

DECISION MODEL FOR POLICE ENCOUNTERS

A SCIENCE-BASED APPROACH
FOR DECISION MAKING IN
POLICE ENCOUNTERS



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TORONTO
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Police, at all times, should maintain a relationship with the public that gives reality to the historic tradition that the police are the public and the public are the police; the police being only members of the public who are paid to give full-time attention to duties which are incumbent on every citizen in the interests of community welfare and existence.

-Sir Robert Peel, 1829

Dear Minister,

On June 29th, 2016 Ombudsman Paul Dubé published a report titled “A Matter of Life and Death: Investigation into the direction provided by the Ministry of Community Safety and Correctional Services (MCSCS) to Ontario’s police services for de-escalation of conflict situations.” In recommendation #3 of this report, Ombudsman Dubé challenged the Ministry of Community Safety and Correctional Services to rapidly address the complexity and lack of clarity surrounding the current Ontario Use of Force Model (2004).

In an effort to address the Ombudsman’s report, MCSCS collaborated with Dr. Judith Andersen and her University of Toronto (UofT) research team. To address Ombudsman’s Recommendation #3 from an evidence-based approach, the UofT team utilized a multi-pronged strategy: 1) conducting a scientific literature review on the field of visual graphic design and decision models (in general and for police); 2) interviewing national and international police experts and practitioners and; 3) gathering core police competencies and procedures for use of force and decision making from Ontario Police Service nominated experts. Based on the scientific review and the data collected, the UofT team engaged a leading visual design firm to help build a new visual model that represents core police content and incorporates the Ombudsman’s recommendations.

The research team’s recommendation to MCSCS is based solely on the literature and the practical data collected, not opinion. This evidence-based approach has resulted in the development of a new decision model for Ontario that encompasses all police encounters rather than those that focus solely on use of force. It is the research team’s belief that the combined academic and practitioner perspectives as presented in this report may best inform policy recommendations. We are proud to present the proposed ‘Decision Model for Police Encounters’ for use by the Ontario Ministry of Community Safety and Correctional Services and Ontario Police Services.

Sincerely,

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INTRODUCTION

Ombudsman Dubé challenged the Ministry of Community Safety and Correctional Services in his June 2016 report: “A matter of Life and Death” to rapidly address the complexity and lack of clarity surrounding the current Ontario Use of Force Model (2004).

Recommendation (#3) of the report states:

“The Ministry of Community Safety and Correctional Services should institute a new use of force model that is easy to understand and clearly identifies de-escalation options rather than just use of force options. Both the BC and Las Vegas models have clarity and balance, but Ontario should lead by developing its own model that builds on the best of what others have done. Given the urgency of this issue, a new model should be developed and rolled out to all police services as quickly as possible and no later than 12 months after the publication of this report.” (Dubé, 2016)

Addressing the challenge put forth by the Ombudsman, and echoed in recent Coroner’s inquests, is no small task. In 2017, the Ministry of Community Safety and Correctional Services (MCSCS) engaged Dr. Judith Andersen and her team at University of Toronto (UofT) to conduct an analysis and lead an evidence-based response to the Ombudsman’s report. In the 2017 UofT Report the research team reviewed the current scientific literature on de-escalation and use of force and undertook extensive interviews and site visits across Ontario. In the 2017 Report, the UofT research team advised MCSCS to pursue a Decision Model for Police Encounters as a replacement to the Ontario Use of Force Model (2004). The 2017 Report contains detailed evidence for the reasons why a model that encompasses all police encounters is most appropriate. Essentially, use of force is rarely used by police in Canada (Baldwin, 2018). The models used by police to guide behavior in the field, and to train officers should reflect this reality in order to benefit both police and public understanding and behaviour. The majority of police-public encounters in Ontario are resolved without any use of force, so training materials and models should highlight the police response options most frequently used (e.g., communication, containment, positioning) to resolve encounters. Including use of force concepts and skills in the context of when they are necessary, and limiting their extent to only as much as necessary to maintain public safety and protect life. As described below, and highlighted by the Ombudsman’s report, the current Ontario Use of Force Model (2004) does not effectively reflect the ongoing police professionalism and commitment to public safety and saving lives in Ontario.

The following proposed Decision Model for Police Encounters highlights the Ombudsman's request to place de-escalation actions by the police at the foundation for all calls and to reduce the focus on use of force options. This model also addresses the recommendation made by the Corner investigating the death of Andrew Loku to: "Rename the Use of Force Model (e.g. Compliance Model) and redesign it to incorporate and emphasize communication, de-escalation, disengagement and containment and that the use of lethal force is a last resort." (OCC Inquest - Loku 2017).

Revealed in this report is the scientific evidence supporting the new model and the collaborative efforts of the police and public stakeholders to accurately represent policing and police training in Ontario. The principles that the public and police maintain regarding policing in Canada actually align. **The primary responsibility of an officer is to preserve and protect life. Safety is the overriding priority. Force is used only when necessary, and to the least degree necessary. Lethal force is the last resort to protect life and restore safety.** The alignment of principles must be kept at the forefront. There is an inherent danger to the promotion of a 'police vs. public' mentality (Makin, 2018).

"Recent high-profile events have sparked unrest over use of force decisions made by police, particularly in the context of interactions with minority citizens...further eroding citizen trust in law enforcement. Public concerns over the state of policing are one of the most polarizing issues affecting American society today." (Todak & James, 2018)

In Canada, the police are tasked with maintaining public safety. In order to maintain public safety, the police are granted the authorities to limit or remove a person's civil liberties in certain events. The public ultimately grants these authorities to the police and because of that, the public has the right to a level of transparency in police procedures. The reality is that current police practices in Ontario already align with most public demands but a divide between the groups persist, and among some, grow deeper. A more accurate reflection of the aligned public-police principles is an essential step in improving outcomes and enhancing a sense of community between the police and the public. In Canada, two of the sources that maintain the 'us vs. them' (police vs. public) mentality; the promotion of this view by the media, and poorly designed training materials and public documents produced by the police, such as the Ontario Use of Force Model (2004).

GUIDANCE PRINCIPLES FOR THE “DECISION MODEL FOR POLICE ENCOUNTERS”

As you read through the model on the following page, please take note of the following:

Note the overriding principles at the top of the page. The way in which the sanctity of life and safety is highlighted, along with de-escalation and resolution options as the foundation below the police encounter anchor graphic.

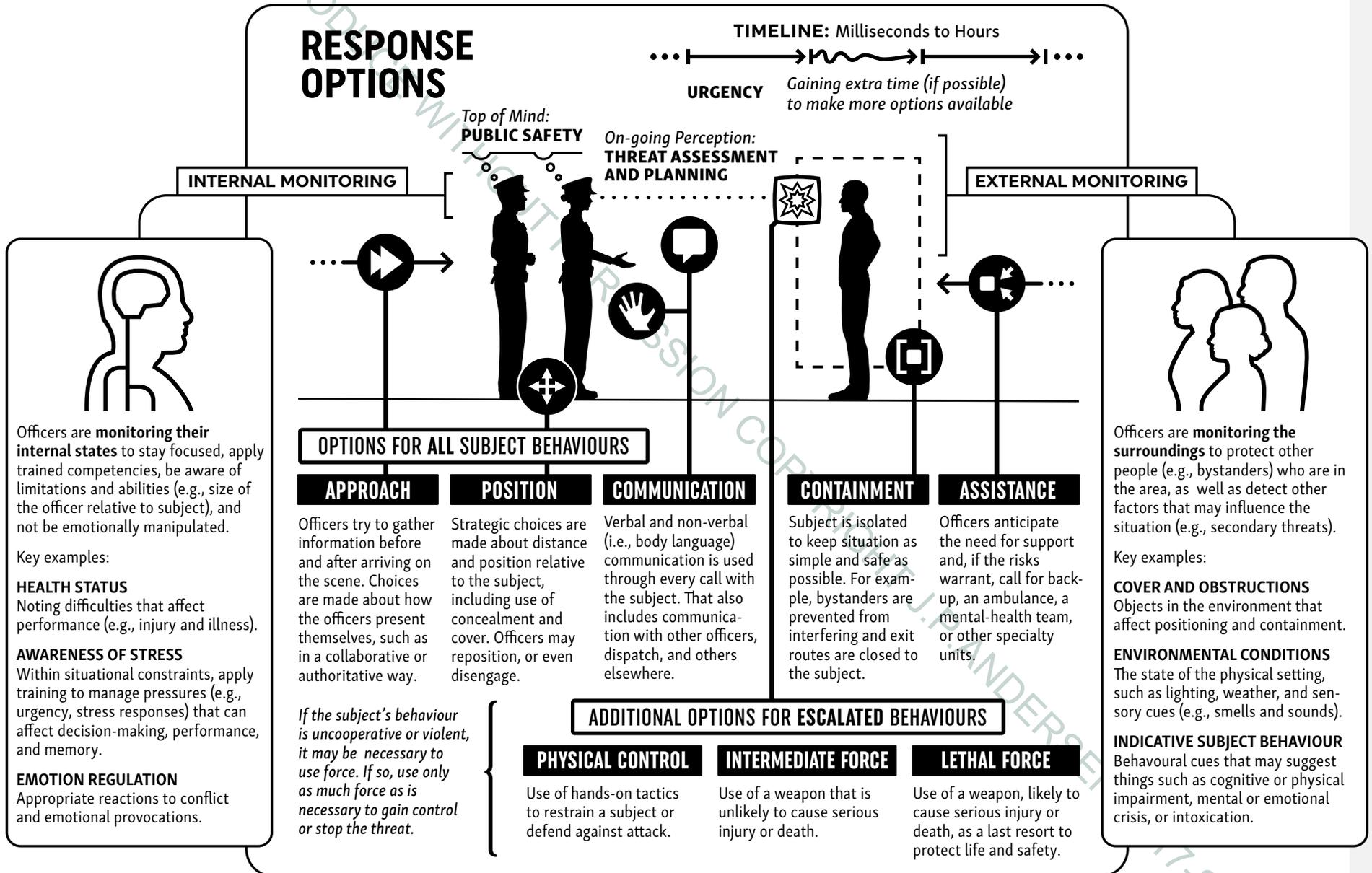
Note the great number of variables that a police officer must keep in mind during an encounter. Police must monitor both internal and external factors as well as engage in responses based on the subject’s behaviours. The use of force has been accurately de-emphasized and lethal force is used as the last resort, and only when to protect life and safety.

Note that time is an important factor. Officers may have little time and high pressure to make decisions that most civilians will never have to face. The police have the responsibility to be transparent about their decisions and actions, and the public have the responsibility to analyze each police encounter independently, and for what was humanly possible in the given time, and given all situational factors.

DECISION MODEL FOR POLICE ENCOUNTERS

Police officers try to achieve cooperation and compliance from a subject. **Safety is the overriding priority:** the primary responsibility of an officer is to preserve and protect life. To keep the public safe, officers must remain safe themselves.

Every situation is different and highly dynamic. Decision-making is highly fluid. De-escalation away from threatening or harmful behaviour is based on training but dependent on circumstances—there is no single step-by-step process.



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DESIGNING A DECISION MODEL FOR POLICE ENCOUNTERS

“Our main goal should be to tell a story clearly by achieving order and having some sort of narrative through each graphic. Any project should start by analyzing what your story is about and then finding the best way to tell it by splitting it up into easily digestible chunks, without losing depth.” (John Grimwade interviewed by A. Cairo in the Functional Art pg.213)

The field of information design is about using visuals and text to convey a message. Information graphics are basic visual explanations (Tufte, 2006). In developing visual graphics, the principles of cognitive psychology, specifically how the mind works and how we receive visual information, must be incorporated into the process of design (Cairo, 2013). Humans are a visual species. In creating information graphics, the designer must anticipate how the brain will process the visual information. Humans have visual and cognitive limitations on how much they are able to process and hold in the mind at one time. Information graphics must work within that capacity (Cairo, 2013).

“Infographics are visual representations of data and phenomena that reveal things the bare eye would not be able to see otherwise.” (Cairo, 2013). In cases where there is a large amount of dynamic information to convey, and the relationships within the information can be quite complex, like policing, it would take an extremely large amount of text to describe the same information that could be easily communicated by a graphic (Cairo, 2013). The current Ontario Use of Force Model (2004) has attempted to summarize the dynamic complexity with visuals that do not assist in mental imagery, and large category words that require a secondary documentation for understanding and usage. Of course, no one-page graphic contains all the occupationally relevant information that a police officer must learn in order to make decisions during encounters with the public. A visual model introduces the process and variables necessary for occupationally relevant decision making, but is not a substitute for complete lesson plans and skill based training.

“We have the potential to use graphics more intelligently because the principles informing their design have never been clearer” (Cairo, 2013, p. 14). “The world is complex, dynamic, multidimensional; the paper is static, flat. How are we to represent the rich visual world of experience and measurement on flatland? There are ways, design strategies for enhancing the dimensionality and density of portrayals of information.” This is the essential characteristics of the

field of information design, and has been exemplified throughout time; from cave drawings to Galileo's manuscripts, to National Geographic's many visual depictions of climate change science (nationalgeographic.com). The combination of text and images matter. As will be outlined below, the essential nature of presenting information in clear and understandable manner is an obligation, and in the case of policing, has life and death consequences (Tufte, 2006; 1990).

The key to clear design, and the techniques used to design this model are detailed next.

ACCESSIBILITY

Designing to the accessibility guidelines is most evident in the following areas: use of black-and-white imagery is preferable for those who have colour blindness, which is approximately 8 percent of the population (Jenny & Kelso, 2007, p. 62); use of high-legibility typefaces, clear type hierarchies, and high-contrast imagery with hard edges aids those with low visual acuity; use of text explanation in full sentences and plain language makes the graphic accessible to those with complete visual impairment who use text-to-speech technology (Bernhard Jenny and Nathaniel Vaughn Kelso, "Color Design for the Color Vision Impaired," *Cartographic Perspectives*, no. 58 (2007), pp. 61-67).

PLAIN LANGUAGE

Problematic linguistic devices were avoided and plain language best practices were adopted.

Specific problematic devices include:

- **"Zombie words"** that have so many possible meanings that they could mean practically anything, and thus fail to work as a conveyor of meaning (e.g., using terms like "resources" to refer to forms of assistance, such as ambulance services);
- **Verb-ifying nouns, Noun-ifying verbs, and adjective-izing action words** which can cause confusion by obscuring the specific mechanisms at play or conveying unrealistic connotations (e.g., the term "assaultive behaviour" on the current Ontario Use of Force Model (2004) makes it unclear what specific activity is generating a sense of threat);

- **Euphemisms, loaded terms, vagueness, and idioms**, which are all forms of undue political evasion intended to obscure reality and avoid accountability (e.g., “soft weapons”) or are turns of phrase that are not easily interpreted by those who speak English as a second language;
- **Unclear jargon**, or words that are of a technical nature that are not spelled out, leaving the audience unclear as to meaning;
- **Unexplained complex concepts**, or umbrella terms that summarize two or more other complicated concepts, which are problematic because of lack of specificity; and,
- **Mentally taxing sentence structures**, or lengthy sentences with too many items or clauses to juggle in the mind at one time, thus leading to errors of interpretation without excessive levels of concentration.

A variety of good practices were adopted, including but not limited to:

- **Clear verbs and nouns**, with an emphasis on action verbs that make the activity being described easy to imagine in the mind’s eye;
- **Short, simple sentence structures** that convey meaning in short, easily digestible bites; Words and associations matter. “A sensation can be evoked with just a word or two, so sensory appeals are a common feature of microstyle. Visual images, in particular, are well suited to short messages. Microstyle uses simple elements to maximum effect, can be noticed in a cluttered environment, and communicates in an instant (Johnson, 2012, Microstyle pg. 69).
- If introducing a necessary technical term, **adding plainly worded elaborations** (e.g., “body language” as clarification for “non-verbal communication”) or elaborating examples.
- Recommendations exist for **reading level of materials for the lay public**. Specifically, language, when possible, should be limited to an elementary school literacy standard (Jenkinson, 2018).
- **Stipulating the intended meaning if there is a risk that misinterpretation is highly likely**, which is why all the main concepts of the graphic (e.g., the response options) are not expected to stand on their own as self-evident but, instead, are elaborated in full sentence explanations or stipulated definitions.

POSITIONING & PROXIMITY

The grouping and positioning of the various response options conveys an emphasis in favour of de-escalation options, while downplaying (and qualifying) the use-of-force options. The grouping of the two types of response options, with the use-of-force options placed below (and in a de-emphasized part of the page, the bottom) helps convey that the first five response options are always in play, but also that they are favoured. Within this schema, the “lethal force” option is in the most de-emphasized position, with the reader traversing all the other options before arriving that that one (given the top-to-bottom, left-to-right reading pattern, plus the other cues that guide the eye). De-emphasizing use of force options in this manner aligns with the statistics showing that use of force is rare in Canada (Baldwin, et al., 2018).

TIMELINE

The positioning of the timeline at the top is a choice to remind the viewer that time pressures are an important consideration when interpreting the nature of the scenario and the interpersonal dynamic contained within. It also emphasizes the existence of an important constructive variable, which is that successful attempts to gain extra time will open up additional tactical and strategic options for the police officers. The typography used ties together “urgency”, “public safety”, and “threat assessment” as the three “marquee messages” of the anchor graphic; that is, the messages that are overriding considerations for understanding the nature of the interpersonal dynamic depicted in the scenario.

LITERATURE REVIEW: ANALYSIS OF DECISION MAKING MODELS IN POLICING AND OTHER OCCUPATIONS

Ontario is in the midst of a fundamental shift in the definitions of police roles in the communities in which they serve and portrayal in media outlets. The Ontario Association of Chiefs of Police are recommending a shift in focus among police services from crime prevention to safety promotion and favour transparent and equitable collaborations with the community (OACP Resolution 2016-02). In a free and democratic society, it is ultimately the public, and their political representatives, that make the laws and grant officers with the authorities to use force if it is necessary to stop a threat to safety or protect life. Because of this, the public has the right to transparency in the oversight and parameters in which the police make decisions that affect people's civil liberties.

“Policing is a job that is based on uncertainty. There's no assurances that each day, each call or each interaction will follow any set of rules and any situation could potentially turn a violent at any time. This can be difficult for some officers because although they must remain vigilant, if they become amplified or hyper vigilant of every interaction, their decision making outcomes, especially when dealing with the 'symbolic assailant' can be flawed. The Symbolic Assailant, is a construct created by police scholar, Jerome Skolnick in the 1960s, is an old policing concept, the short hand for whomever poses the greatest risk to an officer and the public in that community (Skolnick, 1966). This problem cannot be addressed by bias training because we live in a world filled with bias stereotypes and we all harbor them, but it is another thing to act on these stereotypes or biases. Dr. Makin stated that he believes this project overall is also about a cultural shift in policing, it's more than just changing a model. What does it mean to be a police officer? This question drives everything from rules to policy and how officers approach their job. Thinking about it in this way changes the types of decisions you make and what outcome you get to in that decision. How you think about your job influences the type of training you seek out and even the people you associate with and whether or not you choose to grow. What the community wants and what they need may not always align. It's an us vs them attitude, police vs public, but their attitudes actually are aligned in the teaching materials.”

Dr. David Makin, a prominent police researcher and leader of the Complex Social Interactions Lab in the Department of Criminal Justice and Criminology at Washington State University encapsulates the inherent difficulties faced by Police officers today.

What follows is a synthesis from leading experts in decision making, policing, police policy, and decision models. Experts hail from North America and Europe. In-depth interviews and focus groups were held with a representative sample of police experts from Services in Ontario, Canada (over 80 hours of focus group discussion). Although many US police agencies utilize independent decision and use of force models, there is little to no scientific evidence supporting these models. What is known is reviewed below. For the purpose of this review, the UofT team also reviewed literature on decision models in relevant occupations (e.g., first responders, physicians and pilots) in order to present a comprehensive understanding of decision models.

Dr. Steve Morreale, an expert in dealing with barriers to implementation of decisions at an organizational level and a retired police officer in New York State, stated that while there is generally resistance to change within law enforcement, a project such as this one [the development of an evidence based decision model] is an opportunity for current police officers in Ontario get on board with progress, get involved with the creation of the model, and ultimately, to leave their organization better than it was when they came into it (Morreale, 2018).

DECISION MAKING IN OTHER OCCUPATIONS

Criteria evaluated in the scientific literature review included decision models for: first responders; medicine; aviation and; business. Business models were quickly ruled out as too far a contrast from the requirements of first responders (Jenkinson, 2018). Although it became clear that medicine and aviation, although the high stress, high demand components of those occupations are related to policing, they are not the same. Some law enforcement experts (Taylor, 2018 Force Science) recommended both aviation and medical models, their recommended articles have been included in our review. The articles recommended to us were integrated along with other sources in the following subsections and evaluated for their transferability to a policing context. Decision making models in other fields were also explored due to lack of variation that currently exists in the small amount police-specific decision making research that is currently in the literature.

AVIATION

Airline pilots adhere to many strict standards and policies prior to flight. These involve mechanical checklists and standard operating procedures to ensure safety of the aircraft, and security of individuals on board. While many of factors can be evaluated and predicted ahead of time, including airport take-off and landing schedules of other aircraft, mechanical maintenance of the aircraft and detailed understanding of the myriad of checklists that accompany each warning system message inside the cockpit. They also face dynamic situations, including changing weather patterns, and mechanical issues in flight that require aeronautical decision making (ADM). Studies have shown that while the checklists are vital sources for information for pilots facing non-normal problems in flight, they are often used in fragmented ways because problems often don't follow in the same sequence in which the checklist was written (Wright et al., 2003). The overall process guiding which checklist is used by the pilot can be summed up in the DECIDE Aeronautical Decision Making Model (Figure 1; FAA Handbook, 2016).

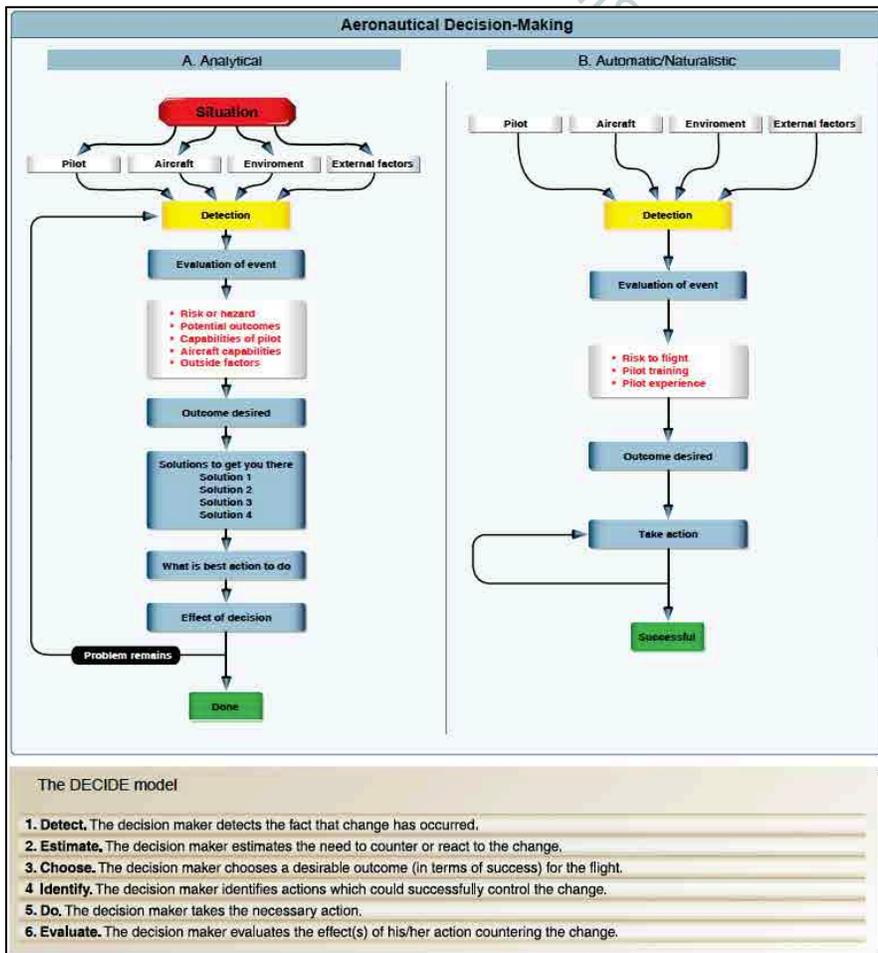


Figure 1. Aeronautical “DECIDE” Decision making Model (Pg. 219 of the FAA Pilot’s Handbook of Aeronautical Knowledge (2016).

This model provides a framework that may guide cognitive processes for pilots and is presented in both its analytical and automatic/naturalistic forms. This shows that the major steps in decision making are the same in both critical and analytical decision making, the number of potential solutions considered before action is taken is what differs. In another study, pilots in Brazil were monitored to determine how a cockpit (pilot) manages abnormal or emergency situations. This study found that pilots use fragments of multiple checklists from the standard operating procedures as well as previous personal experience and knowledge of the maintenance and previous failures reported for that aircraft to make critical decisions (Carim Jr et al., 2016). Work in complex and dynamic workplaces often require subtle, local judgements with regard to timing, relevance, importance and prioritization of sub-tasks (Suchman, 1987). For example, procedures for landing an aircraft are standard but they are not automated because every landing is different in terms of timing of events due to many situational and environmental factors.

Overall, integrating checklists into critical decision making processes for pilots is a useful approach because there is a finite number of warning systems within the cockpit they must respond to. Beyond that, each checklist is specifically designed to provide information and resources on the limited number of actions a pilot can choose to take in order to correct or disable the warning signal.

Pilots must make critical decisions related to mechanical and warning system messages within the airplane they are flying. Police officers must make critical decisions based on unpredictable human interactions in uncontrolled environments, therefore, integrating checklists into training or standard operating procedures is unnecessary but also potentially unsafe in the dynamic environments of police decision making.

Integrating checklists would not be a reasonable approach in the development of a police decision model because there is almost an infinite number of situational or behavioural factors that an officer considers in any given situation. Additionally, there are a wide variety of response options an officer can choose from based on the uniqueness of the situation at hand.

MEDICINE

It is common practice in the medical profession, and specifically within the hospital environment to use checklists for ensuring the highest possible levels of patient care and safety are maintained. In a meta-analysis (literature search), researchers found that adverse effects occurred in 9.2% of patient records analyzed, and that 43.5% of those incidents were preventable (de Vries et al., 2008). The Canadian Institute for Health Information (CIHI) and the Canadian Patient Safety Institute (CPSI) released a joint report that stated in 2014-2015 one of every 18 patients were harmed in hospital by interventions or oversight that were preventable (Chan & Cochrane 2016). In order to address the preventable incidents in a surgical environment, the World Health Organization mandated surgical safety checklists to reduce the incidence rates of adverse events during surgery (WHO, 2008). However, a study on the implementation of the mandated surgical checklist in Ontario, Canada failed to show a decrease in patient mortality, and in reality, checklists are ineffective and possibly not being completed by practitioners in real world situations (Urbach et al., 2014). In another study, Raman et al., 2016 found that checklists are able to prevent some types of adverse events but many checklists in use are outdated and not sufficient to reduce the incidence of complications during cardiac surgery.

It should be noted that checklist-style approaches do play a vital role in some of the standard police procedures followed by police officers in Ontario such as protecting a crime scene from contamination, or traffic control around traffic accidents among other step-by-step procedural processes.

In order to address the shortcomings of a checklist-based approach, anesthesiologists were among the first in the medical profession to adopt crisis resource management techniques and the DECIDE decision making model directly from the field of aviation (Stiegler et al., 2012; Figure 1 above). This model has been adapted for the sometimes complex and life-threatening environment of the operating room because this “cognitive checklist” forces habitual thinking to be replaced with deliberate consideration of alternatives (Stiegler et al., 2012).

Overall, almost half of the adverse events that occur in operating rooms are the result of preventable causes and integrating strict checklists can result in ‘impressive’ decreases in mortality by instituting simple checklists before surgical procedures (Haynes et al., 2009). But for the rare, unexpected and unpreventable events, decision making tools like the DECIDE model are needed to prevent errors caused by heuristics, or mental short cuts, in decision making.

As discussed in the aviation section above, medical-style checklists are not appropriate for use in a policing context because the situations are not controlled as they are in an operating room and many police incidents can neither be predicted, nor prevented simply by altering an officer's approach using a checklist. Additionally, Ontario police services cannot simply adopt the DECIDE decision making model from the field of aviation as the medical profession did because while it may guide thought processes for trained professionals, it does not provide sufficient detail for a training framework for police officers.

The DECIDE Decision Making Model provides a valuable framework for both aviation and medical professionals to organize decisions and actions during time-pressured situations. Although police officers must make occupationally-relevant decisions under similar pressures to those experienced in aviation and medicine, police have unique added pressures. For example, police officers do not perform in highly structured environments like a cockpit or operating room. Rather, they encounter highly dynamic situations in unpredictable environments (low light, interfering bystanders, risky situational characteristics, etc.).

Due to the unique qualities of policing that separate this occupation from medicine or aviation, checklists such as the DECIDE model are not recommended as a new Decision Model for Police Encounters in Ontario.

Research on decision making by Gary Klein and colleagues has investigated how first responders make decisions in high-pressure situations. Dr. Klein's extensive work sets the stage for understanding how officers learn accurate occupationally relevant decisions over time. Although his research model is not an in-field decision model, it is relevant to the understanding of how experts make decisions. Dr. Klein recommends significant, occupationally relevant, training occur from the stage of recruitment till retirement in order to build a 'repertoire of experience' that can be drawn on to make wise, occupationally relevant decisions.

RECOGNITION-PRIMED DECISION MAKING

For over 30 years, clinical psychologist Dr. Gary Klein has been interested in understanding how professionals make high-stakes decisions under difficult circumstances. Despite possessing expertise and demonstrating correct behavioural outcomes, the individuals making these decisions are often unable to articulate exactly how or why they arrived at their decisions. When asked how they made decisions during a critical incident, Klein found that fireground commanders didn't report 'making choices', considering alternatives, or assessing probabilities.

In Klein's first interview with a participant who had over 25 years of experience as a firefighter and captain, they reported that they had never made a single decision, but by following procedures he "just knew" what to do (Klein, 2018). Although experts tend to assume their 'implicit knowledge' is instinctual, it is actually based on a repertoire of experiences learned through occupationally relevant training. Inherent knowledge of police tools and procedures are not present at birth, as instinct is, they have to be learned, as in other professions. Klein has identified several key stages in the decision making process that are highly dependent on recognizing prior exposures, whether obtained through training or prior occupational practice.

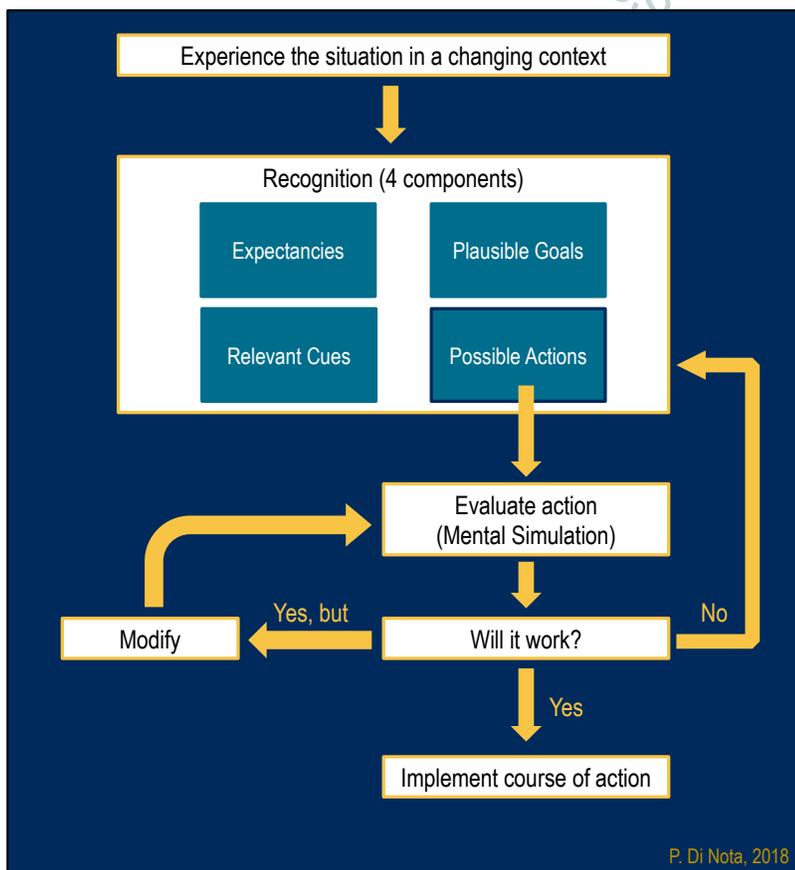


Figure 2. **Recognition-Primed Decision Model.** Modified from Keampf, Klein, Thordsen & Wolf (1996) with permission from G. Klein (June 2018).

To improve training and understanding of decision making in real world, high-stakes situations, Gary Klein developed the Recognition Primed Decision (RPD) Model. Initially based on decision making by military personnel and fireground commanders, use of the RPD Model has been successfully validated in a variety of occupational settings, including critical care nursing, paramedics, computer programmers, maintenance officers, and design engineers, all of whom make decisions under extreme time pressure. This evidence-based model explaining the decision making process has also been verified in real-world and training contexts, among individuals and teams, and with novice and expert decision makers.

“Proscriptive decision strategies are not designed for ill-defined tasks or time-pressured situations.” G. Klein, 2018

Proficient decision makers use their experience to recognize familiar cues in a situation (Figure 2 – RPD Model). This is similar to the continual assessment that police officers perform, using skills such as situational awareness to update their perceptions. When arriving at various ‘decision points’ (i.e., a juncture in a situation where a decision has to be made), the RPD Model stipulates that the decision maker selects what goals are feasible or not and considers the expected outcomes of subsequent actions that are typical to that situation (Keampf et al., 1996).

The RPD Model does not involve concurrent deliberation of multiple alternate options, but instead involves the mental simulation of the single chosen action. If any pitfalls are expected, the action plan is adjusted. If there are too many pitfalls, the action is rejected, and the next most typical action is considered. As a trade-off to limited time and information, the goal of the RPD Model is not to search for the best option as analytical strategies do, but to arrive at a fast decision that is most likely to work, known as ‘satisficing’ (Klein, 1989). Because there is no deliberation, decision makers often cannot explain their rationale, which they attribute to ‘intuition’. Delving deeper into the actual steps involved in recognition-based decision making, decision makers generate, monitor, and modify plans to meet situational demands. These perceptions and responsive actions are based on past experiences. Decision making becomes implicit through a “recognitional, pattern-matching process that flows from experience” (Klein, 1989).

The RPD Model best explains the decision making process when experienced personnel are working on time-pressured, contextually-dependent tasks in dynamic environments where ‘satisficing’ works better than careful deliberation. In the heat of the moment, police officers do not have the time to weigh multiple outcomes and would waste time considering the outcome of less-than-optimal actions. RPD emphasizes situational assessment and recognition that will prime a ‘first good option’ as a decision, while analytical methods emphasize selection among multiple options that meet coarse

criteria, and which need further evaluation and processing. This latter effort takes time and effort that officers often do not have in high-stakes, dynamic, and quickly unfolding situations. However, analytical decision making strategies are more likely to be used when available information is abstract and alphanumeric, rather than perceptual.

“Because there is no deliberation, decision makers often cannot explain their rationale, which they attribute to ‘intuition’. Decision making becomes implicit through a recognitional, pattern-matching process that flows from experience and training.” G. Klein, 2018

When acting as individuals, or in cohesive teams and partnerships, officers are not likely to experience ‘deadlocks’ in decision making. Team decision making involves more justification of choices and conflict resolution, so one would expect more decision analysis (Klein, 1989; 2018).

TRAINING RPD

Klein recommends that the RPD approach in and of itself should not be trained, since it is a description of what people already do in a variety of operational settings, given the body of knowledge they have learned. Instead, training is needed in building expertise and build of the body of knowledge they have to draw upon: recognizing situations, communicating situational assessment, and acquiring experience to conduct the mental simulation of options. This is also applicable to experts, who also face new situations.

Therefore, the RPD model doesn’t account for problem solving, but quickly recognizing patterns to prevent burnout and avoid painstaking deliberation (Klein, 1993; 2018). These experienced decision makers can find a satisfactory, rather than an optimal, course of action, on the first pass and evaluate it through mental simulation. *It is therefore crucial that*

decision makers are equipped with the experience of past exposures to a) inform fast and accurate choices in the heat of the moment, and b) reduce reliance on ‘crutches’ like prescriptive models rather than their own experience and ‘intuition’ (Klein, 2018). Based on this evidence of how decision making actually unfolds under the conditions that police officers typically face, it is important that policy makers use opportunities for advancing and updating training programs to shift away from a procedural mindset to methods that emphasize problem-solving (Klein, 2018).

In applying what can be learned from Klein’s extensive research and the restrictions about using models from occupations such as aviation and medicine, it is helpful to review factors that shape the unique exposures to be considered in a police decision model.

FREQUENCY-PRIMED DECISION MAKING

Gordon Graham, a 33-year veteran of California Law Enforcement, is well known for popularizing the approach that the majority of police training should focus on the very high risk, but low frequency events (e.g., active shooter). Of course, high-quality, focused training for rare events is necessary to prepare officers because the potential for them does exist (Blair, 2018). However, there is evidence that limiting training to focus on rare, high risk events does not adequately prepare officers for their most frequent encounters (e.g., communicating with individuals experiencing a mental health crisis) (Kremadine, 2013). Further, a narrowed focus on high risk but rare events places officers at risk of misperceiving events as more threatening or events involving life threat as more frequent than is the case (Harman, 2018; Makin, 2018).

Researchers examining how the brain processes risk and threat report that unrealistic representations of threat frequency inadvertently primes the belief that use of force encounters are more frequent than they are, and that force will be used more often than it is. This is true in regards to the public misperception of the frequency of use of force encounters in Canada, as is reinforced by some media depictions and reference to US statistics. A notable side effect of the chronic perception of threat is associated hypervigilance in officers that may result in errors or burnout (Harmon, 2018; McCarty & Skogan 2012).

In a review of 10.9 million police-public interactions between January 2012 and December 2015 for a 'large Canadian law enforcement agency' approximately **1 in every 1,210** calls involved a use of force incident (Baldwin et al., 2018). For the purpose of this project, Police Services in Ontario were asked to provide their use of force statistics from 2017. Twenty four of the 51 police services of varying size from across the province provided us with reports that indicated 6922 use of force incidents from 4,025,169 calls for service (approx. 1 in every 581, or 0.2%).

It is evident in Ontario, and across Canada, that use of force is indeed rare. The Ministry is working to standardize a more accurate reflection of use of force both on visual training materials via the current report, and through gathering and systematizing training competencies and standards across Ontario (Bennell et al., 2018).

POLICE DECISION MAKING: HUMAN FACTORS

Research reveals that human factors can have a significant impact on cognitive processing and decision making in general (Thayer 2006; 2009) and in policing specifically (Andersen et al., 2017, 2018; Martin, 2016). The new Decision Model for Police Encounters recognizes the scientific and practitioner evidence that human factors play a role in police decision making. Furthermore, research evidence supports training that addresses human factors and should be taught by police services in Ontario to fully prepare their officers to maintain best practices in field operations. To this end, Dr. Craig Bennell and his team of researchers at Carleton University conducted a scientific review of the academic literature, as well as interviews and training observation across Ontario Police Services in 2018. Dr. Bennell's findings reveal a number of core training competencies outlined for officers in Ontario. There are a number of competencies that will be reviewed in Dr. Bennell's report (e.g., Knowledge of police policies and legislation) but those that apply to the New Decision Model are briefly reviewed below. Specifically, human factors include the awareness and management of stress effects, decision making and problem-solving, perceptual and motor skills, emotion and behavioral regulation (including communication).

INTERNAL MONITORING

In the new 'Decision Model for Police Encounters' officers are monitoring their internal states to stay focused, apply trained competencies, be aware of limitations and abilities (e.g., size of the officer relative to the subject), and not be emotionally manipulated.

Key examples of competencies include...

HEALTH STATUS

Noting difficulties that limit performance (e.g., injury and illness).

Required occupational exposures increase health risks for police officers. Fatigue (e.g., long hours/shift work) is associated with perturbations in autonomic arousal that result in allostatic load (Thayer et al., 2006; 2009). Allostatic load is defined as 'wear and tear on the body' that, over time, is associated with poor physical health and reduced cognitive function (Clark et al., 2007; McEwen, 2002; Thayer, 2006; 2009; Violanti et al., 2007). The probability of decision making errors is elevated when an individual is fatigued or psychologically threatened, as evidenced by low and irregular cardiovascular arousal profiles (Schmitt, et al., 2013; Arpaia 2018; Thayer 2018). In this competency, officers are taught to recognize physical and mental health states that may impact their decision making

and physical performance. Police Service resources to help officers recognize and get help for workplace injury and illness is essential. For example, post-traumatic stress disorder is included in occupationally related workplace injury (Violanti, 2006). In a retrospective review of Canadian police officers, Boyer & Martin (2009) report just over 10% of officers monitored over time developed partial or full PTSD. Many Ontario police services recognize and are beginning or continuing programs to assist officers with mental and physical health awareness and treatment. The Decision Model reminds officers and their police service to monitor health status, not only in each encounter, but in training and support at the service.

AWARENESS OF STRESS

Within situational constraints, apply training to manage pressures (e.g., urgency, stress responses) that can affect decision making, performance, and memory.

From an evolutionary perspective, all animals, including humans, have been hardwired to instinctually monitor the environment for threats to safety. When the brain senses a

threat, a set of automatic, internal responses are initiated. The fight or flight response is an example of a true 'instinctual' response. When exposed to perceived threat, the nervous

system begins a cascade of responses that mobilize the body for survival. By exerting top-down control of visceromotor, neuroendocrine, and behavioral responses involved in high-stakes decision making, the prefrontal cortex projects sympathetic and parasympathetic signals to the heart, directly influencing heart rate and heart rate variability (HRV) (Saul, 1990). When threat is detected, sympathetic arousal increases vigilance and attention to relevant situational cues (Akinola & Mendes, 2012). Parasympathetic responses balance arousal and support enhanced cognitive functioning during stress (Laborde et al., 2014; Roos et al., 2017; Thayer et al., 2009). Research indicates however, that the suppression of parasympathetic influence during threat may result in reduced decision making skills and poor behavioral performance in both cognitive tasks (Thayer, 2009) and among police (Haller et al, 2014; Saus et. Al., 2006).

Indeed, in a series of studies conducted by Oudejans et al. (reviewed 2018) they compared police use of force decisions in high and low threat conditions, as well as before and after high-threat live scenario training. Together, these studies have shown more pre-training shooting errors, faster reaction times, reduced visual attention, and lower shot accuracy when threat is high. Lethal force errors were significantly reduced immediately following live scenario training, and at long-term retention intervals. Gains were accompanied by improvements in visual attention to task-relevant cues (Nieuwenhuys, Cañal-Bruland & Oudejans, 2012; Nieuwenhuys & Oudejans, 2010; 2011; Nieuwenhuys, Savelsbergh & Oudejans, 2012). Furthermore, stress-mapping physiological

responses among officers during active duty calls provides evidence that police commonly experience significant stress associated with potentially conflictual encounters or those that may require force (Baldwin et al., 2017; Andersen et al., 2016a; Anderson et al., 2002; Andersen et al., 2017).

The 'Awareness of Stress' competency is twofold: officers need to be aware of the influence of stress, and they need to apply training (provided by their police service), to avoid memory, decision making and performance errors, within situational constraints. Evidence indicates that individuals use different cognitive strategies in making decisions based on time, pressure, stress or habit. A term often used to explain automatic, non-deliberative thought is 'heuristics' - "simple mental strategies that people use to deal with our uncertain world" (Snook & Cullen, 2008, p.1). In comparison, purposeful, deliberate thought takes a bit longer (although it can happen quite rapidly) (Kahneman, 2011). Currently in Ontario, a focus has been on creating use of force heuristics in an attempt to improve officer safety. For example, the proscriptive nature of the current Ontario Use of Force Model (2004) favours use of force heuristics (e.g., serious bodily harm or death = lethal force; knife = gun). However, as science indicates (Thayer, 2006; 2009; 2018) safety seeking survival responses do not need to be programmed into heuristics; in humans, they already are. In fact, if an officer has met the competency outlined for "motor skills, especially as related to the utilization of use-of-force intervention options" (Bennell, 2018) the safety survival response will be automatic, and occupationally relevant. Rather, a training area in need of bolstering is developing critical

thinking skills and creating heuristics for non-force options, as are listed on the new Decision Model for Police Encounters. It is necessary to train officers in the domains that do not come automatically to individuals (e.g., communication, containment, police approach and positioning skills, stress management, etc).

The good news is that although the stress response system may impact performance of the competencies listed above, police performance in the field reflects their training. Police training can provide a variety of learning

opportunities (e.g., interactive, scenario based), that addresses internal physiology (e.g., officer stress responses), and reinforces officer skills and confidence in their own abilities.

Together, these types of training experiences increase the officer's repertoire of positive experiences, and has been shown to dramatically reduce use of force errors, and enhance decision making, health and safety. (Andersen et al., 2018; Andersen, 2017 report; Nieuwenhuys & Oudejans, 2010; 2011; Saus et al., 2014).

EMOTION REGULATION

Appropriate reactions to conflict and emotional provocations.

This section relates to officer professionalism despite potential conflicts or emotional provocations from the subject or others around them. As with any other skill, this should be specifically taught and practiced by officers throughout their careers (Bennell, 2018; de Snoo & Slagmolen, 2018; Krameddine, 2015).

Professionalism (e.g., showing respect and dignity towards individuals; allowing individuals to have a voice in the interaction, when appropriate; conveying trustworthy motives; exhibiting neutrality in decision making). This competency should also be reflected in other training modules as appropriate, such as approach and communication.

ANALYSIS OF CURRENT POLICE DECISION MAKING MODELS

In the process of designing a new Decision Model for Police Encounters in Ontario, a review of industry standard decision models was appropriate. The review is not a critique of the training that these models represent. Training critiques and standardization recommendations will follow from the Ministry in a separate project (MCSCS: <https://news.ontario.ca/mcscs/en/2018/04/ontario-transforming-police-response-and-training.html>). The following section includes critiques of Use of Force or Decision Models that were either recommended to be updated (i.e., the Ontario Use of Force Model, 2004) or that were suggested as replacements by Ombudsman Dubé (e.g., BC-CID; Las Vegas). The critiques below were gathered from interviews with our visual design expert (Peter Stoyko), a literature review of the field of visual design, scientific interviews and articles, and officer reports. For the purpose of this report, the models are divided into three categories based on their visual characteristics: *Circular models* containing multiple components within, such as colours, greyscale, bars, loops, and text, etc., (i.e., Ontario Use of Force Model; *Linear continuum models* (i.e., Las Vegas Model); and *Cycle models* containing shapes, such as boxes or circles, with arrows connecting boxes or surrounding the model (i.e., BC-CID Model). Although including all available police models (e.g., PERF, U.K., etc.) is beyond the scope of this project, the critiques below could be used by other organizations to test their model against the design principles of clarity, meaningfulness, and understandability and assist in the development of new models. As a reminder, these critiques are not a reflection of the quality of police training in Ontario or actual use of force statistics (which are low in Canada). These critiques are the analysis of the effectiveness of the visual graphic in communicating the message of how decisions are made during police encounters.

CIRCULAR MODELS: THE ONTARIO USE OF FORCE MODEL (2004)

The following is the publicly available visual of the Ontario Use of Force Model (2004).

“If you don’t present your information to people in a way they can see it, read it and explore it, there is no reason for them to trust you”

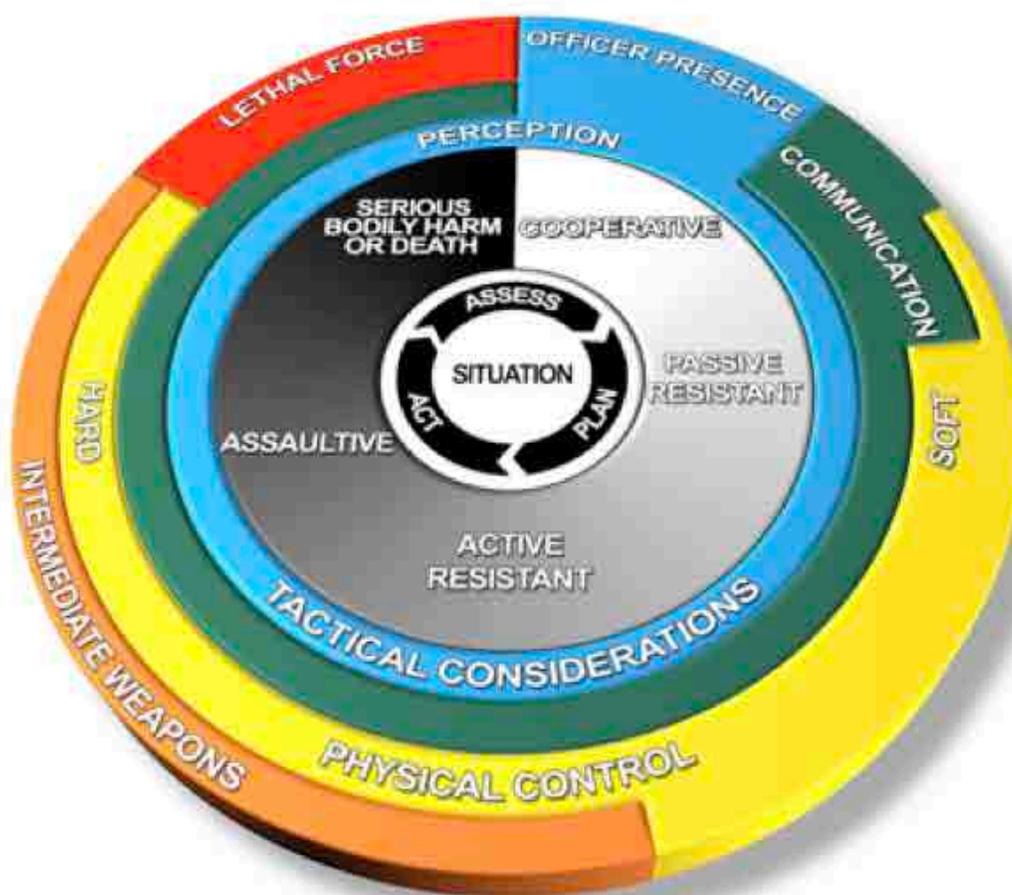
Cairo, 2013; p.13

The National Framework from which the current Ontario Use of Force, 2004 model was developed states “This model was developed to assist in training and as a reference when making decisions and explaining actions.” Although there are secondary documents that describe the terms on the model and how to interpret it, the definitions are not contained within the current visual. Secondary documentation on how police use the model to make decisions during encounters with the public and when and how to use force can only be found with further investigation. There are problems with relying on a secondary source document (Stoyko, 2018). Primarily, that the model is not interpretable without the secondary source document, which is most often separated from the model itself.

The following sections contain an in-depth analysis of the visual components of the Ontario Use of Force Model, 2004 including: the multiple chart types combined into a single graphic, signal to noise ratio, accessibility, abstract language, the abstraction trap and if/then decision processing.

DO NOT RE

Ontario Use of Force Model (2004)



The officer continuously assesses the situation and selects the most reasonable option relative to those circumstances as perceived at that point in time.

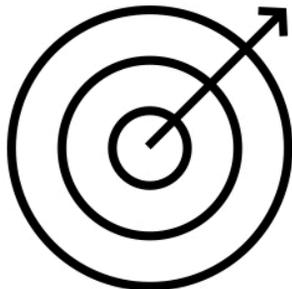
(Photo abstracted from Dubé, 2016)

2017

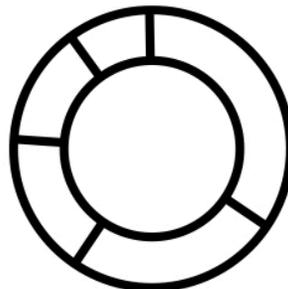
20

1. The Use of Multiple Chart Types In One Graphic

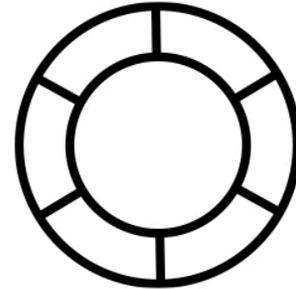
There are a large number of different chart types combined within the Ontario UOF Model (2004) see below. Although most of the chart types are familiar to people in Canada, we cannot forget the fact that people have to learn to read charts. Most chart types were invented about 150 years ago (e.g., pie chart, line chart, bar graph) by a man named William Playfair in the middle of the 1800's (Berinato, 2016, p.18-19). People do not inherently know how to interpret information on a chart. Each chart type was originally designed with a specific purpose, the ability to display a certain type of information. The existing Ontario UOF Model is built upon multiple chart types. The following figures are all layered upon one another in the current Ontario UOF Model. The combination of multiple chart types causes the conflation of information and is not recommended (Tufte 1983; 2006; Stoyko, 2018).



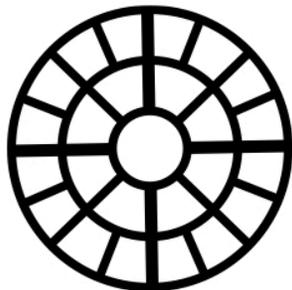
RING



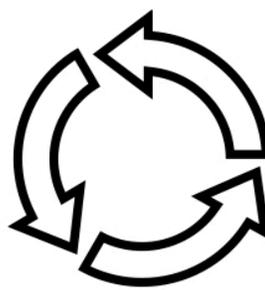
**DONUT
(PIE)**



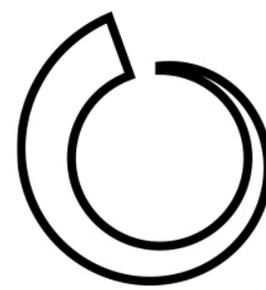
**DONUT
(TAXONOMY)**



CRYSTAL



CYCLE



**CONTINUUM
(CIRCULAR)**

(Stoyko, 2018)

A. The Ring Chart Has An In-and-Out Dimension

Central information is presented at the core and additional information radiates from the centre. One of the real challenges with the existing model is that there is no way to tell what the in-and-out dimension is. There is no explicit information telling the reader that the core (assess, plan, act, and situation) are happening as you progress through each separate ring from the centre to the outer. Although that information has been taught to police separately during training, it is not a clear concept to visually ascertain on the current graphic. The assumption that the public would 'just know' how to interpret the

graphic, or that circles or rings convey motion and dynamic processes is what is called a 'knowledge trap.' A knowledge trap is the assumption that information known to oneself is self-evident to others, despite its lack of it being explicit. For example, the assumption that circles or rings inherently convey that something is a dynamic process is a knowledge trap. The creators of the graphic, or those that have extensively used this graphic, have come to assume that the implicit characteristics (e.g., circles indicate dynamic motion) assigned to the model are readily 'known' or explicit to others.

B. Circle Charts (Pies and Donuts)

Circle charts are not recommended because they require the audience to attempt to assess the area within the circle to gain some meaning from the information presented. While circles may be pleasing to the eye to some individuals, interpreting the area of a circle and comparing information within the area of a circle is not something the brain is good at doing (Berinato, 2016, p.24; Cairo, 2013, p.40-41; Evergreen, 2017, p.17-18; Nussbaumer Knaflic, 2015, p.61). Similarly, pie and donut charts cut information into segments, creating calculations about the meaning of the separate angles and areas contained within. In this case, physical control is a much

longer bar than lethal force, but it is considerably thinner in parts, the meaning of this is unclear. The information contained within may be under or overestimated when attempting to interpret the information, resulting in misleading the reader (Cairo, 2013, p. 41). One example, in the case of the current Ontario UOF Model, is that the use of circles, donuts, multiple colour and cognitive challenges in judging frequency from information in such chart types, dramatically overestimates the role and usage of 'Lethal Force' in police encounters in Ontario (Peter Stoyko, 2018; J. Jenkinson expert interview in Andersen, 2017).

“Aside from the mental calculations that are challenged by area and angle, readers also have somewhat visceral reactions to data graphed in circles. In a study run by Ziemkiewicz and Kosara (2010) respondents reported that bubble [circle] charts seemed “unstable” and “uncontrolled.” They said that the donut chart looked like it might “roll away.” The study authors suggest respondents found the chart types “disconcerting.” Whether we like it or not, chart type can influence much more than the simple encoding of our data. It affects interpretation and credibility.” **Evergreen 2015**, p.17-18

Pie and donut charts are made excessively difficult to understand with the use of three-dimensional design (3D). As Evergreen (2018, p.14-15) reviews “three-dimensional data displays slow down interpretation and often lead to inaccurate comprehension.” The use of 3D design in the current Ontario UOF Model is discouraged as it distorts the information on the graphic (Stoyko, 2018). Three-dimensional effects make the portions at the top of the chart appear farther away

and smaller than they actually are while those at the bottom appear larger than they actually are. The same can be said about distortions to text that are in the lower portions of the 3D effect (Nussbaumer Knaflic, 2015, p.64; Stoyko, 2018). A circular graph with 3D rendering misrepresents each segment’s proportion to the whole (Wong, 2010, pg76). Removing 3D effects makes chart elements appear visually precise (Duarte, 2008, p. 76).

C. Crystal Charts

Crystal charts are hierarchies containing a main concept in the middle (e.g., officers are in a situation, assess, plan, act) that branches off into subcomponents (e.g., serious bodily harm or death) that branch off into other components (e.g., perception) and more subcomponents (e.g., lethal force). However, each section of the crystal chart is also supposed to refer

to other hierarchies (e.g., the communication, tactical considerations slice). Crystal charts are by their nature a very unfamiliar and confusing chart type. The existing model violates the assumptions of all the chart types used, resulting in excessive complexity (Stoyko, 2018).

D. Cycle Charts

The challenges inherent in the use of cycle charts are reviewed below in the review of the BC-CID model.

E. Continuums and Taxonomies

A greyscale visual continuum, which actually isn't a real chart type but is layered here, is superimposed into a centre ring in the Ontario Use of Force Model (Stoyko, 2018). One problematic issue with the continuum used here is that people are being asked to judge a taxonomy of unfamiliar concepts (cooperative behavior to serious bodily harm or death) superimposed on a grey-scale continuum indicating categories that typically would have finite definitions and boundaries. The unfamiliar concepts, placed on top of a shaded grid exponentially increases the cognitive load on the reader. As reviewed by Knaflic, (2015) although all graphics will place some cognitive load on the consumer's brain, humans have a finite amount of processing power. Visual designers must consider the cognitive load being placed on the reader and reduce chart flourishes that distract from essential information (Tufte, 2006, p. 152).

Furthermore, using chart segments clockwise from smallest to largest (or less to more; cooperative to serious bodily harm or death) gives the impression that the very last slice is the most frequent and important, and is generally discouraged (Wong, 2010, p.74). Applying this analysis to the Ontario UOF Model, "serious bodily harm or death" is in the last quadrant of the inner circle of greyscale, indicating that it is most frequently occurring type of encounter. On this continuum, death is getting the most emphasis with cooperation getting the least emphasis. This graphic is in direct support of the Ombudsman's critique that UOF options are being highlighted rather than de-escalation options. Additional challenges of using continuums in communicating messages are described below in the critique of the Las Vegas Model and in the Seattle P.D. Case Study below.

Each one of the above listed chart types has a set of rules that allow people to interpret the information inside. When chart types are mixed, the rules of interpretability are violated and the reader does not know which one applies." (Stoyko, 2018). The overwhelming amount design features and chart types used in the current Ontario UOF Model leads to another violation of clarity in the principles of good design: the signal to noise ratio (Tufte, 1983; 2006).

2. Signal to Noise Ratio

The signal is the information one is trying to communicate, while the noise is unnecessary visual information. Noise can hide the information we want to communicate from being understood (Nussbaumer Knaflic, 2015, p.72; Duarte, 2010 p.170). Poor signal to noise ratio has been termed as 'chartjunk' by one of the founders of the field of visual design, Edward Tufte. In the Ontario UOF Model, the use of 3D, shadow (on the bottom of the image), pixelated bitmap quality graphics, over use of colours and shapes, are but some of the components that are considered to be noise, meaning that they do not aid in the understanding of the model (Stoyko, 2018). A common mistake on the part of model designers is to add decoration in the belief that it makes the model appear more advanced, complex, or artistic. This belief is then used to defend, and even promote the use of these unnecessary components as essential the message they wish to convey (Tufte, 1983, p.107-122).

“Graphics do not become attractive and interesting through the addition of ornamental hatching and false perspectives to a few bars... no information, no sense of discovery, no wonder, no substance is generated by chartjunk.”

Tufte, 1983, p.121.

In fact, chartjunk noise may do more damage than simply confuse someone.

As Tufte warns...

“Audience members at a presentation featuring chartjunk rather than evidence should ask themselves: Is this the quality of analysis that we are relying on to understand a problem or to make a decision? Why should we trust this presenter? Does the presenter think we're fools?” **Tufte, 2006**, p. 152

Tufte's scientific review of the impact of visual graphic chartjunk on reader's attitudes coincides with the public sentiment reported in Ombudsman Dubé's report and recent inquests. Some of the public mistrusts police, not only on the basis of false media reports and the conflation of US statistics with Canadian statistics on use of force, but also on the fact that the materials presented to the public regarding use of force misrepresent the frequency of force, and also overwhelm the reader in complexity. These factors together likely result in the over reliance on what is publicly available and easy to understand (e.g., US statistics, erroneous media representations).

It is not only the actual graphical flourishes that dissuade consumers from attempting to understand a graphic, it is the *perceived difficulty* of attempting to learn the information, that can dissuade information consumers (Nussbaumer Knaflic, 2015, p.72-73). This information has direct implications for creating a model that the public can read, and a simple graphic that is visually understandable at a basic level that encourages consumers [and police] to read on, explore the information, learn new information and even re-educate themselves to confront possible myths that they hold (Nussbaumer Knaflic, 2015, p.73). An entire field of psychological research exists on the impact of Gestalt principles of visual perception, including concepts such as proximity of variables, their similarity, enclosure, continuity, connection, visual order and alignment (Cairo, 2013, p.114). These principles can be used to communicate messages effectively without needing to resort to chartjunk. There is significant research evidence that using components on visual graphics that are extraneous or don't fit in with the overall design can leave the consumer feeling unsettled (Duarte, 2008, p.122). It is recommended to choose a theme and stick to that theme rather than combining multiple chart types. Consistency is professional and creates understanding (Duarte, 2008, p.114).

3. Accessibility

As Duarte reviews (2008), a fact to always consider in graphic design is that about 1 of 12 people have a colour vision deficiency. Thus, placing meaning in the use of colours will disallow a portion of the population to understand the graphic due to visual disability (Duarte, 2008, p. 136).

From Stoyko, 2018:

The Ontario UOF Model relies heavily on slight, indented lines and colours to communicate differences. The distinctness of the colours and bars sometimes blur, sending a confusing message of which is the information to be relied upon to make decisions about the information presented. Another problem is that a rainbow color palette is present, which uses some very basic colors, red, green, blue, with very similar tone and very saturated in colours.

The problem with using this kind of rainbow, although it may be a default on Microsoft Office, is that it gives certain emphasis to colours while also deemphasizing other colours. That's a problem because the colour assignment seems arbitrary and do not coincide with the things you are trying to emphasize. The really hot colors are emphasized, so the red emphasizes lethal force, while tactical considerations and communication are highly de-emphasized because they are on the cooler end of the colour spectrum. Highlighting lethal force was likely not necessarily the intention of the designers

of this model given that it is rare Canada (Baldwin et al., 2018). Yet lethal force is the most prominent feature of the Ontario Use of Force Model, 2004 graphic.

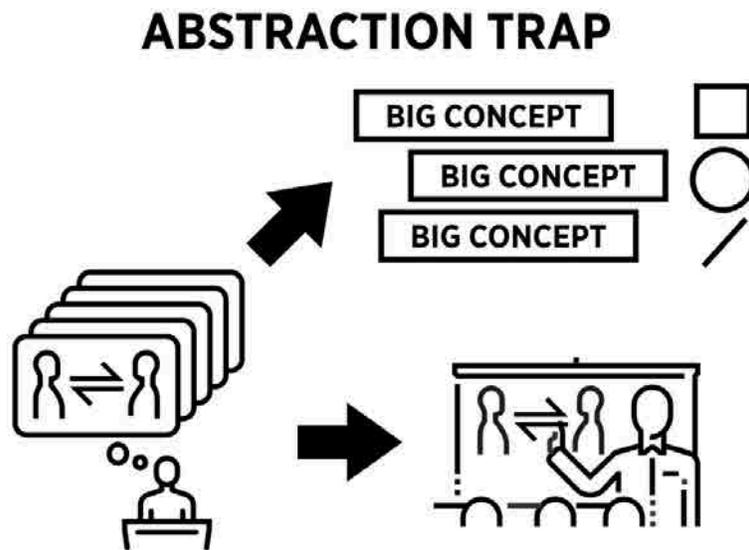
4. Abstract Language & The Use of ‘Jargon’

The current Ontario Use of Force, 2004 model violates many of the principle of plain language necessary for clear and meaningful visual communication.

The following are some examples of these violations:

- Noun-ifying verbs, verb-ifying nouns and adjective-izing action words which can cause confusion by obscuring the specific mechanisms at play or conveying unrealistic connotations (e.g., the term “assaultive behaviour” makes it unclear what specific activity is generating a sense of threat);
- The use of euphemism, loaded terms, vagueness, and idioms, which are all forms of undue political evasion intended to obscure reality and avoid accountability (e.g., “soft control”) or are turns of phrase that are not easily interpreted by those who speak English as a second language (“active resistant”) (Stoyko, 2018).
- Unclarified jargon, or words that are of a technical nature that are not defined, leaving the audience unclear as to meaning (e.g., “tactical considerations, passive resistant”).
- Unexplained complex concepts, or umbrella terms that summarize two or more other complicated concepts, which are problematic because of lack of specificity (e.g., “officer presence, perception, intermediate weapons”).

5. The Abstraction Trap



The use of overly broad categories without definitions are at risk of being interpreted differently across police services and the public (especially likely to happen without the use of the secondary source document). For example, large category terms like “communication” may mean different things to different officers, and to the public.

As Stoyko, 2018 reviews...

The individuals who developed the model may have one conceptual image associated with the large category words, but others who use, or be exposed to, the model may differ, simply because the categories do not map directly onto mental images. The concepts have become abstractions that are far removed from real-world examples they are intended to convey. For instance, take a moment to think of two people communicating. In your mind, did you see two figures or did you see two boxes with an arrow connecting them labeled ‘communication?’ Likely, you ‘saw’ two figures. This example is in line with scientific evidence that humans do not think in terms of circles, squares and arrows. (Stoyko, 2018)

“Use of circles (and directional arrows or what is thought to convey direction via multiple circles within a circle or ‘cycle’), squares or triangles to represent concepts is not wise because the human brain has difficulty comparing angles, directions, and curvatures. People will misunderstand the relative frequency or importance of each of your variables” (Cairo, 2013 121).

The danger is that when shapes and arrows are used to represent concepts, the meaning is lost in the abstraction because people are not able to pull up the images in their minds. Further complicating this is the addition of abstractions on top of abstractions, such as is done in the Ontario Use of Force Model. For example, individuals may have difficulty interpreting or remembering the UOF model because of the level of abstractions used to describe an officer’s decision (e.g., an officer is present at a situation, applies tactical considerations based on their perception, uses communication, then applies soft physical control because the subject was passively resistant).

Humans have limits on working memory, and scientific evidence demonstrates that the use of visual imagery reduces cognitive load, allowing individuals to learn and remember more, and understand more complex processes (Evergreen, 2018, p.18-23). The lack of visual images in the current Ontario UOF model, and the number of abstractions necessary for understanding the complexity of police decision making based on the model’s many non-explicit assumptions may lead to misinterpretation and errors (Stoyko, 2018).

6. If-Then Contingencies

In addition to problematic visual characteristics of the Ontario Use of Force Model (2004), there have been risks of potential officer misinterpretation and subsequent erroneous behavior when using the current Ontario UOF Model, as identified by the scientific review and subject matter experts in the focus groups (Andersen et al., 2017; supplementary materials). A central problem is that the Ontario UOF Model is a **proscriptive** decision model given the nature of its design. To explain a ‘proscriptive’ model – let’s run a case while looking at the current Ontario UOF Model. If an officer using the current Ontario UOF model were to attend a call (officer presence), perceive that the subject was holding a knife (perception), communicate ‘drop the knife’

(communication) and then make the tactical decision (tactical considerations) of ‘Serious bodily harm or death’ they would like use lethal force, given it is the behavioural response most closely associated with the set of situational characteristics and directly next to ‘serious bodily harm or death’ in location on the current model. This is an ‘if-then contingency’. A proscriptive decision model does not stimulate creative or dynamic thought about approaching calls from a variety of resolution options. And there is no proscriptive decision model that can tell an officer what to do in every encounter because there is no stepwise procedure or single recipe to follow for all police calls, they are dynamic and situation dependent.

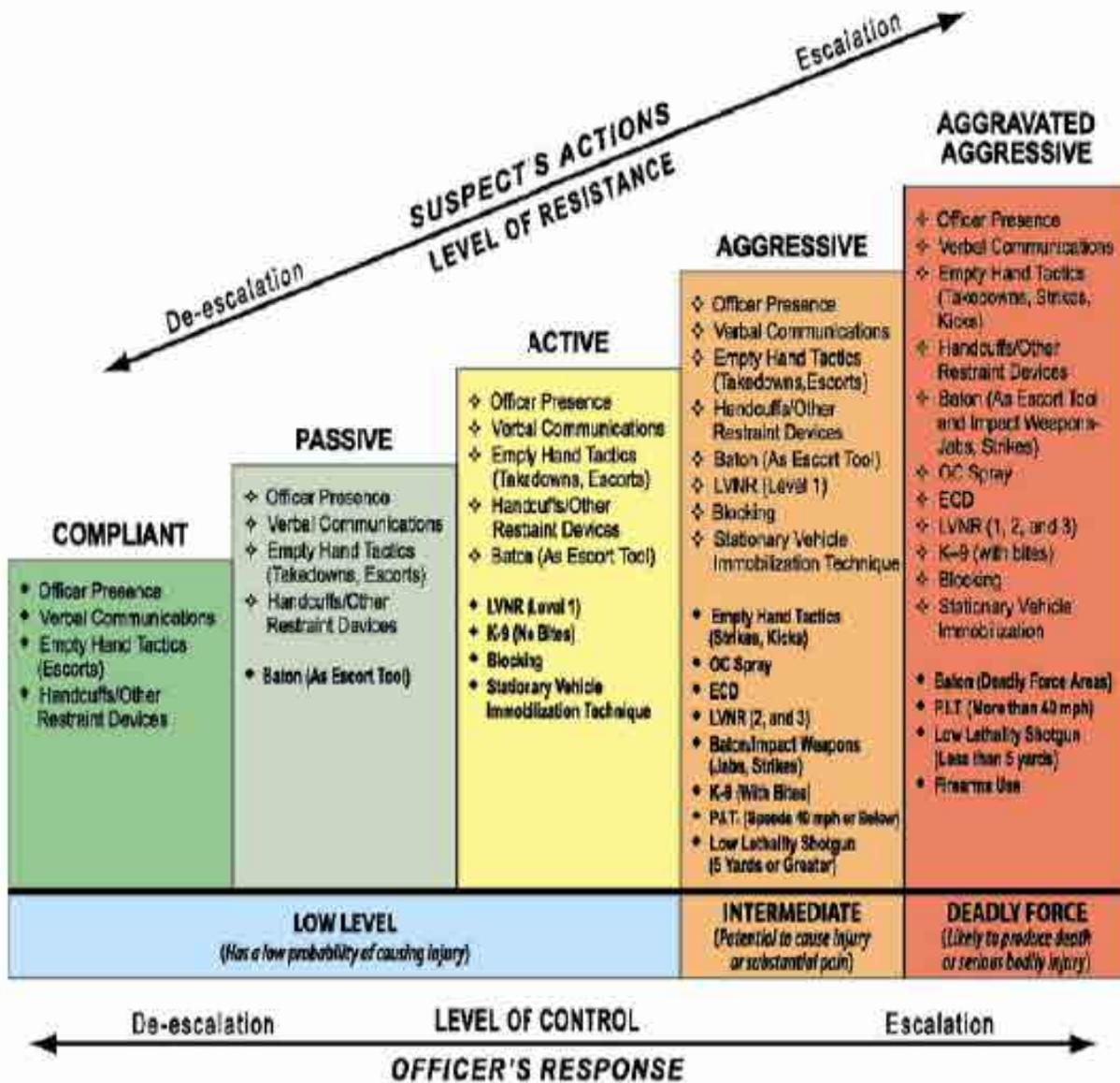
LINEAR CONTINUUM: LAS VEGAS MODEL

The use of continuums in police models is widely discouraged based on research, expert interviews and police expertise (Ovens, 2018; Bartel, 2018; Papenfuchs, 2018; focus groups 2018). Researchers and practitioners alike report that linear models, i.e., continuums, have failed to serve the needs of the officers during time-pressured encounters. The officer is not able to follow the step-wise processes outlined in linear models because the brain does not process in a linear fashion (Keampf, 1996; Klein, 1989; La Doux & Pine, 2016; Blair, 2018).

“Most use-of-force continua indicate a reflective approach to a menu of force options with the goal of selecting the least intrusive option. The typical force continuum begins with the presence of the officer or with verbal commands and then lists use-of-force options in order of increasing intrusiveness, ending with deadly force. Usually, accompanying language suggests that officers should consider which force option is appropriate and includes the suggestion of “escalating” their response to a subject with a view toward “de-escalating” the threat posed by the subject. The continuum also usually contains language that suggests officers consider progressing up or down the force continuum. While virtually every force continuum provides that such progressing through force options may not be appropriate in all use-of-force situations, the seed of hesitation is inescapably planted. The word continuum implies a sequential approach.”

Excerpt from Thomas D. Petrowski, 2002.

Each bolded force option within the Levels of Control represents the highest levels of force options available; however, each other force option should be considered to help de-escalate the situation.



(Photo abstracted from Dubé, 2016)

As reviewed by Stoyko (2018) the Las Vegas Model (above) is a visual metaphor of stairs. Stairs are designed to connote moving from one state to another. In this case, the model and the colours lead the eye in the process of escalation. Given the colours and mental image of an escalator, or stairs, the overwhelming interpretation is that escalation is an inevitable outcome. The model designers have attempted to counter that inevitability by adding a double-sided arrow that goes down as well as up, and added the words de-escalation. There are many elements of confusing information present. The axis left to right is de-escalation to escalation but there are two versions of that, one on the top and one on the bottom. There is a juxtaposition in that moving up is subject behavior and moving down is officer behavior, which is not what the stairs are implying (a moving upwards direction of escalation). Labeling the same axis twice is by nature confusing, and not scientifically supported. As a rule, **'Avoid secondary y-axes'** (Knaflic, 2015, p.61).

**“The knowledge trap is the assumption that information known to oneself is self-evident to others, despite its lack of it being explicit.”
Stoyko, 2018**

In the body of the model, there is problematic use of bullet points and acronyms. As reviewed above, the use of bullets, multiple colours and symbols that do not add to the interpretation of the model become 'chartjunk' unnecessarily raising the noise to signal ratio (Tufte, 2006). Similar to the above review, the use of broad categories, appearing multiple times (e.g., officer presence) is unnecessary.

Referring to Peter Stoyko, 2018: The use of “zombie words” are those that have so many possible meanings that they could mean practically anything, and thus fail to work as a conveyor of meaning (e.g., using terms like “resources” to refer to forms of assistance, such as ambulance services). In this case, the word ‘other’ is a garbage term, adding no additional clarification. The use of slashes is not a good idea. One concept/another concept is broad and vague. Here, they have added one broad vague category and/ another broad category and it becomes meaningless. Words brought together by slashes are an evasion of meaning. Think about what is really needed to express a visual image and use that word, or better, use the visual image. If a new word is needed, or the use of a compound word is necessary then explain the concept briefly. Be explicit about the information you wish to convey. Zombie and garbage words are a lack of commitment to a definition of a concept. When you add multiple slashes, you make people juggle too many concepts in their minds at one time and the relationship between concepts is not defined or lost. It becomes a word salad. The primary causes of word salads are bullets and slashes, becoming amalgams of words, requiring the reader to piece them together and imbue their own meaning. This just makes the relationships even more ambiguous and

opens the model up for misunderstanding. This is another example of the knowledge trap reviewed above.

“The force continuum can be superficially very attractive, particularly when provided in the form of a euphonic acronym. This purports to make it easy to remember the steps of the continuum—which is exactly what it does—resulting in guaranteed hesitation in the face of a threat. The force continuum is most problematic when it is necessary for an officer to apply deadly force or a higher non-deadly force option. An officer trained to progress through a force option menu inevitably will hesitate too long to eliminate all less intrusive force options.”

Thomas D. Petrowski

FBI Law Enforcement Bulletin 2002. Vol. 71, no. 10.

The largest criticism with the Las Vegas model is with the bullets and the use of acronyms (level 1, 2, 3). The acronyms are not fully articulated thoughts. That violates the *principle of portability*. When incomplete thoughts and acronyms are used, two things happen. First, someone else has to step people through the chart to explain what they are, and second, people have to search down another source document that defines the acronyms or incomplete thoughts and that may take a huge effort. That source document has been separated from the Las Vegas model and therefore it cannot stand alone. This problem is similar to that of the Ontario Use of Force Model, 2004 (Stoyko, 2018).

CYCLE MODELS: BC-CID MODEL

“Simplicity isn’t just about reduction. It can (and should) also be about augmentation. It consists of removing what isn’t relevant from our models but also of bringing in those elements that are essential to making those models truer.”

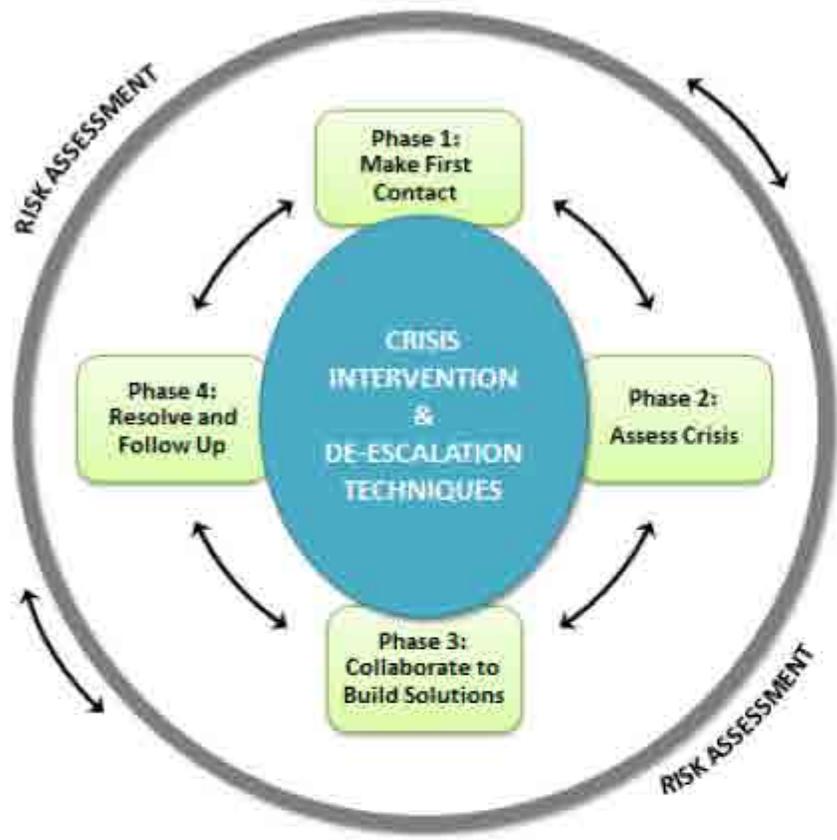
Cario, 2016, p.97

The BC-CID model was recommended by Ombudsman Dubé for clarity and understandability. The model appears clear at first because of its simplicity. The model is simple only in the sense that there is little information presented. This simplicity creates a false sense of understandability. It is a simplistic, not just ‘simple’ model (Stoyko, 2018).

There is a danger in sacrificing meaningfulness for simplicity (Cairo, 2013). As reviewed by Stoyko (2018) if you look at the BC-CID model, what does it really tell us about police involvement in crisis intervention? How is this model specific to police in any way? First off, the title is both on the left side of the model and repeated in the middle. The redundancy means a lost opportunity to provide meaningful information in the centre. In Eric Spiekermann’s book ‘Stop stealing sheep and understand how typography works’ (2014) he reviews the frustration that is created by utilizing graphics requiring uncomfortable movements by your reader. There is specialized typography that does not force people to turn their heads. To ignore appropriate typography is poor practice (Spiekermann, 2014).

DO NOT RE

CRISIS INTERVENTION & DE-ESCALATION MODEL



(Photo abstracted from Dubé, 2016)

Using technocratic broad language (e.g., build solutions) does not help the public, or even police understand what actions might an officer actually do to address the crisis. Further, these terms may be interpreted very differently by police services or even between officers within the same service, and the public. Using terms such as ‘Collaborate and build solutions’ is an abstraction of a solution without committing to any substantive instruction. Solutionism is an ideology that all problems can be boiled down into one quick fix (Shi, 2014).

A test that can be done to see if a model is contributing meaningful, occupationally relevant information: Apply the model to other occupations. For example - could financial planners use the BC-CID model in its current form? Certainly - Financial planners make first contact with their clients, then they assess the client’s financial crises, then they collaborate to build solutions to address their debt or financial crises, and then they resolve the issue and follow up. If you extend this line of thinking, the vague wording on the BC-CID model could be applied in the same way to the Coast Guard, or even a lawn care company and achieve the same interpretation. The model does not contribute occupationally relevant instruction for the police or the public.

Although the BC-CID model is part of a larger training, the visual model in itself brings no additional understanding to the way in which a police actually responds to a person in crisis. Furthermore, the BC-CID model, and those similar to it, require extensive secondary ‘source documents’ to interpret them, defeating the purpose of a stand-alone visual model. Another concern about the BC-CID Model, and those similar to it, is the use of endless cycles and unlabeled arrows. The public has long been warned about the overuse of unending and unlabeled circles and arrows in visual models. As quoted from Morse’s critique of “crap circles” in the *Harvard Business Review*, they are “Pernicious circles-and-arrows diagrams infest PowerPoint and other presentations, purporting to clarify an idea while actually obscuring it” *Harvard Business Review* (2013).

Of note, just because a model contains poorly placed visuals, does not automatically mean that the information taught in the program, or that the attempted message conveyed by the organization responsible, is not good. The quality of any program must be evaluated for content on its own merits. The current analysis concludes that the visual representation of the BC-CID model does not convey clear, meaningful messages about occupationally relevant training for police officers in Ontario (Stoyko, 2018).

Policing is a complex occupation and it requires graphics that display that complexity without being cluttered, overwhelming or confusing.

“Clunky boxes, cartoony arrows, amateur typography, and colourful chartjunk degrade diagrams. Designs for analytical diagrams should be clear, efficient, undecorated, maplike; the content should be intense, explanatory, evidential, maplike.” **Tufte, 2006**, p.79

ALTERNATE APPROACHES TO POLICE DECISION MAKING TOOLS

In Amsterdam, the Dutch Police Academy trains their officers to make decisions using a 6-step guide called “The Blue Core” (2008). The Blue Core is designed to give officers a framework for “thinking and acting in a professional, police-minded way in conflict and danger situations, before these escalate” (The Blue Core, 2008). This guide does not include a visual representation, rather it is a handbook outlining and explaining the processes that a Dutch police officer should internalize and go through instinctually while out on the road. The steps include: Observe and Assess the situation, set a goal you want to reach, what legal framework are you bound by, what strategic and tactical measures are needed to achieve the desired outcome, the dynamic response and self-evaluation of the outcomes of your decisions. With training and practice, an officer is to naturally progress through these steps and access the relevant parts of their training for the situation at hand.

SECOND-LEVEL DECISION TOOLS

A number of law enforcement organizations use three-part acronyms or stepped-tools to assist officers in choosing a path of action during an encounter. These steps or acronyms are words that must be attached to an occupationally relevant body of knowledge about what police decisions entail in order to apply the tool. For example:

1. ALERRT, Texas

At the Advanced Law Enforcement Rapid Response Training (ALERRT) center at Texas State University, Police officers and other law enforcement professionals are given advanced training on how to deal with one of the most time-pressured situations an officer may encounter, an active shooter. Research conducted by ALERRT scientists and practitioners demonstrated that when many first responders are attempting to work together, and they all have agency specific best practices (e.g., paramedics, tactical teams, frontline officers), applying a simple 3 step tool assists trainees to make the most relevant decision based on their prior knowledge.

ALERRT’s 3-step approach: Stop the Killing, Stop the Dying and Rapid Evacuation of the casualties (J.P. Blair Interview, 2018). This simplified approach, combined with Colonel John Boyd’s OODA loop provide a framework for an officer to follow while accessing their prior law enforcement training during high stress situations in which groups must work together to stop the threat. Blair (2018) reinforced the importance of detailed trainer feedback during the de-brief period in order to

enhance the critical thinking skills of officers as they add to their repertoire of experiences. This program is unique in that it trains a variety of first responders to work together during an extreme critical incident. Given the individuals have not trained together in the same manner as a tactical response team, the simplified 3-step approach stimulates officers to make decisions based on their prior body of knowledge in how to stop the killing, dying and evacuation strategies. *This approach does not substitute as a police decision model because it is very specific to one specific type of critical incident and relies on fact that officer's draw from occupationally relevant decision options in order to perform the three-step test.*

2. Ontario

In Ontario, a number of police services use three or 4-step tests to assist officers in remembering the repertoire of trained decisions during a stressful encounter. For example, the 'Isolate, Contain, Evacuate and Negotiate (ICEN) Model' is being used by some police agencies in Ontario as an acronym for first responder to think about when they arrive at crisis situation. When following the ICEN model, the person in crisis is initially isolated so that they are not a threat to others. Using available resources, the scene is contained, both to make sure that the person in crisis does not leave their isolation, and no other person enters the area. Any civilians or bystanders are then evacuated from the danger area. Once the subject and area are controlled, then negotiation and de-escalation can begin between officers and the person in crisis. Traditionally taught only to Tactical Teams and Incident Command as an operational procedure, ICEN is now being used within some frontline training and support courses. *The acronym may assist officers in remembering key points of their prior training in occupationally relevant crisis intervention but it does not cover the broad range that the Decision Model for Police Encounters covers, specifically leaving out communication, use of force, internal and external monitoring considerations and the reminder regarding the preservation and protection of life, among other key training points that are missing.*

In a similar fashion, the Ontario Association for Chiefs of Police (OACP) developed Incidence Response Training. In 2014, the OACP defined Incident Response in a policing context as "such events as major events and disasters, public order, search, and barricaded persons/hostage rescue, and includes high risk warrants and incidents involving explosive material" (OACP Resolution 2016-04). These high-risk events necessitate the organization and coordination of incident commanders, frontline and other first responder groups. In this context, incident is an appropriate word - it connotes the need for major, coordinated action to address a serious threat or disaster. However, many decisions and actions that frontline police officers make every day (e.g., give instructions, assist persons, direct actions) do not constitute major disasters or threats, necessitating a primary decision model. Similar to ALERRT, listed above, the OACP has developed a 3-step test 'Action Criteria (NRA) Decision Making Model' with the acronym NRA (Necessary. Risk Effective. Acceptable.) The NRA acronym was developed to assist officers in applying their prior, occupationally relevant,

knowledge of policing to select and rank the most effective decision before they act. This model is intended to help an officer before and during a call by simplifying their thought processes. It is also intended to be used during articulation and writing their notes after the call is completed but, as with other 3- or 6-step processes, it must be supported by the entire body of knowledge of officer training. Unfortunately, the NRA model shares its' acronym with a very well-known and controversial organization, the National Rifle Association, which was originally formed in 1871. The overlapping acronym may cause confusion or unintended associations.

Three to 4-step models do not inherently conflict with the new Decision Model for Police Encounters. However, it is important to keep in mind that these smaller, acronym-based models are **second-level** decision tools, applied as a sorting method to rank all possible available decisions and choose the most appropriate given the situational characteristics at the time of the event. The proposed model (Decision Model for Police Encounters) is a first-level, or primary, decision model covering the range of occupationally relevant decisions available for police in Ontario. Among other functions it highlights de-escalation and nonuse of force options as foundational for resolution as the situation permits and de-emphasizes use of force.

IS A MODEL NECESSARY? A CASE EXAMPLE: SEATTLE POLICE DEPARTMENT, USA

The Seattle Police Department stopped using any visual representation of a use of force continuum altogether about 15 years ago based on an article published in the FBI Law Enforcement Bulletin. The article advised against linear, continuum models (see Petrowski 2002, excerpts in the linear continuum section). Instead of a visual use of force model, the Seattle Police Department then used only established case law in order to promote better understanding of legal authorities and decision making skills in their police officers.

There's a disconnect between analytic models and the dynamic nature of the real world. The biggest disconnect is that trainers don't base their training off of the analytical models they profess to teach. If you don't build scenarios and skills training outside of the classroom it won't make the connections in the officers' brain.

T. Ovens, 2018

Did a 'no model' model approach work?

Seattle found that when this case law-based training approach was implemented, it too unearthed some significant flaws for training and retention. Specifically, basing decisions in case law was a very analytical approach that not only failed to be internalized or fully understood by officers, but did not provide any guidance for officers on how to use a new weapon or tool as it has not been established in the case law e.g. the introduction of the Conducted Energy Weapon (Ovens, 2018). Since not having a visual model created confusion in officers, and difficulty in explaining complex techniques and when to

use them by trainers, the Seattle PD has moved back to a schema-based approach with a *Tell-Show-Do Model* of teaching (Ovens, 2018).

The *Tell-Show-Do Model* is aimed at growing an officer's repertoire of experiences while teaching variations on specific techniques or tactics. The instructor tells the students what they are going to learn, using photos and visual aids. Then shows the students what that technique looks like in a live environment (a mat room). Finally, the student does the technique in an attempt to ingrain both the

muscle memory and the reason for using that technique in their minds. To supplement this, they have re-implemented the use the Continuum of Compliance and Resistance to structure their defensive tactics training modules, outline officer actions, and provide details of types of force and circumstances to be considered in decision making (similar to the Las Vegas Model reviewed in this report).

Removing a visual or graphical representation of the training materials (the force continuum) altogether and basing lesson plans strictly on case law resulted in several issues for both officers and for police trainers in the Seattle Police Department. New officers had a

difficult time retaining the information and how it fits in the context of real life encounters without the aid of a visual framework in which to organize their thoughts. Police trainers also quickly found that with the introduction of a new weapon, Conductive Energy Weapon (CEW), there was no established case law in which to base their lesson plans and no solid understanding of where it would fit in with other use of force training at the time.

Ultimately, a modified visual framework was combined with teaching case law and hands-on practice in a variety of situations resulting in a modern, hybridized version of police training that is geared towards training on-the-job critical thinking.

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