

5-15-2023

Creativity training needs assessment for homeland security enterprise: a case for creative thinking

Alexis L. d'Amato

University of Nebraska at Omaha, adamato@unomaha.edu

Samuel T. Hunter

NCITE, University of Nebraska at Omaha

Follow this and additional works at: <https://digitalcommons.unomaha.edu/ncitereportsresearch>

Please take our feedback survey at: https://unomaha.az1.qualtrics.com/jfe/form/SV_8cchtFmpDyGfBLE

Recommended Citation

Alexis L. d'Amato & Samuel T. Hunter (2023) Creativity training needs assessment for homeland security enterprise: a case for creative thinking, *Journal of Policing, Intelligence and Counter Terrorism*, DOI: 10.1080/18335330.2023.2209849

This Article is brought to you for free and open access by the National Counterterrorism Innovation, Technology, and Education (NCITE) at DigitalCommons@UNO. It has been accepted for inclusion in Reports, Projects, and Research by an authorized administrator of DigitalCommons@UNO. For more information, please contact unodigitalcommons@unomaha.edu.

Creativity training needs assessment for homeland security enterprise: a case for creative thinking

Alexis L. d'Amato^a and Samuel T. Hunter^b

^aDepartment of Psychology, University of Nebraska at Omaha, Omaha, Nebraska, United States of America;

^bNational Counterterrorism Innovation, Technology, and Education (NCITE) Center, Omaha, Nebraska, United States of America

To cite this article: Alexis L. d'Amato & Samuel T. Hunter (2023): Creativity training needs assessment for homeland security enterprise: a case for creative thinking, *Journal of Policing, Intelligence and Counter Terrorism*, DOI: <https://doi.org/10.1080/18335330.2023.2209849>

ABSTRACT

Creativity, specifically creative problem solving, is often excluded from Homeland Security Enterprise efforts to train and develop their workforces. To determine if this lack of training was a key knowledge gap in the communities, we drew on organisational creativity literature. Using the personnel databases O*NET and Careers in the Military Database, we conducted a training needs assessment by identifying relevant job tasks, knowledge, skills, and abilities (KSA) that align with the creative process. More specifically, we sought to identify the need for creative problem-solving training and designated creative thinking time (e.g. red teaming) to influence innovative intelligence capabilities. Based on our findings, we recommend creativity training to facilitate creative thinking and action. Moreover, we outline situational and individual factors that will affect the transfer of the training, such as organisation environment, leadership, and creative self-efficacy. The impact of these recommendations will aid security, counterterrorism, and intelligence communities to efficiently detect and prevent emerging threats, as well as develop intelligence products to further support the Homeland Security Enterprise mission.

KEYWORDS

Novel threats; creativity training; counterterrorism; training needs assessment

Introduction

Between 1990 and 1995, Japanese cult Aum Shinrikyo unsuccessfully launched 17 chemical and biological weapon attacks with motivations ranging from assassination to mass murder. Among the 17 attempts, one was successfully implemented in 1995 when five members of the cult boarded different subway lines headed towards centre city Tokyo, Japan with the intention of releasing sarin, a deadly chemical nerve agent. Each member boarded separate subway cars, equipped with shopping bags filled with sarin and an umbrella in hand. Before exiting, members subtly dropped their respective bags and punctured them with the end of their umbrellas to release the airborne chemical. The chemical spread throughout the subway cars and the neighbourhoods surrounding centre city Tokyo, as the chemical stuck to people's shoes and clothing. Despite their many failed attempts prior to this attack, Aum Shinrikyo ultimately managed to implement a malevolently creative plan, which killed 12 and injured over 1000 people.

This example is one of many occurrences where extremist organisations use the creative problem-solving process to implement harmful ideas (Gill, Horgan, Hunter, & Cushenbery, 2013; Hunter, Walters, Nguyen, Manning, & Miller, 2022). More specifically, their resilience to failure and dedication in planning and implementing creative ideas (for a review, see Hunter et al., 2012). More recent examples demonstrate that creativity and innovation remain vital components to showcase political stances, as well as further extremist movements. In 2022, in the throes of the Ukraine-Russian conflict, Ukrainian soldiers stated that they will use all means at their disposal to sabotage the Russian invaders. Using creative thinking, they poisoned sweet cherries that Russian soldiers were stealing from local farmers (Farberov, 2022). Another noteworthy example is the assassination of former Japanese Prime Minister, Shinzo Abe. The homemade gun used in the assassination bypassed Japan's notoriously strict laws (Brown, 2022). The gun, found alongside several similar weapons in the suspect's apartment, showcases how creativity and innovation can ameliorate constraints, such as legislation, to implement the assassination. Of particular relevance to this point are the attacks on 11 September 2001, in which the novelty of the attack left the United States ill-

prepared to identifying the threat and preventing such an attack.

All the above examples have a central theme: the individuals and groups proceeded through the steps of the creative process. Although successful in 1995, Aum Shinrikyo had 17 failed malevolent ideas prior to the subway attack. Their dedication and perseverance for malign acts showcases their use of the creative problem-solving process and their commitment not only to generate novel ideas but also to implement them. Stated directly, extremist and terrorist organisations have demonstrated a clear capacity to adapt and innovate against counterterrorism efforts (Cropley, Kaufman, & Cropley, 2008; Gill et al., 2013). Indeed, creativity and innovation are key indicators for the ten percent of successful terrorist organisations that do not dissolve within the first year (Cronin, 2009; Gill et al., 2013).

In line with the above, the central thesis here is as follows. In the same way that violent extremist organisations use malevolent creativity and innovation to cause harm, counter- terrorism and intelligence personnel should also ideate malevolently creative solutions to avert such attacks. For example, malevolent creativity ideation allows counterterrorism employees to identify and evaluate potential vulnerabilities, how those vulnerabilities can be exploited, then ways to prevent or deter that exploitation. Creativity plays an important role in the competition between extremist organisations and counterterrorism efforts (Cropley et al., 2008). In the 1970s, the intelligence community addressed the challenge of fostering creativity by offering a training (Marchio, 2021). Amply titled 'Creativity in Intelligence', students were taught to think more divergently by exploring all possible solutions with few limitations on time or imagination. This course, originally offered as an elective, is now a required credit for the Central Intelligence Agency's advanced analytic training program (Marchio, 2021). However, for initiatives to foster and increase creative thinking to succeed, training must be integrated into larger efforts by altering the work- place culture surrounding creative thought.

Leaning on research in organisational science, developing and facilitating creative thinking skills and solutions to complex, ill-defined problems can become an essential pillar of counterterrorism and intelligence communities. Understanding organisational creativity and the creative problem-solving process can provide

employees the opportunities to use their expertise to identify threats and develop innovative solutions. Past research has identified the external and internal constraints and how they enhance or tamper creative performance in malevolent creativity and innovation in terrorism organisations (Logan et al., 2021), highlighting that malign individuals, groups, and organisations ideate and execute creative attacks despite attempts to prevent them. Put simply, to combat terrorism and extremism successfully, counterterrorism professionals must think functionally creative in that their ideas and implementations are novel and effective (Cropley et al., 2008; Gill et al., 2013).

Current training and education

Following the novel attacks on 11 September 2001, efforts to facilitate creativity resulted in more education in homeland security and defense to educate, research, and support security, threats and terrorism, and intelligence processes (Pelfrey & Kelley, 2013; Ramsay & Renda-Tanali, 2018). Emerging novel threats posed by extremist and terrorist organisations highlight the training gaps in the counterterrorism and intelligence communities. The 2022 DHS Internal Review Working Group identified several gaps that impede the department's ability to prevent, detect, and respond to domestic violent extremism threats including a lack of 'specialized training for employees ... to identify and adjudicate violent extremist activity' (DHS Strategic Plan, 2022, p. 10). More specifically, training must facilitate employees' exploitation of their current expertise to identify early indicators of extremism and prevent radicalised violence (Black & Obradovic, 2022). Homeland security education has expanded to include higher degrees related to emergency preparedness for natural and human-induced hazards that quickly add new curriculum to cover preparedness against terrorist attacks (Ramsay & Renda-Tanali, 2018). Many of the homeland security education is practitioner-based disciplines guided by competencies, such as knowledge, skills, and behaviour/attitudes as the standards of education.

Competencies, which include measurable skills, knowledge, and behaviours, are used to prepare employees for future challenges (Kormanik, Lehner, & Winnick, 2009). Educational domains for homeland security include nine competencies ranging from intelligence to critical infrastructure security to terrorism (for a review, see Ramsay &

Renda- Tanali, 2018). Of note, the ninth domain, professionalism, is not specifically tied to academic or practice areas (e.g. emergency management, law). These skills include oral and written comprehension and clarity, problem sensitivity, coordination and collaboration, and complex problem solving and creative thinking. Those who engage in homeland security education, as well as those in homeland security leadership positions, have reported operating more effectively in ambiguous environments following the education, as well as engaging in more strategic collaboration and critical thinking (Pelfrey & Kelley, 2013). As such, the benefit of creative problem solving, creative thought, and malevolently creative ideation and innovation are beneficial topics in training and education homeland security employees or other counterterrorism professionals.

Related to the training and education of these employees, Moore and colleagues (2005) identified the core competencies needed for successful job performance of intelligence analysts. These competencies include engagement and collaboration, critical thinking, personal leadership and integrity, and technical expertise. Many of the competencies are gained and shaped throughout one's career via professional development or training programs (Black & Obradovic, 2022). A few core competencies listed related to creative thinking were problem solving, curiosity, collaboration, information gathering, and critical reasoning, further highlighting the need for creative thought and ideation.

To help address the need for specialised training, we have two primary goals for the present effort. First, we seek to identify *why* creativity is a crucial skill for detecting and preventing novel threats. In doing so, we identify the existing tasks and competencies of several counterterrorism jobs that fit into the creative process, such that creativity training relies on employees maximising their existing knowledge, skills, and abilities to ideate and execute creative ideas and solutions. As illustrated in the earlier examples, violent extremist organisations use the creative process to implement their novel and effective (i.e. harmful) plans. When they fail, they cycle back to previous phases of the creative process, then proceed forward. To effectively compete against terrorism efforts, counterterrorism and security professionals must join them in thinking and acting creatively. Second, we highlight the situational and individual factors that are

related to and facilitate creative problem-solving. Training is only as effective as the transfer of knowledge, skills, and abilities to day-to-day tasks. A climate for creativity, as well as supportive leadership, error-management, and creative self-efficacy allow employees to explore the creative process. These factors result in more creative solutions than if training transfer is not considered. Taking these two goals into account, we posit that the need for specialised training lies in employees understanding their current creative capabilities and collaborating across agencies to apply their collective expertise to each step of the creative problem-solving process. With that, we begin with an overview of creative problem-solving to highlight why such processes are so critical to combating emerging threats.

Creative problem-solving

Creative problem-solving begins with the generation of novel and useful ideas bound within complex and ambiguous problems (Amabile, 1988; Mumford, Mobley, Reiter-Palmon, Uhlman, & Doares, 1991). Creative problem-solving is a cognitive process dependent on situational and individual factors involving the generation and exploration of alternative solutions to problems (Hunter, Bedell, & Mumford, 2007; Mumford, Hester, & Robledo, 2012). Unlike other forms of problem solving, creative problem-solving is centred around ill-defined, or ambiguous situations (Anderson, 1983; Mumford et al., 1991). It is a framework used by individuals or teams to generate and analyse novel options, solutions, or courses of action (Treffinger, 1995).

Early work of creative problem-solving promoted creativity by finding new and useful solutions to develop opportunities and enhance ambiguous situations (Finke et al., 1992; Mumford et al., 1991). When presented with an ill-defined problem, the goals, information, and resources are not clearly specified, placing a burden on individuals to identify important information (Mumford et al., 1991). However, there is a distinct gap between developing an idea and implementing it. That is, ideating and executing the idea through fruition includes subsequent activities within the creative process (Hunter et al., 2022; Mumford, Whetzel, & Reiter-Palmon, 1997).

The 8-stage model of creativity, as described by Mumford and colleagues (1991), presents key sub-processes from ideation to implementation. The authors specify that

creativity operates on information organised into categorical structures, allowing individuals or teams to cycle back to previous processes, as Aum Shinrikyo did in response to each failed attempt. The eight steps include problem definition, information gathering, information organisation, idea generation, idea evaluation, implementation planning, and solution monitoring (Mumford et al., 1991, 2012).

Creative problem-solving structures problems as opportunities for change or constructive action, rather than negative obstacles. However, in the context of counterterrorism, security, and intelligence, problems regarding malign actors implementing novel threats are threatening and destructive. To properly detect and prevent these threats, employees must think creatively (Mumford et al., 2012). Creativity in government and military operations may seem counterintuitive, but creative problem solving can help solve real, harmful, and ambiguous problems. Marchio (2021) called for more creativity in bureaucratic work, as it plays a vital role in preventing terrorist or criminal behaviours. Thus, we contend that creative problem-solving training and dedicated creative thinking time are critical and, indeed, necessary.

Method

To address the critical gap between specialised creativity training and counterterrorism, security, and intelligence work tasks, we conducted a training needs assessment to accurately assess whether creative problem-solving training is appropriate. Training needs assessment serves as the building blocks to develop an effective training program (Brown, 2002; Salas, Tannenbaum, Kraiger, & Smith-Jentsch, 2012; Schneier, Guthrie, & Olian, 1988). A training needs assessment identifies the required tasks performed and knowledge, skills, abilities, and other characteristics (KSAO) in a certain job or group of jobs. The outcomes of a training needs assessment should include expected learning outcomes, guidance for training design, ideas for evaluation, and information about the organisational factors that facilitate or hinder training effectiveness (Meyer, Weichselbaum, & Hauser, 2020; Milhem, Abushamsieh, & Pérez Aróstegui, 2014; Salas et al., 2012). Individuals are often not able to articulate their training needs, so a training needs assessment serves as a blueprint to uncover the needs (Brown, 2002; Salas et al., 2012). However, training is sometimes not a

solution. A training needs assessment should address a specific job, organisation, and individuals to address a deficiency.

A training needs assessment is comprised of three components: job-task, organisation, and person analyses. A job-task analysis identifies important work functions by outlining the tasks and competencies required to complete a specific job (Salas et al., 2012). The analysis lays the groundwork for understanding the functions of a job (Brown, 2002; Salas et al., 2012). Jobs that are complex and knowledge-based, like the Homeland Security Enterprise, may require cognitive task analyses, in which the cognitive processes and expertise are accounted for (Cooke & Wills, 1999; Salas et al., 2012; Zsombok & Klien, 2014). Finally, a job-task analysis can also be conducted at a team level. This type of analysis identifies team-related tasks, competencies, and coordination among different jobs.

An organisation analysis pinpoints where the organisation's training priorities lie (Brown, 2002; Salas et al., 2012). This analysis examines the culture, norms, resources, limitations, and support for training development. By identifying these organisational components, the correct and most effective training can be provided, and the workplace environment is prepared for training transfer (Salas et al., 2012). The first part of an organisation analysis involves identifying objectives and challenges, as well as overall organisational strategy (Tannenbaum, 2002). This step can ensure training resources are properly allocated and in alignment with organisational needs, which is a strong facilitator of change (Reed & Vakola, 2006). The second part of an organisation analysis examines the organisation's readiness for training, such that there is a higher likelihood of training transfer and effectiveness if obstacles in the training environment are identified and removed (Salas et al., 2012).

Finally, a person analysis, which spans beyond the capacities of the current effort involves surveying and interviewing employees to determine their training needs. It serves as the final procedure in a training needs assessment by examining individual characteristics (e.g. self-efficacy, goal orientation) that could influence training effectiveness. Its purpose is to customise training for those who would benefit from maximising their learning and training transfer (Salas et al., 2012). Methods for conducting a person analysis includes interviewing currently employees and subject

matter experts to identify and consider training gaps.

Taken together, a training needs assessment is the vital first step in a training development. To advocate for the need of specialised creativity training, we conducted task and organisation analyses. Findings of this preliminary step in the training process suggest that HSE would benefit from creative problem-solving training, as it is an essential cognitive skill to identify, anticipate, and prevent harmful attacks.

Procedure

A job-task analysis was conducted to provide a set of key job tasks and employee capabilities (e.g. KSAOs). Using established personnel databases as our guide, we identified five jobs that span across intelligence, security, and counterterrorism domains, as we believe each part of counterterrorism and related communities can benefit from creativity training. The jobs selected were broad in scope to capture and identify that creativity is not specific to one domain, rather creative thinking and problem solving is essential in any realm of problem solving. When more domains within the counterterrorism and intelligence communities can invent, adapt, and integrate innovation into their operations, the less likely they are to fall behind and become unprepared against adverse individuals, groups, and organisations (Cronin, 2019). We used Occupational Information Network (O*NET) and Careers in the Military databases using the search terms 'Intelligence Community' and 'Security Community'.

The databases used are established and evidence-based tools for practitioners and applicants designed to provide a comprehensive system for understanding the nature of work. O*NET is a useful and cost-effective tool to analyse specific job requirements, such as tasks and worker attributes. O*NET began as a large research project sponsored by U.S. Department of Labor to synthesise occupational descriptions and over 60 years of knowledge from the Department of Occupational Titles (DOT; Jeanneret & Strong, 2003; Peterson et al., 2001). The original version was developed as an employment system for individuals to link skills and jobs following the Great Depression (Peterson et al., 2001). In its updated form, O*NET has six job-related categories: experience requirements, worker requirements, occupation requirements, worker characteristics, occupation-specific requirements, and occupational

characteristics (Jeanneret & Strong, 2003; Peterson et al., 2001). For a more complete assessment for HSE, we also used Careers in the Military database to identify military and government occupations. Careers in the Military is an Armed Services Vocational Aptitude Battery Career Exploration Program sponsored by the Department of Defense. The site offers public access to in-depth military career information for career planning and exploration. It is free for schools and students to provide career path information by helping interpret one's strengths and identify aptitudes for military careers. Taken together, five HSE related jobs were identified (Table 1).

Table 1. Tasks and capabilities of five HSE jobs. (Table view)

	Job tasks	Knowledge	Skills	Abilities
Intelligence Analyst	<ul style="list-style-type: none"> Gather, analyse, and evaluate information from various sources to anticipate and prevent organised crime. Examine, correlate, and evaluate information to identify patterns and trends using law enforcement databases, surveillance, intelligent networks, and geographic information systems. 	<ul style="list-style-type: none"> Law and government Public safety and security Psychology 	<ul style="list-style-type: none"> Active learning Critical thinking Complex problem solving Judgement and decision making Coordination Monitoring 	<ul style="list-style-type: none"> Fluency of ideas Selective attention Information ordering Problem sensitivity
Information Security Analyst	<ul style="list-style-type: none"> Plan, implement, upgrade, and monitor security measures to protect computer networks and information by assessing vulnerabilities and implementing risk mitigation strategies. Develop plans to safeguard computer files against unauthorised or destructive data processing, perform risk assessments, and review violations to ensure they are not repeated. 	<ul style="list-style-type: none"> Public safety and security Engineering and technology Computers and electronics 	<ul style="list-style-type: none"> Critical thinking Complex problem solving Judgement and decision making Monitoring Systems analysis Coordination Systems evaluation 	<ul style="list-style-type: none"> Problem sensitivity Information ordering Category flexibility Fluency of ideas Originality
Intelligence Specialists	<ul style="list-style-type: none"> Ensure military operations are planned to use the most accurate and current information about enemy forces and their capabilities Collect, exploit, develop, analyse, and produce information about enemy forces and their capabilities 	<ul style="list-style-type: none"> External and threat environment expertise The number, location, tactics, and potential battle areas of enemy forces 	<ul style="list-style-type: none"> Defining problems by assessing risk and vulnerabilities 	<ul style="list-style-type: none"> Problem construction Information gathering Information ordering Conceptual combination
Special Forces	<ul style="list-style-type: none"> Implement novel operations by air, land, or sea Conduct intelligence information and advanced reconnaissance operations 	<ul style="list-style-type: none"> Ordinance (e.g. weapons) identification Combat and counterterrorism issues 	<ul style="list-style-type: none"> Idea generation and implementation 	<ul style="list-style-type: none"> Information ordering Category flexibility Originality Conceptual combination
Protective Service Specialists	<ul style="list-style-type: none"> Perform, plan, coordinate, and execute protective missions Ensure safe and effective movement and monitoring in a variety of environments by coordinating with law-enforcement counterparts 	<ul style="list-style-type: none"> Public safety and security Early-warning detection Operations and logistics 	<ul style="list-style-type: none"> Monitoring risk and threat assessment 	<ul style="list-style-type: none"> Problem construction Solution monitoring

Note: KSAs listed are those specific to the creative problem-solving process.

The five HSE related jobs were analysed based on job descriptions, worker attributes (e.g. knowledge, skills, and abilities), work tasks, and job-specific training by two independent raters (Terry et al., 2017). Moreover, creativity capabilities were identified and categorised based on steps in the creative process. Each job assessed included aspects of creative thought and creative problem-solving highlighting that creativity is embedded into HSE. Due to its embedded nature, creative problem-solving training is even more apparent to properly foster and lead for creative ideation and implementation. Before continuing to the broader contributions of this training needs assessment, it is important to note that each job included several aspects in line with the creative process. Due to the collaborative and interdependent nature of creative problem solving, it is important for the various domains to understand their own and others' expertise and strengths to maximise innovation (Figure 1).

Intelligence analysis (O*NET reference code 33-3021.06)

Intelligence Analysts gather, analyse, and evaluate information from various sources to anticipate and prevent organised crime. The sources of information include law enforcement databases, surveillance, intelligence networks, and geographic information systems. The analysts examine, correlate, and evaluate information to identify patterns and trends in criminal activity. According to their O*NET profile, they have knowledge about law and government, programming language, psychology, and public safety and security. In addition, their skills include active learning, judgement and decision making, negotiation, and social perceptiveness. Their knowledge, skills, and abilities align closely with the creative process, as the job requirements of Intelligence Analysts encompass the first five steps in the creative problem-solving process. For example, their skills in critical thinking, complex problem solving, and coordination all make for novel and useful problem definition, idea generation, and idea evaluation. Additionally, their knowledge about law and government, psychology, and public safety puts them in a unique position to use their expertise to understand (e.g. information gathering) and prevent novel threats (e.g. idea generation). Worker abilities, such as problem sensitivity, information ordering, and fluency of ideas and originality make for meaningful idea generation. Thus, creativity

training will emphasise the use of their unique KSAs to garner analytical thinking, flexibility, and coordination in evaluating and anticipating novel threats.

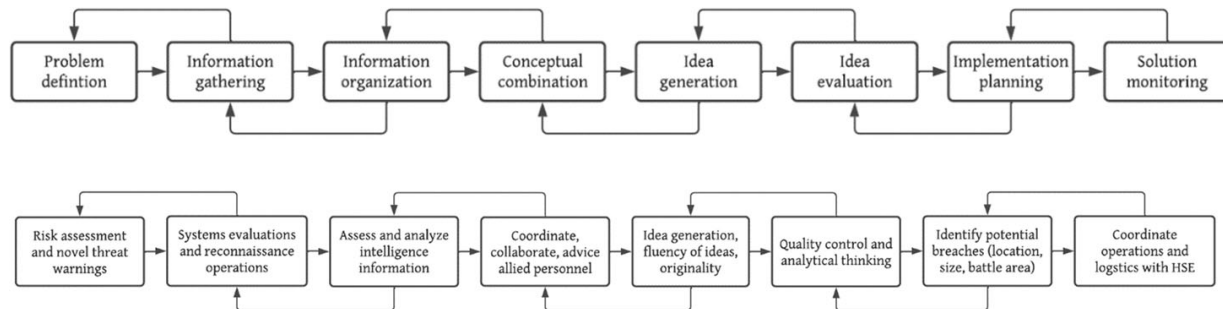


Figure 1. HSE knowledge, skills, and abilities in the stage model of creativity (Mumford et al., 1991).

Information security analysis (O*NET reference code 15.1212.00)

Information Security Analysts plan, implement, upgrade, and monitor security measures to protect computer networks and information. They assess vulnerabilities to propose and implement risk mitigation strategies. Tasks include developing plans to safeguard computer files against unauthorised or destructive data processing, as well as performing risk assessments and reviewing violations to ensure they are not repeated. Analysts have knowledge about engineering and technology, telecommunication, public safety and security, and programming language. Analysts have skills in complex problem solving, judgement and decision making, systems analysis, and operations monitoring, which align with the creative process. Information Security Analysts' knowledge, skills, and abilities lay the foundation for creative thought.

To begin, their skills, such as critical thinking and judgement are essential for problem finding and definition. Moreover, systems analyses and evaluations (e.g. information gathering) and coordination, collaboration, and quality control analysis (e.g. conceptual combination and idea evaluation) all require interdependence in the creative process. The analysts also monitor and evaluate systems, which completes the final step in the creative process. Their knowledge regarding public safety and security, engineering and technology, and computers and electronics make their expertise

valuable to solving ambiguous and complex problems, and the interdependent nature of their work allows them to collaborate for richer idea generation. Lastly, these analysts have abilities that complement the creative process, such as deductive reasoning, inductive reasoning, category flexibility, fluency of ideas, and originality. Creativity training would help these analysts purposefully use their KSAs to think creatively when planning and implementing novel solutions.

Intelligence specialist (Careers in the military database)

Intelligence Specialists ensure military operations are planned to use the most accurate and current information about enemy forces and their capabilities. They collect, exploit, develop, analyse, and produce intelligence information to share with military leaders and consumers. Their work identifies targets and provides situational awareness to operations personnel and key leadership. They supervise, perform, and coordinate analyses of strategic and tactical intelligence to affected entities. The specialists have job-specific training related to planning imagery and geospatial data, planning reports, maps, and charts, analysing imagery, foreign language training, and target identification and operational patterns. These training programs provide intelligence specialists with the knowledge and skills to use technical references and make decisions to deter organised crime.

In addition to the tasks of this job, Intelligence Specialists skills and expertise contribute to the first four steps of the creative process. They must have knowledge about the number, location, tactics, and potential battle areas of enemy forces which serves as a foundation for problem definition, implementation planning, and solution monitoring. The specialists define novel problems by assessing risks and vulnerabilities and disseminating threat warning information to other agencies. They also oversee efforts to collect, exploit, develop, and analyse intelligence information for key leaders (e.g. information gathering and conceptual combination). These specialists play a crucial role in identifying vulnerabilities and novel threats (e.g. problem finding and definition).

Special forces (Careers in the military database)

Special Forces members implement unconventional (e.g. novel) operations by air, land, or sea. The operations include combat and peacetime activities such as offensive raids, demolitions, reconnaissance, research and rescue, and counterterrorism. The members conduct intelligence information and advanced reconnaissance operations, as well as identify and evaluate targets or enemy territories. Special Forces job-specific training involves physical conditioning, use of land warfare weapons and communication devices, explosive handling, and bomb disposal. The training provides members with the knowledge and skills to understand warfare weapons, explosives, and communication devices from the front-line.

The unique set of knowledge and skills of the Special Forces support the beginning of the creative problem-solving process (e.g. problem definition, information gathering). These agents define problems by locating and identifying ordinances, such as weaponry. Following problem definition, they conduct advance reconnaissance operations and collect intelligence information (e.g. information gathering and organisation), then advise and assist allied personnel on intelligence information (e.g. conceptual combination). These agents also implement unconventional operations (e.g. novel solutions) to complex issues regarding combat and counterterrorism issues. In all, the information and expertise shared by Special Forces agents allow analysts to gather information and generate ideas. Creative problem-solving training would help these agents identify and define novel threats, as well as know who has the expertise to conduct the subsequent steps in the creative process.

Protective service specialists (Careers in the military database)

Protective Service Specialists perform, plan, coordinate, and execute protective missions for personnel in high-risk and high-profile positions. They are responsible for protective tactics, anti-ambush operations, counter-surveillance operations, evasive driving techniques, and physical security. The specialists monitor early-warning detection systems to identify and address security risks. They ensure safe and effective movement and monitoring in a wide variety of environments by coordinating operational and logistical details with counterparts at other law enforcement agencies. The training for this job involves military and civil laws and jurisdiction, investigation and evidence

collection techniques, restraint techniques, use of firearms, and crime prevention.

The Protective Service Specialists' supports the beginning (e.g. problem definition) and the end (e.g. solution monitoring) of the creative problem-solving process. Their skills in monitoring risk and threat assessments of early warning risks are crucial for problem definition. Further, dynamic and innovative solutions to the threats are monitored (e.g. solution monitoring), and the specialists coordinate operational details with other law enforcement agencies. The dynamic and innovative solutions these specialists implement, and monitor are an amalgamation of the entire creative process, as well as the hard work and collaboration of other areas within the Homeland Security Enterprise. Thus, creativity training would ensure these specialists are able to monitor, define, and identify breaches in solution implementation.

Taken together, each job outlined above requires anticipating and preventing organised crime, extremism, and terrorism activities. The various roles require considerable knowledge and expertise regarding appropriate security measures to keep citizens and critical infrastructure safe, as well as successfully plan and implement national defense operations. The members of these communities also interpret data and monitor activity to address security risks and identify patterns or trends. This type of knowledge is an essential part to creative problem solving. The highest quality and most elegant solutions to complex, ambiguous problems require knowledge to develop unconventional plans and operations in response to current and accurate enemy forces and capabilities. However, individuals cannot rely solely on their knowledge to direct the creative process (Mumford et al., 2012). Instead, the members of these communities must work together to evaluate, as well as shape plans to combine and reorganise new knowledge to generate novel plans.

Training themes identified

Three themes were identified by synthesising literature regarding the creative problem-solving process (Mumford et al., 1991, 2012). These themes highlight the need for creative problem-solving training to dedicate creative thinking time, as well as collaboration for solving complex issues. Creativity training focuses on narrower, limited sets of experiences that can enhance creative thought (Scott et al., 2004a), resulting in

many models of training programs (e.g. Bull et al., 1995; Osborn, 1953). Due to the volume and variety of creativity training programs, we rely on three themes central to HSE workforce that can facilitate meaningful and effective training outcomes.

Standardised processes

Standardised processes and fixation on past examples of novelty can stifle creative performance. Employees are often reinforced to follow conventional wisdom by emphasising rules, paperwork, and coordination (Mumford et al., 2012; Mumford & Hunter, 2005), creating constraints to idea generation and subsequent implementation planning. Additional bureaucratic constraints to creativity include ad hoc pressures, new directives, personnel changes, and legislation (Marchio, 2021). Constraints to creativity are defined as external requirements (Weisberg, 2011) that tend to better define a problem, thus leaving less opportunity for creative thought or originality in problem solving (Oldham & Cummings, 1996). However, an alternative view of constraints defines them as requirements for viable problem-solving, as employees must search for original ways around the constraints (Medeiros, Partlow, & Mumford, 2014; Reitman, 1965).

In line with constraints, fixation on past experiences or attacks (e.g. planning for the last 9/11 opposed to focusing on the next one) can harm creative thought and problem solving. Being constrained by past information is categorised by malleable constraints, meaning employees can easily work around or modify these constraints to produce solutions with higher quality and elegance (Medeiros et al., 2014). By coupling the current knowledge and skills of HSE with existing literature regarding the cognitive skills needed to think creatively, we believe routine work and fixation on past information will be less constraining (Marchio, 2021; Puccio et al., 2010). One potential remedy to these constraints is collaboration among agencies to manipulate the different types of constraints HSE employees face.

Collaboration

The second theme identified is the importance of collaboration and interdependence among agencies by developing plans for innovation. None of the jobs

included in the needs assessment encompassed the entire creative process, as they each have their own knowledge and skills that complement each other to ideate, evaluate, and implement meaningful and robust solutions to novel threats. Each job touched different parts of the process, thus working together to think creatively is beneficial to the collective goal of the agencies. The pursuit of creative thinking and action highlights the need for sustained, or continual, innovation for long-term innovation and competition with creative acts of terror (Hunter et al., 2022). Although, there is some argument that it is not possible to plan for unpredictable activity, such as terrorist attacks (Mintzberg, Raisinghani, & Theoret, 1976), the complex and dynamic nature of innovation requires planning to guide solutions.

Expertise

Related to collaboration and planning, the third theme we identified is the need for expertise to advance creative ideas through fruition. Specific to HSE, diversity in expertise and knowledge can help refine and instantiate novel ideas through fruition (Hunter et al., 2022; Mumford & Hunter, 2005). Knowledge has two attributes: (1) information and (2) framework for interpreting, organising, and gathering information appropriate for solving the problem. Whereas expertise provides individuals with cognitive structures to better organise their knowledge and relevant experiences to work effectively (Mumford, 2006; Mumford & Hunter, 2005). Regarding expertise in creative problem-solving, multiple types of expertise are required for ideas to progress through stages of development or planning. Additionally, the differentiation and specialisation of HSE employees is positively related to organisational innovation (Damanpour, 1991). Relevant expertise can shift overtime as competition with violent extremist organisations and technology (e.g. the advent of the metaverse) change overtime (Mooreman & Miner, 1997; Mumford & Hunter, 2005). To remedy this shift, training the right information regarding creative thought, such as specific, problem-relevant information, can aid creative problem- solving. Put simply, training should focus on specific and relevant information to garner better problem construction and idea generation based on employee's requisite expertise.

Creative problem-solving training

The three themes identified represent a need for specialised training to improve the existing capabilities and coordination in HSE. Specialised creative problem-solving training will provide tools for employees to consciously integrate their expertise and creativity relevant KSAs to further the agencies' missions. Drawing on organisational science, creative problem-solving is a cyclical, stage process in which employees can identify and tackle complex or ill-defined problems. The problems the counterterrorism, security, and intelligence communities encounter, such as novel threats from violent extremist organisations, are ambiguous in nature. Thus, a focus on the phases of creative problem-solving is beneficial to the on-going competition between terrorist organisations and counterterrorism efforts.

Inspiring creativity among employees can be a strenuous undertaking for organisations. However, there are several approaches to encourage creative thinking proposed by Scott and colleagues (2004a). These methods include provisioning effective incentives, acquiring requisite expertise, structuring group interactions, optimising climate and culture, identifying career development experiences, and training to enhance creativity. Creativity training is the preferred approach for enhancing creative thought and action for employees (Montouri, 1992; Scott, Leritz, & Mumford, 2004a). The training method used should include specific techniques to help employees based on job-relevant objectives, such as creative thinking (Day, Blair, Daniels, Kligyte, & Mumford, 2006). Trainers should consider constraints to training, different learning activities, and a framework of a particular training method. Broadly, creativity training is effective in improving individual and organisational creative thought and innovation (Hunter & Cushenbery, 2011; Scott et al., 2004a, 2004b).

Creative problem-solving training, coupled with dedicated creative thinking time, will provide HSE employees with a shared mental model of what creativity is and how to effectively work through *each* phase of the creative process (Mumford et al., 1991, 2012; Scott et al., 2004a, 2004b). More specifically, this training is centred around generating and implementing novel and useful solutions to complex, ill-defined, and ambiguous problems or threats (Birdi, 2016). Training also has the capacity to increase creative self-efficacy and creative mindsets, resulting in higher frequency and quality of

creative thoughts (Royston & Reiter-Palmon, 2019). Moreover, a creative climate is needed to transfer creativity to daily tasks (Amabile, 1996; Hunter et al., 2007, 2012). Creativity training is a vital tool for effectively anticipating and preventing harmful, novel threats for HSE employees. One tool that is particularly useful for homeland security enterprise and related fields is adversarial creativity.

One effective method of adversarial creativity is red teaming. This methodology is the process of deliberately adopting an adversarial perspective to predict emerging threats (Zhang & Gronvall, 2020). Used by the military, government, and private sectors, employees will engage in malevolent creative ideation to identify vulnerabilities and create ways to protect organisations from threats. There is limited research about why malevolent ideation is important or crucial to organisations (e.g. Hunter et al., 2022). However, we posit that thinking in malevolently creative ways may aid HSE employees to plan for the next novel attack, opposed to fixating on the last one. However, training is meaningless without properly implemented a work environment to transfer knowledge and skills to daily tasks.

Training transfer considerations

Training transfer refers to the generalisation of knowledge and skills acquired in a training program to the job, as well as the maintenance of that learning overtime (Ford & Weissbein, 1997; Taylor & Stone, 2009). Objective measures of transfer include faster performance, use of training strategies, and/or increased accuracy of performance. Self-report measures of transfer include behaviourally anchored measures to examine whether the trainees have or intend to transfer their new skills (Chen, Thomas, & Wallace, 2005; Taylor & Stone, 2009; Holladay & Quinones, 2003). In the case of HSE, transfer can be challenging because of the nature of the novel, complex, and dynamic work environments. To alleviate these challenges, teams should monitor their goals as they progress through the creative problem-solving process, coordinate with others, and be willing to adapt to changes in environment or problems (Chen et al., 2005). When developing a training program, both situational and individual factors must be considered for the transfer of creativity training to daily tasks.

Situational factors

Situational factors play an important role in supporting creative ideation and implementation. Such factors include both organisational and environmental-level variables. Ratings of innovation are correlated with various climate factors, including psychological safety and leader support (Bain, Mann, & Pirola-Merlo, 2001; Hunter et al., 2007, 2012). This section identifies and examines three situational factors we deem important to consider when enhancing creativity and innovation: (1) the creative climate, (2) leadership, and (3) teams.

Creative climate

The creative climate is an important situational factor for facilitating daily creative thinking among employees. Creativity is not only a result of an individual employee. Rather, it is an interaction between an individual, their colleagues, their leadership, and the workplace environment (Hunter et al., 2007; Hunter & Cushenbery, 2011). Creative climate is defined as the characteristics of the environment that influence the frequency and quality of creative problem solving (Amabile, 1996). An environment can influence a person's motivation (e.g. response to rewards) and in turn, their creativity (Amabile, 1997). Other factors that affect creativity include autonomy, resources, pressure (e.g. challenging work), and encouragement of creativity (e.g. organisational supervisory, work group support; Amabile, 1996; Hunter, Farr, Heinen, & Allen, 2019).

A creative climate should also account for error-management in the creativity process. An error is defined as an unintentional action or inaction deviates from initial expectations, resulting in either positive or negative consequences (Cusin & Goujon-Belghit, 2019; Follmer, Neely, Jones, & Hunter, 2019). Error-management cultures view errors as unavoidable, especially in dynamic and adaptive work contexts. Errors can also result in unexpected events or increase motivation to learn among employees (Horváth & Richtárik, 2020). Much like Aum Shinrikyo did after each failed attempt, employees should be encouraged to increase their attention and determine the meaning and impact of errors in the creative process. Ratings of individual and team creativity suggest that climate is related to psychological safety regarding errors and support from leaders and teammates (Bain et al., 2001). Broadly, the creative climate distinguishes

highly creative organisations or work teams from others, and the norms of the climate are influenced by leadership.

Leadership

Leaders play a direct and important role in shaping creative efforts and cultivating a creative climate. Leaders provide guidance that helps employees structure and plan creative problem-solving phases (Mumford & Hunter, 2005; Trevelyan, 2001). Due to the complexity and interaction of multiple agencies in HSE, leader sense-making is important to influence creative performance (e.g. Kazanjian, Drazin, & Glynn, 2000; Kidder, 1987). Leader sense-making is defined as the process through which leaders understand novel or confusing events to clarify and interpret cues from the environment (Maitlis & Christianson, 2014). Some definitions refer to sensemaking as a cognitive process, focused on interpreting the environment by developing frameworks or mental models (Starbuck & Milliken, 1988). Whereas other definitions define sensemaking as a social process where individuals negotiate with each other to interpret their environment (Maitlis, 2005; Weick, 1995, 2005). Despite the differences in definitions, leader sense-making is understood to be an ongoing process in which past experiences are used to confront unexpected events or issues that require an explanation for problem-solving. Related to leader sense-making, radical innovation can be fostered when leaders think strategically (O'Connor, 1998). Despite these cognitive processes are important for creativity, there are many other factors can influence creativity and innovation. Other leader traits that shape their creative teams include role modelling, recognition, sharing a vision, and allocation resources.

Teams

Related to leader support and sense-making, the problems HSE face are too complex for one individual or team to solve. Based on the complex problem(s), the teams that form are cross-functional and serve as the backbone to creative processes. In a review of cognitive team creative processes, Reiter-Palmon & Leone (2022) state that these teams face unique hurdles from homogeneous teams. Specifically, they examined processes related to problem construction, idea generation, and idea

evaluation. Interdisciplinary teams have more diverse representation and experiences, providing structure and nuance to these three phases on the stage model of creativity. Conversely, however, conflict can arise when there is no cohesion between the members. Creativity training can help HSE employees understand the goals and phases of the creative process, to hopefully remedy some conflict. A specific conflict that may arise is related to the novelty of ideas being generated and evaluated.

In team settings, novel or original ideas can be viewed as an asset or a detrimental risk (Hunter et al., 2022). The novelty of an idea is linked to uncertainty, which impacts the acceptance and inquiry of the idea. The more original an idea, the less is known about its usefulness once implemented (Harvey & Mueller, 2021; Simonton, 2003). This uncertainty causes a tension between the novel idea and the predictability of its future usefulness. The tension can cause the HSE workforce to miss detrimental cues about novel threats, as well as halt productive red teaming exercises. To thwart originality bias, groups must frame ideas as liminal (Harvey & Mueller, 2021), as well as encourage enthusiasm towards new ideas (Hunter et al., 2022).

Individual factors

Often intertwined with and influenced by situational factors of creativity, individual factors focus on the employees, as it is ultimately individual employees who generate ideas. The individual factors of creativity are related to knowledge, processes, disposition, and motivation (Mumford & Hunter, 2005). These factors indicate an individual's ability to understand the implications of ideas, cope with radical changes, and generate stronger ideas. However, we focus solely on two individual factors: creative self-efficacy (Tierney & Farmer, 2002) and creative mindsets (Karwowski, 2014), as they influence how an employee will garner and use their individual creativity. These factors impact an individual's willingness to engage in the creative process, as people are sensitive to contextual influences (Mumford & Hunter, 2005).

Creative self-efficacy

Creative self-efficacy, defined as the perceptions one holds regarding their belief and capacity to be creative (Tierney & Farmer, 2002). Creative self-efficacy predicts

creative performance and is a critical component to team and organisational creativity (Royston & Reiter-Palmon, 2019). One's creative self-efficacy is an underlying motivational mechanism that influences their creative performance (McKay, Lovelace, & Howard, 2018). Creative performance levels become stronger as creative self-efficacy increases, and when employees' creative roles strengthen, their self-efficacy follows (Tierney & Farmer, 2011). Training can strengthen individual's creative roles and creative self-efficacy (Byrge & Tang, 2015). Training helps employees become more aware of and believe in their creative abilities, as creativity is often only referred to as idea generation. Findings suggest that training increases employee's abilities to change perspective, be open minded, and have a positive attitude regarding the creative process. Related to these findings, authors have also linked creative ability to malleable mindsets (Byrge & Tang, 2015).

Creative mindsets

Past research suggests that individual's psychological characteristics and mindsets influence their motivation and behaviours (Dweck & Sorich, 1999; Makel, 2008). The type of creative mindset one holds is an example of those psychological characteristics. Creative mindsets are a set of beliefs associated with one's ability to be creative. Rather, their beliefs about their characteristics being stable or malleable (Karwowski, 2014; O'Connor, Nemeth, & Akutsu, 2013). Those with malleable mindsets believe their creative abilities can improve and change overtime, whereas those with fixed mindsets do not believe their creative abilities can change with training. When individuals perceive creativity as a fixed characteristic, they encounter problems during the creative problem- solving process, whereas malleable mindsets engage in creative tasks and present creative solutions. Moreover, malleable mindsets are positively related to creative self- efficacy, whereas fixed mindsets are negatively related (Karwowski, 2014). Since creativity training has a positive effect on creative self-efficacy (Byrge & Tang, 2015), those with either or both mindsets benefit from increasing creative self-efficacy and creative performance.

Conclusion

Before turning to the broader conclusions, certain limitations should be noted. The present training needs assessment did not include interviews with the workforce of interest. Although we conducted an in-depth analysis of relevant jobs via well established and researched personnel databases, we failed to examine the robust aspects of each job. The learning outcomes and guidance for training transfer are recommendations based on one part of a training needs assessment. However, the central thesis of creative problem-solving being an important aspect in the competition between violent extremist organisations and counterterrorism organisations remains. Future research will address this issue by conducting an organisation analysis and person-analysis (Salas et al., 2012). Moreover, this current effort focused primarily on training employees to maximise their knowledge, skills, and abilities for the creative problem-solving process, opposed to hiring creative employees. As personnel selection and training are separate fields, future research should focus on the selection of creative counterterrorism and related communities workforces.

The training needs assessment highlighted three benefits to creative problem-solving training for Homeland Security Enterprise and related workforces. First, training will reframe the pressure put on employees to solely generate ideas. Creativity training encompasses the entire creativity process and encourages individuals to cycle back to previous phases when needed (Amabile, 1996; Mumford et al., 1991, 2012). The findings of this present effort suggest that HSE employees already hold many of the skills and abilities that align with the creative problem-solving process. Training will simply provide the enterprise with a shared mental model of what creativity is, how it can be used against novel threats, and aid HSE employees to maximise their current competencies.

Second, creativity training will increase employee's self-efficacy. Because creativity is a cognitive process, having the belief about one's ability is crucial. Research has found that training has a positive effect on creative self-efficacy (Byrge & Tang, 2015), such that people are more likely to engage in the creative process if they are confident in their ability. If their creative self-efficacy increases, HSE will be more likely to take risks and share ideas regarding their creative thought, especially during red teaming exercises. Finally, the third benefit of creativity training for HSE highlights an

important consideration for leaders and collaborators in the creativity process. An effective climate is one with autonomy, resources, challenging work, and error-management which fosters the frequency and quality of creative problem-solving (Amabile, 1996; Hunter et al., 2007). Due to this, creativity training will also reveal the nuanced environmental changes needed to foster creativity. The workforce analysed already has the capabilities and KSAs to think creatively. By implementing a creativity training program with specific, instructional objectives and the encouragement of a creative climate, the counterterrorism workforce can detect and prevent novel threats from violent extremist organisations.

We recognise that achieving creative outcomes is difficult. However, this present effort attempted to simplify the ambiguity around training themes and factors that are specific to the Homeland Security Enterprise. The training needs assessment conducted for the HSE workforce regarding a need for creativity found a gap in the counterterrorism work- force training requirements. Although each job has tasks and KSAs to think creatively throughout each step of the creativity process, none of the jobs assessed specifically train employees to garner and exploit their capabilities. Training starts by developing an integrated training system, teaching instructional objectives, and considering constraints (e.g. bureaucratic work; Day et al., 2006), and generalised new knowledge or skills via transfer by cultivating a creative climate and supportive leadership (Hunter et al., 2007). In all, the counterterrorism workforce must encourage creative thought to properly defend against the creative and innovation threats posed by terrorism and extremist organisations.

Acknowledgements

The views and conclusions included here are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the U.S. Department of Homeland Security.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

This material is based on work supported by U.S. Department of Homeland Security [grant number 0000-0001-7418-7929].

ORCID

Alexis L. d'Amato  <http://orcid.org/0000-0001-7418-7929>

References

- Amabile, T. M. (1988). A model of creativity and innovation in organizations. *Research in Organizational Behavior*, 10(1), 123–167.
- Amabile, T. M. (1996). *Creativity and innovation in organizations*, (Vol. 5). Boston: Harvard Business School.
- Amabile, T. M. (1997). Motivating creativity in organizations: On doing what you love and loving what you do. *California Management Review*, 40(1), 39–58.
- Anderson. (1983).
- Bain, P. G., Mann, L., & Pirola-Merlo, A. (2001). The innovation imperative: The relationships between team climate, innovation, and performance in research and development teams. *Small Group Research*, 32(1), 55–73.
- Birdi, K. (2016). Creativity training. In H. Shipton, P. Budhwar, P. Sparrow, & A. Brown (Eds.), *Human resource management, innovation and performance* (pp. 298–312). London: Palgrave Macmillan.
- Black, M., & Obradovic, L. (2022). Strengthening DHS intelligence analysis education: Core competencies, gaps, and challenges. *Journal of Policing, Intelligence and Counter Terrorism*, 1–18. doi:10.1080/18335330.2022.2069475
- Brown, J. (2002). Training needs assessment: A must for developing an effective training program. *Public Personnel Management*, 31(4), 569–578.
- Brown, L. (2022, July 8). *Homemade gun used to kill Japan's ex-PM Shinzo Abe*. New York Post. Shinzo Abe assassin used homemade gun (nypost.com)
- Bull, K. S., Montgomery, D., & Baloch, L. (1995). Teaching creativity at the college level: A synthesis of curricular components perceived as important by instructors. *Creativity Research Journal*, 8(1), 83–89.

- Byrge, C., & Tang, C. (2015). Embodied creativity training: Effects on creative self-efficacy and creative production. *Thinking Skills and Creativity, 16*, 51–61.
- Chen, G., Thomas, B., & Wallace, J. C. (2005). A multilevel examination of the relationships among training outcomes, mediating regulatory processes, and adaptive performance. *Journal of Applied Psychology, 90*(5), 827.
- Cooke, P., & Wills, D. (1999). Small firms, social capital and the enhancement of business performance through innovation programmes. *Small Business Economics, 13*(3), 219–234.
- Cronin, A. K. (2009). *How terrorism ends*. Princeton University Press.
- Cronin, A. K.. (2019). *Power to the people: How open technological innovation is arming tomorrow's terrorists*. Oxford University Press.
- Cropley, D. H., Kaufman, J. C., & Cropley, A. J. (2008). Malevolent creativity: A functional model of creativity in terrorism and crime. *Creativity Research Journal, 20*(2), 105–115.
- Cusin, J., & Goujon-Belghit, A. (2019). Error reframing: Studying the promotion of an error management culture. *European Journal of Work and Organizational Psychology, 28*(4), 510–524.
- Damanpour, F. (1991). Organizational innovation: A meta-analysis of effects of determinants and moderators. *Academy of Management Journal, 34*(3), 555–590.
- Day, E. A., Blair, C., Daniels, S., Kligyte, V., & Mumford, M. D. (2006). Linking instructional objectives to the design of instructional environments: The integrative training design matrix. *Human Resource Management Review, 16*(3), 376–395.
- Department of Homeland Security. (2022). Report to the secretary of homeland security domestic violent extremism internal review; Observations, findings, and recommendations, March 11, 2022, Office of the Chief Security Officer. <https://www.dhs.gov/publication/dhs-report-domestic-violent-extremism-internal-review>
- Dweck, C. S., & Sorich, L. (1999). Mastery-oriented thinking. *Coping, 11*, 232–251.
- Farberov, S. (2022, June 16). Ukrainian farmers poison Russian troops with cherries: mayor. *New York Post*. Ukrainian farmers poison Russian troops with cherries

(nypost.com)

- Finke, R. A., Ward, T. B., & Smith, S. M.. (1992). *Creative cognition: Theory, research, and applications*. Cambridge, MA: MIT Press.
- Follmer, K. B., Neely, B. H., Jones, K. S., & Hunter, S. T. (2019). To lead is to err: The mediating role of attribution in the relationship between leader error and leader ratings. *Journal of Leadership & Organizational Studies*, 26(1), 18–31.
- Ford, J. K., & Weissbein, D. A. (1997). Transfer of training: An updated review and analysis. *Performance Improvement Quarterly*, 10(2), 22–41.
- Gill, P., Horgan, J., Hunter, S. T., & Cushenbery, D. (2013). Malevolent creativity in terrorist organizations. *The Journal of Creative Behavior*, 47(2), 125–151.
- Harvey, S., & Mueller, J. S. (2021). Staying alive: Toward a diverging consensus model of overcoming a bias against novelty in groups. *Organization Science*, 32(2), 293–314.
- Holladay, C. L., Knight, J. L., Paige, D. L., & Quiñones, M. A. (2003). The influence of framing on attitudes toward diversity training. *Human Resource Development Quarterly*, 14(3), 245–263.
- Horváth, S., & Richtárik, P. (2020). A better alternative to error feedback for communication-efficient distributed learning. *arXiv preprint arXiv:2006.11077*.
- Hunter, S. T., Bedell, K. E., & Mumford, M. D. (2007). Climate for creativity: A quantitative review. *Creativity Research Journal*, 19(1), 69–90.
- Hunter, S. T., Cassidy, S. E., & Ligon, G. S.. (2012). Planning for innovation: A process oriented perspective. In M. D. Mumford (Ed.), *Handbook of organizational creativity* (pp. 515–545). Academic Press.
- Hunter, S. T., & Cushenbery, L. (2011). Leading for innovation: Direct and indirect influences. *Advances in Developing Human Resources*, 13(3), 248–265.
- Hunter, S. T., Farr, J. L., Heinen, R. L., & Allen, J. B. (2019). Integrating creative climate and creative problem-solving. In M. D. Mumford & M. E. Todd (Eds.), *Creativity and innovation in organizations* (pp. 137–160). Routledge.
- Hunter, S. T., Walters, K., Nguyen, T., Manning, C., & Miller, S. (2022). Malevolent creativity and malevolent innovation: A critical but tenuous linkage. *Creativity Research Journal*, 34(2), 123–144.

- Jeanneret, P. R., & Strong, M. H. (2003). Linking O* NET job analysis information to job requirement predictors: An O* NET application. *Personnel Psychology*, 56(2), 465–492.
- Karwowski, M. (2014). Creative mindsets: Measurement, correlates, consequences. *Psychology of Aesthetics, Creativity, and the Arts*, 8(1), 62.
- Kazanjian, R. K., Drazin, R., & Glynn, M. A. (2000). Creativity and technological learning: The roles of organization architecture and crisis in large-scale projects. *Journal of Engineering and Technology Management*, 17(3-4), 273–298.
- Kidder, P. J., Nerison, R. M., & Laabs, G. T. (1987). Navy Job Performance Measurement Program: An Examination of Data Bases, Programs and Training Simulators as Sources of Job Performance Information. Navy Personnel Research and Development Center San Diego CA.
- Kormanik, M. B., Lehner, R. D., & Winnick, T. A. (2009). General competencies for the HRD scholar- practitioner: Perspectives from across the profession. *Advances in Developing Human Resources*, 11(4), 486–506.
- Leone, S. A., & Reiter-Palmon, R. (2022). Leading creative teams: A process-perspective with implications for organizational leaders. *Translational Issues in Psychological Science*, 8(1).
- Logan, M. K., Damadzic, A., Medeiros, K., Ligon, G. S., & Derrick, D. C.. (2021). Constraints to malevolent innovation in terrorist attacks. *Psychology of Aesthetics, Creativity, and the Arts*, 17(1), 91–105.
- Maitlis, S. (2005). The social processes of organizational sensemaking. *Academy of Management Journal*, 48(1), 21–49.
- Maitlis, S., & Christianson, M. (2014). Sensemaking in organizations: Taking stock and moving forward. *Academy of Management Annals*, 8(1), 57–125.
- Makel, M. C. (2008). The malleability of implicit beliefs of creativity and creative production (Doctoral dissertation. Indiana University).
- Marchio, J. D. (2021). Fostering creativity in the IC: Insights from four decades ago. <https://www.ciagov/resources/csi/studies-in-intelligence/> Articles from 1955 through 2004 can be found at, 19
- McKay, A. S., Lovelace, J. B., & Howard, M. C.. (2018). The heart of innovation:

- Antecedents and consequences of creative self-efficacy in organizations. In R. Reiter-Palmon, V. L. Kennel, & J. C. Kaufman (Eds.), *Individual Creativity in the Workplace* (pp. 223–244). Academic Press.
- Medeiros, K. E., Partlow, P. J., & Mumford, M. D. (2014). Not too much, not too little: The influence of constraints on creative problem solving. *Psychology of Aesthetics, Creativity, and the Arts*, *8*(2), 198–210.
- Meyer, R., Weichselbaum, M., & Hauser, A. W. (2020). Machine learning approaches toward orbital-free density functional theory: Simultaneous training on the kinetic energy density functional and its functional derivative. *Journal of Chemical Theory and Computation*, *16*(9), 5685–5694.
- Milhem, W., Abushamsieh, K., & Pérez Aróstegui, M. N. (2014). Training strategies, theories and types. *Journal of Accounting, Business & Management*, *21*(1), 12–26.
- Mintzberg, H., Raisinghani, D., & Theoret, A. (1976). The structure of “unstructured” decision processes. *Administrative Science Quarterly*, *21*(2), 246–275.
- Montouri, A. (1992). Chaos, creativity and self-renewal. *World Futures. The Journal of General Evolution*.
- Moore, D. T. (2005). Species of competencies for intelligence analysis. *American Intelligence Journal*, *23*, 29–43.
- Mooreman, C., & Miner, A. S. (1997). The impact of organizational memory on new product performance. *Journal of Marketing Research*, *34*, 91–105.
- Mumford, M. D. (2006). *Pathways to outstanding leadership: A comparative analysis of charismatic, ideological, and pragmatic leaders*. New York: Psychology Press.
- Mumford, M. D., Hester, K. S., & Robledo, I. C. (2012). Creativity in organizations: Importance and approaches. In M. D. Mumford (Ed.), *Handbook of organizational creativity* (pp. 3–16). Academic Press.
- Mumford, M. D., & Hunter, S. T. (2005). Innovation in organizations: A multi-level perspective on creativity. In F. Dansereau & F.J. Yammarino (Eds.), *Multi-Level Issues in Strategy and Methods* (Research in Multi-Level Issues, Vol. 4, pp. 9–73). Bingley: Emerald Group Publishing Limited.
- Mumford, M. D., Mobley, M. I., Reiter-Palmon, R., Uhlman, C. E., & Doares, L. M.

- (1991). Process analytic models of creative capacities. *Creativity Research Journal*, 4(2), 91–122.
- Mumford, M. D., Whetzel, D. L., & Reiter-Palmon, R. O. N. I. (1997). Thinking creatively at work: Organization influences on creative problem solving. *The Journal of Creative Behavior*, 31(1), 7–17.
- O'Connor, A. J., Nemeth, C. J., & Akutsu, S. (2013). Consequences of beliefs about the malleability of creativity. *Creativity Research Journal*, 25(2), 155–162.
- O'Connor, M. C. (1998). Chapter 2: Can we trace the “efficacy of social constructivism”? *Review of Research in Education*, 23(1), 25–71.
- Oldham, G. R., & Cummings, A. (1996). Employee creativity: Personal and contextual factors at work. *Academy of Management Journal*, 39(3), 607–634.
- Osborn, A. F. (1953). *Applied Imagination: Principles and Procedures of Creative Thinking*. Scribner's Sons.
- Pelfrey, W., & Kelley, W. (2013). Homeland security education: A way forward. *Homeland Security Affairs*, 9(3), 1–12.
- Peterson, N. G., Mumford, M. D., Borman, W. C., Jeanneret, P. R., Fleishman, E. A., Levin, K. Y., ... Dye, D. M. (2001). Understanding work using the occupational information network (O* NET): implications for practice and research. *Personnel Psychology*, 54(2), 451–492.
- Puccio, G. J., Cabra, J. F., Fox, J. M., & Cahen, H. (2010). Creativity on demand: Historical approaches and future trends. *Artificial Intelligence for Engineering Design, Analysis and Manufacturing*, 24, 153–159.
- Ramsay, J. D., & Renda-Tanali, I. (2018). Development of competency-based education standards for homeland security academic programs. *Journal of Homeland Security and Emergency Management*, 15(3).
- Reed, J., & Vakola, M.. (2006). What role can a training needs analysis play in organisational change?. *Journal of Organizational Change Management*, 19(3), 393–407.
- Reitman, W. R. (1965). *Cognition and thought: An information processing approach*. Oxford: Wiley.
- Royston, R., & Reiter-Palmon, R. (2019). Creative self-efficacy as mediator between

- creative mindsets and creative problem-solving. *The Journal of Creative Behavior*, 53(4), 472–481.
- Royston, R., & Reiter-Palmon, R. (2019). Creative self-efficacy as mediator between creative mindsets and creative problem-solving. *The Journal of Creative Behavior*, 53(4), 472–481.
- Salas, E., Tannenbaum, S. I., Kraiger, K., & Smith-Jentsch, K. A. (2012). The science of training and development in organizations: What matters in practice. *Psychological Science in the Public Interest*, 13(2), 74–101.
- Schneier, C. E., Guthrie, J. P., & Olian, J. D. (1988). A practical approach to conducting and using the training needs assessment. *Public Personnel Management*, 17(2), 191–205.
- Scott, G., Leritz, L. E., & Mumford, M. D. (2004a). The effectiveness of creativity training: A quantitative review. *Creativity Research Journal*, 16(4), 361–388.
- Scott, G., Leritz, L. E., & Mumford, M. D. (2004b). Types of creativity training: Approaches and their effectiveness. *The Journal of Creative Behavior*, 38(3), 149–179.
- Simonton, D. K.. (2003). Expertise, competence, and creative ability. In R. J. Sternberg & E. L. Grigorenko (Eds.), *The Psychology of Abilities, Competencies, and Expertise* (pp. 213–240). Cambridge University Press.
- Starbuck, W. H., & Milliken, F. J. (1988). Executives' perceptual filters: What they notice and how they make sense.
- Tannenbaum, S. (2002). A strategic view of organizational training and learning. *Creating, Implementing, and Managing Effective Training and Development*, 13(2), 10–52.
- Taylor, M. E., & Stone, P. (2009). Transfer learning for reinforcement learning domains: A survey. *Journal of Machine Learning Research*, 10(7), 1633–1685.
- Terry, G., Hayfield, N., Clarke, V., & Braun, V. (2017). Thematic analysis. *The SAGE Handbook of Qualitative Research in Psychology*, 2, 17–37.
- Tierney, P., & Farmer, S. M. (2002). Creative self-efficacy: Its potential antecedents and relationship to creative performance. *Academy of Management Journal*, 45(6), 1137–1148.

- Tierney, P., & Farmer, S. M. (2011). Creative self-efficacy development and creative performance over time. *Journal of applied psychology, 96*(2), 277–293.
- Treffinger, D. J. (1995). Creative problem solving: Overview and educational implications. *Educational Psychology Review, 7*(3), 301–312.
- Trevelyan, R. (2001). The paradox of autonomy: A case of academic research scientists. *Human Relations, 54*(4), 495–525.
- Weick, K. E. (1995). *Sensemaking in organizations*. (Vol. 3). Thousand Oaks: Sage.
- Weick, K. E., Sutcliffe, K. M., & Obstfeld, D. (2005). Organizing and the process of sensemaking. *Organization Science, 16*(4), 409–421.
- Weisberg, J. (2011). Varieties of Bayesianism. *Inductive Logic, 10*, 477–551.
- Zhang, L., & Gronvall, G. K. (2020). Red teaming the biological sciences for deliberate threats. *Terrorism and Political Violence, 32*(6), 1225–1244.
- Zsombok, C. E., & Klein, G..(eds) (2014). *Naturalistic decision making*. Psychology Press.