Strategic Compression
and the Military's Pursuit of Cognitive Readiness

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ABSTRACT

The Joint Force of today is facing an inflection point with respect to the way it believes it should learn, train, and educate. The generation that fought America's longest war is more savvy and intuitive but also sober on what really "works." The authors have observed, for instance, that "Jointness" is being redefined, and correspondingly preparation for it is shifting, focusing less on systems and more on developing higher-order cognitive skills, such as problem-solving, adaptiveness, and anticipation. However, trainers are unclear on how to create interventions that simultaneously un-lock the cognitive potential of their staffs, enable accurate and actionable performance measurement, and support affordable scalability to geographically dispersed training audiences.

We argue that part of the solution requires exploiting web-based technologies that can create semi-immersive experiences in "strategic compression," which we use as a short-hand reference for the stresses of operational/strategic crisis action planning and decision-making under time constraints, contextual complexity, and organizational ambiguity. If those conditions are rendered in a distributed team simulation (part-task trainer) and paired with appropriate instructional interventions, this creates opportunities for trainers to facilitate quality interventions in support of a group's decision-making processes (i.e., "strategic reflection"). The authors build upon previously published research related to technology-enabled joint training at the lower-end of the cognitive learning taxonomy (i.e., remember, understand, and apply; see Fautua, Schatz, et. al., I/ITSEC 2014) to provide preliminary findings in establishing similar interventions for the taxonomy's upper end: analyze, evaluate, and create.

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THE STRATEGIC CORPORAL AND TACTICAL GENERAL

"The four-star general proudly recounts how he spent 'two hours watching footage' beamed to his headquarters." So begins Peter W. Singer's 2009 article about the rise of the tactical general. The general in question (kept anonymous by mutual agreement) went on to explain how he, via live video feed from a Predator, watched two insurgent leaders sneak into a compound, linger, and eventually exit carrying weapons. Then he recounted how he personally verified the target, gave the order to strike—and even decided upon the exact munitions to use.

The strategic corporal makes the counterpoint to the tactical general. In General Charles Krulak's famous essay, he tells the story, "While Corporal Hernandez considered the feasibility of a rescue attempt, the situation took another serious turn," Krulak writes (1999). He goes on:

> "...What had started out as another routine day of humanitarian assistance was rapidly becoming something else entirely. A Molotov Cocktail crashed into the position injuring no one, but contributed further to the confusion. The Marines of 1st Squad looked from man to man and then stared questioningly at Corporal Hernandez. He reassuringly returned the gaze of each man, knowing better than any of them that the fate of the squad, of the wounded IRO [International Relief Organization] personnel, and perhaps, of the entire multi-national mission, hung in the balance. In the span of less than three hours he had watched a humanitarian assistance mission turn terribly wrong and move ever closer to outright disaster. Corporal Hernandez was face to face with the grave challenges of the three block war and his actions, in the next few minutes, would determine the outcome of the mission and have potentially strategic implications."

DEFINING STRATEGIC COMPRESSION

The two stories above illustrate symptoms of **strategic compression**, which we define as follows:

> Strategic compression defines a phenomenon where the ***tactical, operational, and strategic levels of war contract***, enmeshing the characteristics of those levels (i.e., the actions, goals, time scales, physical spans of influence, and available resources). It also involves changes to traditionally expected causal relationships, incorporating ***new causal chains across the levels*** (e.g., low-level tactical actions directly impact broad-scale strategic responses) and ***eliminating expected causal connections*** (e.g., successfully meeting all tactical outcomes without attaining the expected positive strategic end states).

As far as we can determine, Dave Dilegge, Editor-in-Chief of *Small Wars Journal*, penned the first article on strategic compression. Although self-described as a draft think piece, Dilegge's article created momentum around the concept and inspired a number of thoughtful online discussions. In it, he defines strategic compression as: "the forming of unexpected causal relationships and breaking of expected causal relationships among the tactical, operational, and strategic levels of conflict. …As such, the levels of war seem to compress in time and in causal linkages" (Dilegge, 2007).

Traditionally, *Joint Publication 3-0, Joint Operations*, defines three levels of war: strategic, operational, and tactical; and military theorists generally distinguished the three levels based upon factors of time, space, and mass (i.e., available resources).

(1) The *strategic level* involves long-term planning, broad worldwide concepts, and utilization of national resources. Strategy defines a political end state—*what* to achieve.

(2) The *operational level* plans major operations; it's defined by mid-term timespans, regional oversight, and sizeable (but bounded) resources. Operational planning defines the military ends, ways, and means to achieving strategy; that is, operations determine *how* to achieve.

(3) The *tactical level* executes battles and other small engagements. It involves short-term, micro-level actions, focusing on immediate timescales, immediate physical reach, and the immediate resources at-hand. Tactical level personnel *take action*, but often without inputs to, nor even understanding of, the larger strategy, goals, or rationale.

Strategic compression blurs the conceptual boundaries of our formalized organizational structures, blurring lines not only within the vertical hierarchy but also laterally and between what is "inside" versus "outside" the system. Correspondingly, it muddies the expected causal chains, creating unexpected emergent outcomes of lower-level actions or wholly ambiguous cause-and-effect sequences. In other words, strategic compression is multivariate. It is not merely defined by tactical generals and strategic corporals; rather it's an enmeshment—a compression of the layers but also a greater fluidity across widespread organizational structures and their respective spans of influence (i.e., the actions, goals, time scales, physical spans of influence, and available resources). Problems of strategic compression for our current systems are numerous. For example, it creates distractions for generals, and commands risk becoming completely reactive to situations; it also forces complex decisions down to lower and lower levels and at fast-and-faster timescales. Combined with fluctuations in expected cause-and-effect relationships, all this limits our ability to effectively plan ahead of engagements. These challenges are salient in industrialized military organizations because, at least in part, of our foundational conceptions of warfare.

The traditional conceptualization of the three levels of war stems from a classic Western, or Clausewitzian, perspective. By that we mean a perspective that assumes knowable cause-and-effect relationships, well-defined structures, analytical processes, and formalized management. From the Clausewitzian perspective, "strategic compression" carries a negative (or at least risky) connotation. However, we are now fighting against an enemy with a different paradigm—foes who can impose compression upon us as well as embrace a wholly different mindset of warfare. This could be called the *perspective of the other*, or more formally, the *civilizational perspective* (Dilegge, 2007; Huntington, 2003; Lind, Nightengale, Schmitt, Sutton, & Wilson, 1989; Lind, 2004).

From such alternative perspectives, "strategic compression" could be re-cast more positively, say, as "tactical expansion"—a beneficial phenomenon where individuals and small groups have the opportunity to gain influence and exercise greater control—as well as potentially subvert formal and hierarchical structures. (This is not to imply that "tactical expansion," itself, is inherently damaging or dangerous. In fact, both formal hierarchies and socially dynamic systems can simultaneously exist within stable and healthy organizations; however, that discussion falls outside the scope of our paper. Instead, refer to Stodd et al., 2016.) For our current discussion, we are most interested in how some asymmetric adversaries have learned to exploit strategic compression, through enemy actions, such as social media posting of beheadings, which can quickly collapse the "time, space and mass" of the best of plans (Kelly & Brennan, 2009).

In addition to acting as a lever that asymmetric foes can employ, strategic compression challenges our conventional practices of leadership, the reliability of formal chains of command, and overall adds complexity to all planning and operational processes. A secondary outcome is that strategic compression also exposes foundational gaps in our traditional warfare–oriented training and educational approaches.

STRATEGIC COMPRESSION AND OPERATIONAL STAFF TRAINING

Strategic compression affects whole systems, and of course, all three layers of our current organizations. However,

for the sake of discussion, let's consider our operational layer—those battle staff planners sandwiched between the strategic vision-setters and tactical executors.

Today's operational planners must be prepared to manage a broad range of missions, across the full range of military operations—from orchestrating the logistics of urgent disaster relief operations in the South Pacific to navigating multinational interests in coalition operations in Africa, or from post-conflict stabilization in the Middle East to cyber-operations reaching across the global. Under this new paradigm, battle staffs must have the capacity to operate on intent, balance their tactical actions against strategic goals, and integrate multiple domains of sophisticated skills (e.g., soldiering skills, sociocultural understanding, emotional intelligence, resilience, and self-reflection) all within a joint, interagency, intergovernmental, and multinational context (Schatz et al., 2015).

The operational challenges are as numerous as they are novel, and they occur under the added complexity of strategic compression. However, traditional training approaches at the joint operational level (i.e., Joint Force Command boards/bureaus, centers/cells and working groups) build upon industrialized methods of planning and course-of-action development, assuming that operational actions exist within defined boundaries (with generally respected left/right lateral limits) and that they can be managed as logical, linear, and knowable processes. As a result, typical battle staff exercises have been limited to scripted, unchallenging training experiences.

To better prepare battle staffs for today's volatile, uncertain, and complex environments, we should reexamine these outdated training methods. That is, we need operational training that prepares battle staffs to accurately assess and evaluate multi-layered, complex problems, and then produce nuanced, reasoned, and strategically minded recommendations. Historically, such sophisticated training might be accomplished via cognitive apprenticeship, where a highly experienced mentor painstakingly guides a more novice student through an array of complex, real-world tasks (e.g., Collins, Brown, & Newman, 1989). However, this mentor-based model lacks measurability, scalability, and affordability for our largescale, geographically dispersed, and frequently rotating trainee population.

Thus, our challenge is to create training interventions that simultaneously exercise and enhance the cognitive potential of battle staffs, while enabling accurate and actionable performance measurement, and supporting affordable scalability across geographically dispersed training audiences.
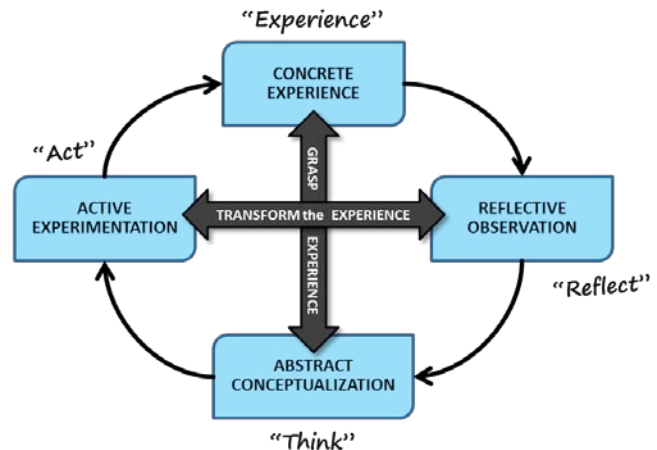
Part of the solution in fostering higher-order cognitive skills among battle staffs lays in exploiting available instructional technologies. Advances in simulation, for instance, can enable the creation of semi-immersive training environments calibrated for strategic compression. Of course, technology is only part of the answer. Cultivating higher-order cognitive skills also requires exposure to authentic scenarios (involving the relevant time and cognitive pressures), the application of effective instructional techniques, and the use of valid and reliable measures of higher-order cognitive skill attainment. These training interventions must also generate opportunities for individuals and teams to reflect—upon their own cognitive process, the situation, other actors, and various interactions of these. To meet this need, we examine the use of technology-enable learning paired with a learning technique we call "strategic reflection."

Reflection

Deliberate, developmental reflection plays a key role in many well-known adult learning models, such as Donald Schön's *Reflective Practice* methodology or David Kolb's *Experiential Learning Theory*, both of which explain how learning and personal development can be intentionally cultivated through hands-on experience (Kolb, 1984). Importantly, these bodies of research emphasize that not all experiences necessarily foster cognitive or emotional growth. For instance, as Kolb explains, effective experiential learning requires "an idealized learning cycle or spiral where the learner 'touches all the bases'—experiencing, *reflecting*, thinking, and acting—in a recursive process that is responsive to the learning situation and what is being learned" (emphasis is ours; Kolb & Kolb, 2009, p. 298; see Figure 1).

Adult education theorist, Stephen Brookfield, also embraces deliberate reflection as fundamental process in adult learning (Brookfield, 1995). Further, Brookfield emphasizes the term "*critical* reflection," noting that not all reflection reaches that level of scrutiny (Brookfield, 2009, p. 294):

The conflating of the terms 'reflection' and 'critical reflection' implies that adding the qualifier 'critical' somehow makes the kind of reflection happening deeper and more profound. I contend that reflection is not, by definition, critical. It is quite possible to practise reflectively while focusing solely on the nuts and bolts of process and leaving unquestioned the criteria, power dynamics and wider structures that frame a field of practice. Reflection is useful and necessary in the terms it sets itself; that is, to make a set of practices work more smoothly and achieve the consequences intended for them. But this is not critical reflection; critical reflection calls into question the power

Figure 1. Experiential learning model from Kolb (1984)

relationships that allow, or promote, one particular set of practices over others. What also makes reflection critical is its foregrounding of power dynamics and relationships and its determination to uncover hegemonic dimensions to practice. Someone engaged in critical reflection always asks whose interests are served by particular codes of practice, and stays alert to the way they are embracing ideas and behaviours that are subtly harming them.

Brookfield (2009) notes that critical reflection opportunities are generally triggered by "disorienting dilemmas," i.e., events that highlight a discrepancy between real-world experiences and the learners' assumptions and world views about what *ought to* occur. Following this, the critical reflection process involves four inter-related pieces:

(1) Assumptions, embedded in language or demonstrated in action, are uncovered
(2) Each assumptions is analyzed for accuracy, with evidence sought to support or refute its validity
(3) Different perspectives are considered, viewing situations and actions through the eyes of others involved
(4) Informed actions, with clear rationales that could be explained to others, are taken

Brookfield's critical reflection methodology requires questioning, reframing, and explicit scrutiny of the "dominant commonsense" assumptions held by the majority. Additionally, and somewhat uniquely across the reflection literature, his approach emphasizes "ideology critique," which he defines as the process recognizing widely held cultural, social, political ideologies, embedded in everyday situations and practices, and which individuals often uncritically accept or, even, fail to even notice. These insights are imminently transferable to the challenge of training for strategically compressed conditions.

Strategic Reflection

Critical reflection allows adults to think about their own thinking and, in turn, expand their cognitive skills, overcome assumptions and blindspots, and adapt to changing contexts. Guided critical reflection (e.g., via after action review discussions) also gives instructors, trainers, and mentors the opportunity to "unpack" learners' thinking, to help assess and coach their cognitive processes. For instance, in the joint training context, reflection can enable analysis of staff members' ability to "frame" multifaceted and non-linear problems, problem-solve as a team, evaluate vague or conflicting data, sense-make and share information, and/or create novel perspectives or nuanced appreciations to more effectively understand compression problems.

Critical reflection can occur in any experiential learning circumstance, and it has particular value for the complex, volatile, paradigm-breaking strategic compression context. For this reason (and to increase the palatability of the term for battle staff training audiences), we refer to critical reflection methods applied to strategic compression training scenarios as "strategic reflection."

To employ strategic reflection in joint training, we require (1) appropriate scenarios involving relevant disorienting dilemmas, (2) opportunities to insert reflective activities, and (3) skillful facilitation of critical reflective practice. In

other words, scenarios must be designed to create conditions that will foster disequilibrium, surface misconceptions, probe for teamwork weakness, and (most importantly) create rich opportunities for reflection. Practically, the scenarios must also contain opportunities where, for instance, trainers can unobtrusively "pause" the training event to facilitate in-stride discussions, decomposing a group's social interaction and decision-making processes. In the following section, we discuss attempts to integrate these specific features into joint training scenario-based exercises and the lessons learned from these experiences.

TRAINING WITH COMPRESSION AND REFLECTION

Early conceptualizations of strategic compression and associated reflection were explored during two operational training events. During the first event, investigators examined whether well-conceived and properly calibrated strategic-compression scenarios created meaningful opportunities to facilitate reflection. During the second event, investigators planned to conduct a similar exploration with an additional focus on structured data collection in support of the event, but those plans were interrupted by real world operations.

Preliminary Case Study: A Combatant Command

The first attempt at applying and measuring strategic compression and reflection took place as part of routine staff training at a Combatant Command (CCMD). The event's training objectives centered on strengthening the planning capacity of two important cross-functional battle staff working groups: Future Plans (FUPLANS) and Future Operations (FUOPS). Each working group operates within an ad hoc construct, comprised of various functional experts from different staff sections (e.g., intelligence, logistics, lethal and non-lethal targeting, and communications). High-performing working groups can quickly "form, norm, and perform" as an integrated team with minimal "storming."

In the context of military doctrine, FUPLANS and FUOPS conduct mission analysis and planning for a given mission requirement at different time and space horizons. In day-to-day operations, FUPLANS anticipates future mission requirements and builds sets of concept plans (CONPLANs) for addressing those potential missions. When a crisis occurs, FUPLANS reviews their archives, selects the most appropriate forecasted plan, and then conducts deeper analysis to update it for the prevailing environment. At that point, the plan becomes a concept of operations (CONOPS), which they then transition to FUOPS for further analysis before putting it into action. Hence, where FUPLANS employs a broader view, FUOPS conducts planning within near-term horizons.

Prior to the CCMD training event—and in preparation for designing a strategic compression scenario—planners from Joint Staff, J7 (Training) discussed the compression/reflection concept with CCMD trainers. The trainers considered the typical training model used for battle staffs and were interested to learn how a new approach could be taken.

In the traditional approach, almost 90% of the training focus is at the lower end of the taxonomy, represented by the dotted blue line in Figure 2. Training audiences gain foundational knowledge, usually in the form of instructor-focused briefings in plenary settings where participation is minimal except for a few question-answer sessions at the end of the lecture, and trainees have opportunities to apply standard concepts and procedures in the live exercises. Left unexploited in this approach are the learning opportunities for higher-order skill development beyond standard memorization, understanding, and application of facts, simple procedures, and concrete concepts. This was the void that the compression/reflection concept attempted to fill.

CCMD trainers understood immediately the benefits of the compression/reflection dynamics and worked to build an appropriate design into their exercise, which was executed using a small-group scenario-based staff simulator. As part of the exercise design, the trainers also shifted the training design away from an instructor-based method and towards a learner-centric approach where the training audience would actively participate in a problem-based scenario.

One challenge was to design an appropriate scenario that would stimulate the battle staff to perform under pressure, encourage deeper cognitive engagement in planning processes, richer social/group collaboration, and, of course, opportunities to engage in strategic reflection.

The trainers created a problem-based scenario involving multiple, near-simultaneous foreign humanitarian assistance/disaster relief operations within their operational region. This was the problem-set both working groups needed to plan against and resolve as a team. This scenario challenged the normal hierarchical structure of FUPLANS and FUOPS, for instance, by forcing the working groups to make decisions at lower levels and attempting to trap participants into a reactive-only state.

The training was scheduled for a three-day period, using a fluid battle rhythm. Reflection (and remediation) opportunities were scheduled after key junctures of the working groups' planning phases, divided along their distinct planning horizons. With this design, the trainers believed they could reach the untouched areas of higher-order concepts and cognition highlighted in yellow in Figure 3.
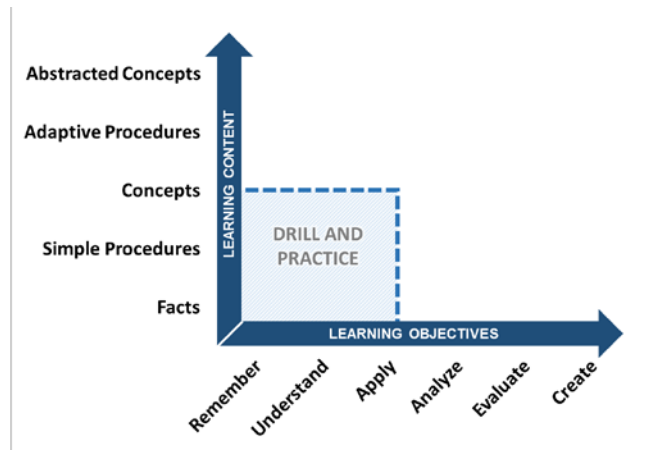
Figure 2. Often, training uses drill-and-practice methods that constrain learning outcomes to lower-order cognitive processes and less demanding learning content

(Original model from Fletcher, 2012)
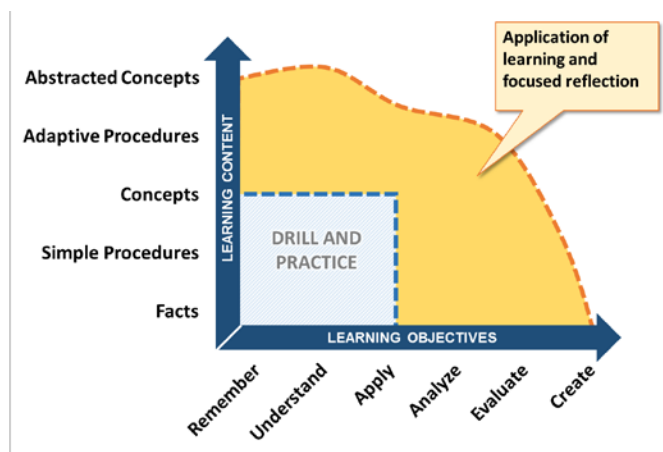
Figure 3. Using appropriate learning techniques, such as focused reflection, unlocks the ability to convey more sophisticated concepts and foster higher-order thinking skills

In the parlance of the science of learning, this is called a constructivist approach. Constructivism is famously messy and time consuming as the group is compelled to "construct" their own knowledge (and insights) from different experiences through open interaction and cross-talk. Interacting under pressure also exposes the group's internal ability to work together as a team. The point is the competitive tension creates an *experiential* learning environment where the benefits to learning are great, including improved retention of the learned material and mission-based processes as well as improving internal group collaboration (Klein, 1997; Fletcher, 2010; Park, 2007). The learning is deepened further when "strategic reflection" opportunities are included.

When the compression/reflection–themed scenarios were executed at CCMD, the trainers did observe increased engagement with the desired contextual complexity and corresponding higher-order thinking. For example, on one instance of a carefully crafted compression event, the FUOPS working group (consisting of over thirty cross-functional subject matter experts) engaged in an intense mission analysis activity on framing the challenges of the disaster relief crisis. They presented what they thought were well-considered assessments of the disaster relief challenges to the gameplay commander, a senior Army Colonel. At the very opening of the brief, however, the group was stumped when the "commander" asked a simple but penetrating question: "who gave you this guidance?"

No one had. The group had reactively launched into their mission analysis with the sense of urgency that circumstances demanded, without first seeking their commander's guidance to shape their planning. In truth, the event's trainers had purposely failed to emphasize this requirement during the scene setters, which is well known in military doctrine, to see if the group would adhere to the operational rules or whether they would become ensnared at the tactical level. The point was not to trip up the training audience, but to drive home the challenge of urgency and a compressed decision timeline in a "safe" learning environment. The Colonel, a former instructor at the Army's prestigious School of Advanced Military Studies, paused the exercise execution to lead the group in a reflection of how the distraction and confusion of a well-formed compression environment led to an unpredictable misstep by the FUOPS group.

At this point, the trainers realized there was a need to create a data collection process to document and assess these moments of compression and reflection.

Preliminary Case Study: A Headquarters in the Middle East

Following the CCMD exploration, trainers attempted a second compress/reflection tailored event, this time with added measurement methods. This case study took place in the Middle East with a small forward-based headquarters, with about 140 staff members. Optimizing staff performance was an important learning objective for these trainers, not only to test their operational concepts against an authentic regional problem, but to have their staffs perform as a group under duress in a coherent, integrated way.

The headquarters' trainers grasped immediately the importance of strategic compression and strategic reflection, and they engaged in a lengthy dialogue on calibrating an appropriate level of competitive design into their scenarios. They also reasoned that the possibility for short-notice current operational alerts (i.e., real-world operations) might affect the execution of the training and should be factored into its design. Having experienced success in CCMD in creating a training environment that seemed to exercise strategic compression, the trainers were now ready to attempt to collect data on a similar training event. Trainees completed tests prior to and after the scenario. Data collection rubrics were also designed for this event, to be employed by the officer cadre who formed a group of observing subject matter experts. These observation rubrics received mixed results, which will be discussed below.

As warned, actual operational alerts occurred in the week before training execution, causing three primary cross-functional work group leads to deploy. Despite this, the Headquarters G3—a Colonel operations chief—sent out an internal message to continue with the training event as scheduled, despite the fact that he would also be focused on conducting the real-world mission. To add more challenge, another current operational alert occurred in the middle of the actual training, causing an additional 30% of the primary planners to attend to real-world planning events while simultaneously performing their staff actions in the training event. When planning events overlapped, the primaries of each planning group left their "seconds" to continue the training. But as noted above, this possibility was already incorporated into the training plan enabling very little disruption or drop in the quality of the Course of Action development phase of the training event. In short, planners in both FUOPS and Current Operations were mentally braced for exactly such diversions.

One clearly defined compression event during the mission occurred when a hypothetical US Service member got into an altercation along the war zone border with a partner-nation service member; the current operations planners were tasked with dealing with this highly tactical situation at a distance, facing the effect of real-time escalation as the forces in the scenario dealt with their partners, forcing the team into a mostly reactionary position until a pause in the scenario for reflection allowed them to re-adjust their actions.

Measuring Performance Outcomes

Capturing the cognitive presence changes shown in the scenarios above is a challenge for subject matter expects; this is compounded in a distributed training environment, with a large training audience and multiple trainers attempting to collect data on trainees' behaviors and responses to the training. To ease this process, during the headquarters case study outlined above, an instrument was pilot-tested: the Communications Coding Survey was a modification of an online survey instrument developed by Garrison, Anderson & Archer (2001) and Meyer (2003). What this form sought to provide was a technique for trainers to collect on and later perform content analysis, which Borg & Gall (1989) defined as a "technique for the objective, systematic, and quantitative description of the manifest content of

communication." Thus, communications could be coded during the event, with the coding instructions at hand for the observers to refer to during collection.

The Communications Coding Survey included four categories for comments to be coded against, as was used by both Garrison et al. (2001) and Meyer (2003): (1) <u>Triggering</u>: comments offering background information that culminates into a probing question where group members can understand enough of the problem to frame its nature; (2) <u>Exploration</u>: comments reflecting preliminary thinking, without much evidence; (3) <u>Integration</u>: comments that begin to gain consensus, building upon one another and melding into an integrated critical thought; (4) <u>Resolution</u>: collective comments that are translated into well-argued positions or persuasive courses of actions. Because the survey involves these four coding categories (i.e., Triggering, Exploration, Integration, and Resolution) it is sometimes called the TEIR system.

This observational data was paired with a 10-question self-efficacy survey, which trainees completed immediately after receiving team training (but before experiencing other training events). The self-efficacy survey was designed to gauge the impact of the blended learning interventions delivered prior to the small-group scenario-based learning exercise. This survey asked for self-report about developing cognitive skills for battle staffs; examples of these include critical thinking, problem framing, problem solving, anticipation, and internal collaboration. The survey was subsequently issued again after the exercise to gauge the utility of the training over time. The plan was to analyze this survey data along with observations made by the observer/trainers to form a collective team-level assessment of staffs' higher-order cognitive skills. Ideally, this would paint a picture to help inform the headquarters' trainers and shape future training events in ways that continue to build and sustain these higher-order thinking skills.

The observational data collected from this first employment was, however, problematic. Trainers collected participant comments during several open discussions over mission analysis, critical discourse during briefings, and sidebar micro-dialogues whenever possible. Using the communications coding survey, cross-talk dialogue was then categorized into the four coded segments of communication to determine the group's "community of inquiry" and level of proficiency in specific critical thinking areas, such as framing, questioning, reflection, reasoning, clarity, accuracy, and depth, to name but a few. However, inter-rater reliability was not reached, and no solid transcript of the event was made; many participants moved from room to room, and their specific vocalized comments were not recorded for later rating by other coders. Only one observer's record was retained in many cases. Due to this and other deviations from the protocol during this event, our version of the Communications Coding Survey is being re-worked; as an analytical guide, it performs very well, but as a collection tool, it needs refinement.

Despite these issues with its ecological usability, the concepts behind the survey still seem valuable. For instance, when applied, post hoc, to clean vocal transcripts it shows results such as those in Figure 4 and Table 1. These aggregate data were taken from transcripts from Bold Quest 12-2, a yearly Joint Staff J6 (C4/Cyber) exercise focused on coalition interoperability. In this case, transcripts were collected pre- and post-training and then coded using the TEIR schema; this illustrates the kinds of observable impacts expected when trainees complete training that exercises their individual and team-based thinking skills.
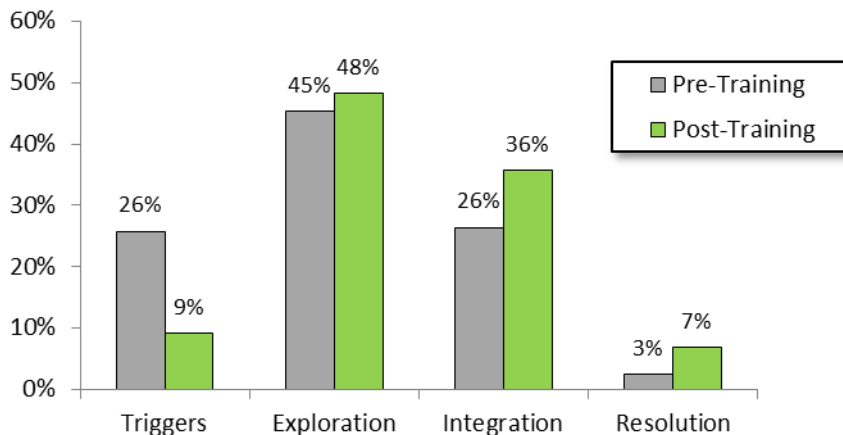
Figure 4. Comparison of soldier TEIR performance areas, pre- and post-training

Table 1. Analysis of aggregated pre and post training audio data from BQ 12-2, as soldiers performed three tactical mission types.

	Pre-Training on sensemaking (n=43)	Post-Training on sensemaking (n=42)
Triggers	41	20
Exploration	72	105
Integration	42	78
Resolution	4	15

In this case, the training audience experienced the most growth pre-training to post-training in the *Triggers* category, which had previously been almost 26% of their communication, and *Integration*, which grew by almost 10%. The other areas experienced smaller gains. Comparing these post-training changes to the numbers collected in other applications of the TEIR coding concept, the participants' higher order thinking compared favorably to participants who just engaged in similarly challenging training (Meyer, 2003).

CONCLUSION

This paper discussed the concept of "strategic compression," something many authors have discussed since 2001 but which we have attempted to better define into a workable construct. Such constructs, help us conceptually explore the idea and, importantly, develop education and training interventions to help personnel operate effectively under it. Building upon the strategic compression idea allowed joint trainers to build small-group scenarios that tested the relevant individual and team higher-order thinking skills required for strategically compressed context. Further, incorporating adult learning principles related to critical reflection (which we referred to as "strategic reflection") helped ensure the training experiences cultivated the desired growth. Finally, to help determine if this growth occurred, the trainers developed and tested a behavioral observation rubric, designed to capture and encode trainee utterances to find evidence of appropriate critical thinking process (i.e., appropriate reflection).

Strategic compression creates challenges for our well-structured military institutions. Leaders can become distracted by compelling lower-level details, and in so doing, lose the integrity of strategic view; systems risk becoming reactive, losing objectivity, and being drawn into unwanted frames of reference. The volatile spans of responsibility not only affect leaders but threaten the structure of the system. However, rather than cast compression as an unequivocal risk, we can view it as an opportunity for adaption and can embrace a more dynamic approach to how we train for it and how we structure our organizations to thrive within it. If we embrace this adaptive view, strategic compression can become a positive catalyst, encouraging devolved and distributed power, increasing the speed and efficacy of organizational communication, encouraging sensemaking via distributed and diverse inputs, and overall creating a more robust system.

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REFERENCES

Borg, W., & Gall, M. (1989). The methods and tools of observational research. In W. Borg and M. Gall (Eds.), *Educational research: An introduction, 5th edition* (pp. 473–530). London: Longman.

Brookfield, S. (1995). Adult learning: An overview. In A. Tuijnman (Ed.), *International encyclopedia of education*. Oxford: Pergamon Press.

Brookfield, S. (2009). The concept of critical reflection: promises and contradictions. *European Journal of Social Work, 12*(3), 293–304.

Collins, A., Brown, J. S., & Newman, S. E. (1989). Cognitive apprenticeship: Teaching the crafts of reading, writing, and mathematics. *Knowing, learning, and instruction: Essays in honor of Robert Glaser, 18*, 32-42.

Dilegge, D. (2007, Oct 21). Hearts and Minds. *Small Wars Journal Blog*. http://smallwarsjournal.com/blog/hearts-and-minds

Fletcher, J. D. (2011). *DARPA Education Dominance Program: April 2010 and November 2010 Digital Tutor Assessments* (No. IDA-NS-D-4260). Alexandria, VA: Institute for Defense Analyses.

Garrison, D. R., Anderson, T., & Archer, W. (2001). Critical thinking, cognitive presence, and computer conferencing in distance education. *American Journal of distance education*, 15(1), 7-23.

Huntington, S. P. (1993). The clash of civilizations? *Foreign Affairs*, 22–35.

Kelly, J., & Brennan, M. (2009) Alien: How operational art devoured strategy. *Strategic Studies Institute* (pp. 1–123), US Army War College: Carlisle, PA.

Klein, Gary. (1997). Developing expertise in decision making. *Thinking and reasoning, 3*(4), 337–352.

Krulak, C. C. (1999). *The strategic corporal: Leadership in the three block war.* Fort Leavenworth, KS: Center for Army Lessons Learned. Available: http://www.au.af.mil/au/awc/awcgate/usmc/strategic_corporal.htm.

Lind, W. S., Nightengale, K., Schmitt, J. F., Sutton, J. W., Wilson, G. I. (1989.) The changing face of war: Into the fourth generation. *Marine Corps Gazette, 73*(10), 22–26.

Meyer, K. A. (2003). Face-to-face versus threaded discussions: The role of time and higher-order thinking. *Journal of Asynchronous Learning Networks*, *7*(3), 55–65.

Park, Beverly. (2007). The Science of Learning Meets the Art of Teaching. *Education Canada, 46*(4), 63–66.

Schatz, S., Fautua, D., Reitz, E., & Stodd, J. (2015). The changing face of military learning. In Ralph Doughty et al., eds., *Innovative learning: A key to national security*, Ft. Leavenworth, KS: The Army Press.

Schön, D. A. (1983). *The Reflective Practitioner: How professionals think in action.* London: Temple Smith

Scriven, M., & Paul, R. (2004). Defining critical thinking. Retrieved: 22 May 2016, http://www.criticalthinking.org/pages/defining-critical-thinking/766.

Singer, P. W. (2009). Tactical generals: Leaders, technology, and the perils of battlefield micromanagement. *Air & Space Power Journal, 23(2)*, 78. Available: http://www.brookings.edu/research/articles/2009/07/summer-military-singer.

Stodd, J., Reitz, E. A., Schatz, S., Fautua, F. (2016). Black Swans and the Limits of Hierarchy. In *Proceedings of the I/ITSEC 2016*. NTSA: Washington, D.C.

Young, E. (2013). Decade of war: Enduring lessons from a decade of operations. *Prism, 4*(2), 123–142.