

Repeated Mistakes made by Avalanche Professionals¹

TERRAIN EVALUATION

Underestimating terrain and consequences because of inherently problematic terrain.

- **Misjudgment of slope potential** – underestimating how big a slope can go or underestimating the consequences in small terrain features.
- **Unsuitable ski cutting** – no safe zones, hard slab conditions, deep snow or wet snow conditions.
- **Stubborn slope angles** – 30-35° terrain might necessitate the use of different tools than steeper terrain
- **Areas with few or no safe zones.**
- **Small terrain features** – underestimate the slope angle and slope features

SNOWPACK ASSESSMENT

Any conditions that you don't recognize/understand should raise warning flags and make you take a step back.

- **Faceted snow problems** – Backcountry snowpack exists in a ski area early season. Persistent and difficult to predict when it is safely bridged or not. Very difficult to control. Can be triggered remotely from a great distance away.
- **Ski cut suitability** – What avalanche problem is present? Ski cuts aren't suitable in deep slab or hard slab conditions. High consequence terrain makes ski cuts unsuitable.
- **Extreme Loading Events** – the faster cornices and wind loaded areas build, the more sensitive they will be.
- **Abnormal Loading Events** – winds out of directions that are counter to prevailing winds will load shallow and often weak snowpacks.
- **Changes Over Space and Time** – if you are focused on one small piece of terrain, you can lose sight of the big picture.

PARTNER DYNAMICS

Problem: Abandoned Safe Rituals because of:

- **Poor Safe Travel Procedures** – expose more than one person to the hazard at one time, not using true safe zones, cutting in above partners.
- **Poor Communication** – with partner(s) or with other groups
- **Impatience** – ascent/descent taking longer than expected

Solutions: Plan ahead and COMMUNICATE, coordinate with other teams/parties

¹ Repeated Mistakes Made by Avalanche Professionals, by Douglas Richmond, ISSW '94 – Snowbird, UT Proceedings, pp.449-458

Professional Avalanche Worker Incidents²

DISTRACTION

Our brains can handle a limited amount of information at a time.

Contributed to 80% of accidents and near misses studied

- **Environmental distractions** – cold, windy, insufficient gear
- **Pre-route distractions** – fight with partner, disagreement with route partner, injury
- **Event related distractions** – ie. Misfires/duds, equipment failure, partner dynamics
- **Pressure** – by management, supervisory, peer pressure, pressure on self

COMMUNICATION ISSUES

Contributed to 40% of accidents and near misses studied

Occurred before and during the route

- **Unclear expectations** – due to large experience differences, poor communication
- **Failure to warn partner**

MOTIVATED REASONING

The tendency to find arguments in favor of conclusions we want to believe to be stronger than arguments for conclusions we do not want to believe.

Contributed to 42% of accidents and near misses studied

SUPERVISOR/ORGANIZATIONAL MISTAKES

- **High turnover** can lead to inexperienced workers and unfamiliarity with terrain
- **Assuming a level of experience is applicable to a new area** (e.g. years in a maritime snowpack will not prepare someone for a mid-winter continental snowpack and vice-versa)
- **Carrying through with a pre-determined plan when conditions change** rapidly for the unexpected

HEURISTIC TRAPS

Professionals are just as susceptible to heuristic traps as recreationists

- **F** – Familiarity
- **A** – Acceptance
- **C** – Commitment
- **E** – Expert Halo
- **T** – Tracks
- **S** – Social Proof/Facilitation

² Compiling and studying professional avalanche worker incident data to improve worker safety, by Ron Simenhois and Scotty Savage, ISSW '10 – Squaw Valley, CA, Proceedings, pp.544-547

CONCLUSIONS BY SAVAGE & SIMENHOIS

- Ski area forecasters and ski patrollers will make some poor decisions that lead to near misses & accidents
- Awareness helps, but organizations would be well-served to increase training on human factor & decision-making topics
- Trainings can include: debriefs, case studies, improving safety culture, improving communication
- Trainings can be modeled after the airline industry and other well-funded industries

Zen and the Art of Avalanche Forecasting³

Obstacle – Ego

Antidote – Cultivate humility

Obstacle – Narrow Focus

Antidote – Keep your eye on the big picture

Obstacle – Inattention

Antidote – Cultivate mindfulness

Additional Distractions

- Laziness
- Morale
- Complacency
- Exhaustion
- Perception problems
 - miss the obvious
 - ignore the obvious
 - time lag
 - belief inertia
- Attitude towards risk

³ Zen in the art of avalanche hazard forecasting, by RL “Sam” Davis, ISSW ’98 –Sun River, OR, Proceedings, pp.335-338

Solutions for Avoidance

Individual

Ruthless self-assessment

- Training
- Fitness
- Personal Disaster Flags (PDF) Test
- Risk Attitude
- Experience

Organizational

- Operations Plan
- Training
- Morning meeting
- Operational Mindset
 - Initial Assessment
 - Stepping Out
 - Status Quo
 - Stepping Back
 - Entrenchment
 - Open Season
 - Free Ride
 - Maintenance
 - High Alert
 - Spring Diurnal
- Situational awareness

SITUATIONAL AWARENESS

- Establish the threat
- Identify cues
- Identify proper mitigation efforts
- Avoid reactive states

| | WHITE | YELLOW | ORANGE | RED | BLACK |
|----------------|---|---|--|--|--|
| MIND/STATE | <ul style="list-style-type: none"> • Unaware of environmental danger • Unprepared to take action • Oblivious | <ul style="list-style-type: none"> • Prepared and alert • Proper Situational awareness, yet no specific threat has been identified • Observing and Quantifying | <ul style="list-style-type: none"> • Alert to a specific danger or condition • Skill aware of surrounding environment • Prepared to assess additional threats | <ul style="list-style-type: none"> • Fight or Flight Mode • Complete commitment to emergency at hand • Irrational and emotional responses heightened • Lowered Intellectual Response Time Distortion | <ul style="list-style-type: none"> • System Overload • Denial • Confusion • Irrational and/or repetitive |
| PHYSICAL STATE | <ul style="list-style-type: none"> • Relaxed • Vulnerable | <ul style="list-style-type: none"> • Relaxed but prepared to react • ready to shift to Orange as cues present themselves | <ul style="list-style-type: none"> • Ready to take action • Reflexive escape evade • Heart and Respiratory rates increase | <ul style="list-style-type: none"> • Adrenaline Dump • Fine Motor Skills Disappear • No chance to lower situational state until threat is mitigated | <ul style="list-style-type: none"> • Adrenaline Overload • Cramping • Hyperventilation • Gross Motor skills affected |
| COMMENTS | Ignorance is Bliss | "I may encounter avalanches today" | Ski cutting, opening a slope, rapidly changing conditions, or baseline is wrong | You are right of Whoomph! Reactive to situation | Freeze State Complete Amygdala Hijack you have become a victim |