Weapon System Selection in Police Use-of-Force Training: Value to Skill Transfer Categorisation Matrix

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ABSTRACT

The development of transferable skills that help officers in preventing and dealing with armed and unarmed confrontations is crucial to police use-of-force (PUOF) training. Based on the concept of representative learning designs guided by an ecological dynamics perspective to learning, we argue, that skill acquisition is predicated on continuous information-based interaction between the learner and the performance environment. This nonlinear pedagogical approach to PUOF practice requires PUOF coaches to underpin their operational practice with a clear understanding of the interactional relationship between the informational variables and the goal-directed behavior. As such, a sound knowledge of the functional properties of used weapon systems is essential, in order to efficiently locate their use within the context of PUOF learning environments. The paper proposes a categorisation matrix to weapon systems that are used in PUOF training settings according to their functional properties and their opportunities for learning. On a practical level the matrix enables PUOF coaches to make decisions about the use of different training systems based on their functional properties. On an organisational level the matrix helps law enforcement agencies to evaluate the cost-benefit ratio, when investing in new training systems.

Keywords: Police use-of-force training, skill acquisition, weapon systems, representative learning design, ecological dynamics, nonlinear pedagogy

INTRODUCTION

Police officers are regularly tasked with the resolution of conflicts (Amendola, 1996; Anderson, Litzenberger, and Plecas, 2002; Anshel, 2000). As organs of the executive branch of government the use of proportionate use-of-force is a legitimate part of their role (Amendola, 1996; Terrill, Paoline, and Manning, 2003). However, conflict resolution and achieving compliance is not limited to the use-of-force, as can be seen by the value of communication and negotiation skills in these contexts (Vecchi, Van Hasselt, and Romano, 2005;

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Zaiser and Staller, 2015). The police occupation involves coping with a broad range of situations. How these situations develop and unfold cannot be foreseen. On the one hand, even routine deployments can result in life threatening situations for the officer (e.g. terror attack while on patrol). On the other hand, high-risk deployments can turn out to be non-threatening once the police officer arrives at the scene (e.g. martial arts class practicing in the park). Additionally, the types of threats posed to police officers can vary from verbal abuse to deadly assaults. Even unarmed encounters pose a serious risk of injury to the police officer and the other party involved (Bochenek, 2014; 2011; Ellrich, Baier, and Pfeiffer, 2011; Jager, Klatt, and Bliesener, 2013; Smith and Alpert, 2000).

Police use-of-force (PUOF) training is geared towards officers developing transferable skills that help in preventing and dealing with armed and unarmed confrontations in different social contexts and fields (Armstrong, Clare, and Plecas, 2014; Staller and Zaiser, 2015). PUOF coaches are often tasked to design learning environments and training activities that optimally foster the transfer of learned skills from the training to the real-world context (Staller and Zaiser, 2015). However, recent investigations of performance of police officers have shown (Jager et al., 2013; Renden, Nieuwenhuys, Savelsbergh, and Oudejans, 2015), that skills developed in police use-of-force learning environments do not necessarily transfer to the environment where these skills are needed.

Publications in the context of pedagogical practice of police use-of-force learning environments regularly recommend: 1) designing the training as realistic as possible (Armstrong et al., 2014; Hoff, 2012; Jager et al., 2013; Renden et al., 2015; Wollert, Driskell, and Quali, 2011); 2) refining the taught skills (Renden et al., 2015; Renden, Savelsbergh, and Oudejans, 2016); and 3) to provide more training (Jager et al., 2013; Renden et al., 2015). Even though there is practical value within this body of research, it seems that these recommendations are based on pedagogical practices that advocate a traditional reproductive style to coaching; that is, questionable with regards to optimal skill development in PUOF settings (Staller and Zaiser, 2015). Such practices are characterised by conventional teaching and learning sequences, consisting of three consecutive phases of practice: 1) introduction to the technical/tactical skill with detailed explanations of the key features of the skill; 2) repetitive attempts of the learner to reproduce the movement patterns, that have been prescribed by the coach and that are considered to be optimal; and 3) an application phase, where the skills should be applied in the criterion context (Chow, Davids, Button, and Renshaw, 2016; Moy, Renshaw, and Davids, 2015). Recommendations to optimise the effectiveness of training, which is based on this traditional reproductive approach, consequently include increasing the amount of training time and to review, revise and specify the taught patterns (Jager et al., 2013; Renden et al., 2015).

Based on the drawbacks of such an approach in police use-of-force training and the evidence emerging from sports training programs that advocate a nonlinear pedagogy (Araújo, Davids, and Hristovski, 2006; Chow et al., 2016; Chow, Davids, Hristovski, Araújo, and Passos, 2011; Davids, 2000; Handford, Davids, Bennett, and Button, 1997), we recently argued to shift the emphasis in PUOF (and civilian self-defense) training to representative learning designs based on a nonlinear pedagogy (for further explanations see Staller and Bertram, 2016; Staller, Zaiser, and Körner, 2016b; Staller, Zaiser, Körner, and Abraham, 2016c).

This approach is underpinned by an ecological dynamics perspective to learning, advocating that skill acquisition is predicated on continuous information-based interaction between the learner and the performance environment (Davids, Renshaw, Pinder, Araújo, and Vilar, 2012). The police use-of-force coach is understood as a designer of the learning environment,that enables the learning officer to experience the interacting constraints of the performance environment in a managed way (Davids, 2015; Davids et al., 2012; Hristovski, Araújo, Balagué Serre, Button, and Passos, 2014). The interactive process between the police officer and the environment leads to the coupling of key information sources to goal-directed movements as each individual adapts to changes in the performance context.

This nonlinear pedagogical approach to police use-of-force practice requires coaches to underpin their operational practice with a clear understanding of the interactional relationship between the informational variables and the goal-directed behaviour. As such, a sound understanding of the functional properties of used training systems is essential, in order to efficiently locate their use within the context of PUOF learning environments.

It was posited that a categorisation matrix to weapon systems that are used in police use-of-force training settings according to their functional properties and their opportunities for learning in training settings. The matrix enables the police use-of-force coach to make informed decisions about the use of different training systems based on the functional properties and may help law enforcement agencies to evaluate the cost-benefit ratio, when investing in new training systems. For that purpose, weapon systems are first categorised before outlining pedagogical aspects that should be considered by PUOF coaches.

WEAPON SYSTEMS IN PUOF TRAINING SETTINGS

In police use of weapons learning environments, a variety of weapons systems are used to train for violent real-world confrontations. Used weapon systems have to accommodate for representativeness in the learning design while simultaneously ensuring health and safety of those involved (Staller et al., 2016b; Staller et al., 2016c). Since representative learning design implies that these environments need to be predicated on key information sources that are found in the specific performance context (Pinder, Renshaw, Headrick, and Davids, 2014), the categorisation of weapon systems has to account for informational variables and goal-directed behaviours that could emerge through the use of a specific weapon system in a training setting.

An interactional relationship (between informational variables and goal-directed behaviour) in police use of weapons training settings is mainly influenced by the projectile or emission out of the barrel from the weapon system, and the target of that emission with its dynamical properties. Regarding the emission out of the barrel, weapons can be differentiated between four categories. First, weapons can emit potentially lethal projectiles like conventional ammunition, potentially lethal training ammunition, or unhardened structure target ammunition (Murray, 2004).

Second, non-lethal training weapons use projectiles that exit the barrel with a reduced velocity that is great enough to enable shots over a certain distance, but is small enough to not penetrate the skin of users. Common non-lethal training systems include Simunition FX weapons, Airsoft, and Paintball. The third category consists of laser-based systems like the SAAB Small Arms Transmitter, Lasertag systems, Stress Vest, or the Beamhit Interactive Dry Fire System. These systems involve a sender unit (weapon) and a receiver unit that is mounted on the potential target (e.g. vest, head gear). Since no projectiles are emitted, there is no experience of pain, if a participant is hit by a laser-based weapon system (although the Stress Vest can be used with electric shock to induce pain). Finally, there are inert weapons that are non-functional by design, meaning they are not able to emit any projectiles during the training session. Examples include ASP RedGuns, rubber guns, but also real weapons that are temporarily rendered non-functional (e.g. by blocking the barrel via a *safety stick*, unloading the weapon).

The target, that is the potential receiver of the weapon's projectile or emission, can be either non-human or human. Non-human targets can be stationary, like paper targets, or non-stationary, making target practice more difficult. Human targets can be fellow trainees or the trainers who act in scripted or non-scripted parts-like in a stage play. In scripted target behavior actors role play events in a predefined way to generate a range of realistic situations that the trainee has to solve. Non-scripted practice involves situations that are only bound by a set of general rules. Paintball and laser-tag matches are prototypical activities involving non-scripted behaviors of participants.

These two broadly described categories of weapon systems (emission/projectile and target of emission/projectile) regularly define the boundaries under which the weapon system can be used with regards to representativeness and participants' health and safety. For instance, it is not ethically permissible to use live-fire against a fellow training partner who is acting in a non-scripted training scenario.

PEDAGOGICAL ASPECTS OF DIFFERENT WEAPON SYSTEMS

Besides the functional properties of different weapons systems, police use of weapons coaches have to account for various pedagogical aspects in order to design effective and efficient practice programs and activities. In general, learning environments are designed to accelerate skill development through various features that have to be carefully considered in order to enhance effectiveness and efficiency of training programs. Key features include: 1) representative learning design (Broadbent, Causer, Williams, and Ford, 2015; Pinder, Davids, Renshaw, and Araújo, 2011b; Staller and Bertram, 2016); 2) repetitive practice via active learner engagement (Issenberg, McGaghie, Petrusa, Gordon, and Scalese, 2005; Okuda et al., 2009); and 3) intra-experience, direct feedback (Okuda et al., 2009).

Representative Learning Design

With regards to optimal skill transfer, learning environments in combat settings should accommodate principles of representative learning design (Staller and Zaiser, 2015). As such, a task should allow the learner to be exposed to and act upon the same constraints as in the performance environment. Furthermore, the learner has to be allowed to execute a response that is the same as in the performance environment (Pinder, Davids, Renshaw, and Araújo, 2011a).

The use of different weapon systems allows coaches to be able to design many realistic task that representative real-world scenarios employing the learning method know as *perception-action coupling*. While interaction with realistic environmental variables is important to achieving performance, weapon systems that allow for continuous, dynamic interaction between the learner and the target enable more representative learning than weapon systems that consist of a stimulus-response reaction, like non-human targets (including video screens).

Repetitive Practice and Active Learner Engagement

It has been acknowledged that practice is essential to skill development (Coutinho, Mesquita, Davids, Fonseca, and Cote, 2016; Ericsson and Towne, 2010). Research has repeatedly shown a relationship between the number of hours of practice and level of achievement (Baker, Cote, and Deakin, 2005; Berry, Abernethy, MacMahon, and Farrow, 2009; Coutinho et al., 2016). However, the quality of practice activities that are undertaken has been shown to be a far more important indicator of expertise development than the time spent in practice (Coutinho et al., 2016; Davids, 2000; Hambrick et al., 2014).

Practice activities that provide high amounts of perceptual-motor coupling under high levels of variability and constraints (e.g. unstructured training activities with more experienced peers) have shown to be important in skill development (Hornig, Aust, and Güllich, 2016; Memmert, Baker, and Bertsch, 2010; Roca, Ford, McRobert, and Williams, 2013). It is worth noting, that practice time does not equal the scheduled time for a training session. Providing learning environments that foster the active engagement of the learner with skill-developing practice activities is a key challenge for coaches (Chow et al., 2016; Dyson, Griffin, and Hastie, 2004; Sinelnikov and Hastie, 2010). This involves providing the opportunities for repetitive practice and engagement in learning activities, and creating the motivational climate to let learner actively engage in practice activities.

In the context of police use of weapons training, opportunities for practice are likely to be restricted by institutional regulations (How many officers are allowed to simultaneously shoot on the range), availability and characteristics of training gear/weapon systems (how many laser-based systems are available for a class of recruits), management of the specific practice session (how many learners can simultaneously work with soft-air guns), and prevalence of injuries of learners (are learners injured because of practice activities). Regarding the motivational climate, the PUOF coach has to be aware that activities involving possible experiences of pain (Staller and Abraham, 2016; Staller, Abraham, Poolton, and Körner, 2016a) pose an additional challenge in creating learning environments that support sustainable motivation.

Intra-Experience Feedback

Mistakes are essential for learning, since they provide the opportunity to revise previous actions and adapt performance (Piggott, 2008). This implies, that learning activities provide immediate and direct feedback to the learner. If a goal-directed behaviour is executed (e.g. a shot to a part of a target, the effective blocking technique, tec.), the learner needs (at some point) to know, if his/her behaviour achieved the goal (e.g. hit the target, defended the punch, and so on). With regard to the issue of pain in training settings (and the possible negative effects on motivation), it becomes a key challenge for police use of weapons instructors to separate their feedback from pain in the learning setting.

While a laser-based system provides feedback if the learner has been hit by an aggressor, it does not involve pain. Non-lethal training weapons provide the experience of pain, which depends on the system used, the distance between learner and target, and the mass/velocity of the projectile. Since the possible experience of pain does alter goal-directed behavior of the learner (Nieuwenhuys and Oudejans, 2010; Renden et al., 2014), it is an important aspect in the design of (effectively) representative tasks. However, there seems to be motivational drawbacks of pain experience in training settings (Staller et al., 2016a).

CATEGORISATION MATRIX

Law enforcement agencies and police use of weapons coaches are regularly challenged in making decision about in what training weapon systems to invest in, and what practice activities to provide. Such decisions involve various considerations on different levels (e.g. financial, pedagogical, etc.). Since transfer of learning is a key element when designing a learning environment (Staller and Zaiser, 2015), different weapon systems should be rated according to their opportunities in using them for activities that promote the skill development of transferable skills.

Table 1 displays a weapons systems categorisation matrix for the functional properties of weapons systems as well as their value in different learning environments. The matrix was developed by distilling the arguments and other factors expressed in the subject literature, then these results were cross-checked for validity by three police use-of-force coaches who assessed the findings independently. Once agreement was reached, the findings were consolidated in data contained in table 1.

The matrix contains the different weapon systems and the possibilities of using them in training settings (horizontal). Each category of use (e.g. use of laser-based weapons systems on non-stationary, non-human targets) is rated across a variety of different aspects that have been identified as being relevant in providing an optimal learning environment. This involves the level of representativeness with regards to perception-action coupling and the differentiation between feedback and pain. Further, each category is rated in relation to the risk of injury in training and the opportunities for repetitive practice, and learner engagement.

Based on the consideration about the pedagogical aspects of PUOF training, it is assumed that training efficiency is high, if: 1) the level of representativeness is high; 2) the practice activity provides intra-experience feedback regarding the effectiveness against the target and the effectiveness of the defensive/evading behavior; 3) risk of injuries are low or not existing; and 4) opportunities for repetitive practice and active learner engagement are high. With regard to deadly force encounters training over short distances, the matrix indicates that non-lethal training systems and laser-based systems engaging human targets provide an optimal learning experience.

Table 1: Categorization matrix for PUOF weapon systems training according to their skill development value for deadly force encounters

Weapon System	Live-Fire Weapon				Non-Lethal Training Weapons				Laser-Based Weapons				Inert Weapons			
Emission / Projectile	Emission of Projectiles with Potential Lethal Impact				Emission of Projectiles with Non-Lethal Impact				Emission of Laser				No Emission Possible			
Target	Non-Human Targets		Human Targets		Non-Human Targets		Human Targets		Non-Human Targets		Human Targets		Non-Human Targets		Human Targets	
	Stationary Target	Non-Stationary Target	Scripted Target Behavior	Non-Scripted Target Behavior	Stationary Target	Non-Stationary Target	Scripted Target Behavior	Non-Scripted Target Behavior	Stationary Target	Non-Stationary Target	Scripted Target Behavior	Non-Scripted Target Behavior	Stationary Target	Non-Stationary Target	Scripted Target Behavior	Non-Scripted Target Behavior
Example of Training Activities	Use of Conventional Ammunition on Stationary Targets	Use of Lethal Training Ammunition on Moving Targets	Use of Conventional Ammunition on Ballistic Vest	Non-Existent	Use of Simuntion FX on Stationary targets	Use of Air-Soft on Moving Plastic Targets	Use of Simunition FX on Role Player	Use of Painball between two Opposing Groups	Use for Beamhit for Target Practice	Use of Laser-Based Weapon on Video Screen	Use of Saab Laser System on Role Player	Use of Laser-Based System Between two Opposing Groups	Dry Drill on Stationary Target	Dry Drill on Moving Target	Use of Red Gun in a Scripted Attacker-Defender Drill	Use of Red Gun in a Non-Scripted Attacker-Defender Drill
Level of Representativeness (Perception-Action Coupling)	Low	Low	Low	Non-Existent	Low	Medium	High	High	Low	Medium	High	High	Low	Low	High	High
Feedback (if learner was effective on target)	Yes	Yes	Yes	Non-Existent	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No
Feedback (if learner was effective in defense)	No	No	No	Non-Existent	No	No	Yes	Yes	No	No	Yes	Yes	No	No	No	No
Experienced Pain (of the target)	Non-existent	Non-existent	Yes	Non-Existent	Non-existent	Non-existent	Yes	Yes	Non-Existent	Non-Existent	No	No	Non-Existent	Non-Existent	No	No
Experienced Pain (if learner was not effective)	No	No	No	Non-Existent	No	No	Yes	Yes	No	No	No	No	No	No	No	No
Risk of Injuries (of the target)	Non-existent	Non-existent	High	Non-Existent	Non-Existent	Non-Existent	Low	Low	Non-Existent	Non-Existent	Low	Low	Non-Existent	Non-Existent	Non-Existent	Non-Existent
Risk of Injuries (if learner was not effective)	Low - Medium	Low - Medium	Low	Non-Existent	Low	Low	Low	Low	Low	Low	Low	Low	Non-Existent	Non-Existent	Non-Existent	Non-Existent
Opportunities for Repetitive Practice / Active Learner Engagement	Low - Medium	Low - Medium	Low	Non-Existent	Medium - High	Medium - High	Medium - High	Medium - High	High	High	High	High	High	High	High	High

It is worth noting, that it is only considered deadly force encounters on short distances for these categories. Moreover, it needs to be emphasised that specific ratings cannot be generalised because practice environments can limit or otherwise alter learning outcomes. For example, the rating for opportunities for repetitive practice/active learner engagement in table 1 are based on the premise that the number of training systems needed are available in that setting. Limitations in these numbers will limit the opportunities. Likewise, if there is a difference if the shooting range (live-fire weapon on stationary, non-human targets) provides the possibility to actively engage all learners simultaneously or not.

CONCLUSION

To design an effective and efficient police use-of-force learning environment, it has been argued that trainers need to develop such programs based on sound pedagogical considerations. To this end, a categorisation matrix was developed to enable PUOF coaches to rate different weapon systems according to their functional properties and their ability to promote skills transfer. The practical aspect of this is that the matrix enables PUOF coaches to make decisions about the use of different training systems; and from an organisational point of view, the matrix can assist law enforcement agencies to evaluate the cost-benefit ratio when investing in new training systems.

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REFERENCES

Amendola, K.L. (1996). "Officer behavior in police-citizen encounters: a descriptive model and implications for less-than-lethal alternatives," *Police Foundation Reports*, (9), 1–8.

Anderson, G.S., Litzenberger, R., and Plecas, D. (2002). "Physical evidence of police officer stress," *Policing: An International Journal of Police Strategies and Management, 25*(2), 399–420.

Anshel, M.H. (2000). "A conceptual model and implications for coping with stressful events in police work." *Criminal Justice and Behavior*, *27*(3), 375–400.

Araújo, D., Davids, K., and Hristovski, R. (2006). "The ecological dynamics of decision making in sport." *Psychology of Sport and Exercise, 7*(6), 653–676.

Armstrong, J., Clare, J., and Plecas, D. (2014). "Monitoring the impact of scenario-based use-of-force simulations on police heart rate: Evaluating the Royal Canadian Mounted Police Skills Refresher Program." *Western Criminology Review*, *15*(1), 51–59.

Baker, J., Cote, J., and Deakin, J. (2005). "Expertise in ultra-endurance triathletes early sport involvement, training structure, and the theory of deliberate practice." *Journal of Applied Sport Psychology*, *17*(1), 64–78.

Berry, J., Abernethy, B., MacMahon, C., and Farrow, D. (2009). "Developmental influences on the acquisition of tactical decision-making expertise." *International Journal of Sport Psychology*, *40*(4), 525–545.

Bochenek, A. (2014). *Gewalt gegen Polizeibeamte: Belastungen durch physische Gewaltanwendung sowie nötige Kompetenzen von Polizeibeamten zur Abwehr von gewalttätigen Angriffen [Violence against police officers: Demands on police officers due to physical violence and competencies to cope with these] (Unpublished master's thesis)*. Ruhr-Universität Bochum, Bochum.

Broadbent, D.P., Causer, J., Williams, A.M., and Ford, P.R. (2015). "Perceptual-cognitive skill training and its transfer to expert performance in the field: Future research directions." *European Journal of Sport Science, 15*(4), 322–331.

Chow, J.Y., Davids, K., Button, C., and Renshaw, I. (2016). *Nonlinear pedagogy in skill acquisition*. New York, NY: Routledge.

Chow, J.Y., Davids, K., Hristovski, R., Araújo, D., and Passos, P. (2011). "New Ideas in Psychology." *New Ideas in Psychology*, *29*(2), 189–200.

Coutinho, P., Mesquita, I., Davids, K., Fonseca, A.M., and Cote, J. (2016). "How structured and unstructured sport activities aid the development of expertise in volleyball players." *Psychology of Sport and Exercise*, *25*, 51–59.

Davids, K. (2000). "Skill acquisition and the theory of deliberate practice: It ain't what your do it's the way that you do it! Commentary on Starkes, L. 'The road to expertise: Is practice the only determinant?'." *International Journal of Sport Psychology*, (31), 461–465.

Davids, K. (2015). "Athletes and sports teams as complex adaptive system: A review of implications for learning design." *Revista Internacional De Ciencias Del Deporte*, *39*(11), 48–61.

Davids, K., Renshaw, I., Pinder, R.A., Araújo, D., and Vilar, L. (2012). "Principles of Motor Learning in Ecological Dynamics A comment on Functions of Learning and the Acquisition of Motor Skills (With Reference to Sport)." *The Open Sports Sciences Journal*, *5*(1), 113–117.

Dyson, B., Griffin, L.L., and Hastie, P. (2004). "Sport education, tactical games, and cooperative learning: Theoretical and pedagogical considerations," *Quest*, *56*(2), 226–240.

Ellrich, K., Baier, D., and Pfeiffer, C. (2011). *Gewalt gegen Polizeibeamte: Befunde zu Einsatzbeamten, Situationsmerkmalen und Folgen von Gewaltübergriffen [Violence against police officers: Results regarding police officers, situational paramters and consequences of violence]*. Hannover: Kriminologisches Forschungsinstitut Niedersachsen e.V.

Ericsson, K. A., and Towne, T. J. (2010). "Expertise." *Wiley Interdisciplinary Reviews: Cognitive Science*, *1*(3), 404–416.

Hambrick, D.Z., Oswald, F.L., Altmann, E.M., Meinz, E.J., Gobet, F., and Campitelli, G. (2014). "Deliberate practice: Is that all it takes to become an expert?" *Intelligence*, *45*, 34–45.

Handford, C., Davids, K., Bennett, S., and Button, C. (1997). “Skill acquisition in sport: Some applications of an evolving practice ecology.” *Journal of Sports Sciences*, *15*(6), 621–640.

Hoff, T. (2012). “Training for deadly force encounters.” *FBI Law Enforcement Bulletin*, (3), 20–24.

Hornig, M., Aust, F., and Güllich, A. (2016). “Practice and play in the development of German top-level professional football players.” *European Journal of Sport Science*, *16*(1), 96–105.

Hristovski, R., Araújo, D., Balagué Serre, N., Button, C., and Passos, P. (Eds.). (2014). *Complex systems in sport*. London: Routledge.

Issenberg, S. B., McGaghie, W.C., Petrusa, E.R., Gordon, D.L., and Scalese, R.J. (2005). “Features and uses of high-fidelity medical simulations that lead to effective learning: A BEME systematic review.” *Medical Teacher*, *27*(1), 10–28.

Jager, J., Klatt, T., and Bliesener, T. (2013). *NRW-Studie: Gewalt gegen Polizeibeamtinnen und Polizeibeamte [North Rhine-Westphalian study: Violence against police officers]*. Kiel: Institut für Psychologie, Christian-Albrechts-Universität.

Memmert, D., Baker, J., and Bertsch, C. (2010). “Play and practice in the development of sport-specific creativity in team ball sports.” *High Ability Studies*, *21*(1), 3–18.

Moy, B., Renshaw, I., and Davids, K. (2015). “The impact of nonlinear pedagogy on physical education teacher education students’ intrinsic motivation.” *Physical Education and Sport Pedagogy*, *21*(5), 517–538.

Murray, K. R. (2004). *Training at the speed of life, volume one: The definitive textbook for military and law enforcement reality based training*. Gotha, FL: Armiger Publications.

Nieuwenhuys, A., and Oudejans, R.R.D. (2010). “Effects of anxiety on handgun shooting behavior of police officers: A pilot study.” *Anxiety, Stress and Coping*, *23*(2), 225–233.

Okuda, Y., Bryson, E.O., DeMaria, S., Jr, Jacobson, L., Quinones, J., Shen, B., and Levine, A.I. (2009). “The utility of simulation in medical education: What is the evidence?” *Mount Sinai Journal of Medicine*, *76*(4), 330–343.

Piggott, D. (2008). “The psychology of ‘managing mistakes’: Some implications for coaches and managers.” *Development and Learning in Organizations*, *22*(4), 20–23.

Pinder, R.A., Davids, K., Renshaw, I., and Araújo, D. (2011a). “Manipulating informational constraints shapes movement reorganization in interceptive actions.” *Attention, Perception, and Psychophysics*, *73*(4), 1242–1254.

Pinder, R.A., Davids, K., Renshaw, I., and Araújo, D. (2011b). “Representative learning design and functionality of research and practice in sport.” *Journal of Sport and Excercise Psychology*, *33*, 146–155.

Pinder, R.A., Renshaw, I., Headrick, J., and Davids, K. (2014). “Skill acquisition and representative task design,” in R. Hristovski, D. Araújo, N. Balagué Serre, C. Button, and P. Passos (Eds.), *Complex systems in sport* (pp. 319–333). London: Routledge.

Renden, P.G., Landman, A., Geerts, S.F., Jansen, S.E.M., Faber, G.S., Savelsbergh, G.J.P., and Oudejans, R.R.D. (2014). “Effects of anxiety on the execution of police arrest and self-defense skills.” *Anxiety, Stress and Coping*, *27*(1), 100–112.

Renden, P.G.., Nieuwenhuys, A., Savelsbergh, G.J.P., and Oudejans, R.R.D. (2015). “Dutch police officers' preparation and performance of their arrest and self-defence skills: A questionnaire study.” *Applied Ergonomics*, *49*(c), 8–17.

Renden, P.G., Savelsbergh, G.J.P., and Oudejans, R.R.D. (2016). “Effects of reflex-based self-defence training on police performance in simulated high-pressure arrest situations.” *Ergonomics*, 1–33.

Roca, A., Ford, P.R., McRobert, A.P., and Williams, A.M. (2013). “Perceptual-cognitive skills and their interaction as a function of task constraints in soccer.” *Journal of Sport and Exercise Psychology*, *35*(2), 144–155.

Sinelnikov, O.A., and Hastie, P. (2010). “A motivational analysis of a season of Sport Education.” *Physical Education and Sport Pedagogy*, *15*(1), 55–69.

Smith, M.R., and Alpert, G.P. (2000). “Pepper spray—A safe and reasonable response to suspect verbal resistance.” *Policing: An International Journal of Police Strategies and Management*, *23*(2), 233–245.

Staller, M.S., and Abraham, A. (2016). “Work on your problem-solving: krav maga experts’ views on optimal learning environments for self-defence training.” *International Journal of Coaching Science*, *10*(2), 91–113.

Staller, M.S., and Bertram, O. (2016). “Ist es Deeskalation, Selbstbehauptung oder Selbstverteidigung?—Der Bedeutungsumfang von Kernbegriffen im Bereich der Gewaltprävention [Is it deescalation, self-assertiveness or self-defense?—The extension of key terms in the area of violence prevention], in M. J. Meyer (Ed.), *Martial Arts Studies in Germany—Defining and Crossing Disciplinary Boundaries* (57–70). Czwalina.

Staller, M.S., and Zaiser, B. (2015). “Developing Problem Solvers: New Perspectives on Pedagogical Practices in Police Use of Force Training.” *The Journal of Law Enforcement*, *4*(3), 1–15.

Staller, M.S., Abraham, A., Poolton, J.M., and Körner, S. (2016a). *“Pain is part of it”: Krav maga experts' views on self-defense performance and the experience of pain during training sessions.* Manuscript submitted for publication.

Staller, M.S., Zaiser, B., and Körner, S. (2016b). *From realism to representativeness: Changing terminology to investigate effectiveness in self-defence*. Manuscript submitted for publication.

Staller, M.S., Zaiser, B., Körner, S., and Abraham, A. (2016c). *Preparing for the real-world encounter: Representative learning design in the police use of force training*. Manuscript submitted for publication.

Terrill, W., Paoline, E.A., and Manning, P.K. (2003). “Police culture and coercion.” *Criminology*, *41*(4), 1,003–1,034.

Vecchi, G., Van Hasselt, V., and Romano, S.J. (2005). “Crisis (hostage) negotiation: Current strategies and issues in high-risk conflict resolution.” *Aggression and Violent Behavior*, *10*, 533–551.

Wollert, T.N., Driskell, J.E., and Quali, J. (2011). “Stress exposure training guidelines: Instructor guide to reality-based training.” *Homeland Security*.

Zaiser, B., and Staller, M.S. (2015). “The word is sometimes mightier than the sword: Rethinking communication skills to enhance officer safety.” *The Journal of Law Enforcement*, *4*(5), 1–17.

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