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Air Force Decision Making Training

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Executive Summary

Title: Air Force Decision Making Training

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Thesis: The United States Air Force as an institution changed its training philosophy after Vietnam to meet the needs to the fight of the time. The USAF must update the current real time battlespace decision-making education and training to the Recognition Primed Decision-Making (RPDM) model and deliberately train its personnel in situations that require rapid decision making. This paper will examine what will be required to fight in the future as well as how to train for the ambiguous warfare of the future.

Discussion: The characteristics of future warfare require battlespace operators to be able to make complicated, high-stakes decisions rapidly in order to achieve necessary tactical, operational, and strategic effects. Ambiguity and the speed of war will only increase in the future and while technology will assist, human thought processes must keep up with the pace of conflict, wherever that conflict is within the range of military operations. Warfighters will most likely not have the time or thought capability to run through checklists or other lengthy thought processes during operations. Naturalistic decision making and RPDM rely on natural thought processes using well developed intuition and experience to assist in rapid decision making.

Conclusion: Warfighters must deliberately train in RPDM utilizing training scenarios and personnel to build intuition. These scenarios should be dynamic, allowing for a different series of variables every time personnel execute training missions to amass experiences, which allow personnel to draw upon during other training event and combat missions. Debrief is also a critical portion of the training that allows personnel to understand why they made the decisions they did during the mission as well as the risk of relying on intuition and experience to be able to recognize when their intuition to lead them astray. Deliberate decision making training is necessary using RPDM will provide warfighters to be able to execute tomorrow's conflicts.

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Preface

First, thank you to my family and friends for your encouragement while I was writing this paper. I am forever grateful for the support of my colleagues and mentors who have listened to me talk about this subject for years and supported and helped me in trying to find and implement a solution. I would also like to thank Lt Col Gregory Sand for his leadership throughout my year at MCU. Lastly, I want to pass my most sincere gratitude to my mentor, Dr. Bradford Wineman, for picking me up as a mentee halfway through the master's process, providing me vector checks, being patient with my writing abilities, and for being the reason this topic and paper are able to exist.

“Today’s best is not good enough for tomorrow” – Franklin D. Roosevelt

War has always been a complicated, complex, and ever evolving phenomenon that is rife with measurable and immeasurable variables.¹ Though the nature of war has not changed, the character of war is becoming increasingly complex and the inherent fog and friction will continue to effect operations; therefore, personnel must be able to make complex and high impact decisions in mission planning and during execution. Decision making is an invaluable skill because most answers in conflicts do not lie in the realm where there is a correct answer and an incorrect answer.² Generally, there are multiple acceptable answers or actions personnel can choose from and the only incorrect action is not making a decision. Dichotomous, black or white, answers are sufficient for initial qualification training, but are rarely the case in the real time battlespace. Just as the United States Air Force (USAF) changed its training philosophy after Vietnam, the USAF must update the current real time battlespace decision-making education to the Recognition Primed Decision-Making (RPDM) model and deliberately train its personnel in situations that require rapid decision making.

Definitions and Scope

This paper refers to operators as any USAF person involved directly or indirectly in mission execution at the tactical and operational levels. Critical thought is a necessary element of the decision-making process that helps operators make sense of guidance and its intent, and practice the use of it. It is also intended for those below the level of commander (administrative or mission) as there will need to be more than one person capable of making decisions at the operational level or on the tactical battlefield. However, this paper does not recommend supplanting or changing in any way technical orders or any instruction necessary to prevent the loss of life, limb, eyesight, or aircraft. Furthermore, this paper does not intend to change the

deliberate decision-making process necessary for planning nor safety checklists used during operations and while in flight. Lastly, detailed examples of the problems caused by poor decision-making training and capabilities are withheld for operational security purposes.

Problem

The USAF needs to update its decision-making instruction in order to create real-time critically thinking tactical level operators. Without a change to training and mission execution, the operational and tactical level of warfighters will continue to operate under the assumption that connectivity will always be available for guidance and decisions that can be made at the highest level possible. Additionally, it can take a catastrophic incident to incite change, even though the acknowledged problems exist and that action or change is necessary. Examples of this are aircraft accidents due to bird strikes such as the E-3 Sentry at Elmendorf Air Force Base, Alaska in 1995, killing all 24 personnel aboard and the loss of a 70-million-dollar aircraft.³ The cause of the crash was multiple birds in the engine intakes upon takeoff. While there was a bird hazard reduction program, the investigation found the crew was not at fault but also found the base had failed to plan for the increased amount of birds in the area during the annual migration season.⁴ The tragic accident generated significant changes in the Bird Aircraft Strike Hazard program such as generating studies to understand when and how the birds migrate, additional measures to scare away the wildlife, allowing squadron schedulers to plan flights around peak migration times, and eventually handing the program over to the US Department of Agriculture, who is much more well versed in animal habits than the USAF.⁵ Waiting for a catastrophic event to happen based on the inability of operators not being able to make decisions at the lowest level possible can create a loss of life, asset, and international incident.

The current USAF decision-making models are the joint planning process models and the Analyze, Plan, Train, Execute, Critique (APTEC) problem solving model. Instructors at the officer accession schools teach the APTEC model and while they provide background information on John Boyd's orient-observe-decide-act (OODA) loop, APTEC is the primary problem-solving model.⁶ The APTEC model is an effective planning and organizational tool but is a long-term change method which when used properly takes hours, days, or longer.⁷ However, while the model can be applied to combat, it is slow, predominantly reactionary, and relies on previous training, which lacking decision making training, operators will not necessarily be able to apply the model. Even though APTEC is a problem-solving tool, there are concept overlaps between problem solving and decision-making concepts that the model is effective for accomplishing the introduction of the skill sets to trainees.⁸ If analytical planning models are accepted as decision-making models, this creates an ineffective instruction of decision making since the real-world lacks time and the typical amount of information available for deliberate planning.⁹ The officer ascension schools set the baseline knowledge throughout the Air Force, however this paper is addressing the decision-making capabilities of operators.

Planning models are one of the only tools the USAF instructs and has documented on how to make decisions. The USAF's operational planning model is described in AFDD-III. The tactical planning process, where decisions are made in planning and prepared for during the mission, are in USAF Tactic, Technique, and Procedures 3-3. Intergrated Planning and Employment. The planning steps are: Initiation, Mission Analysis, COA Development, COA Analysis and Wargaming, COA Comparison, COA Approval, and Order Development.¹⁰ The process is typically long and prescriptive, using checklists to accomplish it. While checklists do not detract from the planning process, they do detract from the real-time decision-making process during

combat. The planning process as the decision-making model creates bias in personnel and does not provide sufficiently rapid assessment.¹¹ Additionally, most military planning methods prescribe checklists based on previously existing checklists and/or the tactical doctrine writers' real world and training experiences. There are also training courses that do not instruct how personnel make decisions but instruct how to use checklists for safety operations, which is necessary for the what the training is, such as Undergraduate Pilot Training. Lastly, personnel only have two sources of formal education in the first ten years of their careers, entry training: basic military training or officer ascension training and basic developmental education: Airman Leadership School (six weeks) or Squadron Officer School (five to eight weeks).¹² Though decision making is part of the syllabi at these schools, the schools must cover many topics and therefore cannot spend sufficient time on decision making and this decision making is not during operations.

Decision makers must stay ahead of the adversary's decision-making process, thereby preserving the advantage of speed.¹³ Operators need to develop a proactive nature of continually assessing the environment and looking for situations, elements, and other recognizable factors to determine which the most appropriate COA. While not all situations are going to be difficult decisions; personnel require deliberate development to recognize situations before they begin to happen or unfold. Instructors and leadership often tell their people to stay ahead of their timeline. These timelines can be either a rapid two-minute, two-hour, even a twenty-four-hour timeline based on the mission, all of which have different follow on effects. Reactive analytical decision making using the APTEC analyze and plan portions first, puts operators behind on the timelines as both steps require time. APTEC is an adequate and functional basis for introduction

to USAF problem solving and decision making, but operators must train to these concepts specifically beyond officer ascension training.

Commanders, instructors, and mission leadership must prepare personnel to actively make decisions while executing the mission and must prepare themselves for decision based training. Operators will face situations where they are unable to make a decision because they are spending too much time evaluating what is occurring in the battlespace or about to occur, developing a paralysis by analysis. This mental paralysis is where personnel take actions late creating a negligible or even negative effect. The other impact of paralysis by analysis is operators not taking action at all due to inability to decide between potential outcomes.¹⁴ While there may be occasional times that late or no action have negligible effects or a positive turn of events occurs, this should not be the norm unless operators consciously decided that COA. Most situations however, require immediate, minimally but consciously thought through decisions and to do this, operators need for practice to develop their experience and intuition.

Precedence of Change

The USAF has made drastic changes in its training in the past, setting a precedence for training updates based on urgent need. Though the first Exercise RED FLAG was flown over forty years ago, it represents an institutional change in training methodology that is analogous to the type of change in training necessary now for the future fight. The USAF created its largest, multi-national, joint combat simulation, Exercise RED FLAG after the Vietnam War to provide an opportunity for inexperienced pilots to experience simulated combat to increase the likelihood of that pilot surviving the first combat missions.¹⁵ The US Navy had already succeeded in a similar effort by developing its fighter weapons school, TOPGUN which is now a part of the Naval Aviation Warfighting Development Center. The assessment of pilot experience versus

aircraft loss in Vietnam was a quantitative approach to a change in culture and training. The lack of combat experience caused the US to lose aircraft at a high rate in Vietnam but when a pilot flew in at least five simulated combat missions, there was a sharp increase in the likelihood of the pilot surviving combat in Vietnam.¹⁶ The institutional change of large force combat simulations represents is the same type of change required now to be able to fight the current and future fights wrought with new technology, a plethora of information and disinformation, and adversaries using ambiguity as a weapon.

Today's environment and the future operating environment have reached a qualitative catalyst to drive change as the advent of RED FLAG did. It is not as easy to identify a quantitative catalyst to change such as a number of aircraft or aircrew lost because although aircraft and aircrew have been lost in the 40 years since the start of exercise RED FLAG, extremely few have been lost in combat due to the characteristics of the conducted conflicts. Friendly forces quickly gained and maintained air superiority in Operation Desert Storm, and in operations over Iraq and Afghanistan. However, in a near peer or peer conflict, adversary capabilities are significantly more advanced than the adversaries of the last 40 years. The reach of weapons in today's battlespace, the complexity of a proxy war or coalition battlespace, the leaps in technology around the world, and the increase in the complexity of battlespace intangibles drives the need to change the culture to one of critical thinking operators at all levels (tactical, operational, and strategic) who are capable of making decisions when delegated authorities.

Ambiguity, uncertainty, fog, and friction exist throughout the entire range of military operations (ROMO), from humanitarian aid to total war and operators must be able to make decisions during all of these operations. However, the ambiguity does not exist proportionally

throughout the ROMO. Humanitarian operations can have uncertainty and though total war may have aspects that are less ambiguous because there is a clearly defined enemy who operates in accordance with the Geneva Conventions but fog and friction will always exist in war. Operators at the tactical, operation, strategic warfighting levels must decide courses of action (COA) in this vague environment where there is uncertainty of what actions should be taken when there is no clear correct or incorrect answer, the ambiguity of who participants in the conflict are and why they are participating, and the inherent lack of clarity in instructions and rules of engagement that guide how participants should act. The nature of the war does not allow for operators to utilize checklists for most situations. Checklists are prescriptive and the initiating conditions have to be met for operators to use a certain checklist. Though physical checklists may not be used, the mentality of utilizing a step by step process to solve problems is not inherently useless, but operators must understand how they make decisions.

The Future Fight

Warfighters have used uncertainty as a purposeful strategy and tactic throughout history on the battlefield and fog and friction have caused ambiguity since warriors began fighting, creating a wide range of sources of ambiguity. State and non-state actors alike use ambiguity as a weapon, both in actions and information operations. Russia has demonstrated the ability to adapt and update their capabilities, strategies, and tactics based on their enemy's actions, using information to cause confusion amongst their adversary as demonstrated in Georgia (2008), Crimea (2014), and Ukraine (2014).¹⁷ Non-state actors such as Hezbollah have also practiced deception and ambiguity. The terrorist organization applied disinformation against the Israeli Defense Force using suicide bombers and martyrdom, causing disruption in the Israeli forces.¹⁸ Though this was not against the US, it reveals various forms of adversaries are willing to use

ambiguity to wage kinetic and non-kinetic combat. The application also demonstrates that personnel must be prepared for opponents to purposefully inject confusion and deception that will make it more difficult for personnel to determine which actions are the best in a situation.

The NDS discusses the issues with the impact of COIN operations on current readiness for future conflicts.¹⁹ The Joint Operating Environment (JOE) 2035 is the document the Department of Defense uses to describe what the future force construct and capabilities.²⁰ The JOE 2035 describes what is expected in future conflicts ranging from conventional to unconventional challenging personnel through the full spectrum of conflict, and that the nature of those conflicts is ambiguous.²¹ One example of the ambiguity is interactions with other nations in disputed maritime and air identification zones and economic exclusion zones, where the US and allies conduct freedom of navigation operations. The JOE also discusses the high likelihood of adversaries to use strategy that will induce confusion and utilize proxies due to shifting alliances and partnerships, making it more difficult for friendly operators to execute missions.²²

More countries are expanding their global reach and power projection and this will affect how the US will need to respond in new locations and more capable threats.²³ Peer adversaries continue to improve their technology as well as their tactics, techniques, and procedures (TTP) they execute. The NDS and JOE both purport that anti-access, area-denial (A2/AD) will continue to be a factor in conflicts short of war, making blockades and containment increasingly difficult for the US against other great powers.²⁴ More importantly, as alliances and partnerships potentially shift, there is a higher likelihood for non-combatants or neutral parties to be involved in conflicts.²⁵ The ramifications can be strategically and politically volatile if friendly forces are not able to accurately identify neutral forces in the air, on the land or sea. The US relies on its allies and partners for collective security and defense and future wars will most likely not solely

involve two parties.²⁶ The more nations involved in a conflict, especially as nations may subjugate their warfighters to the nation's own rules and instructions, there is an increased lack of clarity in which US operators must execute.

According to leading military thinkers, future conflicts will primarily be with unmanned vehicles or at long-range distances due to weapons capabilities. Therefore, the USAF is heavily investing in artificial intelligence (AI) capabilities and dedicating personnel to studying and developing uses for AI.²⁷ One way the USAF is already seeking to incorporate AI is into decision making.²⁸ This reduces the need for personnel to be trained to make decisions as there will be few humans in the loop to make those decisions. The National Defense Strategy (NDS) also discusses the development and use of autonomous systems in multiple domains to combat adversary technological advances. Though the US and USAF are conducting research, development, and application of AI, humans will most likely still be involved in decision making due to the ambiguity inherent in warfare and the consequences of incorrect battlefield actions, requiring humans to still need have decision making and critical thought skills. To this end, the DoD is investing in research on brain stimulation for personnel to be able to process more information and make decisions.²⁹

How to fight in the Future

With future conflict characterized, it is necessary to define the warfighter application along with the training required to prepare operators for combat. The NDS promotes the instruction of independent warfighters that are able to apply lethal and non-lethal effects in a degraded/lost communications environment.³⁰ Therefore, the Air Force needs its own "strategic corporals," operators who are able to make timely decisions with a variety of authorities, such as engagement authority and identification authority.³¹ Commanders need to actively empower

subordinates and trust their people's actions and decisions, which is necessary for both tactical and operational warfighters to shorten the amount of time necessary to conduct the real time targeting cycle and other real time tactical decisions as much as possible. Delegation of authorities to subordinates is also critical because there will potentially be insufficient connection back to senior decision makers in time sensitive operations.

Operators at all levels must be prepared to and understand how to rapidly escalate, de-escalate, or maintain a level of combat in a variety of situations.³² The omnipresence of the media and rapid information sharing makes it critical that leaders empower operators to take necessary actions in the battlespace, as the events can and will be quickly disseminated to the world, especially in the case of a delayed reaction.³³ Open source information is a boon to adversaries as they are able to collect and act off what is reported to their military advantage, such as the Russians have done as previously discussed. Warfighters, including those at the tactical level, will need to understand the other instruments of national power as well as the applications and integration of those instruments. They will also need to comprehend how their actions effect the other instruments, particularly the second and third order effects of their actions or inactions.³⁴

Instructions, rules of engagement, and other guidance documents will not be able to cover every possible scenario warfighters will face as the authors and providers of the guidance will not be able to think of every possible situation that may occur in the battlespace. Additionally, if they attempted to prescript guidance for almost every situation, the guidance documents would be far too long and detailed for most operators to remember every instruction or even the majority of the instructions. Operators must be able to take a basic set of instructions, think through the instructions in an ambiguous situation, make a COA decision, and rapidly apply it

prior to the enemy being able to do the same.³⁵ Rapid critical thought and decision-making allows US forces to maintain the initiative through speed and maintains a competitive edge in a technologically equal environment. That environment has reached the point where another exercise RED FLAG type of change in training needs to happen in order for forces to be able to conduct operations effectively.

Naturalistic Decision Making

Naturalistic decision making is the essence of the environment in which operators will be executing their missions. Experts describe the naturalistic environment as minimal time available, ambiguous, dynamic conditions that are high risk and high stakes usually with poorly defined procedures.³⁶ The procedures may be poorly defined because the situation may have not occurred before in that conflict, therefore there are no instructions on it, or because the actual guidance from higher headquarters may be intentionally or unintentionally vague. Operations short of declared war can have higher stakes than declared or total war as operators need to be able to escalate or de-escalate situations real time when no guidance is available. The USAF conducts missions across the globe in the air, space, cyberspace, and information domains, providing everything from humanitarian relief support post natural disasters such as hurricanes to fully integrated multidomain warfare in the kinetic and non-kinetic realms. Personnel will be required to execute missions with proper authorities during limited or degraded communications and manage resources such as weapons, fuel, supplies, and mitigate risks within those resources. As previously discussed, future conflict will likely be representative of the naturalistic environment.

Cognitive psychologist Gary Klein presented a new decision-making model called Recognition Primed Decision Making to help people understand how they make decisions so that

they are better able to actively develop their capabilities. The premise of the model is that experiential development leads to the ability of devising a reasonable COA when faced with a decision. Ideally, the first COA thought of will be sufficient for implementation to limit time between assessment and action and subsequent COA creation. The concept of the people using the first reasonable, albeit maybe not the best COA, is satisficing.³⁷ Satisficing is more time efficient as COA comparison requires people to develop multiple COAs. Decisions are routinely made in environments where the person has seen similar situations or elements of a situation before but also environments that present new scenarios or factors people have not seen before.³⁸ People develop two patterns of choices, one a single stream of assessing one COA then the next and a COA comparison pattern; most people use the former until they find an acceptable solution or action.³⁹ Additionally, personnel use recognition, which is a mental library of expectations, cues, plausible goals, typical actions, to find the best COA.⁴⁰

The first aspect of Klein's decision-making model is developing and using intuition and experience to recognize key patterns. Intuition does not provide specific facts from memory like memory recall, but it effects how a person views and assesses a situation. The foundation of intuition is both successes and mistakes alike.⁴¹ The role of experience and intuition in decision making can be very useful, but also can lead down negative or even dangerous paths. Intuition, defined as in Merriam Webster's dictionary by "cognition without evident rational thought and inference," or colloquially as "a gut feeling," is a valuable tool when developed and applied properly.⁴² There can be inconsistencies in the development of intuition that leads some people to be able to make decisions and others to not, though they went through the same training pipelines. One example of this is when inexperienced, junior members of the same operational specialty are capable of making decisions while some senior members, who are considered

experienced, cannot. One reason for this is if the junior member has many more repetitions more recently over the course of their three years in their career field than a field grade officer level operator who is required to spend much of their time at work in an office, then the junior member has a well-used, albeit young, sense of intuition to rely upon. However, if that junior member has developed their intuition poorly or has seen the same training scenarios throughout most of their training, and lacks practice different scenarios, their improperly developed intuition can lead them astray, which can cause death and loss of equipment. Additionally, if personnel use intuition to determine actions and make decisions in combat, then it may be assumed there is no logical thought behind the action or decision, potentially escalating a scenario that cannot afford to be made worse, particularly true in conflicts short of declared war. Gary Klein's book *Sources of Power* provides an example of the use of intuition in a combat scenario utilizing the HMS *Gloucester* shootdown of a Silkworm missile in the Persian Gulf War. In this example, Klein describes the firing officer's use of intuition to assess the scenario, recognize a discrepancy, make a decision, and then conduct an action, the assessment and recognition of which the officer did not understand how he made the until long after the event in a decision making debrief.⁴³ The officer used his intuition built upon his experiences and expectations.

There is debate on the validity of intuition and experience since so many aspects of a decision can go can go wrong when people use them. Experts with significant experience can lead to incorrect assumptions or the ability to explain away vital details and draw incorrect parallels due to assessing a situation is similar to one experienced before when it is actually not.⁴⁴ It is difficult to build expertise as combat environments are dynamic, feedback is not always available, and there may be insufficient repetitions of the task.⁴⁵ These problems are not limited to the military as demonstrated in a study of non-military managers that showed

managers use intuition the same amount as rational and analytical decision-making processes due to complex environments.⁴⁶ The study also describes intuition as allowing for semi-conscious processes to relate a situation in a time limited environment to make a decision, where the sources of relation are training, experience, and education.⁴⁷ An Army War College Strategy Research Project covered RPDM in 2005, but the primary focus was on commanders making decisions, which while necessary for commanders, the focus is too narrow and more than commanders need to make decisions and understand how they make decisions. Those operating at the tactical and operational level must also be capable of RPDM to maintain a proactive edge in the fight. Personnel with experience enable commanders to trust their decisions given the appropriate authority. The theory is the more situations a person sees or hears about, enables that person to draw on those stories to develop and choose COAs.⁴⁸ The APTEC model does not use intuition or experience as part of the model which requires a longer decision-making process, thereby not necessarily effective for combat. The US Army conducted a study on RPDM in 2003 to assess the difference between RPDM and the Military Decision Making Process (MDMP), and came to the conclusion that the RPDM model was helpful because it employed the brain's natural decision-making process it uses to make basic decisions every day without thinking about them.⁴⁹

While these processes present the benefits and issues with intuition and experience, there are other factors that affect how USAF operators utilize intuition. Institutional bias and culture effect personnel development in making decisions or not making decisions. If a group of people have been hindered sufficiently by past experience of their instructors, then though nothing negative may have happened to the students, they can carry the bias from years before. Another misconception is that experience always equals expertise. A person may execute many training

scenarios, but if none of them are difficult, it generates false sense of security that the person will be able to execute or make decisions in complicated combat scenarios, or even complex training scenarios. Additionally, personnel can execute the same training missions but react differently to when those skills are challenged in more complex scenarios, driving the need for multiple types and difficulty levels of training. The last issue is how personnel learn and train intuition and built experience which will be discussed later in this paper.

The next aspect of RPDM is the ability to transfer skills and knowledge to any theater of operations. Transferable skills require the practice of skills in theater-agnostic environments or for personnel to understand they are learning the concepts of the tasks they are accomplishing, instead of a certain task that is only applicable to one theater or conflict. Klein describes as “analogues” -examples drawn from same or related domain-and “metaphors” -example from a different domain-as the ability to rely on previous knowledge or already developed habits and skills based on concepts, which in essence is the ability to transfer experience and skills.⁵⁰ An example of an analogue is the USAF’s Air Force Instruction (AFI) 11-214, which governs aircraft training rules, uses the metaphor of American rules of the road to determine how aircraft should fly when passing each other in the sky, to the right and since it is a three dimensional movement, the aircraft with the higher nose should fly higher for safe approach.⁵¹ Personnel do not have the time in their work schedules to train specifically for every conflict in every area of the world, therefore, experiences built up in the analogues and metaphors are critical to warfighting. The analogues and metaphors can assist personnel in assessing situations and developing situation awareness, as well as structure their own thoughts; however, it is possible for personnel to draw an incorrect conclusion on a decision because they were applying the incorrect analogue or metaphor or overlooking the correct one to associate.⁵² Transference can

also help relate situations that operators have never encountered before or warfighting concepts that are applicable to multiple mission types. Operators must deliberately practice utilizing analogues and metaphors to develop the recognition skills necessary for effective use as analogical reasoning can provide options for analyzing a situation, but personnel must be able to assess factors and variables effecting the situation for similarities and dissimilarities for whether the analogy can be used or not.⁵³ Operators must be able to transfer their conceptual skills to be able to make decisions in the fog and friction of war for unpredictable situations nor previously encountered.

Mental stimulation is the next portion of the decision-making model and enables rapid COA development and assessment. Essentially, mental stimulation develops the ability for personnel to build the who, what, where, why, and when (5Ws) in their minds during a situation to help determine a way forward.⁵⁴ Operators are often instructed to “stay ahead of the timeline” and how much time varies on what role the operator has in the mission and/or crew, but can vary anywhere from thirty seconds to two hours. Mental stimulation provides a proactive approach to decision making, allows assessment of situation but not always a complete or elaborate solution, and utilizes the past to explain the present and predict the future.⁵⁵ It assists in pro-activeness by personnel deliberately assessing situations to make choices that will limit negative or provide positive impacts to the mission. During training, mental stimulation is used in building experts but those operators should have sufficient background knowledge and expertise.⁵⁶ However, operators must build up knowledge and expertise to be able to do mental stimulation though some people rated as “inexperienced” are able to accomplish this without having as much time in their systems due to a large amount of deliberate practice in their roles and missions. While mental stimulation will not result in the good answer all the time as personnel can ignore

evidence or pretend contradictory evidence does not exist and can generate explanations not proof, it does develop a rapid method of determining COAs.⁵⁷

The last portion of the Klein decision making model is storytelling, which is the comparable to the common USAF vernacular of debriefing and lessons learned distribution. Klein describes storytelling as taking difficult, different, and non-routine cases and build into training programs to provide a wide array of experience, learn by developing patterns.⁵⁸ Poor decisions are not necessarily the results of bias but typically occur because of lack of experience, lack of information, and ignorance/explaining away a critical variable.⁵⁹ Additionally, the post mission assessment must be as assessment of what led to the poor decision as opposed to the outcome of the decision.⁶⁰ The USAF typically requires personnel to conduct debrief at the end of every training mission and combat sortie but how people debrief varies on platform and the people themselves. Oftentimes, a debrief can simply be a story told, where there is minimal analysis on why what happened during the story happened, resulting in a tale but nothing learned on why decisions were made the way they were. Typically, time availability and human factors are the main reasons debrief are ineffective, therefore the USAF concentrates on debrief focus points (DFP) to limit the debrief to a specific situation. If operators conduct debrief by telling stories, and discuss the decision-making process, then effective learning can occur. Stories are similar to mental stimulation because both require plausibility, consistency, economy, and uniqueness, however, stories are subject to misremembering, incompleteness, a lack of the presentation of all relevant variables.⁶¹ One of the faults of debrief is the instructional fix to the DFP is so limited to the specific situation encountered, that while it can add a small example to the experience repertoire of those conducting the mission, it requires so many of the same variables that it is almost ineffective. Broader, more generic, fixes in addition to the situational

fix would allow for operators to have a better baseline for their analogues and metaphors.

Additionally, while personnel typically have training on debrief, getting to the true root cause of an event, positive or negative, requires time, effort, and sometimes difficult questions which some personnel are not willing or wanting to answer due to exhaustion post mission, feeling of personal attack, or other reasons that prevent effective debrief.

The other part of storytelling is the distribution of those stories among the people who can face similar situations to build up their experience, metaphors, and analogues. The USAF at large uses stories distributed to mission non-participants as lessons learned, which are intended to be instructive to help others learn from the successes and mistakes of their colleagues. Stories help create analogies and metaphors and have defined endings and learning outcomes.⁶² Both portions of storytelling need to be unemotional, instructive events to prevent shutdown of personnel due to perceived personal attack. Additionally, during training, deliberate effort must be made to distribute lessons learned, whether through briefings, pre-mission planning assessment, or other gatherings, to ensure as many personnel as possible are able to absorb what occurred and why. In order to ensure distribution of lessons learned, the USAF is already looking to update training to cloud base format to enable sharing of experiences and stories.⁶³

Doctrine lays the foundation for operators to be decision makers and current doctrine is sufficient but the application of the doctrine leaves a gap in instruction. USAF Doctrine Document (AFDD) I, which is USAF basic doctrine, articulates personnel should be able to make decisions and empowered to do so using the concept of centralized control, decentralized execution; which is where a single commander empowers subordinates with intent and guidance to execute mission, allowing for principles of flexibility and versatility.⁶⁴ While doctrine establishes the necessity of decision making, the application and execution of decision making

still requires a great amount of focus in both training and education. Doctrine also describes the differences between training and education, which is part of the lack of focus on decision making during day-to-day training operations. AFDD II states training is not inherent in education but that education inherent in training.⁶⁵ Education is where doctrine specifies that personnel develop critical thought, though doctrine does not specify decision making, which while critical thinking is necessary for decision making, decision making is not inherent in critical thought.⁶⁶ The primary difference between critical thinking and decision making is critical thinking is a broad application of thought while decision making requires deliberate action or inaction. Additionally, the only professional military education (PME) officers receive is Squadron Officer School, a five to eight-week course for O-3 personnel. The minimal amount of designated education does not provide sufficient focus on decision making or critical thinking. AFDD-II identifies training as where personnel develop specific technical skill sets but training is what the USAF uses to describe the majority of day-to-day activity for operators.⁶⁷

Changes to doctrine can help reinforce the need to develop decision making education and application during training. Furthermore, the application of doctrine also needs to change throughout PME and daily training. More doctrinal and training emphasis on the development of critical thinking during daily activities is necessary to develop the decision making necessary to conduct decentralized execution as critical thought is not necessarily inherent in technical skills. More specific emphasis on the “why” in training is required since education is inherent within doctrine as written, however re-writing doctrine to have a focus on decision making within education. Additionally, higher headquarters should require units to report the kind of critical thinking and decision-making capabilities of its people. Units have to submit training requirements and training plans, but nothing specific on education or on how education is

assessed. Units are held accountable for training, but not for the education that is supposed to happen during training.

Training for the Future

Training must improve to contain the concepts previously discussed in order to develop operators' experience, intuition, and recognition capabilities in order to execute in the future environment as well as being able to transfer those skills between different levels of warfare, threats, ROE, and geographic environments. Personnel need to be able to develop recognition and retrieval of information automatically based on a situation.⁶⁸ Furthermore, training should be concept based where the underlying themes and behaviors are what trainers focus on as opposed to situation specific COAs that are not applicable to other scenarios. Training and education are the primary ways to develop intuition because personnel have limited time in real combat situations. Virtual simulations are critical components of experience development as live training costs far outweigh virtual training costs. There will be a time and manpower cost retooling training as discussed in this paper, however personnel can integrate the changes into existing training, from single unit simulations to joint, coalition large force exercises.

Assessments of training effectiveness typically lie in the category of number of people trained, number of aircraft executing the mission, shots fired, bombs dropped, etc. However, training effectiveness rarely assesses *how well* the personnel accomplished the mission, tasks, or DLOs, mostly because these are difficult to assess due to the number of variables that can affect mission accomplishment.⁶⁹ The ineffective training assessments lull operators and leadership into false senses of security about actual combat capability. In many cases, leaders and higher headquarters will want to see numbers to prove training effectiveness, but quantifiable data is usually sparse.⁷⁰ There is some correlation between quantifiable data, such as flight hours and

number of repetitions of skills, but these do not necessarily provide the means to qualitatively assess the capability of the operators.⁷¹ RPDM training requires qualitative assessment but will enable personnel to understand when and how to they make decisions. Building the mental databases of operators allows them to access the analogues and metaphors to be able to analyze and decide on COAs in situations they have not experienced before.

Controlled ambiguity is a cornerstone of developmental training as it provides the white force the ability to develop situations in planning and real time during execution where operators are in a focused scenario that is ambiguous and has anticipated reactions and solutions. White force personnel are the members who are responsible for the training scenario and adjusting it to the needs to the trainees. Training events should frequently include both operational and tactical operators, and these events need to be long enough in order for warfighters to understand the second and third order effects of their decisions. Training decision making needs to include decisions on authority delegation, resource management: fuel, weapons, ISR assets, and ROE application. Personnel also need practice on the application of the kinetic and non-kinetic real-time dynamic targeting cycle at the tactical level where senior leadership provide guidance and then delegate authorities to the tactical level to run the entire dynamic targeting cycle.

Additionally, leadership must trust their people to be able to make decisions when authorities are delegated to the lowest level, which is necessary for both tactical and operational warfighters in order to shorten the targeting cycle as much as possible. Leadership must demonstrate support when operators decide a course of action for operators to not be afraid to make a decision. The decisions require debrief and personnel should record and report lessons learned for trainers to enhance other training scenarios for others train. Leaders must accept errors are inevitable and judge personnel on whether they are able to make a rational well-developed decision.⁷²

Measures of Performance are typically subjective in an ambiguous environment but objective standards must be developed to ensure the correct learning is occurring. Measurements should include whether a decision is made or not, the amount of time it takes to make the decision, and the number of follow on effects that operators assess effectively. Correct solutions are not ideal for ambiguous training as it can drive operators to attempt to replicate a scenario where they are right for taking certain actions. Instead, there should be no sanctioned solutions, but a series of indicators for instructors and evaluators to use to assess and grade performance.⁷³

Experts with training and actual experience are able to handle routine situations but not able to mentally adapt to less typical situations or unpredictable situations, therefore, personnel need to understand the how and why of a situation's variable to execute missions with the necessary intuition.⁷⁴ Experience, and therefore intuition, can be trained by exposing people to as many scenarios as possible and those scenarios should be difficult, complex cases to challenge personnel.⁷⁵ Training should provide situations that force assessment of information where there is no written answer to the situation which forces personnel into not being able to, and more importantly not trying to, find a correct answer. If there is an answer that is expected, people will tend to make decisions and take actions to achieve what is considered the "correct" answer to a situation to achieve high marks in training and evaluations.

Instructors should develop training events underpinned by one single overarching scenario with multiple complex and unpredictable situation options possible within the scenario that enable a different training experience each time personnel conduct it.⁷⁶ These scenarios can be theater agnostic, which is good for training concepts, or theater or threat specific, but all should be sufficiently flexible to allow for personnel to build experience by conducting new situations every time scenarios are run. Additionally, training events should not be so specific that

personnel trained observe and assess that the preferred courses of action only apply to the situations in the exercise scenario. Specific and dedicated white force personnel can emphasize deliberate repetitions of key concepts and address the trainee's weaknesses to improve performance.⁷⁷ The flexibility available with unpredictable or trainer driven scenarios allow for trainees to see almost unlimited series of variables, developing the expertise and intuition necessary for RPDM.

Higher order skills such as decision making that is based on intuition and experience will atrophy faster than physical skills, meaning training must be more consistent to ensure operator capability.⁷⁸ Trainees also need to frequently be in ambiguous environments where there is limited time availability to make decisions. As training increases in complexity, the time frame in which to accomplish the tasks is reduced to enable the speed of thought and decisions to create a time/ability gap that is favorable against any enemy forces can face.⁷⁹ The limited time availability also forces personnel to use intuition to develop actions because there is a lack of time space available does not allow for COA development and assessment. Regularly occurring naturalistic decision-making training provides operators with the frequency and limitations needed to improve intuition and experience.

Deliberate practice provides specific instruction on particular skill sets and enables repetition to ensure understanding with multiple variables. This helps develop transferable skills as operators can see how a concept applies in multiple situations. Ideally, immediate feedback should be available from instructors, including a discussion on the second and third order effects caused by trainees' decisions, if unavailable to run during the training scenario, so the trainee can comprehend what the follow-on results of their actions are.⁸⁰ Follow on effects allow the trainee to truly understand if the decision made was the best possible or if other factors need to be

considered. Repetition allows the trainee to attempt the thought and decision-making process again to be able to practice execution more effectively.

Conclusion

Institutional training culture is the overall element that requires change as it did in the 1970s post-Vietnam. The change in culture will enable the evolution of how warfighters execute their missions due to the changing nature of how missions can be executed compared to how conduct counter insurgency (COIN) operations. Deliberate planning models and checklists are inherently useful and need to remain in the USAF curricula and culture, but they mostly for when there is sufficient time to plan or in safety situations. Other times, operators must be able to have effective experience and intuition to draw upon to make decisions in real time operations.

Leaders need to be willing to delegate authorities and personnel must be capable of executing those authorities. Making decisions requires deliberate practice and understanding of how people can sift through the options available in a given situation to determine which is the best course of action. Utilizing the RPDM model to train and educate operators will provide them with the mental skills necessary to have trustworthy intuition. Real time mission execution evolution requires an advancement in training to prepare operators for current and future conflicts along the range of military operations the same way simulated combat missions did for pilots in Vietnam.

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