APPENDIX A

Optional Readings:

This appendix includes the following optional readings that are referenced throughout the course:

- "Your S.A. and Condition White" by Gary Nelson
- "The After Action Review" by Mission-Centered Solutions, Inc.
- "Five Hazardous Attitudes—Flight Out of Balance" by Seth B. Golbey
- "Fatigue" adapted from research performed by Dr. J. Lynn Caldwell, U.S. Army Aeromedical Research Laboratory (USAARL)
- "RPD on the Fireground—How to Avoid the Blank Screen Syndrome" by Larry C. Miller, Los Angeles County Fire Department

Your S.A. and Condition White
Gary Nelson
Los Angeles County Fire Department, Retired

Introduction
Entrapment investigations always reveal a litany of problems faced by the company officer (crew boss, engine boss, etc). In many cases the number and variety of problems overwhelm the company officer's (CO) decision making process. The nature of the business requires the CO to walk a fine line between valuable aggressiveness and reasonable risk many times each operational period. Our COs make many of these decisions every day all summer long each year. With each change in tactics or the fire environment, the company officer must assess the appropriate degree of risk for the company. Many entrapment investigations have disclosed inadequate awareness of recognizable risks. If we can control our thoughts about our awareness, we can ensure that we will recognize potential risk in time to make sound decisions about reasonable risk. Recent research (2) has shown the relationship between Situation Awareness (SA) and effective decision making. This paper presents one method of controlling awareness.

Situation Awareness
SA, good or bad, is at the heart of fireline decision making. Your decisions are only as good as your perception of reality. SA for firefighters is a term used to describe the firefighter's awareness of the total working environment. Knowing that the total working environment, including tactical and logistical information, can overwhelm effective decision making, you may need to put a priority on safety SA to the exclusion of all other matters in some situations.   You know that the wildfire environment presents entrapment potential in virtually every assignment. Effective safety SA means that you control your thought processes to ensure an early warning of any fire run that could result in an entrapment. This early warning is an essential part of an effective LCES. To ensure good "Risk Management" (1), your SA must monitor several inter-related factors about fireline safety. Your safety SA must include the current status of:
-   A mental checklist of potential hazards.
-   An awareness of fire behavior data gathered visually and from incident sources.
-   Continuous observation of surroundings for visual cues of potential hazards.
-   An awareness of the current status of the quality of each component of your LCES.
-   An awareness of barriers affecting good SA.
-   A current awareness of changes in time, movement and tactics.

Inadequate SA can occur when you have allowed your attention to one or more of these factors to slip out of your current awareness or to be blocked by some over-riding factor or barrier. The new NWCG class on Human Factors on the Fireline (1) describes many of the barriers to effective SA and decision-making. The barriers described in this course include:
- Stress.
- Attitude
- Task saturation
- Information overload
- Fatigue
- Distraction.

Knowing that effective SA is essential for safe and aggressive tactics, and knowing that these barriers are present during most fire assignments presents a real challenge for one who wants to fight fire aggressively without taking any inordinate risks.

Responsibilities
The company officer and each crew member is responsible for maintaining a current SA and for keeping each other informed about any new hazards. The CO is responsible for making decisions about tactical action and appropriate risk. If the CO has encouraged good communication about SA, and if the CO is using the standard decision model (1), it is likely that the company can continue aggressive tactics in any dynamic situation without taking any inordinate risk.

Communication
Regular Intra-crew discussions about S.A. can raise awareness and improve the decision making of the company officer. Putnam (1995) and others (2) have shown the relationship between Intra-crew communication and good decision making by the company officer. They have also illustrated that a breakdown in communication usually precedes a breakdown in effective decision making under stressful situations. Fire companies must find ways to keep their communication alive so the discussion of the environment ensures effective safety SA.

The Human Factors course also illustrates many barriers to effective communication, and it also covers the problems associated with indirect communication. Firefighters must learn to make concise and direct comments about any perceived hazard or any awareness failures of the crew. The good news is that once we are aware of these problems, we can avoid them through consciousness decision-making and improved intra-crew communication. One way to overcome these problems is to use the Harral Color Coded System for Total Control. This system provides a simple and direct way to control your awareness state and to communicate about hazards and awareness.

Harral System for Total Control
The Harral System provides a simple language for thinking and for intra-crew communication. Harral has identified four levels of awareness that affect one's ability to stay focused on hazards. In two of the levels we are fairly unaware of our surroundings.

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In one of these awareness levels we can recognize that we are missing the visual cues about the fire environment or the "Watchout Situations". This low awareness level can occur because of complacency, or because we can be forced into this level by normal incident situations of stress, fatigue, "Missionitis" (1), and task saturation. Harral has color-coded the awareness levels to facilitate simple, direct communication.

Condition White
In condition White you are generally unaware of hazards in your environment. You have no reason to believe that you should be looking for hazards at that moment. This could flow from a complacent attitude, or from allowing your focus to drift to competing thoughts. You may be able to recall an example of this in your driving experience. If you are driving down the road, and you are hungry, your thoughts could be focused on your lunch plans to the degree you are missing visual cues of traffic hazards. Your selective perception can exclude the more important road hazards, while you are thinking about food or reading restaurant signs because your focus is driven by your thoughts about food. The same kind of wandering focus can occur on the fireline. This is usally caused by over-focusing on tactical issues to the exclusion of effective safety SA.   You can eliminate this problem by making a conscious decision to move up to the next level whenever your are on the line at a wildfire.

Condition Yellow
In condition Yellow we make a conscious decision to assume a heightened level of SA. There are no immediate threats to our safety, but our training has taught us that we need to scan our horizon on a regular basis to perceive the cues of fire behavior factors that can lead to an entrapment. This is a relaxed awareness: we are continually seeing, listening, and searching for anomalies. In condition yellow we should also be doing some "what if?" thinking, such as "how soon could the fire hit our location if we experienced a 90 degree wind shift?

Once you have learned to think and communicate about condition white and condition yellow, you will notice how often you allow yourself to slip into condition white. Moreover, you are also more likely to recognize a false sense of urgency from others who might suggest a "high tempo" operation that can push you back into Condition White. One of the values that users have reported is heightened awareness of their "blind spots" and more communication about potential hazards.

Staying in Condition Yellow can be difficult. Many of the SA barriers can push an alert firefighter back into Condition White. Using this system on a regular basis will improve your awareness of the barriers. If the whole crew is communicating about awareness levels, one or more members may make the comment that can break the error chain leading to an entrapment.

Condition Orange
Condition Orange means a member of the crew has recognized a potential hazard. The company officer will evaluate the risk and follow the "standard decision model" (1) for an appropriate action. This is the "Hazard Assessment Step" in the "risk Management Cycle" (1).

The company officer ensures that someone (lookout) keeps an even higher level of awareness about the specific hazard. The lookout has a primary responsibility to stay focused on the Condition Orange factor (spot fire), so the rest of the crew can focus on getting the job done. The hazard may be minor or latent (smoldering spot fire) and only need watching. The leader has predicted that, under current conditions, the crew can get to the spot fire before any flare-up can occur. The lookout remains in Condition Orange about the new hazard, so the crew can continue working in condition yellow about the complete environment. Users have reported that talking about "condition Orange factors" can be a useful way to describe all of the environment factors that have potential for increased risk. A crew that collectively monitors the variable levels of awareness and ensures that someone is always in Condition Yellow is not likely to ignore any high-risk situations.

Condition Red
Condition Red is an automatic response mode. In this mode one is desperately trying to save their life, and they are not likely to see anything except their path to safety. If you did some good "what if" thinking in your earlier awareness levels, you might be able to overcome the faulty decision making associated with this awareness level. If you didn't, you may become a victim of over- training or bad habits. Putnam has reported one example of this. The old habit of always carrying one's tool has significantly slowed some fleeing firefighters who were ultimately trapped.

Using an improved awareness of conditions white, yellow and orange and communicating about these with your crewmembers can help you overcome many of the barriers to effective SA. Talking about condition Red may help you identify some old habits that could hinder a timely escape. Talking about all of the awareness levels can improve your crew's ability to remain aggressive while maintaining very high levels of Situation Awareness. This kind of SA can improve any crew's collective decision-making capabilities.

References:

1. Human Factors on the Fireline, 2000, NWCG, Boise, ID.
2. Findings From the Wildland Firefighters Human Factors Workshop, 1995, MTDC, Missoula, MT.
3. Harral, What Color is Survival?, 1994, California Fire Instructor's Workshop.
4. Putnam, The Collapse of Decision-making and Organizational Structure on Storm King Mountain, Wildfire Magazine, June 1995.

The After Action Review

The After Action Review (AAR) is a post-shift team discussion that incorporates and integrates both technical information and human factors.

The AAR...

- Is the primary tool for incorporating the action's or day's events into the learning cycle.

- Provides a forum for determining the roots of crew performance successes and failures. In the event of failure, it provides a forum for developing strategies for mitigating causal factors in the future.

- Assists in establishing a common crew perception of the events of the day.

- Provides practice for crew communication and for conflict resolution between team members.

- Provides a place to establish, emphasize, and reinforce group norms.

Guidelines for the AAR

The AAR should detail the actions of the crew during the assignment. Technical, operational, and human elements of crew performance should be discussed as appropriate. Both good and sub-standard performance should be addressed and analyzed. The content of each AAR may vary widely, depending upon the events.

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Subjects discussed or mentioned during an AAR may include the following:

- Technical performance
- Techniques used
- Planning
- Communication of directions, events, changes
- Perception of events
- Communication
- Environmental problems
- Stress impacts
- Fatigue impacts
- Questions and answers
- Adapting

- Equipment performance
- Lessons learned
- Procedures adherence
- Environmental attributes or changes
- Coordination
- Attitude impacts
- Safety concerns
- Roles and Responsibilities
- Environmental indicators
- Organizational issues or cultural problems as they impact the team

In general, an AAR answers these questions:

1. What was planned?
2. What really happened?
3. Why did it happen?
4. What can we do better next time?

Some days are more exciting than others, and the AAR should reflect this reality. As a crew leader, you will need to focus the AAR to make it effective.

Adjust the content of the AAR to reflect the events of the day, but don't assume *nothing* happens on a quiet day. A crew can fall down on quiet days as easily as it can on busy ones. Low stress can breed complacency. Keep the AAR straight-forward and focused on task.

Following are some watchouts to keep in mind during AARs:

- Don't over-analyze the day's events. Short of a catastrophic problem that really needs to be torn down and examined, discuss only the most important factors and move along. In some cases, you may need to guide or limit the discussion so that it does not get too deep or convoluted.

- Don't allow the AAR to bog down with trivia or unnecessary details that do not relate to the unit's actions and events. If nothing happened, don't feel obligated to extract a 30-minute AAR from it.

Timing the AAR

The AAR is a learning tool. Time it to occur when the crew is ready and able to learn. As a leader or supervisor, you need to plan the AAR so that it can be as effective as possible.

- **End of the day**—Generally, AARs conducted immediately after the shift provide the best learning. This is the time when most things are still fresh in the mind both technically and emotionally. Unless the feelings associated with an event are very strong, crew members will not retain an emotional memory of it for long.

Emotion and Memory

If human factors performance is important for effective learning, discussing the emotional aspect of an experience right away is critical. Terms such as frustrated, confused, unsure, apprehensive, and pissed off can indicate the emotional manifestation of a human factors breakdown. After time passes, most people forget that they were confused or frustrated about a specific situation. The emotional aspect of the event fades, and the event itself can be reduced to its technical aspect only.

- **Split format**—This format is the second-best choice when a full post-shift AAR cannot be implemented: for example, when you have a tired crew but also have important things to discuss.

  In the split format, the "What really happened?" part of the AAR is explored at the first opportunity, but the remaining part of the briefing is postponed until later. The "What really happened?" stage requires the most emotional recall and focuses only on recalling the events of the action. Analysis and creative thinking are needed for the latter stages, and a crew with no mental energy will have difficulty with these. In this format, these stages are delayed until the crew is ready to learn.

- **Start of the day**—Conducted prior to morning briefing, this type of AAR enables crew members to retain many details from the previous day. Crew members are generally not as interactive or engaged as they would be right after the event. Although better than nothing, an AAR conducted the next morning is hard to get started and to keep moving.

- **End of assignment**—Unlike the post-shift AAR, this AAR is usually is more academic and global in nature because most of the emotional aspect and much of the detail is missing. This type of briefing does not have to be conducted in the four-question AAR format. Since the post-shift AAR is concentrated on daily performance, the post-assignment briefing may concentrate more on large events, operational procedures, shelved, or organization-related issues.

Location

An AAR can be conducted nearly anywhere as long as the crew has some privacy and all the crew members can hear and be heard. An AAR can take place on assignment to departure, in the truck headed back to headquarters, or in a quiet spot after dinner. It is more important *that* it is conducted, not *where* it happens.

Formality

Make the AAR a standard operating procedure for your team—as important as any other required activity. Informal conduct may threaten the importance of the AAR in the crew's eyes. As any formal activity, make sure you have the time and the place to accomplish it effectively.

Confidentiality

Advocate and demonstrate privacy and confidentiality. What happened in the AAR and who said what should stay within the confines of the AAR. Although specific information may come out as a result of the AAR, the details about what was said by individual crew members should be kept confidential.

This code of conduct should be strongly enforced, as it is the foundation that enables all crew members to speak freely and confidently without fear of retribution or attribution.

You can reinforce this conduct by taking the following kinds of action:

- Selecting a private place to conduct the AAR

- Purposely removing or destroying drawings and other information that is used or constructed during the AAR

- Allowing other parties to view the AAR only if all crew members have given permission and are comfortable with it.

- Reprimanding crew members who disclose inappropriate information concerning the AAR to others or otherwise undermine the confidentiality of the AAR.

Issues that need to be brought to the attention of higher-ups should be done so independently by the supervisor. Supervisors should try to concentrate and disclose the *what* not the *who* of issues that need to be elevated from an AAR.

AAR Format

The AAR answers, as a minimum, the following questions:

1. What was planned?

2. What really happened?

3. Why did it happen?

4. What can we do better next time?

1. What was planned?

What were the goals and objectives?

- Incident action plan
- Crew incident goals
- Other crew goals
- Individual goals
- Additional unstated goals

What barriers did we expect?

- Safety hazards or dangers identified in the incident action plan
- "Experience tells us" problems

2. What really happened?

Discover the events of the day through your crew member's eyes. Collectively, the crew probably knows what happened, but each individual may not.

Use facilitation techniques to have the crew rebuild what happened. Recount the day's events and ask questions that promote and encourage crew members to fill in the blanks.

In situations where you were the primary observer and decision maker, help the crew fill in the blanks through your eyes and experiences. Add context and perspective where appropriate to make the situation clearer.

Ask questions. Find out whether the crew was unsure about what they we supposed to be doing at times or if they were not clear about what was happening around them. Ask specifically about anything you noticed during the day that indicated people had inaccurate or poor situation awareness.

Listen carefully. Resolve inconsistencies, and be an active listener.

Examine your team's performance:

- Compare it against established standards for crew effectiveness.

- Analyze whether crew members deliberately stepped through key components of the decision making model.

  - **Recognition:** When was the problem realized and by whom? Were there indicators? If so, what were they? Was there information in the plan that keyed us to the presence of the indicators?

  - **Situation Awareness:** Who was aware of the situation, and who was not? How was the problem communicated? Did different crew members perceive the situation differently? If so, why? What was the *reality* of the situation? What resources were used (or should have been used) to fill in gaps in the information?

  - **Option Development:** How effective was the selected option or options? If formally discussed, what was the reasoning that led to the final decision? Was it valid?

  - **Risk Assessment and Analysis:** Were the critical risks identified? If not, why? Were the risks weighed appropriately?

  - **Action:** Was the action communicated to the crew in an effective, clear, and timely manner? Was the technical execution to standard? How successful was the action at achieving the desired result?

Identify significant barriers

- Unanticipated barriers

- Team-related barriers (communication barriers, perception barriers, attitudes that presented barriers)

- Individual barriers (stress, fatigue, exhaustion, attitude)

- Did the team recognize and respond to any problems?

Examples:

- Did the team recognize a changing environmental factor or a Watch Out Situation?

  - Did people recognize it when it occurred? If yes, what was working that enabled the team to stay safe? If no, what should have happened that didn't?

  - Did people communicate the situation to all the affected crew members?

- Was the strategy that was deployed effective? If not, were there (in retrospect) indications that the course of action should have been reconsidered? If yes, were there indications that supported the strategy? Were these in the plan?

- Were there times when crew members were out of contact, or were unsure about the big picture? If so, what factors contributed to this situation? If people generally had good situation awareness, what practices helped in keeping everyone on the same page?

- Were there external factors that helped or hindered the effort? How did the team respond to these factors? Was it possible to anticipate the change? Why?

ALWAYS discuss all non-textbook actions.

Examples:

- The crew or command—or both—not using Standard Operating Procedures (SOPs) to accomplish a task.

- Situations that resulted in safety violations, the loss of safety margins, or presented unnecessary risk.

Turn sub-standard actions and results into good lessons about what not to do, and good actions into an opportunity for advanced training. Be prepared to admit mistakes.

3. Why did it happen?

Find the root causes behind identified performance successes and failures. In many cases, the crew's performance will contain both good and poor performance. As a leader you should attempt to keep these balanced and in perspective. By providing this emphasis, you have an opportunity to teach your crew members some of your experience in ranking the priority of various factors.

Successes

It is often much easier to determine the cause for a failure than for a success, and the natural tendency is to concentrate on what was wrong. The need to determine why a crew was successful or effective is just as important as discussing failures, as these are the actions and behaviors you are trying to replicate in the future.

Take time to discuss these kinds of successes:

- A situation was sized up correctly.

- A potential danger was noticed and communicated immediately.

- A maneuver or action was executed exactly as planned or taught.

- Someone had a good idea or an option about how to handle an emerging situation.

Focusing on what went right presents an excellent opportunity to reinforce behaviors, procedures, warnings, guidelines, or experiences that promote safety and effectiveness in your crew. Don't overlook these opportunities.

Failures

Inquiries and analysis should concentrate on *what* is right, not *who* is right. When a failure is identified, determine what should have happened, and secondly what didn't happen (or happened wrong).

Individual Failures

Identifying an individual crew member's failure is permissible, as long as it goes to the source of the problem. Discussion needs to focus on what should have happened, not at the personal integrity of the individual or individuals involved.

Personnel reprimands should be left out of the AAR because such actions are disciplinary and do not further the learning of the AAR. That is not to say, however, that a disciplinary action may need to be taken as a result of information that comes out of an AAR.

Out of Range

What seemed to have happened (perception):

A couple crew members got out of voice range. When the conditions changed and the crew had to move, the leader had to send someone out to find the crew members and bring them back before the crew could move out.

What really happened (reality):

All crew members were communicating less than usual all day. Many were tired from a poor night's sleep and were working "with their heads down."

Two crew members drifted out of voice range due to inattention from the two crew members as well as the other crew members who were supposed to be communicating with them.

Noise from the fire and the saws also contributed to the communications and situation awareness problems.

The leader noticed that the fire had started to move in a direction that could eventually endanger an escape route. When the leader called for the team to get ready to move, people noticed that two crew members were missing. The leader decided not to move the crew until all were accounted for.

The AAR is this situation could go many directions, and could encompass several different factors.

Possible areas for discussion:

- **Losing contact with the two crew members:** What are the standard communication procedures for crew members without radios? How many on the crew were experiencing the same communications problems?

- **Fatigue:** How many people didn't sleep well? How widespread was this barrier? Was the crew up to the task? Physically? Mentally?

- **Situation awareness:** Did anyone notice or consider the position of the two crew members? Who noticed the missing crew members? Was this information communicated in a timely manner?

- **The fire movement:** Who noticed changes in the fire behavior? What was noticed and when? Was it communicated? Who was aware of it? What were the indications that the fire movement could present a danger? Was the perceived danger communicated effectively?

- **The attack and subsequent withdraw:** Was the crew up to the task technically? Did the situation demand more effort than expected? Were there problems? Were problems and issues communicated?

- **Contingency planning:** Was there a better option than delaying the entire crew until the missing crew members returned? What was planned if the crew members did not come back right away? What were the criteria for moving vs. staying? Were trigger points identified? Was a contingency plan sent with the crew member who was sent to find the others?

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4. What can we do better next time?

Once you have identified the root causes, develop remedies that concentrate on improvement strategies. Avoid making up new procedures, rules, or processes unless absolutely necessary. In most cases the outputs from this portion of the AAR come in the form of enhanced recognition cues that should be folded into the planning phase of the next action, keeping the "crew memory" intact.

Crew goals or objectives for improvement should be incorporated into the next day's planning session. Assist individual crew members to identify goals for their own improvement when necessary, and encourage crew members to help each other with these goals.

Although the AAR is designed to construct a common understanding of the day's events, individual crew members will still learn different things from the same incident or action. This is normal, expected, and necessary. However, this learning will be centred on the common "reality" and the group consensus on the action's results.

Out of Range—*continued*

Identify root causes: *After discussion, this crew generally agreed that fatigue stemming from a hard couple of days and no good sleep played a significant role in the issue. Communications procedures were not followed closely; the two crew members who moved out of range along with the other crew members who were supposed to remain in contact with them had a reduced level of awareness. The leader was also slow to realize what had happened.*

Strategies: *As a result of the AAR, this crew may have an increased awareness of the dangers of fatigue. If the advance indicators of the situation were identified, the crew members will also carry those indicators to the fire tomorrow.*

Individual strategies may be developed, especially on the part of the leader, who may modify the way these factors are weighed in the risk-benefit equation for this crew. These strategies should be incorporated into the next planning sessions if applicable.

AAR Benefits

Following are some of the benefits for institutionalizing standardized and formal post-shift AARs:

- Crew members acquire a more complete knowledge of both the technical and human factors problems that they confront, enabling them to develop plans for doing better in the face of similar problems in the future.

- Crew members obtain a higher level of experience because their behavior and actions are constantly being evaluated for quality and correctness.

- Crews will be more adept at setting realistic and achievable performance goals.

- Team members gain confidence in both themselves and their teammates, knowing that corrective action is taken when problems present themselves.

- Through discussions, team members develop a common perspective or perception regarding the successes or problems that were encountered. This provides the team with a common reference point from which they can build on in the future.

Practice Makes Perfect

In the beginning, a crew WILL NOT conduct an AAR easily or well—it takes practice. After time, crew members will learn what to expect from an AAR and will begin to use it to their advantage.

Do not expect to AAR a serious failure unless your team has had practice talking about both technical and human factors issues in advance and has developed trust in the process. After you have established the AAR as part of the team's culture, secondary crew leads should be given the opportunity to conduct AARs.

Again, practice makes perfect.

FIVE HAZARDOUS ATTITUDES

Flight out of balance

BY SETH B. GOLBEY

Most pilots would agree that the single most important element in assuring the safety of flight is the exercise of sound judgment, or good old-fashioned "common sense." In the January issue of *AOPA Pilot* (p. 71), Editor Richard Collins discussed six qualities that can be associated with pilots who we consider to exercise good judgment: patience, intuition, organization, cool, decisiveness, and coordination.

Clearly, judgment is the product of a combination—a balance—of factors that includes a pilot's basic stick-and-rudder skills; his knowledge of aircraft, route, and weather; experience; training; personality; and attitude. But these factors can just as easily combine in an exercise of poor judgment as they can in good judgment. The challenge facing researchers seeking to formalize judgment training is to find ways to reinforce good decision-making processes and to discourage bad ones.

The personality factor is a particularly tough nut to crack because personality traits are deeply rooted behavioral characteristics that are usually established in childhood and are highly resistant to change. Attitudes, on the other hand, are not innate; they are learned responses to various types of situations. Attitudes can be influenced and changed (this is the stock in trade of advertising agencies, politicians, and theologians, among others).

In aviation, a pilot's attitude toward safety in general, toward himself, and toward the very act of flying can greatly influence his judgment. If common sense were really so common, fewer accidents attributed to "pilot error" would occur. Researchers, therefore, have sought to formalize the difference between good attitudes and bad attitudes. They have come up with five "hazardous" attitudes that may exist in varying degrees in any pilot in any given situation. By recognizing the onset of hazardous attitudes in ourselves and understanding the antidotes to them, we can change our decision-making habits for the better.

1 Anti-authority

The anti-authority attitude is found in pilots who dislike being told what to do, who resent external control over their actions. "Don't tell me!" is their unspoken response to what they consider to be a challenge to their command prerogatives. These pilots often disregard rules, regulations, and procedures they feel are silly or unnecessary; they feel the rules were written for "the other guy."

Nobody enjoys feeling like he is being pushed around. Moreover, the pilot has responsibility for, and is the final authority as to, what is appropriate for the safety of his flight. The pilot has the prerogative to question authority when he feels it to be in error. Under Federal Aviation Regulation 91.3, in an emergency the pilot may deviate from any rule or regulation to the extent necessary to meet that emergency. Be that as it may, when a pilot deliberately flouts the rules, he has stepped over the line into a hazardous attitude.

The antidote: When you find yourself flirting with the anti-authority hazardous attitude, think "Follow the rules. They are usually right."

2 Impulsivity

Some pilots feel the need to do something—anything—immediately when confronted with a choice of action. "I must act now—there's no time," they say to themselves. What makes this attitude hazardous is that these pilots usually do the first thing that enters their heads; in other words, they don't think. They don't take the time to select the best alternative.

Decisiveness is a positive attribute in a pilot, but making a decision in the absence of facts is a dangerous habit. "Plan your flight, then fly your plan," the military teaches its pilots. To fly safely, we must always have alternative courses of action in mind should something go wrong right *now*. (Sometimes this is mandated, as in alternate airport requirements under instrument flight rules.) Among other benefits, this reduces overall pilot work load.

Regardless of the swiftness of the onset of an unusual situation, it behooves the smart pilot to take a moment to analyze the situation, carefully consider his alternatives, and then make a decision based on the best possible course of action under the circumstances. It needn't take more than a moment if the pilot has the right decision-making attitude.

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Antidote: When tempted to respond without thinking through a problem, remember "Not so fast. Think first."

3 Invulnerability

Despite the evidence supplied by such columns as "Never Again" that bad things can happen to anyone, some pilots defy logic and the laws of probability with an attitude of invulnerability. "It can't happen to me," they think, as they read of another gear-up landing or of a dual electric/vacuum failure in instrument meteorological conditions. They know accidents happen, they know anyone can be affected—they just don't believe it will ever happen to them personally.

The evidence of our senses should be enough. Anyone who has amassed sufficient experience in the cockpit will have had some untoward event occur at some time in his flying career. The alternative attitude—that something is likely to go wrong on each and every flight—is equally wrong-headed but overall a safer basis for decision-making. We are taught even in driver's education courses to anticipate the unexpected. If nothing happens on a particular flight, fine, but anticipation of potential trouble is the first step toward dealing with it when (not if) it eventually occurs.

Antidote: If you ever find yourself feeling that you fly under a lucky star, say to yourself "It *could* happen to me."

4 "Macho"

A pilot we know—a mild-mannered, soft-spoken chap—started a takeoff into a strong crosswind recently, and finding that he could not keep the airplane tracking down the centerline, he thought about aborting. Realizing that friends were watching from the ramp, however, he continued the takeoff. As he drifted across the runway edge lights with about two feet of altitude, he realized he had fallen victim to the most perfidious of the hazardous attitudes, "macho." "I'll show them," he was unconsciously thinking. "I can do it."

The "macho" bug can bite the shy and retiring. It bites women with great

regularity, as well, particularly women who feel they are somehow in competition with male pilots. But "macho" reaches its nastiest manifestations in pilots who, for whatever psychological reasons, are always trying to prove they are better than anyone else. They prove this to themselves by taking risks and trying to impress others. Beware overconfidence.

Aviation's fascination with having "the right stuff" unconsciously reinforces this most dangerous of attitudes. Recent popular books, films, and television programs imply that pilots who don't take risks, who are afraid of facing a little danger, don't have the moral fiber required of a "real" pilot. Having had the right stuff is of little consolation to the widow(er) and orphans of the pilot who had it.

In fact, the researchers' choice of the word *macho* is probably ill-taken. Macho means nothing more than strong, manly. Though feminists may argue that this in itself is an undesirable attribute, the dictionary would disagree. Rather, the negative response we are supposed to have to the word is based on its misuse (probably in place of the word *machismo*, which is derived from macho but implies male domination) in popular culture over the last decade or two. A more appropriate word is *hubris*, meaning excessive pride or self-confidence, arrogance.

Competitiveness is a characteristic of modern society, and most of us probably fall prey to it on occasion. Competition has its place in aviation, but that place is not in the day-to-day flying activities of the majority of general aviation.

Antidote: Be on guard for the hubris monster, for it is the most insidious of beasts. There's nothing wimpy about saying, "Taking chances is foolish." Just ask your kids.

5 Resignation

The flip side of the invulnerability coin is the attitude of resignation. "What's the use?" say pilots who feel they have little control over what happens to them. They do not see themselves as players in their own lives' dramas. They feel that circumstances are governed by luck, and they leave action to others, allowing other people or commitments to influence their decisions.

They are resigned to leaving things as they are, and they may deny that a situation is as critical as it appears.

But listen to William Ernest Henley: "It matters not how strait the gate, how charged with punishments the scroll; I am the master of my fate: I am the captain of my soul." Henley was not a resigned man. Above all, "the pilot in command of an aircraft is directly responsible for, and is the final authority as to, the operation of the aircraft" (FAR 91.3[a]). No controller, no instructor, no set of rules or procedures can help you unless you are firmly, and comfortably, in command of your flight. It's your ship; you are the captain, and you are the master of your fate.

Antidote: When things look bleak, tell yourself "I'm not helpless. I *can* make a difference."

●

Become alert to hazardous attitudes creeping into your flight activities. Sensitizing yourself to them is the first important step in eliminating them. By telling yourself something different from what the attitude would have you believe, by taking an "antidote," you can improve the way you react to adverse situations.

When seated comfortably reading a magazine by the fire, it is easy to deny the influence of hazardous attitudes. To discover the extent these attitudes may influence your flying, you may want to take an attitude inventory. The AOPA Air Safety Foundation has prepared a series of manuals for use in aeronautical decision-making courses. Manuals have been developed for student and private pilots, instructors, instrument pilots, commercial pilots, and those pilots operating multicrew aircraft. Each contains an attitude inventory that allows a pilot to score himself on the presence of hazardous attitudes in his decision-making processes. For more information on the aeronautical decision-making manuals, contact Richard D. Gless at AOPA ASF, 421 Aviation Way, Frederick, Maryland 21701; telephone 301/695-2196.

Most hazardous attitudes are based on normally positive attributes. They become hazardous when carried to an extreme, when they replace thought and analysis with rote responses, when the balance required by the decision-making process is lost. But they can be changed, and recognition is the first step toward turning a hazardous attitude back into a positive attitude and making common sense a little more common. □

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Fatigue

Fatigued soldiers perform poorly, behave carelessly, tolerate greater errors, and become inattentive. They display decreased motivation, increased irritability and depression, and/or low morale.

Fatigued soldiers are a hazard in Army operations. Leaders should watch for behavior changes that indicate soldiers are fatigued and stressed. For example, the following are signs of fatigue:

- Difficulty in concentrating and thinking clearly.
- Poor and careless performance.
- Greater tolerance for error.
- Inattention to minor, but potentially important, details.
- Increased lapses of attention.
- Increased irritability.
- Decreased motivation and attempts to conserve effort.
- Increased errors.
- Slow and irregular reaction times.
- Impairment in communicating and cooperating with other soldiers, particularly when working as a crew.
- Complaints of headaches or stomachaches.
- Feelings of depression and poor morale.
- Loss of appetite.

Controls

While there is no substitute for adequate sleep, rest, or time off, there are some short-term solutions leaders can use to control the hazards presented by fatigued soldiers.

- Require a moderate work pace on physically demanding tasks.
- Provide periodic rest breaks to permit physiological and/or mental recovery.
- Offer diverting physical activities (for example, alternate working soldiers between heavy- and light-duty tasks).
- Maintain high standards of physical fitness. Emphasize the importance of daily PT. Allow company time for group PT/games to improve morale.
- Ensure soldiers are adequately rested before their work shifts.
- Adjust the complexity of duties and make changes in assignment where possible to prevent boredom.
- Provide breaks, naps, or time off after tasks have been completed.
- Provide nutritional food before, after, and/or during work.
- Ensure soldiers maintain good personal hygiene and health practices.

Fatigue levels tend to be higher at the midpoint and toward the end of a work shift than at other times during the day. In industry, accidents peak during the last 2 hours of a 10-hour day, presumably because of fatigue. Generally alertness declines sharply from 1600 to 2300 during a normal day, and after 2300 the probability that people will lapse into sleep increases dramatically. Otherwise normally-functioning soldiers may suffer from short, intermittent episodes of fatigue, especially when sleep deprived. These episodes are characterized by very brief lapses in the performance of tasks during which details are missed, accuracy is impaired, and/or performance is slowed.

(Adapted from research performed by Dr. J. Lynn Caldwell, U.S. Army Aeromedical Research Laboratory (USAARL), Fort Rucker, AL, and published in a Crew Endurance Leader's Guide, a joint effort of USAARL and the Army Safety Center. ♦

EXECUTIVE SUMMARY

We all like to believe we'd be cool, calm and capable in any emergency, but lack of experience may cause us to stumble. A recent study concluded that fireground commanders make pressure-based decisions in a most-untraditional way—and past experience is the key.

RPD on the Fireground

How to Avoid the
Blank Screen Syndrome

By Larry C. Miller, Ops. Chief, Deputy, Los Angeles County Fire Dept.

I recently took a weekend trip to San Diego. As I passed the nuclear power station at San Onofre, I found myself thinking: Wouldn't it be something to be first-in on a runaway reactor that spreads from the containment building and digs a quarter-mile hole on its 8,000-mile journey to China?

Yes, how cheated I would feel if I was off duty when the meltdown came. Can anyone identify with this?

Or say it's your first day as a new battalion chief. As you drive through your new district, you pass a refinery. You think: Wow, what if there were a fire in a cat cracker on my very first shift!

Or how about the recent train/ haz mat wreck in San Bernardino County, CA? Did anyone else out there say: It sure would have been exciting to be first-in on that one— would I have dazzled my peers with some fancy footwork!

The first-due company and battalion officers that did respond to that incident may well have said: "Thank goodness I'm on duty today!" Wouldn't most of us react that way? After all, we're fully prepared....aren't we?

Even new company officers or battalion commanders usually feel that, since they ranked high on the list and were chosen over other qualified candidates, they must be more than ready to command any emergency....right?

It's only natural that the first thing we want as new company officers or battalion commanders is to be tested so we can prove to our peers, crews and, yes, even ourselves that we have been sent to earth by God as a gift to firefighting.

Sure, there are probably a lot of things that we are gifted at when it comes to firefighting. But I just mentioned nuclear, petro-chemical and haz mat control. How about multi-casualty incidents, highrise and wildland fires, structure collapse, flooding, swiftwater rescue, USAR, civil disturbance, air crash, shipboard fires, auto extrication, bio-chemical, EMS and plain old structure fires? And of course, there's electrical—my personal favorite is fighting something I can't see.

Honestly, does anyone reading this article truly feel comfortable commanding any one of these incidents, no matter how many years of fire service experience they have? No way!

The point is that no one feels comfortable about everything the modern firefighter is responsible for knowing. The reason for this lack of confidence is that firefighting is not an inherited skill; it is not inborn. Simply put, it is acquired through experience.

None of us is born with the skills to be a firefighter. They are all learned.

Nonetheless, right from the first shift, most of us expect to perform as if it all came naturally. One of the few benefits of age—and the wisdom that sometimes accompanies it—is the ability to look back at where we came from and be honest in assessing the journey. It took me 26 years to realize and admit this.

To some, this realization will take some of the pressure off. For others, it will pour it on. Only an honest self-assessment will determine which is the case.

Upon being promoted to company officer, almost everyone is scared to death. If they aren't, they should be.

Believe it or not, the best company officers and battalion com-

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manders are at least uncomfortable for their entire career! This shouldn't be surprising, because there is plenty out there to be uncomfortable about.

Any one of the incidents listed at the beginning of this article could happen on any night in nearly any district. So how comfortable can anyone be with so much to learn and so little time to learn it?

RECOGNITION-PRIMED DECISION-MAKING

In 1988, the U.S. Army Research Institute for the Behavioral and Social Sciences commissioned a study leading to Technical Report 796 from Klein Associates of Ohio. The objective of "Rapid Decision Making on the Fire Ground" was to understand how military officers make decisions under extreme time pressures when lives and property hang in the balance.

Since, at that time, there had not been a major conflict since Viet Nam, the Army wanted to know how they could best train their officers to make quick decisions under combat conditions. First, they needed to know how quick, effective decisions are made.

After Klein Associates reviewed the different occupations that possibly share decision pressures, they found that (surprise!) fire service incident commanders face the same decision pressure on a daily basis as a military combat officer.

The study went on to examine experienced fire company officers in order to determine just how they made rapid decisions. Dr. Klein, the founder of Klein Associates, derived from these studies what he thought was a radical hypothesis: Experienced company officers did not use the conventional laboratory or university model of analytical decision-making. This involves reviewing all the pros and cons of many possible solution to choose the correct course of action.

Dr. Klein discovered that company officers faced with an emergency incident usually didn't have enough time to completely analyze all the possible options. Instead, they invested what little time they had on sizing up the situation rather than choosing among options of what to do.

Initially, Klein was surprised to find that experienced company officers did not select from several options, but instead identified a situation as typical of incidents they had experienced before. Then they would act on this experience by recognizing what to do without even considering a second option.

In other words, under time pressure, experienced officers produced a more "intuitive" approach to problem solving. However, few consistently selected one particular option of attack over others. Instead, they used a

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matching process—rather than calculation—to achieve a decision.

When faced with extreme time pressure, the officers conjured up mental pictures instead of words to compare the incident at hand to a prototype or picture they had in their minds. When a memory picture matched the incident (which the first picture did 80 percent of the time), they implemented the course of action that worked before.

If the officer encountered an incident that didn't match any previous experience, he would come up with a mental picture he thought was closest to what he was seeing. The officer would quickly play out the corresponding course of action in his mind and, if it worked, he would go with it. If not, he would mentally alter the course of action, using a process called "mental stimulation," until the problem was solved.

Dr. Klein called this process "Recognition-Primed Decision," making or RPD. To understand it, think of the mind as holding a big slide carousel. New slides are placed in this carousel by experience, whether real or created. These slides/experiences can be drawn from later.

As a basic example, say a company officer gave an order to go to the truck and get the gas-powered smoke ejector. The crew member who received the order in-

stantly calls up a picture of what the smoke ejector looks like. Despite the array of various equipment on the truck, he has no problem fetching the piece of equipment that resembles the picture he has in his mind.

It also helps that, on the way to the truck, he pictured which compartment the ejector was in to reduce the hunt.

Obviously, even this simple slide picture was not there from birth, but put there through experience. This is the same mental process that goes on when responding to an emergency that will require tactical decision-making. The mind projects a slide picture of the closest experience to the present incident.

What all of this tells us is that we may not know how to handle all the incidents listed in the beginning of this article. It is not surprising that we may be uncomfortable attacking a fire in a nuclear reactor, a petroleum cat cracker fire or even a train derailment with hazardous materials. We simply may not have the slides in our carousel to deal with these incidents.

So, when the new guy pulls up to that first fire and stumbles, he or she shouldn't feel bad—the slide carousel is probably not fully developed yet. This also explains why a great wildland IC may stumble at a highrise incident. His slide carousel is whirling through a panoply of

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wildland slides, but there's an empty section labeled "Highrise."

Returning from our first room-and-contents fire as a new company officer, most of us realized that things could have gone a whole lot better. And most of us made some decisions differently at the next fire.

Our minds can also change the slide carousel, so we can compare the last incident to the next similar incident and take action based on the experience gained. When the same type of fire occurs again, the slide carousel presents the similar picture—and the course of action that will be successful. Hence the term "Recognition-Primed Decision."

It takes skill to recognize situations as typical, and correctly using the prototypes or slide pictures is enhanced by experience. The ability to know if "X" applies is dependent on situational awareness. i.e., experience.

It is never enough to simply teach rules to a novice and expect to make him or her an expert. For example, a sign that a roof is near failure is often described to new firefighters as a "spongy" feeling. So the first time they set foot on a lightweight, panelized roof, most rookies think it's about to fail.

In fact, what they're feeling is the typical bounce of a good roof assembly. It will take many walks on many different types of roof assemblies and possibly many fires under an experienced company officer to supply the critical cues appropriate to roof-collapse to the new firefighter's slide carousel.

CRITICAL CUES

Critical cues are the signs and symptoms that help with a correct diagnosis. Examples of critical cues are those things that company and battalion officers evaluate in an initial size-up, such as:

- Life Hazards
- Special population (elderly, disabled, prisoners)
- Smoke (color, amount, location)
- Fire (color, amount, location, duration)
- Structure (house, factory, office, vehicle)
- Construction (age, composition)
- Weather
- Time of day
- Resources (available, needed, special needs)
- Product involved
- Signs of structural failure
- Water supply

New officers may make "cheat sheets" or command boards to help with early size-up and decision-making, but as experience is gained, the cheat sheets are consulted less and less.
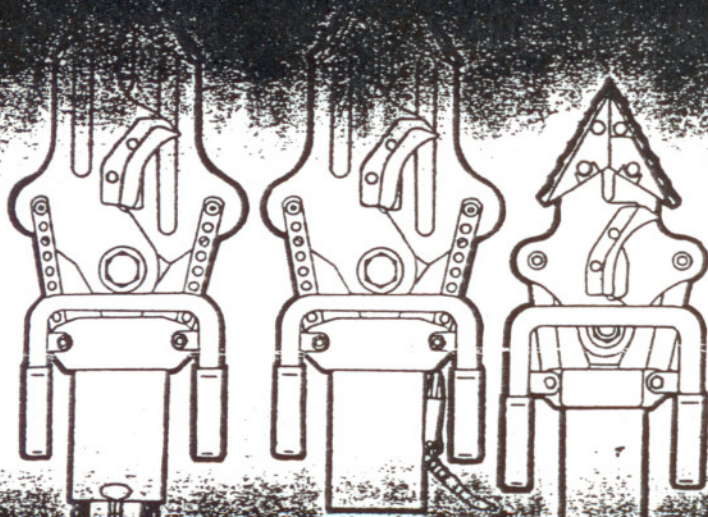
The experienced officer makes the size-up in a more intuitive way, without much active thought. If

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you ask the experienced officer to recite the list of what factors he/she considered, the officer will take longer to express them than a rookie will. This is because the experienced officer observes the fire and compares it to the slides in the mental carousel. When a match is found, he or she gives the correct, time-tested orders.

This is not meant to disparage the use of cheat sheets or command boards. They can serve as useful reminders of items that may otherwise be overlooked or act as an assist on incidents that are not common in the district—where the slide library may be a little weak.

In conjunction with the previous statement that the experienced officer may have trouble articulating the steps in his/her decision-making process, let me relate a personal example.

I was a paramedic for 12 of my 26 years in the fire service. I responded to dozens of full arrests, and my carousel is pretty full of relevant slides. But when it comes time to pass the CPR exam, I have to go back and study all the "dance steps," because the raters are more interested in the exact process I use than the outcome!

Also, the exam process very seldom resembles the site, sounds and circumstances of a real incident. Therefore, the slides in my carousel don't relate particularly well to a hypothetical situation.

Most of us are frustrated by the annual changes to CPR procedures after some new doc decides that "X" number of ventilations prior to starting CPR are better than whatever last year's number was. And let's not forget those constantly changing compression rates. Are these process changes really better for the outcome of the patient, or are they just designed to throw our carousels out of whack?
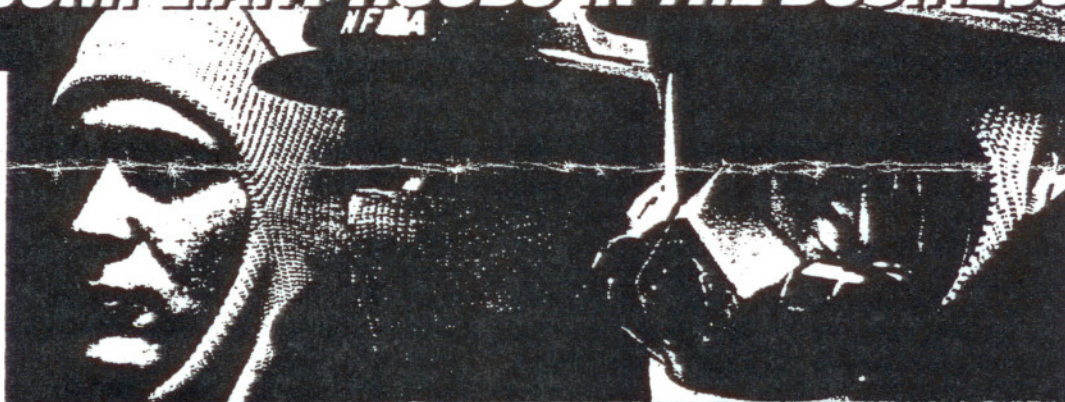
This is why training officers should avoid getting too carried away with the exact steps in the process. Instead, concentrate on the ideal outcome of tactical objectives on the fireground.

It's okay to teach novices step-by-step methods to achieve a proper outcome, but more experienced crews need to be given performance standards that state the desired result, critical safety considerations and absolute dos and don'ts. It's better to skip the exact foot and hand placements.

So many improvements in our art can be missed if firefighters aren't given the latitude to experiment with new ways of doing things. Crews that are held to rigid step-by-step procedures for performing a tactical objective on the drillground may not take the initia-

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tive to overcome fireground problem that weren't covered in the drill manual.

FILLING THE CAROUSEL

There are many worthwhile training methods that will help load the slide carousel with pertinent pictures. Examples include hands-on training and live-fire recreations where ideal actions are practiced.

Another good idea is to obtain buildings in the district that are going to be torn down and use them to practice everything from search and rescue to forcible entry, ventilation, salvage, and fire attack. (Of course, practice only ideal performance for emulation at a real incident.)

Simulators are another good idea. Simulators create the time pressure that an IC faces at a real incident. This forces RPD, the "intuitive" model of decision-making.

Success at the simulator comes from making it typical of incidents encountered in the jurisdiction. If proper mitigation is applied, the IC must "win" the exercise.

Also, read trade journals. Study fires other departments have faced, and discuss their actions. Watching videos of incidents will help stock pictures in the mental carousel. The crews should discuss them to help build better decision-making.

It is also good to train in context. This means always training in actual combat mode.

Pre-planning—"chalk talking" incidents that could occur in the jurisdiction is also helpful. Get the crew involved on every shift.

Learn from people with a full carousel—experienced people. This doesn't just mean those with a lot of time on the job, but those who continually train to make themselves better and strive for ideal perfor-

mance. These people are usually pretty easy to identify—they may even be subordinates.

Slide pictures have a tendency to fade over time, so if you don't use them, they may not be there when they are needed. This is a most important consideration for chief officers who find themselves spending more time working in-boxes than incidents. Anyone who is still responsible for commanding the Big One had better be involved with the preparations for it.

For novices: Don't wait to fill the slide carousel with experience gained at actual incidents. This risks losing the whole carousel—and the projector with it!

Finally, please give the new guy a break! Even great ICs can be reduced to quivering wrecks when working outside their usual environment.

Most importantly of all, never be afraid to admit your carousel is empty. This is the first step to getting it filled.

For additional reading on the subject of Rapid Decision Making, see: "Naturalistic Decision Making: Implications for Design," April 1993, Gary Klein, Ph.D. Klein Associates Inc., Dayton, OH (Ordering info: CSERIAC Prog. Office, 2255 H St., AL/CFH/CSERIAC, Bldg. 248, Wright-Patterson AFB, OH 45433)

"Decision Making in Action: Models and Methods," edited by Orasanu, Calderwood and Zaambok. (Ordering info: Ablex Publishing Corp., 355 Chestnut St., Norwood, NJ 07648)

"Advances in Man-Machine System Research," Vol. 5, 47-92. Greenwich, CT , JAI Press, Inc.

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