2000; Kumasaki & King, 2020; Mayhorn & McLaughlin, 2014), these same principles can be applied to people who may confront ambiguous threat signals in their professional roles. Because distrust is a defining feature of denial, institutions should strive to develop cultures where honest and accurate communication is prioritized, false alarms are not viewed as inconveniences, and individuals who more quickly overcome normalcy bias and recognize threat signals are acknowledged and rewarded. Seager et al. (2025) describe this “culture of resilience” (p. 5065) as crucial for adapting to unforeseen challenges, which is likely to be more effective than training for a narrow range of specific events:

Under normal conditions, learning primarily serves to refine and reinforce preexisting beliefs, incorporating minor updates without fundamentally altering the overall mental model. However, in the context of surprise, learning must involve a deeper process of reconceptualization. When a surprising event has fundamentally challenged prior assumptions, the learning process must go beyond simply absorbing new information. It requires conceptualization, where the new experience is integrated into an updated mental model, reshaping how future expectations are formed. (p. 5072)

Thus, while having an awareness that normalcy bias can impact all levels of an organization is an important first step in overcoming it (Schippers et al., 2025), leaders also should empower their staff by encouraging them to demonstrate personal responsibility and ownership over decision-making in contexts of limited information.

Finally, it is important to emphasize that industry professionals consistently reject the notion that “unknown unknowns” (i.e., Black Swans; Taleb, 2007, 2010)—the kinds of events most likely to engender normalcy bias—are only predictable in hindsight and cannot be properly prepared for (e.g., Cooper & Eschleman, 2021; Flage & Aven, 2015; Hajikazemi et al., 2016). This presumed inability to conceive of worst-case scenarios is sometimes referred to as the “failure of imagination” (Piore, 2011), where potential points of failure are unforeseeable by designers and regulators. Experts contend that risk mitigation strategies, such as red teaming and scenario planning, help ensure that emerging signs of a low probability/high impact event are taken seriously by those who would ordinarily dismiss them (Lyon & Popov, 2022; Masys, 2012). This perspective follows closely from the resilience framework proposed by Seager et al. (2025), who argue that the primary antidote to ineffective action in the face of surprise is to constantly revisit the prevailing assumptions that guide routine decision-making. Thus, although the specific aspects of extremely rare events are often somewhat unpredictable, normalcy bias itself can be reliably expected and accounted for ahead of time.

Conclusion

Normalcy bias is a pervasive and predictable feature of human cognition that has significant consequences for risk management and critical infrastructure protection. The inclination to discount emerging threats is a natural byproduct of how people process unfamiliar information under stress, manifesting in delayed response, faulty risk calculation, and a distrust of warning signs and authority figures. While denial may

serve an adaptive function by giving people time to gather information before committing to a course of action, this same instinct can prove catastrophic when confronting rare, high-impact events that require immediate action. The social science literature makes clear that myths about panic and instinctive self-preservation continue to obscure the reality that people tend to freeze and seek reassurance from others rather than respond quickly and decisively. Accordingly, practitioners in critical sectors should not expect their personnel to simply overcome this “human factor” through willpower or awareness alone but instead work to build institutional cultures, training systems, and communication practices that anticipate normalcy bias and design around it.

References

Aguirre, B. E. (2023). Emergency evacuations, panic, and social psychology. *Psychiatry*, *86*(4), 307-316. https://doi.org/10.1080/00332747.2023.2289817

Aguirre, B. E., Wenger, D., & Vigo, G. (1998). A test of the emergent norm theory of collective behavior. *Sociological Forum*, *13*(2), 301-320. https://doi.org/10.1023/A:1022145900928

Ale, B. J., Hartford, D. N., & Slater, D. H. (2020). Dragons, black swans and decisions. *Environmental Research*, *183*, Article 109127. https://doi.org/10.1016/j.envres.2020.109127

Anderson, C. J. (2003). The psychology of doing nothing: Forms of decision avoidance result from reason and emotion. *Psychological Bulletin*, *129*(1), 139-167. https://doi.org/10.1037/0033-2909.129.1.139

Aven, T. (2013). On the meaning of a black swan in a risk context. *Safety Science*, *57*, 44-51. https://doi.org/10.1016/j.ssci.2013.01.016

Aven, T. (2015). Implications of black swans to the foundations and practice of risk assessment and management. *Reliability Engineering & System Safety*, *134*, 83-91. https://doi.org/10.1016/j.ress.2014.10.004

Baron, J., & Ritov, I. (2004). Omission bias, individual differences, and normality. *Organizational Behavior and Human Decision Processes*, *94*(2), 74-85. https://doi.org/10.1016/j.obhdp.2004.03.003

Baybutt, P. (2016). Cognitive biases in process hazard analysis. *Journal of Loss Prevention in the Process Industries*, *43*, 372-377. https://doi.org/10.1016/j.jlp.2016.06.014

Bear, A., & Knobe, J. (2017). Normality: Part descriptive, part prescriptive. *Cognition*, *167*, 25-37. https://doi.org/10.1016/j.cognition.2016.10.024

Bertsou, E. (2019). Rethinking political distrust. *European Political Science Review*, *11*(2), 213-230. https://doi.org/10.1017/S1755773919000080

Bracha, H. S. (2004). Freeze, flight, fight, fright, faint: Adaptationist perspectives on the acute stress response spectrum. *CNS Spectrums*, *9*(9), 679-685. https://doi.org/10.1017/S1092852900001954

Breakwell, G. M. (2000). Risk communication: Factors affecting impact. *British Medical Bulletin*, *56*(1), 110-120. https://doi.org/10.1258/0007142001902824

Ceric, A., & Holland, P. (2019). The role of cognitive biases in anticipating and responding to cyberattacks. *Information Technology & People*, *32*(1), 171-188. https://doi.org/10.1108/ITP-11-2017-0390

Cibulski, S. P., & de Sales Lima, F. E. (2026). We can no longer ignore Cassandra's warnings. *EcoHealth*, *23*, 197-199. https://doi.org/10.1007/s10393-026-01776-8

Cooper, J., & Eschleman, K. J. (2021). Be the ant, not the grasshopper: Preparing for the next black swan event. *Industrial and Organizational Psychology*, *14*(1-2), 221-225. https://doi.org/10.1017/iop.2021.54

Drabek, T. E. (1986). Human system responses to disaster: An inventory of sociological findings. Springer-Verlag.

Drury, J., Novelli, D., & Stott, C. (2013). Psychological disaster myths in the perception and management of mass emergencies. *Journal of Applied Social Psychology*, *43*(11), 2259-2270. https://doi.org/10.1111/jasp.12176

Dunn, J. (1988). Trust and political agency. In D. Gambetta (Ed.), *Trust: Making and breaking cooperative relations (*pp. 73-93). Blackwell.

Flage, R., & Aven, T. (2015). Emerging risk–Conceptual definition and a relation to black swan type of events. *Reliability Engineering & System Safety*, *144*, 61-67. https://doi.org/10.1016/j.ress.2015.07.008

Fletcher, H. W., & Aunger, R. (2024). Understanding mass panic. *Journal of Applied Social Science*, *18*(2), 288-308. https://doi.org/10.1177/19367244241245702

Frey, B. S., Savage, D. A., & Torgler, B. (2011). Behavior under extreme conditions: The *Titanic* disaster. *Journal of Economic Perspectives*, *25*(1), 209-222. https://doi.org/10.1257/jep.25.1.209

Fritz, C. E., & Williams, H. B. (1957). The human being in disasters: A research perspective. *The Annals of the American Academy of Political and Social Science*, *309*(1), 42-51. https://doi.org/10.1177/000271625730900107

Gershon, R. R., Magda, L. A., Riley, H. E., & Sherman, M. F. (2012). The World Trade Center evacuation study: Factors associated with initiation and length of time for evacuation. *Fire and Materials*, *36*(5-6), 481-500. https://doi.org/10.1002/fam.1080

Glöckner, A. (2016). Psychology and disaster: Why we do not see looming disasters and how our way of thinking causes them. *Global Policy*, *7*, 16-24. https://doi.org/10.1111/1758-5899.12289

Grimm, A., Hulse, L., Preiss, M., & Schmidt, S. (2014). Behavioural, emotional, and cognitive responses in European disasters: Results of survivor interviews. *Disasters*, *38*(1), 62-83. https://doi.org/10.1111/disa.12034

Gutzwiller, R. S., Rheem, H., Ferguson-Walter, K. J., Lewis, C. M., Johnson, C. K., & Major, M. (2024). Exploratory analysis of decision-making biases of professional red teamers in a cyber-attack dataset. *Journal of Cognitive Engineering and Decision Making*, *18*(1), 37-51. https://doi.org/10.1177/15553434231217787

Hajikazemi, S., Ekambaram, A., Andersen, B., & Zidane, Y. J. (2016). The Black swan–knowing the unknown in projects. *Procedia-Social and Behavioral Sciences*, *226*, 184-192. https://doi.org/10.1016/j.sbspro.2016.06.178

Hammond, K. R. (2000). *Judgments under stress*. Oxford University Press.

Hao, Y., & Peng, S. (2026). Social norms or individual experience? Which affects individual risk perception of disaster warnings. *Safety Science*, *195*, Article 107074. https://doi.org/10.1016/j.ssci.2025.107074

Hardin, R. (Ed.). (2004). *Distrust*. Russell Sage Foundation.

Henry, J. (2013). Return or relocate? An inductive analysis of decision-making in a disaster. *Disasters*, *37*(2), 293-316. https://doi.org/10.1111/j.1467-7717.2012.01303.x

Hoffman, B. G. (2017). Red teaming: How your business can conquer the competition by challenging everything. Crown Business.

Joo, S., Kashiyama, T., Sekimoto, Y., & Seto, T. (2019). An analysis of factors influencing disaster mobility using location data from smartphones: Case study of western Japan flooding. *Journal of Disaster Research*, *14*(6), 903-911. https://doi.org/10.20965/jdr.2019.p0903

Kahneman, D. (2003). A perspective on judgment and choice: mapping bounded rationality. *American Psychologist*, *58*(9), 697-720. https://doi.org/10.1037/0003-066X.58.9.697

Kahneman, D. (2011). *Thinking, fast and slow*. Farrar, Straus and Giroux.

Kinateder, M. T., Kuligowski, E. D., Reneke, P. A., & Peacock, R. D. (2015). Risk perception in fire evacuation behavior revisited: Definitions, related concepts, and empirical evidence. *Fire Science Reviews*, *4*(1), 1-26. https://doi.org/10.1186/s40038-014-0005-z

Kinsey, M. J., Gwynne, S. M. V., Kuligowski, E. D., & Kinateder, M. (2019). Cognitive biases within decision making during fire evacuations. *Fire Technology*, *55*(2), 465-485. https://doi.org/10.1007/s10694-018-0708-0

Klein, G. (1996). The effect of acute stressors on decision making. In J. Driskell & E. Salas (Eds.), *Stress and human performance* (pp. 49-88). Psychology Press.

Korteling, J. E., Brouwer, A. M., & Toet, A. (2018). A neural network framework for cognitive bias. *Frontiers in Psychology*, *9*, Article 1561. https://doi.org/10.3389/fpsyg.2018.01561

Koshinskie, R. (2022). Modern devil's advocacy: Disrupt groupthink, build stronger plans, and achieve better results. Business Expert Press.

Kristal, A. S., & Santos, L. R. (2021). G.I. Joe phenomena: Understanding the limits of metacognitive awareness on debiasing (No. 21-084). Harvard Business School.

Kumasaki, M., & King, M. (2020). Three cases in Japan occurred by natural hazards and lessons for Natech disaster management. *International Journal of Disaster Risk Reduction*, *51*, Article 101855. https://doi.org/10.1016/j.ijdrr.2020.101855

Leach, J. (2004). Why people 'freeze' in an emergency: Temporal and cognitive constraints on survival responses. *Aviation, Space, and Environmental Medicine*, *75*(6), 539-542.

Lemay, A., & Leblanc, S. P. (2018). Iterative analysis of competing hypotheses to overcome cognitive biases in cyber decision-making. *Journal of Information Warfare*, *17*(2), 42-53.

Lewicki, R. J., McAllister, D. J., & Bies, R. J. (1998). Trust and distrust: New relationships and realities. *Academy of management Review*, *23*(3), 438-458. https://doi.org/10.5465/amr.1998.926620

Livermore, J. J., Klaassen, F. H., Bramson, B., Hulsman, A. M., Meijer, S. W., Held, L., ... & Roelofs, K. (2021). Approach-avoidance decisions under threat: The role of autonomic psychophysiological states. *Frontiers in Neuroscience*, *15*, Article 621517. https://doi.org/10.3389/fnins.2021.621517

Löw, A., Weymar, M., & Hamm, A. O. (2015). When threat is near, get out of here: Dynamics of defensive behavior during freezing and active avoidance. *Psychological Science*, *26*(11), 1706-1716. https://doi.org/10.1177/0956797615597332

Lowrey, W., Evans, W., Gower, K. K., Robinson, J. A., Ginter, P. M., McCormick, L. C., & Abdolrasulnia, M. (2007). Effective media communication of disasters: Pressing problems and recommendations. *BMC Public Health*, *7*(1), Article 97. https://doi.org/10.1186/1471-2458-7-97

Ludovico, M. (2019). Human behaviour and emergency planning. *Chemical Engineering Transactions*, *77*, 487-492. https://doi.org/10.3303/CET1977082

Lyon, B. K., & Popov, G. (2022). On the concept of risk, uncertainty & black swans. *Professional Safety*, *67*(03), 18-23.

Masys, A. J. (2012). Black swans to grey swans: Revealing the uncertainty. *Disaster Prevention and Management: An International Journal*, *21*(3), 320-335. https://doi.org/10.1108/09653561211234507

Mawson, A. R. (2005). Understanding mass panic and other collective responses to threat and disaster. *Psychiatry*, *68*(2), 95-113. https://doi.org/10.1521/psyc.2005.68.2.95

Mawson, A. R. (2018). Mass panic and social attachment: The dynamics of human behavior. Routledge.

Mayer, R. C., Davis, J. H., & Schoorman, F. D. (1995). An integrative model of organizational trust. *Academy of Management Review*, *20*(3), 709-734. https://doi.org/10.5465/amr.1995.9508080335

Mayhorn, C. B., & McLaughlin, A. C. (2014). Warning the world of extreme events: A global perspective on risk communication for natural and technological disaster. *Safety Science*, *61*, 43-50. https://doi.org/10.1016/j.ssci.2012.04.014

Mayo, R. (2015). Cognition is a matter of trust: Distrust tunes cognitive processes. *European Review of Social Psychology*, *26*(1), 283-327. https://doi.org/10.1080/10463283.2015.1117249

Mayo, R. (2019). Knowledge and distrust may go a long way in the battle with disinformation: Mental processes of spontaneous disbelief. *Current Directions in Psychological Science*, *28*(4), 409-414. https://doi.org/10.1177/0963721419847998

McKnight, D. H., & Chervany, N. L. (2001). Trust and distrust definitions: One bite at a time. In R. Falcone, M. Singh, & Y. H. Tan (Eds.), *Trust in cyber-societies: Integrating the human and artificial perspectives* (pp. 27-54). Springer. https://doi.org/10.1007/3-540-45547-7_3

Mertzanis, C. (2021). Epidemiological susceptibility risk, adaptive management and firm performance. *British Journal of Management*, *32*(4), 1242-1264. https://doi.org/10.1111/1467-8551.12529

Meyer, R., & Kunreuther, H. (2017). *The ostrich paradox: Why we underprepare for disasters*. University of Pennsylvania Press.

Moats, J. B., Chermack, T. J., & Dooley, L. M. (2008). Using scenarios to develop crisis managers: Applications of scenario planning and scenario-based training. *Advances in Developing Human Resources*, *10*(3), 397-424. https://doi.org/10.1177/1523422308316456

Murata, A., & Yoshimura, H. (2015). Statistics of a variety of cognitive biases in decision making in crucial accident analyses. *Procedia Manufacturing*, *3*, 3898-3905. https://doi.org/10.1016/j.promfg.2015.07.907

Murata, A., Nakamura, T., & Karwowski, W. (2015). Influence of cognitive biases in distorting decision making and leading to critical unfavorable incidents. *Safety*, *1*(1), 44-58. https://doi.org/10.3390/safety1010044

Oberlin, R. (2018). Improving disaster outcomes with better decision making. *Journal of Business Continuity & Emergency Planning*, *11*(3), 279-286. https://doi.org/10.69554/tioa5090

Omer, H., & Alon, N. (1994). The continuity principle: A unified approach to disaster and trauma. *American Journal of Community Psychology*, *22*(2), 273-287. https://doi.org/10.1007/BF02506866

Papale, P. (2026). Cognitive biases and rational decision making for volcanic hazards and risks. *Frontiers in Earth Science*, *14*, Article 1755833. http://doi.org/10.3389/feart.2026.1755833

Piore, A. (2011). Planning for the black swan. *Scientific American*, *304*(6), 48-53.

Posten, A. C., & Gino, F. (2021). How trust and distrust shape perception and memory. *Journal of Personality and Social Psychology*, *121*(1), 43-58. https://doi.org/10.1037/pspa0000269

Prentice, R. A., & Koehler, J. J. (2003). A normality bias in legal decision making. *Cornell Law Review*, *88*(3), 583-650.

Quarantelli, E. L. (1957). The behavior of panic participants. *Sociology and Social Research*, *41*, 187-194.

Quarantelli, E. L. (2008). Conventional beliefs and counterintuitive realities. *Social Research: An International Quarterly*, *75*(3), 873-904. https://doi.org/10.1353/sor.2008.0003

Ripley, A. (2024). The unthinkable: Who survives when disaster strikes—and why. Harmony Books.

Roberts, P. S., & Wernstedt, K. (2019). Decision biases and heuristics among emergency managers: Just like the public they manage for? *The American Review of Public Administration*, *49*(3), 292-308. https://doi.org/10.1177/0275074018799490

Saunders, M. N., Dietz, G., & Thornhill, A. (2014). Trust and distrust: Polar opposites, or independent but co-existing? *Human Relations*, *67*(6), 639-665. https://doi.org/10.1177/0018726713500831

Savage, D. A. (2016). Surviving the storm: Behavioural economics in the conflict environment. *Peace Economics, Peace Science and Public Policy*, *22*(2), 105-129. https://doi.org/10.1515/peps-2015-0047

Savage, D. A. (2019). Towards a complex model of disaster behaviour. *Disasters*, *43*(4), 771-798. https://doi.org/10.1111/disa.12408

Schippers, M. C., Kepp, K. P., & Ioannidis, J. P. (2025). Biases and debiasing in policy decision-making. *European Journal of Clinical Investigation*, *55*(9), Article e70064. https://doi.org/10.1111/eci.70064

Schul, Y., Mayo, R., & Burnstein, E. (2008). The value of distrust. *Journal of Experimental Social Psychology*, *44*(5), 1293-1302. https://doi.org/10.1016/j.jesp.2008.05.003

Seager, T. P., AbdelMagid, M. H., Pesicka, E. A., Eisenberg, D. A., & Alderson, D. L. (2025). Infrastructure resilience to surprise. *Risk Analysis*, *45*(12), 5065-5079. https://doi.org/10.1111/risa.70161

Shirado, H. (2022). Individual and collective learning in groups facing danger. *Scientific Reports*, *12*(1), Article 6210. https://doi.org/10.1038/s41598-022-10255-3

Siligato, E., Iuele, G., Barbera, M., Bruno, F., Tordonato, G., Mautone, A., & Rizzo, A. (2024). Freezing effect and bystander effect: Overlaps and differences. *Psych*, *6*(1), 273-287. https://doi.org/10.3390/psych6010017

Taleb, N. N. (2007). Black swans and the domains of statistics. *The American Statistician*, *61*(3), 198-200. https://doi.org/10.1198/000313007X219996

Taleb, N. N. (2010). The black swan: The impact of the highly improbable (2nd ed.). Random House.

Tierney, K. (2025). *Disasters: A sociological approach* (2nd ed.). John Wiley & Sons.

Tsurushima, A. (2022). Tunnel vision hypothesis: Cognitive factor affecting crowd evacuation decisions. *SN Computer Science*, *3*(5), Article 332. https://doi.org/10.1007/s42979-022-01217-7

Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty: Heuristics and biases. *Science*, *185*(4157), 1124-1131. https://doi.org/10.1126/science.185.4157.1124

Van De Walle, S., & Six, F. (2014). Trust and distrust as distinct concepts: Why studying distrust in institutions is important. *Journal of Comparative Policy Analysis: Research and Practice*, *16*(2), 158-174. https://doi.org/10.1080/13876988.2013.785146

Wester, M. (2011). Fight, flight or freeze: Assumed reactions of the public during a crisis. *Journal of Contingencies and Crisis Management*, *19*(4), 207-214. https://doi.org/10.1111/j.1468-5973.2011.00646.x

Wickens, C. D., & Alexander, A. L. (2009). Attentional tunneling and task management in synthetic vision displays. *The International Journal of Aviation Psychology*, *19*(2), 182-199. https://doi.org/10.1080/10508410902766549

Wysocki, T. (2020). Normality: A two-faced concept. *Review of Philosophy and Psychology*, *11*(4), 689-716. https://doi.org/10.1007/s13164-020-00463-z

Yamazaki, T., Tamai, H., Owada, Y., Hattori, K., Taira, S. I., & Hamaguchi, K. (2016). Urban disaster simulation incorporating human psychological models in evacuation behaviors. In Y. Murayama, D. Velev, P. Zlateva, & J. Gonzalez (Eds.), *Information technology in disaster risk reduction* (pp. 20-30). Springer. https://doi.org/10.1007/978-3-319-68486-4_3

Yang, S. W., Soltis, S. M., Ross, J. R., & Labianca, G. J. (2021). Dormant tie reactivation as an affiliative coping response to stressors during the COVID-19 crisis. *Journal of Applied Psychology*, *106*(4), 489-500. https://doi.org//10.1037/apl0000909

Zenko, M. (2015). Red team: How to succeed by thinking like the enemy. Basic Books.

Author Biography

Peter S. Lehmann, Ph.D., is an Associate Professor in the Department of Criminal Justice and Criminology at Sam Houston State University. His research interests include juvenile justice and delinquency, criminal sentencing, racial and ethnic disparities in punishment, school discipline and safety, and public opinion on crime and criminal justice policy. His published work has appeared in *Justice Quarterly*, *Journal of Research in Crime and Delinquency*, *Crime & Delinquency*, *Journal of Criminal Justice*, and other journals.

The Institute for Homeland Security at Sam Houston State University is focused on building strategic partnerships between public and private organizations through education and applied research ventures in the critical infrastructure sectors of Transportation, Energy, Chemical, Water/Wastewater, Healthcare, and Public Health.

The Institute is a center for strategic thought with the goal of contributing to the security, resilience, and business continuity of these sectors from a Texas Homeland Security perspective. This is accomplished by facilitating collaboration activities, offering education programs, and conducting research to enhance the skills of practitioners specific to natural and human caused Homeland Security events.

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