SHRINE BOWL AVALANCHE CASE STUDY: LESSONS IN EXPECTATIONS

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ABSTRACT: This case study of an outlier in avalanche rescue survival provides an opportunity to examine how expectation-based heuristics influence operational judgment and attitudes in avalanche rescue decision-making.

In 2025, Summit County Rescue Group (SCRG) responded to an avalanche involving two snowmobilers in Shrine Bowl, Colorado. One rider was completely buried and remained under the snow for over one hour prior to extrication. Despite a burial duration markedly exceeding likely survival times, the patient survived, making this case an outlier within the SCRG response area. Summit County has the second-highest number of avalanche fatalities in Colorado, the state with the most fatalities in the United States.

We present a reconstruction of the incident, the organized response, and key operational decision points. Analysis focuses on rescue outlook considerations and access constraints, with emphasis on how these factors drove tactical choices during storm conditions. Particular attention is given to moments where time-based assumptions conflicted with observed rescue outlooks.

This case highlights a critical tension in avalanche rescue: while survival probability curves are foundational to training and triage, they can also introduce expectation bias that shapes perceptions of survivability and urgency. This phenomenon is observed even among experienced and highly trained rescuers. In long burial scenarios, these expectations may influence rescue decisions related to search persistence, risk tolerance, and allocation of resources in the face of difficult access and adverse weather conditions.

To place this event in context, we reference other documented long burial survival outliers, examining these unexpected cases. This examination supports a shift in emphasis in rescuer education and training to better prepare for such scenarios and to influence rescuer attitude and decision-making.

This case study contributes to ongoing discussions in avalanche rescue and decision-making by identifying how expectation bias can influence operational outcomes. We propose that rescue frameworks and training explicitly address this bias and incorporate flexible, observation-driven decision strategies. Lessons learned provide practical insights in support of this approach.

KEYWORDS: Avalanche Rescue, Search and Rescue, Long Avalanche Burial, Cognitive Heuristics, Expectation Bias, Decision-Making

1. INTRODUCTION

On 17 February 2025, the Summit County Rescue Group (SCRG), a Mountain Rescue Association-accredited volunteer Search and Rescue (SAR) team based in Frisco, Colorado, United States, responded to a report of an avalanche involving two snowmobilers. The incident location was near Vail Pass, Colorado, in a busy motorized recreation area. The avalanche danger in the area was rated High (Level 4 of 5) and had been under special advisory and an avalanche warning since 13 February. This case study details the events and decisions leading to the successful rescue of an avalanche patient buried for over 63 minutes. Survival statistics are among the most frequently cited tools in avalanche rescue training, and for good reason: they communicate urgency, reinforce the value of companion rescue, and provide rescuers with a shared framework for triage. However, when those statistics become expectations, they can shape operational decisions before a patient has ever been assessed.

This case study examines not only how a statistically unlikely survival occurred, but how the assumption that it would not occur influenced decision-making at multiple points during the re-

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sponse. To do so, it draws on cognitive decision-making concepts such as cognitive ease, premature closure, and anchoring bias; these concepts are used to explain how experienced, well-trained rescuers can find their operational judgment shaped by statistical familiarity and experience. A successful outcome does not preclude critical examination; understanding what went right, what went wrong, and what went unplanned is essential to improving future education, training, and response.

The following is an account of the rescue timeline, key tactical transition points, and an exploration of how expectation-based heuristics influence operational judgment and attitudes in avalanche rescue decision-making.

2. BACKGROUND

The accident occurred in Shrine Bowl near the Vail Pass trailhead, a primary staging area for snowmobile access in the Vail Pass Winter Recreation Area (VPWRA). The VPWRA is located approximately 90 minutes west of Denver along Interstate 70 and sees roughly 35,000 fee-paying visitors per winter season (Olson et al., 2017).

2.1 Shrine Bowl Description

Shrine Bowl is a terrain feature facing northeast to east sitting above treeline to the south of the summit of Shrine Mountain on Wingle Ridge. Access to the area is via the Shrine Bowl groomed road, a north-to-south route running from the Shrine Pass junction. The route is classified as “More Difficult” under VPWRA standards and climbs 361 m over 6.2 km through meadows and forested terrain (Vail Pass Alliance, 2026). The road is regularly groomed and marked; however, on the day of the incident, heavy snowfall and wind-drifted snow caused most of the route to be ungroomed. Critically, the route avoids avalanche terrain entirely, making it a low-hazard approach for motorized users. The Shrine Bowl area consists of open, east-facing, planar slopes flowing off of a 1.9 km ridge line. The vertical fall of the slope is approximately 100 m with gradual transitions to flatter terrain. The average slope angle is near 35 degrees.

2.2 Avalanche Description

The avalanche was a soft slab that failed on weak, faceted grains near the ground. It broke 168 m across and ran 107 m vertically to the treeline. The crown was 60 cm-1.2 m deep. The avalanche was classified as medium-sized compared to the path and was large enough to bury, injure, or kill a person (R3-D2)

3. SNOW AND WEATHER CONDITIONS

The month leading up to the accident was relatively typical for this part of Colorado: cold, mostly clear weather with short stormy periods bringing sporadic snowfall with small snow totals (<20 cm at a time). The Vail Pass area had been under an avalanche warning since 13 February with 60 cm to 100 cm of accumulated new snow.

Colorado Avalanche Information Center’s avalanche warning for the Vail Pass area stated:

> *An Avalanche Warning is in effect for the Summit area. Heavy snow and strong winds will create very dangerous avalanche conditions starting early Monday and lasting through Tuesday. Large avalanches will be easy to trigger, and some could release naturally. You can trigger avalanches in the new snow large enough to bury you. Some avalanches will break deeper in the snowpack, propagating broader and larger than expected. You could trigger an avalanche from a distance or below. Travel in avalanche terrain is not recommended during this time. (2025)*

A weather station on Vail Pass recorded a temperature of -10 C at 1200 MST. With the recent snow, the off-trail snowmobiling was excellent; however, many non-sheltered roads were wind-drifted in and made for trickier riding conditions. Additionally, it was a holiday weekend that brought great numbers of users to the area. This increased traffic created extremely rough conditions on below-treeline roads forcing slower riding speeds and careful navigation to avoid damage to snowmobiles.

4. CALL FOR SERVICE AND INITIAL RESPONSE

At 1210 MST, the 911 emergency services call center for the area received a call for an avalanche with a known burial. The on-call Incident Commander (IC) was immediately notified. While en route to Vail Pass, the IC spoke to the reporting party (RP) by phone and confirmed that there was a buried subject who was not searchable by transceiver. The IC instructed the RP to continue searching. During the debrief, the IC stated that his mindset during these initial phone calls was: “Well, we know what this is going to be.” (Personal communication, 2025).

Table 1: Chain of Response

Time	***Event***
1210	911 Call
1237	Sheriff’s Office Deputies Arrive at trailhead
1250	Team 1: SCSO deputy and SCRG rescuer deploy with snowmobiles
1307	Teams 2 & 3: Five SCRG rescuers enter the field with RECCO, AED, avalanche rescue dog and paramedic
1313	Team 1 finds a tennis-ball-sized piece of the subject’s airbag sticking out of the snow. They confirmed the burial with a probe strike and began excavation.

The excavation that followed the 1313 probe strike revealed a burial scenario that would define the remainder of the response. During excavation, it was determined the subject was buried facing head-downhill, diagonally across the slope, in a prone position, and with his airbag between him and the surface. The subject was wearing a full-face helmet and a one-piece snowmobiling suit. Patient care began once the team removed the snow from in front of the helmet. The patient then began to speak to the rescuers. The time from the 911 call to establishment of a clear airway was 63 minutes. It should be noted that actual burial time was necessarily longer as the reporting party attempted a transceiver search for some undetermined amount of time before he called 911. The patient stated the next day that he estimated searching for 10 to 15 minutes before calling, but such estimates are affected by the stress of the incident.

Teams 2 and 3 arrived shortly after Team 1’s radio report that the patient was conscious and breathing. These teams did not hear the radio traffic due to snowmobile noise. When Teams 2 and 3 arrived, they were surprised to learn the patient was alive and seemingly uninjured. The paramedic from Team 2 took over patient care while other rescuers began planning the evacuation.

Figure 1. (Left) A view of the crown and climbers' right flank. Burial location circled in red. (Right) The first SCRG rescuer on scene and a bystander assisting the patient during excavation.

5. PATIENT CARE, EVACUATION AND DISPOSITION

Upon examination, the patient was alert and oriented to person, place, time, and event. The patient’s chief complaint was being very cold, shivering uncontrollably, and diffuse low back pain. Both the initial and secondary physical assessments were unremarkable. The patient reported he “fell asleep” (Patient, personal communication, 2025) at some point while buried. This was likely due to hypoxia and possibly hypercapnia. Due to the weather and the initial findings the paramedic left the patient’s helmet on and did not open the one-piece suit. The medical team then began additional measures to counteract hypothermia. They used insulated pads under the patient, an expedition-weight down parka and multi-layer rescue tarp. The patient’s clothing was assessed for wetness; however, no intervention was needed.

Due to snow accumulation and road conditions, the snowmobile towed patient transport trailer was left at the Shrine Pass Road junction and an Akja-style toboggan with a snowmobile-hitch was brought to the scene. The patient was packaged in a commercial hypothermia bag with chemical heat packs, then placed in the Akja. The Akja was then towed out of the field with the paramedic riding along in the rear horns of the Akja. Due to the patient's condition and the conditions anticipated during the first portion of the evacuation, it was necessary to cover the patient's face and head completely within the hypothermia bag to prevent cold injury.

Fifteen minutes later at the Shrine Pass Road junction, the paramedic and a nurse reassessed and evaluated the patient finding significant improvement (Figure 3). The patient was no longer shivering at this point. He reported being much warmer and resolution of back pain. Due to the severity of the road conditions, it was determined the best patient care was to avoid the rough ride of the tow-behind trailer, and instead to have the patient ride out on the back of a two-seat snowmobile. The paramedic towed out behind the snowmobile with the patient. This portion of the extrication took 25 minutes ending at the Vail Pass trailhead. Care was transferred to a waiting ambulance. Approximately 2 hours and 39 minutes had elapsed from burial to transfer of care.

Figure 3. Paramedic assisting the patient out of the Akja. Note: the down jacket on the patient is unzipped to replace chemical heat packs.

The ambulance transported the patient 22 km by road to a designated trauma center. The patient was admitted to that hospital and kept for observation after lab values indicated possible cardiac injury. After a 24-hour observation stay, the patient was discharged with no deficits or lasting injury.

6. DISCUSSION

The following sections examine first the circumstantial and operational factors that made survival possible and the decision-making patterns that, had the outcome been different, might have gone unexamined. The nature of these decision-making patterns is then analyzed, and paths forward presented. As members of the responding team, the authors are in a position to examine these decision-making patterns with direct knowledge of the response and offer this analysis in the spirit of institutional learning rather than individual critique.

6.1 Unplanned Factors Influencing Survival

The SCRG response was effective and well-executed; however, several unplanned factors also contributed to the patient's survival. Neither the buried subject nor his companion had avalanche training, and the buried subject was not wearing a transceiver. The subject was not carried far into the toe of the debris; instead, he was buried just below the transition from the steep slope to flatter terrain. When caught, the subject was on his machine and was struck from behind by the avalanche. It is unknown how long he held onto the handlebars. The snowmobile was buried approximately 1 m directly below the subject.

The subject described pulling his avalanche airbag trigger with considerable effort after the snow had stopped moving. This explains why the airbag did not assist in segregating him toward the surface during flow. Under different burial circumstances, late airbag deployment could have reduced airspace or contributed to compressive asphyxia; however, in this instance, the deployment appeared to have displaced loose surface debris, making a portion of the airbag visible above the snow surface, and enabling rescue by visual clue detection, thereby significantly reducing search time. The relatively short avalanche path may also have limited debris turbulence, which could help explain the relatively shallow burial depth. Additionally, the debris was notably soft and unconsolidated, likely reducing compaction around the subject's airway.

The subject's helmet was equipped with a breath box, a component designed to deflect warm exhaled breath downward and away from the goggles. It is hypothesized that this feature may have created a small space in front of the mouth and nose and deflected exhaled breath away from the snow surface directly ahead of the airway, potentially preventing the formation of an ice mask. In conjunction with the subject's burial position, this may have contributed to airway patency throughout the burial. This remains speculative, and no manufacturer claims this as an intended function of the device. Notably, shallower burial depth and the presence of an air pocket are both independently associated with improved survival odds, regardless of burial time (Procter et al., 2016).

Fortuitous resource positioning also played a meaningful role. Nearly 24 hours before the call, SCRG's advanced snowmobile team had completed a mountain riding training in a neighboring county. Several personally owned snowmobiles remained loaded in a Summit County Sheriff's Office (SCSO) trailer awaiting unpacking. This coincidence helped pre-position critical equipment; a deputy was able to quickly move the machines to the trailhead and have them ready as rescuers arrived.

The SCSO has rescue-trained personnel that may deploy alongside SCRG rescuers during time-sensitive operations. In this case, two SCSO deputies were available, and the fortuitous presence of a SCRG rescuer recreating near the trailhead reduced response delays allowing a SCSO deputy to deploy with the rescuer. Storm conditions prevented helicopter deployment of rescuers and search dogs directly to the site, necessitating a road response to the trailhead and field access by snowmobile. Responding units traveled through slow, snow-covered traffic without the ability to use emergency lights on the interstate.

6.2 Operational Decisions and Lessons Learned

Both rescuers on Team 1 were experienced backcountry travelers. Given the low exposure risk on the approach to the accident site, even under High (Level 4 of 5) avalanche danger, the IC determined it was acceptable to deploy the team without a face-to-face briefing.

The team completed the critical elements of the search and maintained rescue momentum throughout. Specialist resources, including avalanche rescue dog teams, were deployed as soon as they arrived at the trailhead. However, despite the rapid deployment of many resources, additional advanced life support (ALS) personnel were not immediately sent into the field despite their importance in SCRG long-burial considerations for nearly twenty years. Command staff noted a hesitation to request additional advanced care, driven by the assumption that, given the burial duration, such resources would not be needed. A mechanical CPR device was not included in early deployment, a priority in SCRG training for a decade. The lesson is that deploying appropriate medical personnel and equipment regardless of assumed patient outcome is essential; these resources cannot improve a situation they were never sent to address.

Evacuation equipment deployment was delayed, partly due to the timing of rescuer arrivals at the trailhead and partly due to assumptions that rapid patient transport would not be required. Both patient transport options were deployed with the awareness that the tow-behind trailer posed a substantial risk of becoming stuck if it deviated from the main road. Using the Akja hitched to a mountain sled, with a rescuer positioned in the rear control horns and the patient loaded, was an unconventional method for SCRG; however, given the conditions, it was deemed the most expedient available tactic. During packaging, careful attention was paid to padding the patient adequately, as transport behind a snowmobile in an Akja would be considerably rough. The snowmobile operator was selected based on extensive riding experience. After a detailed reassessment, the paramedic and a nurse determined the patient was minimally injured, able to follow commands, and sufficiently warmed to ride out on the back of a snowmobile. This decision reduced transport time and the risk of further injury compared to continued Akja transport on deteriorating road conditions. The key lesson from these operational decisions is that expectation of patient outcome, conscious or otherwise, influenced resource allocation at multiple points during the response. The sections that follow examine this phenomenon in greater depth.

6.3 Expectation Bias and Cognitive Heuristics

In this incident, burial time was clinically defined as long burial (>60 minutes), but could have been much longer (Strapazzon et al., 2026). Comparable long burial survival cases in the literature provide important context for understanding what these statistics mean in practice. Oberhammer et al. (2008) report full neurological recovery following avalanche burial with profound hypothermia and prolonged cardiac arrest treated by extracorporeal rewarming, demonstrating that survival in extreme burial scenarios, while statistically rare, is not without precedent. ALS and mechanical CPR are critical tools for achieving positive outcomes in the otherwise unsalvageable hypothermic long burial patient (Strapazzon et al., 2026). ICAR guidelines have followed the evolving evidence base and inform SCRG training protocols (Pasquier et al., 2023). That rescuers trained to this standard still hesitated to deploy these resources underscores the degree to which expectation bias can override both knowledge and preparation in competent and experienced rescuers. The following paragraphs examine the cognitive mechanisms through which this effect operates.

Avalanche burial survival statistics have been used since the 1990s to emphasize the importance of companion rescue and to communicate the urgency of rapid response. Updated survival data published by Rauch et al. (2024) show a narrower initial survival window, approximately 10 minutes before the asphyxiation phase begins, compared to the previously cited 15 minutes, and a plateaued survivability of approximately 30% after 35 minutes for patients with an air pocket. Notably, the likelihood of survival for burials exceeding 130 minutes increased from 2.6% to 7.3% in the most recent dataset (Rauch et al., 2024). These statistics are valuable tools for communicating the urgency of companion rescue to recreational backcountry users and for reinforcing consequence consideration.

However, the context in which these statistics are applied differs meaningfully between the companion rescuer and the professional rescuer. The companion rescuer must respond regardless of preparation. The professional rescuer, by contrast, actively plans and prepares for such incidents in advance. It is precisely in this professional context that survival statistics can become a liability. Recited frequently in training and operations, these figures can transition from useful tools to uncritical assumptions, shaping expectations about patient outcome before any direct assessment has been made. Kahneman (2011) describes cognitive ease as the experience of information feeling true, familiar, and effortless to accept, particularly when it aligns with prior experience. When survival curve statistics are repeatedly encountered in training and consistently reinforced by field outcomes, they become cognitively easy to accept as predictive of any given incident. This is problematic in avalanche rescue because the condition of the patient cannot be known until rescuers arrive on scene.

Outcomes that deviate from statistical expectations, such as the Shrine Bowl rescue, risk being discounted during planning simply because they feel improbable. This dynamic is an expression of anchoring bias: the tendency to over-rely on an initial piece of information, burial duration in this case, when making subsequent judgments (Tversky and Kahneman, 1974; Kahneman, 2011). Burial time is frequently the first and most salient data point available to an Incident Commander. When that figure exceeds the statistical survival window, it can anchor all subsequent resource allocation decisions toward a recovery rather than rescue posture, even before patient presentation has been assessed. The Shrine Bowl response illustrates this pattern at multiple decision points. The IC's statement upon learning of the burial, "Well, we know what this is going to be," reflects an anchored expectation formed before any definitive patient information was available beyond speculatively long burial times associated with non-transceiver-searchable burials. Hesitation to deploy additional ALS personnel and delays in evacuation equipment staging both reflect downstream effects of this initial anchor. This hesitation is consistent with what Croskerry (2002) describes as premature closure: the tendency to stop seeking or acting on new information once an initial assessment feels confirmed, even in the absence of direct patient contact in emergency response. Importantly, these responses were not the result of negligence or inexperience; they were the result of trained, capable rescuers operating under cognitively familiar assumptions that happened to be incorrect in this instance.

Regarding survival statistics, it is worth examining which datasets are most applicable to operational planning and mindset. Rauch et al. (2024) report a survival rate of 21.9% for burials of 31–130 minutes (n=96, 2011–2020), with minor difference compared to older Swiss datasets at the 63-minute mark. This figure is not negligible; a one-in-five survival rate for burials in this duration range does not, on its face, support a default recovery posture. And yet anchoring toward a poor outcome occurred among rescuers who were aware of these statistics and had trained extensively on long burial management. By contrast, Haegeli et al. (2011) report survival rates falling to approximately 4% for burials beyond 35 minutes in a Canadian dataset. The divergence between these figures is meaningful: a rescuer whose conceptual or experiential frame is anchored to the lower estimate may respond very differently than one anchored to the higher. Neither dataset tells a rescuer what will happen in any specific incident, as they describe population-level probabilities that cannot predict individual outcomes. This distinction is critical. When survival statistics are treated as outcome predictions rather than probabilistic references, they cease to inform decision-making and instead replace it.

Individual rescuer experience shapes these expectations in ways that go beyond what didactic statistics alone can produce. Crucially, however, anchoring can persist even when that experience includes directly relevant positive outcomes. Of the rescuers on this incident, three had previously been involved in full-burial-save SAR incidents with burial times exceeding 35 minutes, and one had responded to a companion rescue incident with a full burial and survival with burial time also exceeding 35 minutes. All were surprised at the survival. Klein (1999) describes how experienced decision-makers rely on pattern recognition to rapidly assess situations, matching observed cues to prior experience. In long burial scenarios, this process may work against adaptive response when the dominant experiential pattern is one of non-survival. SCRG had trained on extended resuscitative efforts considering ICAR guidelines for long burials since 2007, and with mechanical CPR devices since 2016. Klein's Recognition-Primed Decision model helps explain why even competent, experienced rescuers remained mentally oriented toward a poor outcome despite training and prior experience to the contrary, suggesting that traditional training alone is insufficient to fully mitigate this effect.

The broader challenge of heuristic traps in avalanche decision-making has been explored in the context of terrain and hazard assessment (McCammon, 2004). Formal exploration of analogous heuristics in rescue response contexts has received less attention and represents a meaningful opportunity for future research.

6.4 Recommendations for Rescue Frameworks

Outcome assumptions should never be based on burial time alone. Burial times are probabilistic while patient survival is necessarily binary. Patient presentation upon extrication must be the primary basis for clinical decision-making. A patient may benefit from favorable circumstances, as this subject did, and rescuers must be positioned to leverage those circumstances regardless of statistical probability. The following recommendations are offered for rescue teams and Incident Commanders managing long burial scenarios:

First, during initial planning for any known complete burial, Incident Command should explicitly ask: "What resources will we need if this patient is alive?" Medical and transportation resources should be retained in a rescue posture until direct patient assessment, or established protocols support a transition to recovery operations. A checklist may be a helpful tool to drive doctrinal compliance in the face of mindset-confounding heuristic traps (Trolliet et al., 2024).

Second, the response should be escalated to the extent permitted by risk management constraints. The Shrine Bowl response did not require travel through complex avalanche terrain, which allowed for a full rescue posture without additional risk exposure. When terrain and hazard complexity require risk management trade-offs, those decisions should be made explicitly and documented, not driven implicitly by outcome assumptions.

Third, rescue frameworks and training programs should explicitly address expectation bias and anchoring as cognitive risks in long burial scenarios. Croskerry et al. (2013) identify structured debiasing training as an effective intervention for reducing cognitive errors in high-stakes decision-making environments, supporting the inclusion of expectation bias, premature closure, and anchoring as explicit topics in avalanche rescue education. Structured analytical frameworks such as Bayesian reasoning, structured decision-making frameworks including the OODA loop (Observe, Orient, Decide, Act), and deliberate debiasing exercises offer practical tools for managing intuitive assumptions under operational pressure.

Finally, the mantra of "risk nothing for what is already lost" (Brunacini, 2001) should be applied with precision in avalanche rescue. It is appropriate as a risk management principle but should not be invoked prematurely to justify a recovery posture before patient status is known.

7. CONCLUSION

Avalanche rescue practitioners must plan not only for resuscitation efforts but for the possibility of a living, responsive patient regardless of burial duration. When burial time is short, that information appropriately reinforces urgency within the ideal survival window. When burial time is long, that information should prompt preparation for complex patient management, including hypothermia care and careful extrication, not a default shift to recovery operations. The operational mindset should default to rescue until evidence or established protocol dictates otherwise. Survival statistics are essential tools for training and for communicating risk to the public, but they should not anchor operational decision-making in the field before patient presentation is assessed.

As technology continues to develop, including advances in avalanche airbag systems, avalanche safety devices, medical devices, and communication tools that shorten response times, the frequency of long burial survivals may increase. Rescuers must be prepared for outcomes that fall outside of statistical expectations. The Shrine Bowl rescue was shaped by a combination of effective response and fortunate circumstance. Leveraging that luck required rescuers to remain open to an outcome that their training and experience told them was unlikely. Preparing for any outcome, regardless of probability, is not wishful thinking; it is a disciplined application of rescue principles. This incident challenged our team to examine not only what we know, but how our expectations shape what we are prepared to do.

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